

PART I

**OVERVIEW OF THE ALLOWANCE PROGRAM IN
THE CLEAN AIR ACT AMENDMENTS OF 1990**

CHAPTER 1

SUMMARY AND OVERVIEW OF THE ALLOWANCE PROGRAM IN THE CLEAN AIR ACT AMENDMENTS OF 1990

Title IV of the Clean Air Act Amendments of 1990 (CAAA) created a new regulatory instrument, an emission allowance or credit, that electric power producers (utilities and others) will be required to possess and expend to emit sulfur dioxide (SO₂) into the atmosphere. The emission allowance system created by the CAAA will be grafted onto an already complex system of state and federal electric utility regulation. How state public utility commissions and the Federal Energy Regulatory Commission (FERC) respond to utility compliance actions, including the regulatory treatment of allowances, will greatly affect the decisions that electric utilities under their jurisdiction make to comply with the CAAA and, therefore, the cost of compliance to ratepayers.

Synopsis of Title IV of the Clean Air Act Amendments of 1990

Title IV of the CAAA, "Acid Deposition Control," is intended by the year 2000 to reduce annual sulfur dioxide (SO₂) emissions by 10 million tons below the 1980 level, and nitrogen oxides (NO_x) emissions by 2 million tons below the 1980 level. The intent is to limit emissions of SO₂ to 8.95 million tons. The title also includes provisions to encourage the use of energy conservation, renewable energy (biomass, solar, geothermal, and wind), clean coal alternative technologies, and other pollution control to reduce emissions and "other adverse impacts of energy production and use" (§401(b)).

The reduction in SO₂ will be achieved in two phases. Phase I will require units specifically identified in Table A in Title IV of the CAAA to reduce emissions beginning in 1995. Phase I affected units are units that have emissions greater than 2.5 pounds of SO₂/mmBtu and have a generating capacity greater than 100 megawatts. Phase II affected units are essentially all existing fossil-fueled boilers (including phase I units) that

serve an electric generator with a capacity greater than 25 megawatts and all new units. Phase II units will be required to comply by January of 2000.

Title IV stipulates creating a market-based system for trading emission allowances. The allowances will permit the holder to emit one ton of SO₂ that can be either used in the designated year or "banked" (saved) for future use. Existing "affected units" are units that were in operation before the CAAA passed. These units will receive an allocation of allowances based on the actual fossil fuel consumption and unit emissions or the cap specified by the CAAA depending on which is lower. Certain new units specified in the CAAA will also receive an allocation of allowances. New units that begin operation after December 31, 1995 will not be allocated allowances, but will need to acquire allowances to cover their emissions beginning in January 2000. The allowances will be issued and tracked by the U.S. Environmental Protection Agency (EPA).

All affected units will be required to hold sufficient allowances to cover their emissions. Each allowance will be identified as being issued for a specific year. While existing units will be issued allowances only up to the emission requirement (excluding "bonus" allowances), units may exceed this limit if the owner or operator acquires additional allowances. However, all sources are still subject to the National Ambient Air Quality Standard limits (as stipulated in Title I of the CAAA), notwithstanding the number of excess allowances held.

In general, allowance trading is intended to allow sources with relatively low emission control costs to sell their allowances to sources with relatively higher control costs. High-cost sources would buy allowances since the cost of control is more than the price they expect to pay for allowances. In this way the price of allowances is based on the cost of controlling emissions. The price reflects the higher control costs that some utilities and other generators will encounter. Most new generating units (except those with special provisions under the law) will have to purchase allowances from existing sources either directly or through an intermediary. In theory, sources will tend to invest in control options until the marginal cost of emission control equals the expected value of the emission allowances. Overall compliance costs are expected to be lower than command-and-control environmental regulation because of the savings made possible from allowance trading.

Industrial and other sources not covered by Title IV may become affected sources by

electing to "opt in" to the allowance system. These sources would be allocated allowances sufficient to cover their current emissions and sources would consider opting-in if their expected emission reduction cost is below the expected allowance price. Their gain would then be the allowance price minus the reduction cost plus any transaction costs.

EPA is required to create special reserves of allowances for special programs mandated by CAAA. In one program, EPA will redistribute the allowances for adopting energy conservation measures or using renewable energy resources to displace emissions. In a second, EPA will provide direct sales of allowances for a fixed price (with priority given to independent power producers) and create an allowance auction system. These reserves will be created by reducing affected sources' initial allocations on a pro rata basis (in proportion to their share of all allowances).

The CAAA establishes a comprehensive permitting system (§408) and requires compliance planning by affected sources. Permits for a period of five years will be issued to affected sources that comply with the provisions of the CAAA. Compliance plans, which will be required to accompany the permit application, will certify that the owner or operator will have sufficient allowances to meet the annual emission requirements of the CAAA.¹ Owners or operators of phase I affected units are required to file a permit application and a compliance plan with EPA for their sources by February 1993. Phase II permits will be issued either by EPA or by states with approved permit programs. Phase II sources must submit permit applications by January 1, 1996 and approved states must issue permits by December 31, 1997. If there is no approved state program, affected sources must submit applications to EPA by July 1, 1996 and EPA must issue permits by January 1, 1998. New affected units must submit permit applications two years before either January 1, 2000 or the date when the unit commences operation, whichever is later.

Other provisions of the CAAA include:

- Utilities and others will be allowed to form "allowance pools" where a group of affected sources can take advantage of their different system resources and

¹ More detail will be required when special provisions of the CAAA are used as part of a compliance plan. These provisions include units substitution, phase I bonus allowance use, reduced utilization, and unit repowering. These provisions are discussed more fully below.

requirements (§403(d)(2)).

- There will be a penalty of \$2,000 per excess ton for sources whose emissions in any year exceed allowances held. These sources will still be required to offset the excess tons in the following year (§411).
- In general, all affected sources will be required to install and operate continuous emissions monitors (CEMS) on each affected unit (multiple units using a single stack will not be required to have unit-specific CEMS). Phase I sources must have CEMS operational by November 15, 1993. Phase II affected sources must have CEMS operational by January 1, 1995. New units must meet the requirements at the start of commercial operation (§412).
- Affected sources will be required to transfer to EPA at the end of each year allowances to cover their SO₂ emissions. EPA will determine in its final rulemaking the length of any grace period for this transfer after the end of the year (EPA has proposed a thirty-day "true-up" period, that is, a transfer deadline of January 30, 40 CFR §77.1) and the method of transfer.
- In general, phase I allowances are based on limiting emissions to 2.5 pounds of SO₂/mmBtu for units larger than 100 megawatts. The allowance allocation for phase I limits are given in Table A in Title IV of the CAAA. Phase II allowances are based on limiting emissions to 1.2 pounds of SO₂/mmBtu for existing utility plants larger than 25 megawatts (§405). This is based on the generating unit's fuel consumption for 1985 through 1987. Utilities can petition the EPA for a different base period if 1985-87

TABLE 1-1
EPA TARGET DATES FOR KEY CAAA PROVISIONS

Action	Date
Allowance Tracking System accounts established for affected units in both phase I and phase II	No later than January 30, 1993
Allowance trading and submittal of transfers to EPA for recordation begins	January 1, 1993
Allocation of allowances from Conservation and Renewable Energy Reserve begins	No earlier than January 1, 1993
Applicants for IPP guarantees for direct sales must apply for financing to construct new units	No later than date of first 1993 auction
EPA Spot and Advance Auctions begin	No later than March 31, 1993
EPA Advance Sales begin	No later than June 1, 1993
EPA Auction Allowances are first usable	January 1, 1995
EPA Sales Allowances are first usable	January 1, 2000
EPA Spot Sales begin	No later than June 1, 2000
EPA may terminate direct sales	No earlier than February 1, 2002
EPA may terminate auctions	No earlier than January 1, 2005
Conservation and Renewable Energy Reserve terminates	No later than January 2, 2010

Source: U.S. Environmental Protection Agency, "Allowance System Proposed Acid Rain Rule," EPA document number 400/1-91/034 (December 1991), 6.

- can be shown to be atypical or to correct errors in the data used by EPA (§402(4)).
- EPA is required to develop procedures and requirements for an allowance tracking system for issuing, recording, and tracking allowances. This is to facilitate "an orderly and competitive functioning of the allowance system" (§403(d)).

EPA is required to issue most of the rules implementing the CAAA. Table 1-1 provides deadlines for some of the key provisions of the CAAA and Table 1-2 provides some expected dates for EPA's proposed or final rules for the allowance system. The remainder of this chapter provides more information on the relevant features of the CAAA to state and federal utility regulators and electric utilities.

Phase I

The SO₂ reduction program in Title IV of the CAAA is divided into two phases. Phase I requires that by the beginning of 1995, 110 plants (over 260 units) will be allocated the number of allowances listed in Table A of the CAAA (§404). In general, these units have a capacity of 100 MW or more with emission rates of 2.5 pounds of SO₂ per mmBtu or more (based on the average fossil fuel consumed in the years 1985, 1986, and 1987).

The owner or operator of a phase I unit may substitute one or more of its unaffected units for some or all of an affected unit's emissions reduction (§404(b)). To qualify for the substitution, documentation must be given to EPA that shows total emissions would be reduced the same or more with substitution than the total emissions that would occur from both the original affected unit and substitute unit(s) without substitution. If approved by EPA, both the original and substitute unit(s) would be affected units and subject to the phase I emission requirements. EPA has proposed rules for substitution plans in 40 CFR §72.41.

Affected phase I sources will also be allowed to comply with the requirements of §404 by reducing the use of or shutting down an affected unit (referred to in the CAAA

TABLE 1-2
ALLOWANCE SYSTEM RULE

Subpart	Proposed Rule (Date Published)	Final Rule (Target Date for Publication ¹)
Background	December 1991	May 1992
Allocation (phase II)	March 1992	December 1992
Tracking	December 1991	May 1992
Transfers	December 1991	May 1992
Auction and Sales	May 1991	December 1991
Conservation and Renewable Energy Reserve	December 1991	May 1992

Source: U.S. Environmental Protection Agency, "Allowance System Proposed Acid Rain Rule," EPA document number 400/1-91/034 (December 1991), 6.

¹ Other sources (not EPA) have indicated that these dates may be one to two months later than shown here.

as "reducing utilization," §408 (c)(1)(B)). The owner or operator will be required, however, to identify in its compliance plan the source of the generation that will replace the power generated by the reduced output of the affected unit(s). Alternatively, the source can demonstrate that the generation will be supplanted by energy conservation or improved unit efficiency. A unit designated to replace the generation of an affected phase I unit(s) will then be considered (if it is not already) a section 404-affected unit

and subject to phase I requirements. EPA has proposed rules for phase I reduced utilization plans in 40 CFR §72.43.

Qualifying phase I units will be allowed to apply for a two-year extension from the phase I deadline to January 1, 1997 (§404(d)). A "qualifying phase I technology" will be one that reduces SO₂ emissions by 90 percent from what would have resulted if the fuel and unit were left unaltered. The allowances needed for the extension will be drawn from a reserve that will equal the reduction of SO₂ emissions projected for 1995 up to a limit of 3.50 million allowances (§404(a)(2)). In addition, adopting these qualifying technologies will make sources eligible for any remaining allowances from this same reserve as an incentive for early phase II reductions (from 1997 through 1999). EPA has proposed that these allowances be allocated on a first-come-first-served basis using a phone-in queuing system (40 CFR §72.501) and has proposed rules for phase I extension plans (40 CFR §72.42).

Since the phase I extension reserve is expected to be oversubscribed, several parties (utilities and the Tennessee Valley Authority) interested in obtaining some of these allowances are considering forming a reserve pool. Under this arrangement the allowances would be allocated on a pro rata basis among the pool participants. Pooling is expected to provide some assurance to the parties that some allowances will be received (in proportion to the level of oversubscription). Taking a chance in the telephone queue could result, they believe, in either no allowances or fewer than anticipated.² At this time, it seems likely that some arrangement will be made.

An additional 200,000 allowances will be allocated to units (except for units at three plants) in Illinois, Indiana, and Ohio each year from 1995 to 1999 on a pro rata basis (§404(a)(3)). These allowances are excluded from the calculation of the reserve of incentive allowances. Other provisions are made for units and utility systems that have

² Comments of Stan Garnett, Allegheny Power System, Inc., to the Committee on Electricity of the National Association of Regulatory Utility Commissioners, March 2, 1992.

reduced coal reliance (§404(e)) and for systems that reduced their emission rates (§404(h)). The deadline in this provision was March 1991.

Phase II

In general, beginning January 1, 2000 existing units will be required to reduce their emissions to 1.2 pounds of SO₂ per mmbtu multiplied by their baseline fuel use (1985 through 1987), or hold allowances for the amount they exceed the cap (§405). These existing units will be allocated allowances either up to the cap or, if emissions are less than the cap, their actual emissions plus a 20 percent bonus (in general, coal, oil, and gas-fired units below 1.2 lbs/mmBtu as defined in §§405(d), (e), and (f)). Again, new units (except specific units that commence operation between 1986 and before 1996 listed in Table B (§405(g)) will be required either to purchase allowances or reallocate allowances from the owner or operator's existing units. All affected sources must in each year hold sufficient allowances to cover their emissions.

In addition, special provisions are included for units that primarily use lignite coal (§405(b)(3)), coal or oil-fired units below 75 MW and above 1.2 lbs/mmBtu (§405(c)), and oil and gas-fired units with fuel consumption of less than 10 percent oil (§405(h)).

Other "bonus" allowances will be awarded in phase II in addition to those indicated above. These include 50,000 allowances for the phase I units (based on pro rata share for the unit in Table A of the CAAA, but allocated in phase II) in ten states: Illinois, Indiana, Ohio, Georgia, Alabama, Missouri, Pennsylvania, West Virginia, Kentucky, and Tennessee (exceptions are one unit each in Illinois, Indiana, and Ohio, §405(a)(3)). Also receiving bonus allowances are units with actual 1985 emission rates below 2.5 lbs/mmbtu and capacity factors less than 60 percent in an amount equal to 1.20 lbs/mmBtu multiplied by 50 percent of the difference between the unit's baseline and the unit's fuel consumption at a 60 percent capacity factor (§405(b)(2)); units that converted to coal from oil between 1980 and 1985 located in states with more than 30,000 MW generating capacity (§405(b)(4)); units in high growth states (that is, having population growth in excess of 25 percent between 1980 and 1988 and having an installed generating capacity of more than 30,000 MW in 1988--§405(i)); specific municipally owned power plants (§405(j)); and states

with emission rates at or below 0.8 lbs/mmbtu (§406).

The bonus allowances allocated for units below 2.5 lbs/mmbtu and less than 60 percent capacity factor (§405(b)(2) and (c)(4)), coal units below 1.2 lbs/mmbtu (§405(d)(3)(A) and (B)), oil and gas-fired units with less than 10 percent oil consumed (§405(h)(2)), and for states with emission rates at or below 0.80 lbs/mmBtu (§406) will be allocated from a reserve of 530,000 phase II bonus allowances for the years 2000 through 2009. EPA will generate these allowances by deducting a total of 53,000 allowances from the total phase II allowance allocation on a pro rata basis for each of the ten years this reserve will be in operation.

Existing units subject to phase II requirements may comply by repowering the affected unit with a qualifying clean coal technology and receive an extension of the compliance date from January 1, 2000 to December 31, 2003 (§409). The CAAA specifies the qualifying clean coal technologies and describes other technologies that may, as determined by EPA and DOE, also qualify (§402(12)). The owner or operator must demonstrate to the permitting authority by December 31, 1997 the affected unit(s) that will comply with phase II requirements by being repowered with a qualifying clean coal technology. The designated affected unit must be replaced with the repowered unit on the date or before the new unit begins commercial operation. EPA has proposed rules for phase II repowering extension in 40 CFR §72.44.

Conservation and Renewable Energy Bonus Allowances

As mentioned, CAAA creates a conservation and renewable energy reserve of 300,000 allowances that will provide extra or bonus allowances for emissions avoided using a qualified energy conservation measure or a qualified renewable energy source (§404(f)). The reserve was designed to encourage the use of conservation and renewable resources to reduce emissions. A qualified conservation measure is defined as a cost effective measure that promotes the efficient use of electricity. Qualified renewable energy sources are biomass, solar, geothermal, or wind. The specifics of these definitions will be determined by EPA (in consultation with DOE) in their final rulemaking.

EPA has proposed a list of qualified energy conservation measures and renewable energy

generation measures for the conservation and renewable energy reserve and supply side measures for the reduced utilization program (Appendix B to §73 of the proposed rules; the main text of the proposed rules for the energy conservation and renewable energy reserve is in 40 CFR §§73.80 through 73.86). In general, qualifying energy conservation measures are demand-side measures that began or will begin operation on or after January 1, 1992 and are *not* supply side measures, load management (unless energy savings can be verified under 40 CFR §73.82), or conservation programs that are exclusively informational or educational. Qualifying renewable energy generation must also begin operation on or after January 1, 1992 and generate electricity directly from the sources indicated above.

The 300,000-allowance conservation and renewable energy reserve will be created by reducing each affected unit's basic phase II allowance allocation on a pro rata basis of 30,000 allowances a year beginning in 2000 and continuing through to 2009. Any remaining allowances in the reserve (after January 2, 2010 when the conservation and renewable energy reserve will terminate) will be allocated on a pro rata basis back to the affected units. EPA has proposed that 60,000 allowances may be set aside from the reserve for renewable energy projects (40 CFR §73.85). This floor will be established if it appears the reserve is about to be depleted without at least 60,000 allowances being used for renewable energy projects. Otherwise allowances will be allocated on a first-come-first-served basis.

Both qualifying energy conservation measures and qualified renewable energy sources must be saving or producing energy between January 1, 1992 and December 31, 2000. Phase I affected sources must apply from 1992 through 1995. Phase II affected sources can apply from 1992 through 2000. EPA has indicated that allowances from this reserve will be awarded on an annual basis beginning no earlier than January 1, 1993.

There are five requirements that an electric utility³ must meet to qualify for conservation or renewable bonus allowances: (1) the utility must pay for the conservation measure or renewable

³ An electric utility is defined as "any person, [s]tate agency, or [f]ederal agency, which sells electric energy." It is unclear if this definition includes industrial sources (e.g., cogenerators) that sell power and that own or operate an affected unit.

energy either directly or from another source, (2) the emissions of SO₂ avoided are quantified in accordance with regulations promulgated by EPA, (3) the electric utility has adopted and is implementing a least-cost energy plan that evaluates a range of resources, including new power supplies, energy conservation, and renewable energy sources--the conservation or renewable energy source must be consistent with a plan approved by the jurisdictional state or federal ratemaking authority, (4) DOE must certify that the state jurisdictional commission has established rates and charges that ensure that the net income of the electric utility after implementation is at least as high as the net income would have been if the conservation measure had not been implemented (not required for qualification of renewable energy), and (5) the utility owns or operates at least one affected unit.

An electric utility must provide the following with its application for bonus allowances: (1) identify the qualified energy conservation measure implemented or the qualified renewable energy source used to avoid emissions, (2) calculate the tons of emissions avoided from implementation, and (3) demonstrate that all five of the above requirements have been met. The application is then given to the jurisdictional state or federal agency with ratemaking authority for approval.

The avoided emissions from qualified conservation measures and qualified renewable energy sources are calculated as the product of the kilowatt hours saved or generated in a year and 0.004, divided by 2000--one ton or one allowance = (kWh saved or generated in a year x 0.004)/2000. This calculation is based on the emissions of an average "clean" coal unit that emits at a rate of 0.4 lbs of SO₂/mmBtu.

The CAAA does not specify the method for calculating the energy saved from a qualified conservation program. Thus far, EPA has indicated that its final rules will not prescribe specific methods for states to follow when verifying their jurisdictional utilities' applications for bonus allowances. However, EPA and others have recognized that a wide variety of methods are available that can lead to significantly different results.⁴ Consequently, EPA has created a

⁴ See for example, *Impact Evaluation of Demand-Side Management Programs, Volume 1: A Guide to Current Practice* (Palo Alto, CA: Electric Power Research Institute, February 1991); Narayan S. Rau, Kenneth Rose, Kenneth W. Costello, and Youssef Hegazy, *Methods to Quantify Energy Savings From Demand-Side Management Programs: A Technical Review* (Columbus, (continued...))

subcommittee of its Acid Rain Advisory Committee (ARAC) on conservation verification. This subcommittee will advise EPA on the development of conservation verification "protocols" for verifying energy savings from qualifying conservation programs. These protocols would be used for both the energy conservation reserve and the reduced utilization provisions.

It should also be noted that since the reserve is relatively small (the 30,000 to be awarded annually represent only 0.3 percent of the 8.95 million allowances) and with a starting date of January 1, 1992 for qualified programs, most bonus allowances will go to states that already have qualified least-cost plans. States that do not already have a qualified least-cost plan or are not currently in the process of developing such a plan are unlikely to be able to meet these qualifications before the reserve is depleted.

EPA Allowance Sales and Auctions

EPA is also required to create another special reserve of allowances for direct allowance sales and for an allowance auction (§416(b)). The reserve will be created by reducing the phase I affected sources' allocations (on a pro rata basis) by 2.8 percent between 1995 and 1999 and reducing phase II affected sources' allocation by 2.8 percent beginning in 2000. Congress included this reserve as a contingency to provide IPPs access to allowances (by providing direct sales) and to facilitate the development of an

(...continued)

OH: The National Regulatory Research Institute, 1991); and Eric Hirst and John Reed, eds., *Handbook of Evaluation of Utility DSM Programs* (Oak Ridge, TN: Oak Ridge National Laboratory, December 1991).

allowance market for private trading (by creating the auction). As shown in Table 1-2, EPA has issued final rules for the allowance auction and direct sales (40 CFR §73 subpart E).

Direct Sale

A portion of the reserve is to be used for direct sale of allowances, where EPA will offer allowances for \$1500 per allowance (to be adjusted by the consumer price index--CPI) giving priority to independent power producers (IPPs) as defined in the CAAA and interpreted by the U.S. Department of Energy (DOE). An IPP proposing construction of a facility that will require allowances before the first EPA allowance auction and that has not received responses to written requests to all affected sources to purchase allowances for \$750 is entitled to an EPA written guarantee or "contingency guarantee" of allowances at \$1500 per allowance (§416(c)(3)). Since potential lenders and the host utility (for example, in a competitive bid) will most likely either require allowances or a demonstration of an ability to secure them, this written guarantee can be used by the IPP in a bid to supply power and to secure financing for construction of the facility. The CAAA defines an IPP as "any person who owns or operates, in whole or in part, one or more new independent power production facilities." It then defines a "new independent power production facility" as a facility that

(A) is used for the generation of electric energy, 80 percent or more of which is sold at wholesale;

(B) is nonrecourse project-financed (as such term is defined by the Secretary of Energy within three months of the date of the enactment of the Clean Air Act Amendments of 1990);

(C) does not generate electric energy sold to any affiliate (as defined in section 2(a)(11) of the Public Utility Holding Company Act of 1935) of the facility's owner or operator unless the owner or operator of the facility demonstrates that it cannot obtain allowances from the affiliate; and

(D) is a new unit required to hold allowances under this title.

DOE has proposed (10 CFR §715) that a "nonrecourse project-financed" facility be defined as an IPP that pledges its financed assets and part or all of the revenue from one or more of the power sales contracts covering the affected facility and expressly excludes financing that provides recourse to an electric utility with a retail service territory. However, an equity contribution by a utility in connection with the financing of a facility is not an obligation to repay debt and would therefore not disqualify the financing from being considered nonrecourse.

The proceeds of direct allowance sales will be returned to the affected sources on a pro rata basis. Purchasers are required to pay 50 percent of the total purchase price within six months after the approval of the request to purchase. The remainder will be due before the allowance transfer. Unsold allowances will be transferred to an auction subaccount. The direct sales can be terminated by EPA if less than 20 percent of the allowances available for sale are sold in any two consecutive years (§416(e)(7)). Any remaining allowances will be transferred to the auction subaccount. EPA has indicated that direct sales will not be terminated before February 1, 2002.

Applicants for an IPP written guarantee for direct sales must apply for financing to construct new units no later than the first EPA allowance auction (by March 31, 1993). EPA plans to begin the advanced sales no later than June 1, 1993. These allowances will be usable beginning January 1, 2000. Spot sales will begin no later than June 1, 2000. Table 1-3 shows the number of allowances available for direct sales. This table is taken directly from the CAAA (§416(c) Table 1).

Allowance Auction

An allowance auction will also be conducted with allowances from the 2.8 percent reserve. This auction will be open to anyone interested in participating, will be a sealed bid auction with the sales based on the bid prices, and with no minimum bid. Auction proceeds will be transferred to affected units contributing to the reserve on a pro rata

TABLE 1-3
NUMBER OF ALLOWANCES AVAILABLE FOR DIRECT SALE AT
\$1,500 PER TON*

Year of Sale	Spot Sale (same year)	Advance Sale
1993 - 1999	-	25,000
2000 and after	25,000	25,000

Source: CAAA Table 1 Sec. 416(c).

* Allowances sold in the spot sale in any year are allowances which may only be used in that year (unless banked for use in a later year). Allowances sold in the advance sale in any year are allowances which may only be used in the seventh year after the year in which they are first offered for sale (unless banked for use in a later year).

basis. Allowances held for auction that were not sold in the auction will be returned to contributing affected sources, also on a pro rata basis. EPA may delegate or contract for auction services. EPA may terminate the auction after January 1, 2005 if less than 20 percent of the allowances available for purchase have been sold in any three consecutive years (§416(f)) after 2002.

Table 1-4 shows the number of allowances available for auction between 1993 and 2000. Any holder of allowances may submit its allowances and specify a minimum price to EPA for sale at auction. These allowances will be sold after the EPA auction is completed. Proceeds will be transferred by the purchaser to the seller; no funds are to be held by an officer or employee of the U.S. government (§416(d)(4)). EPA is required to make public the nature, prices, and results of each auction and record the transfer of

TABLE 1-4
NUMBER OF ALLOWANCES AVAILABLE FOR EPA AUCTION

Year of Sale	Spot Auction* (same year)	Advance Auction*
1993	50,000**	100,000
1994	50,000**	100,000
1995	50,000**	100,000
1996	150,000	100,000
1997	150,000	100,000
1998	150,000	100,000
1999	150,000	100,000
2000	100,000	100,000

Source: CAAA Table 2 Sec. 416(d).

* Allowances sold in the spot auction in any year are allowances which may only be used in that year (unless banked for use in a later year), except as otherwise noted. Allowances sold in the advance auction in any year are allowances which may only be used in the seventh year after the year in which they are first offered for sale (unless banked for use in a later year).

** Available for use only in 1995 unless banked for use in a later year.

allowances. EPA has indicated that spot and advance auctions will begin no later than March 31, 1993. Auction allowances will be usable beginning January 1, 1995.

Allowance Pooling

The CAAA allows affected sources to create "allowance pool" agreements (§403(d)(2)). The Act states that "to insure electric reliability" EPA should not prevent

such agreements "that result from their operations, including emergencies and central dispatch." EPA has stated⁵ that it interprets this provision of the CAAA as still requiring compliance on a unit-by-unit basis as opposed to an aggregate basis. This is, they believe, consistent with other provisions of the CAAA that specify a unit-by-unit basis. EPA notes that allowances from units in a pool that have a surplus could transfer them during the thirty-day allowance transfer period (between January 1st and January 30th) to units in the pool that required them. Since EPA believes that continuous emissions monitoring will permit utilities to know within hours of the end of the year what action they need to take to comply, the proposed thirty-day transfer period will provide more than sufficient time to conduct transfers within an allowance pool. As a result, EPA does not plan to promulgate specific allowance pooling rules, but rather only insure that other compliance rules do not interfere with private pooling arrangements. This approach relies, EPA believes, on the mechanics of the allowance transfer system and would not require complex compliance planning and permitting requirements (possibly involving several permitting authorities for multi-state units and allowance pools).

Exempt Power Facilities

The acid rain control provisions of the CAAA, while applicable to most fossil-fuel electric generating units, are not applicable to simple combustion turbines, industrial boilers, or process sources, or existing fossil-fuel-fired electric generating units of twenty-five megawatts or less. New cogenerators (beginning construction after the enactment of the CAAA) with less than twenty-five megawatts of capacity and having less than one-third of their potential electric output capacity sold to any utility distribution system will also not be affected utility units which must comply with Title IV of the CAAA (§402(17)(C)). Also, existing qualifying small power producers, qualifying cogeneration facilities, and new independent power production facilities (as

⁵ U.S. Environmental Protection Agency, preamble to the proposed rules for the Acid Rain Program: Permits, Allowance Systems, Continuous Emissions Monitoring, and Excess Emissions, 40 CFR §§72, 73, 75, and 77, Office of Air and Radiation, Acid Rain Division, section V(B)(7)(c), 120-21.

defined for the EPA auction and sales reserve discussed above) are exempt from phase II requirements if they meet the requirements of §405(g)(6)(A). This section requires that by the date of enactment, the facility has: (1) an applicable power sales agreement, (2) an electric utility that is required by the state regulatory authority to enter into a power sales agreement with purchase capacity or to enter into arbitration concerning the terms and conditions of the power purchase with the facility, (3) issued a letter of intent or similar instrument committing to purchase power from the facility, or (4) been selected as a winning bidder in a utility competitive bid solicitation.

Election by Additional Sources--Opt-In Provision

Existing and new exempt sources can opt in to the allowance system at their discretion. Allowances issued to units that elect to do this are not considered part of the 8.9-million-ton cap. Industrial boilers or other small existing fossil-fuel units that are not process sources and that elect to opt in are covered by §410(c). The source will be issued allowances based on the lesser of the unit's 1985 actual or allowable emission rate. If the unit did not operate in 1985, the EPA will issue allowances based on the lesser of the actual or allowable emissions rate from a later baseline year. Full credit for decreased allowances can be given these units even if their emission rate is greater than phase I or phase II rates as long as they are unaffected units. Thus, the unit that opts in receives credit for decreased emissions from the baseline year even though it may not do so until years later. A similar program will exist for process sources, however; the CAAA leaves it to EPA to define eligible sources, establish emissions limitations, and determine baseline years.

Opt-in units are subject to the other requirements of the emissions allowance trading provisions, including permitting, penalty, monitoring and record keeping, and enforcement provisions. In addition, allowances for opt-in units that are produced as a result of reduced utilization or shutdown can be transferred or carried forward for use in subsequent years only to the extent that the reduced utilization or shutdown results from the replacement of thermal energy from the opt-in unit, with thermal energy generated by other units subject to the allowance provisions of the CAAA.

Nitrogen Oxides Control

The two-million-ton reduction below 1980 levels by 2000 of nitrogen oxides (NO_x) prescribed by the CAAA is a control requirement, not an allowance-based program. Within eighteen months of enactment, EPA is required to limit NO_x to no more than emissions for tangentially fired boilers to 0.45 pounds/mmBtu (§407(b)(1)(A)) and for dry-bottom, wall-fired boilers (other than units applying cell burner technology) to 0.50 pounds/mmBtu (§407(b)(1)(B)). These standards will go into effect after January 1, 1995 and are applicable to all phase I sources. By January 1, 1997, EPA must promulgate emission limitations for wet-bottom wall-fired boilers, cyclones, units applying cell burner technology, and all other types of utility boilers (§407(b)(2)). All affected sources must meet these standards by the phase II deadline date.

Some other NO_x provisions include: (1) by January 1, 1993 EPA must propose, and by January 1, 1994 promulgate, revised new source performance standards (NSPS) for NO_x from all fossil fuel-fired steam generating units (§407(c)); (2) less stringent emission limitations may be authorized if the owner or operator can demonstrate that the applicable emission limitation can not be met using low NO_x burner technology or cannot meet the applicable rate using the technology on which EPA based the limitation; (3) an extension is possible if the required technology is not immediately available (§407(d)); and (4) an owner or operator of two or more units subject to the NO_x provisions may comply based on the average emission rate of all affected units (§407(e)).

It should be noted that EPA has proposed extending by two years the CAAA deadline for states to move forward with nitrogen oxide controls. Some have charged that the proposed change is unlawful. The fear is that the agency's move could result in a serious delay in installing NO_x controls, which in some areas could be essential in meeting clean air standards for ozone. The proposal represents an easing of EPA's previous position, which called on states to prove by November 1992 that NO_x reductions would not improve air quality.

Compliance Planning

The owner or operator will be required to submit a compliance plan certifying that their affected unit(s) will be covered with sufficient allowances to meet the emission requirements of the CAAA (§408(g)).⁶ Some public utility commissions now require (and others are likely to require in the future) detailed compliance plans that specify how the utility will comply. In addition to installing pollution control equipment and switching to low sulfur fuel, utilities can retire old capacity, purchase capacity from others, repower an existing plant, redispatch existing units, purchase or sell allowances, bank allowances, or invest in conservation and demand-side management. Most utilities have a wide range of compliance strategies from which to choose.

The cost of each option varies for each of the utility's units and across utilities. For one unit, the least costly means of complying might be to fuel switch, for example, from coal to natural gas. For another, a scrubber might be the lowest-cost option and result in overcompliance, which would free allowances that could be used to bring other units into compliance. A utility should look not only at the cost of compliance on a unit-by-unit basis, but at the cost of compliance for the entire company since trades within a firm will be possible. A utility should also look beyond itself and its system and consider other opportunities for emission allowance trading, perhaps, for example, becoming part of an allowance pool. Finally, a utility should look for allowance trading opportunities nationwide. Compliance planning options and the responsibilities of the state and federal regulators and electric utilities are discussed more fully in Chapter 4.

⁶ As noted earlier, more detailed plans will be required if one or more of the special provisions are used (substitution, phase I extension, reduced utilization, or repowering).

Third-Party Ownership, Purchases, and Sales

The CAAA does not restrict who can purchase, sell, or own allowances. Because an SO₂ emission allowance is essentially fungible, organized exchanges and brokers can play a key role in helping arrange emission allowance trading. Brokers can quickly match buyers and sellers without either one needing to engage in extended contract negotiations. Indeed, it is not even necessary for the buyers and sellers to be identified to each other, although they would need to be identified to the EPA for the purpose of recording the transfers. Once a standard contract is drafted to deal with the risk that Congress might, in the future, partially or fully rescind allowances (see the discussion on allowance ownership rights), brokers can help make the market liquid and lower transaction costs within the market.

The Chicago Board of Trade (CBOT) has requested permission from the Commodity Futures Trading Commission to offer a futures contract for allowances.⁷ The New York Mercantile Exchange has proposed offering a similar contract.

Allowance Property Rights

Section 403(b) of the Act states that the EPA will issue regulations that will "permit . . . transfer of allowances prior to . . . issuance." The preallocation transfer of allowances will be deducted from the allowances otherwise allocated to the transferor and added to those of the transferee. For an efficient and effective allowance market to develop, utilities must feel satisfied that allowances represent transferrable property rights. Congress, however, explicitly stated in § 403(f) of the Act that "allowances do not constitute a property right." Rather, §§ 402(3) and 403(f) provide that an allowance is merely a "limited authorization to emit sulfur dioxide." In spite of the bill's explicit language, allowances are, in fact, a form of property right. What's more,

⁷ See Kenneth Rose, "Comments Submitted to the Commodity Futures Trading Commission on the Proposed Chicago Board of Trade Clean Air Futures Contract," November 1991, for a discussion on how futures trading could be used by electric utilities and could benefit ratepayers and electric utilities.

the Congress has held that allowances are assets of the utilities.⁸

The language placed in the CAAA almost certainly reflected two concerns. First, for political reasons, Congress did not want to appear to be creating a property right to pollute. Second, it did not want allowances to be compensable property rights under the Fifth Amendment.

The Fifth Amendment prohibits the taking of private property for public use without just compensation. Rights and benefits created by the federal government, which could have existed independently, may be compensable property. The property interest need not be tangible. However, rights and benefits which could not have existed without government action usually are not compensable property interests, because they are wholly created and defined by federal statute and may be terminated or altered at any time.

Congress intended emissions trading allowances to be treated as a revocable permit or license. Courts have held that where a license or permit is expressly revocable, there can be no reasonable expectation that compensable property interest can arise.⁹ However, where a permit is issued that is not expressly revocable, courts have held that a compensable property interest exists.¹⁰ Until a permit or license is actually issued, there is no compensable property interest in the permit.¹¹

In the case of emissions allowances, the EPA will begin issuing allowances to phase I plants in 1995 and to all plants in 2000. Until an allowance is issued, it is revocable even if it can be traded. Hence, there is no compensable property interest in the allowance should the Congress or EPA revoke the allowances through legislation. Once allowances are issued, however, there may be more than a mere expectation in the allowance: there may be a compensable property right.

⁸ Report of the House Committee on Energy and Commerce on H.R. 3030 at 366.

⁹ *American International Group v. Iran*, 657 F.2d 430, 449 (D.C. Cir. 1981).

¹⁰ *Scott v. Greenville County*, 716 F.2d 1409, 1421 (4th Cir. 1983).

¹¹ *Nuclear Transport & Storage, Inc. v. United States*, 703 F.Supp. 660,671 (E.D. Tenn. 1988).

Whether emissions trading allowances represent compensable property or not, potential allowance sellers, buyers, and brokers will probably need to design a model contractual provision that copes with the risk that Congress would revoke the allowances either before or after they are issued. Model contractual language would help minimize the transaction costs of transferring allowances and facilitate the goal of economically efficient compliance of CAAA's provisions.

Example of Utility Compliance Options with Allowances

Table 1-5 provides an example of several options available for a hypothetical coal unit. This is a simplified example to provide a means to illustrate a utility's compliance decision process for one unit. In reality the decision is considerably more complex. The utility must consider, among other things, its entire system's compliance, several scenarios of future fuel and allowances prices, the uncertainty associated with capital costs, fuel prices and supply, and regulatory treatment, and the possible offset of emissions with a conservation program. This, of course, introduces a great deal of uncertainty into the compliance planning process.

In this simple example the utility considers five options: (1) purchase allowances, (2) adopt a clean coal technology (CCT), (3) switch to low sulfur coal, (4) repower the unit (with a new boiler, for example), or (5) build a scrubber. Since this hypothetical unit is an existing unit, under the CAAA it will receive 6,623 allowances initially (based on the phase II limit of 1.2 pounds of SO₂ per mmBtu). Given these unit characteristics, the estimated cost of allowances can be factored into the overall cost of compliance for each option. This unit would be an affected unit under phase I of the CAAA since it emits in excess of the 2.5 pounds of SO₂ per mmBtu limit set in phase I of the CAAA; however, only phase II compliance is discussed below.

If the utility chooses not to modify the unit and purchases just the needed allowances, then it would be required to purchase 37,378 allowances, assuming the unit

TABLE 1-5
PHASE II COMPLIANCE EXAMPLE

UNIT	1					
AGE	30 years					
CAPACITY	200 MW					
CAPACITY FACTOR	60%					
HEAT RATE	10,500 Btu/kWh					
TONS OF SO ₂ EMITTED	44,000					
INITIAL ALLOWANCE*	6,623					
		OPTIONS				
		<u>Allowances</u>	<u>CCT</u>	<u>Switch</u>	<u>Repower</u>	<u>Scrub</u>
SO ₂ REMOVED (tons)		-	13,000	37,000	40,000	40,000
UNIT COST OF REMOVAL (\$/ton)		-	346	318	422	894
CAPITAL COST (\$/kW)		-	14	60	800	200
OPERATING COST (¢/kWh)		-	4	1	-	3
ALLOWANCE NEEDED (tons)		37,378	24,378	378	(2,622)	(2,622)
VALUE OF ALLOWANCE (M\$) 24.30 @ \$650/ton		15.85	0.25	(1.70)	(1.70)	
TOTAL COST OF REDUCTION (M\$)		0	4.50	11.77	16.88	35.76
NET COST OF COMPLIANCE (M\$)		24.30	20.35	12.02	15.18	34.06
INCREMENTAL COST OF COMPLIANCE (¢/kWh)		2.31	1.94	1.14	1.44	3.24

Source: Based on data reported in "Clean Air Response: A Guidebook of Strategies," Electric Power Research Institute (1990) and NRRI calculations.

Note: Quantities in parentheses indicate excess allowances or the amount of overcontrol.

$$\text{*Total generation} = 200 \text{ MW} * \frac{1,000 \text{ kW}}{\text{MW}} * \frac{8,760 \text{ h}}{\text{yr}} * 0.6 = 1,051,200,000 \text{ kWh/yr.}$$

$$\text{Total allowance} = (1,051,200,000 \text{ kWh/yr}) * \frac{10,500 \text{ Btu}}{\text{kWh}} * \frac{1 \text{ mmBtu}}{10^6 \text{ Btu}} * \frac{1.2 \text{ lbs.}}{\text{mmBtu}}$$

$$* \frac{1 \text{ ton}}{2,000 \text{ lbs}} = 6,623 \text{ tons/yr.}$$

operated at the same level. Based on an allowance price of \$650 a ton, this option would have an estimated cost of \$24.3 million (37,378 times \$650) or 2.3¢/kWh. The CCT option will remove 13,000 tons of SO₂, so that 24,378 allowances are needed. Net compliance cost (total cost net of the value of allowances) is then \$20.35 million (\$15.85 million plus \$4.50 million or 1.94¢/kWh). Switching removes 37,000 tons of SO₂, so only 378 allowances are needed to comply with the CAAA. This option has, in this example, the lowest compliance cost at \$12.02 million or 1.14¢/kWh.

The first three options in this example require the utility either to purchase allowances or to use allowances from another unit. However, some options result in the unit being "overcontrolled" or reducing the emissions of the unit below the initial (phase II) allocation. Repowering the unit, for example, removes 40,000 tons and results in overcompliance. Since the utility can sell these generated allowances (the difference between its initial allocation and projected emissions for this option) they have some value to the firm--irrespective of whether the utility chooses to sell them, bank them for future use, or use them at another unit. While repowering has the highest unit capital cost (\$800/kW), it has the second lowest net compliance cost at \$15.18 million or 1.44¢/kWh. Also, the utility can build a scrubber. This frees the same number of allowances as repowering since the emission levels after modification are assumed to be the same (because the scrubber removes the same amount of SO₂). However, in this example, the scrubber is the most expensive option with a net compliance cost of \$34.06 million, or 3.24¢/kWh.

The allowance price of \$650 was chosen for this example because it represents the midpoint of several scenarios that others have projected. Table 1-6 illustrates the effect and importance of the forecasted allowance price on the estimated costs of the options in the above example. When the forecasted price of allowances is \$300, the lowest cost option is to purchase allowances (\$11.21 million and 1.07¢/kWh) while CCT and switching to low sulfur coal become, respectively, the next lowest cost options. When the price of allowances is \$1,000, however, switching again becomes the lowest cost option (\$12.15 million and 1.16¢/kWh), and allowance purchasing becomes the most expensive.

It is interesting to note, however, that the differences between options are relatively small considering the length of time and the total investment involved for the \$300 scenario. Four of the options in Table 1-6 (allowance purchase, CCT, switching, and repowering) have estimated incremental costs that vary by only a fraction of a cent. Given the uncertainty associated with any forecast, this difference is negligible. This points to the sensitivity of the optimal option to the actual price of allowances. When the allowance price is low, the difference in costs between options is small. On the other hand, when the allowance price is relatively high the difference in costs become more significant for compliance planning purposes.

TABLE 1-6
EFFECT OF THREE DIFFERENT ALLOWANCE PRICES
ON COMPLIANCE COST

Allowance Price \$	OPTIONS				
	Allowances	CCT	Switch	Repower	Scrub
	Net Compliance Cost (M\$)				
300	11.21	11.81	11.88	16.09	34.97
650	24.30	20.35	12.02	15.18	34.06
1,000	37.38	28.88	12.15	14.26	33.14
	Incremental Compliance Cost (¢/kWh)				
300	1.07	1.12	1.13	1.53	3.33
650	2.31	1.94	1.14	1.44	3.24
1,000	3.56	2.75	1.16	1.36	3.15

Source: NRRI calculation, based on Table 1-5.