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EXECUTIVE BRIEF

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Mercury Trading Takes Form

EPA’s Clean Air Mercury Rule caps mercury emissions from coal-fired power plants for the first time ever. A trading market is already taking shape. Evolution Markets’ **Peter Zaborowsky** and **Philip Ammirato** scrutinize the development of this emerging market.

The Environmental Protection Agency (EPA) enacted May 18, 2005 the Clean Air Mercury Rule (CAMR) that will permanently cap and reduce mercury emissions from coal-fired power plants. When fully implemented, these rules will reduce nationwide utility emissions of mercury from 48 tons to 15 tons per year, a reduction of nearly 70%. This rule makes the United States the first country in the world to regulate mercury emissions from utilities. It also creates a viable trading program.

Like the Clean Air Interstate Rule (CAIR) controlling SO₂ and NO_x, CAMR establishes a market-based cap-and-trade system that is based on EPA’s Acid Rain Program and will be implemented in two phases. EPA has assigned each state an emissions budget for mercury, and each state must submit a state implementation plan revision (SIP) by November 17th detailing how it will meet its target for reducing mercury from coal-fired power plants. These state emission budgets are permanent, regardless of growth in the electric sector.

This special issue of Evolution Markets Executive Brief explores the development of this emerging market, the mixed participant response, and probable trading opportunities.

Background

The Bush Administration remains committed to working with Congress to help advance the President’s Clear Skies legislation in order to achieve greater certainty and nationwide emission reductions, but it also believes the U.S. needs regulations in place now to address immediate clean air issues. As a result, the Administration has moved ahead with both CAIR and CAMR, which are important components of its strategy to improve air quality.

EPA believes it makes sense to address mercury, sulfur dioxide (SO₂), and nitrogen oxide (NO_x) emissions simultaneously through CAIR and the CAMR. These rules will protect public health and the environment without interfering with the steady flow of affordable energy for American consumers and businesses. The Clean Air Mercury Rule, specifically, establishes “standards of performance” limiting mercury emissions from new and existing coal-fired power plants and creates a market-based cap-and-trade program that will reduce nationwide utility emissions of mercury in two distinct phases.

The first phase, effective in 2010, will have a nationwide cap of 38 tons per year. During this phase, emissions will primarily be reduced by taking advantage of “co-benefit” reductions – that is, mercury reductions achieved by reducing SO₂ and NO_x emissions under CAIR. In the second phase, effective in 2018 and thereafter, coal-fired power plants will be subject to a second cap, which will reduce emissions to 15 tons nationwide upon full implementation.

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EPA's modeling shows that CAIR will significantly reduce the majority of the coal-fired power plant mercury emissions that deposit in the United States, and those reductions will occur in areas where mercury deposition is currently the highest. The Clean Air Mercury Rule is expected to make additional reductions in emissions that are transported regionally and deposited domestically, and it will also reduce emissions that contribute to atmospheric mercury worldwide.

Implementation of CAMR will be accomplished by the allocation of mercury allowances under a state cap to each unit subject to the rule. Facilities must demonstrate compliance by holding one "allowance" for each ounce of mercury emitted by a covered unit in any given year. Allowances are transferable and can be traded freely.

Additionally, new coal-fired boilers ("new" means construction commencing on or after January 30, 2004) will have to meet stringent new source performance standards in addition to being subject to these caps. New sources may receive allowance allocations from new source set asides in some state programs, or may be required to purchase all their mercury allowances on the open market.

Mercury Cap and Trade Basics

The EPA believes that the cap-and-trade approach to limiting mercury emissions is the most cost effective way to achieve the reductions required in the power sector. Correspondingly, CAMR establishes a cap-and-trade system for mercury that is based on EPA's proven Acid Rain Program. The Acid Rain Program has produced remarkable and demonstrable results, reducing SO₂ emissions faster and at far lower costs than anticipated, and resulting in wide-ranging environmental improvements.

Under CAMR, EPA has assigned each state and two tribes an emissions budget for mercury. Each state must submit a State Implementation Plan revision detailing how it will meet its budget for reducing mercury from coal-fired power plants. States may join the trading program by adopting the model trading rule in state regulations, or they may adopt regulations that mirror the necessary components of the model trading rule. Although states and tribes are not required to adopt the EPA-administered cap-and-trade program, the agency believes most will do so.

The state and tribal emission budgets are permanent, regardless of growth in the electric sector. The mandatory declining emissions caps in CAMR, coupled with significant penalties for noncompliance, will ensure that the rule's mercury reduction requirements are achieved and sustained. Federal enforceable penalties could be as high as \$25,000

per day for each excess ounce of mercury emitted and not covered through the trading program. The generator will also receive three less allowances the following year for each ounce of emissions they exceeded beyond allocation.

At the same time, stringent emission monitoring and reporting requirements ensure monitored data are accurate, reporting is consistent among sources, and the emission reductions occur. The flexibility of allowance trading creates financial incentives for coal-fired power plants to look for new and low-cost ways to reduce emissions and improve the effectiveness of pollution control equipment.

Mercury Control Fundamentals

Emissions of mercury depend on a variety of site-specific factors, including the amounts of mercury and other compounds (such as chlorine) in coal, the boiler type and configuration, and the presence of pollution control equipment, such as fabric filters, electrostatic precipitators, flue gas desulphurization, and selective catalytic reduction equipment. Mercury emissions are very difficult to control as the concentrations are very small and the chemistry complex; emissions can be released in elemental, oxidized, or particulate form. In addition, the level of mercury varies according to coal type and control configuration. For example, when comparing eastern and western coal, studies indicate that the co-benefits associated with eastern coal are greater than those of western coal.

It appears that the development of mercury-specific control technology has hit some significant snags and has not proven to be commercially viable for long-term, high-volume, and continuous use. Currently, the most promising solution for specifically reducing mercury is through activated carbon injection (ACI). However, ACI is less efficient on high sulfur coals and as flue gas temperatures increase. Thus, further tests and modifications are still required to establish the long term effectiveness of ACI.

Sampling all types of coal and reduction units, the average removal rates are expected to be 60%-80% using co-benefit technology. And while co-benefits seem to be the most likely solution to reduce near-term mercury emissions, the recent decrease in SO₂ allowance prices could cause some companies to postpone their scheduled scrubber installations until later dates. This could result in a failure to meet "co-benefit" reduction expectations for the first phase, which could stimulate interest in the purchase of allowances in the trading market.

Most recently, AEP has postponed scrubber projects at its Big Sandy and Muskingum River plants in Kentucky and Ohio.

In addition, Allegheny and NRG are also considering deferring scrubber projects due to a significant increase in capture equipment costs, as utilities prepare for more stringent environmental regulations. In a September 27th report in *Argus Air Daily*, NRG chief executive David Crane was quoted as stating, “the price quoted for back-end controls has gone through the roof over the past year. To retrofit all planned controls by 2010, costs would rise to \$1.3 billion, up 62.5% from previous estimates of \$800 million.”

Current State Participation

As it stands, state participation in the trading program varies not only in whether a state will allow trading, but also if additional reductions beyond the CAMR targets will be required. The top four mercury emitters – Texas, Ohio, Indiana, and Pennsylvania – all differ in their approach to CAMR. Texas has been given the largest allowance allocation of all the states by more than 50% and will participate in CAMR unabridged. Ohio and Indiana also plan on joining the program, but are considering additional allowance allocation restrictions for the first phase. The Pennsylvania Department of Environmental Protection (DER) plans to impose tighter requirements than CAMR and not allow trading in any form. Pennsylvania state legislators oppose the DER’s plan and are considering legislation that will institute trading. However, passage of this legislation this year is looking increasingly unlikely. If trading were to be allowed, Pennsylvania would be a buyer of allowances.

States taking a similar unrestricted approach to Texas are North Dakota, West Virginia, Missouri, Alabama, Wyoming, Tennessee, Iowa, Kansas, Oklahoma, Colorado, Louisiana, New Mexico, South Dakota, and Mississippi. These states account for more than half of the allocated allowances in the top 20 emitting states – and about 50% of the total allowances allocated in the program.

North Carolina, Florida, South Carolina, Virginia, Montana, Oregon, Nevada, and Washington are expected to allow trading, but they will seek to overlay the program with state-specific limits. North Carolina wants to mandate that all units uncontrolled for SO₂ and NO_x install mercury-specific controls. This regulation would possibly make North Carolina a large seller of allowances as all facilities will be making more significant mercury reductions (beyond co-benefit level from scrubbing) from the beginning of the program. Other potential plans range from restricting trading of particular facilities to only allocating a portion of the state’s allowances and keeping the rest in set-aside accounts. Again the specifics of these plans and the states that are still undecided (see *table, end of Brief*) and will not be finalized until after the EPA’s SIP deadline of November 17th.

Legal Challenges

State and environmental group lawsuits are seeking to overturn the CAMR cap-and-trade program in favor of a strict maximum achievable control technology requirement. EPA filed a proposed case briefing schedule on August 31st with the DC Circuit Court of Appeals, which is hearing a host of challenges to the CAMR filed by several states (see *table, end of Brief*), environmental groups and industry groups.

Under EPA’s proposed case briefing schedule, the various state, environmental group, and industry petitioners would have until December 8th to file their briefs, with an EPA reply due March 30th, 2007, and then final briefs due June 8th, 2007. If the court accepts this schedule, a final decision on the lawsuits may not come until late next year.

States challenging the rule are clearly a minority, as one third of the states, including the top emitters, have already joined the trading program unabridged. In most cases, these states have already filed their implementations plans. At this point in time, more than half of the affected emissions base will be in the trading program. To be sure, the outcome of this litigation is speculative and all coal fired power plants should, at a minimum, be considering retrofitting their facilities with appropriate mercury control equipment or exploring buying allowances to meet their state cap.

Outlook for Trading

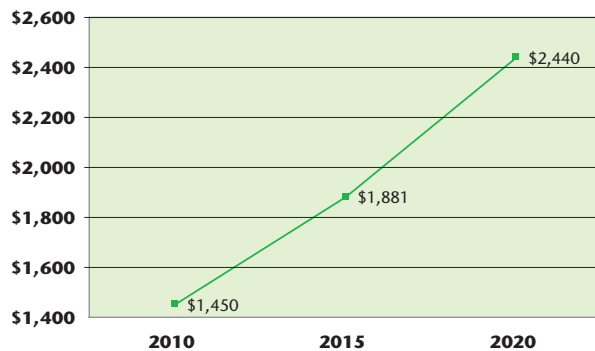
EPA’s model projects that only 31 tons of mercury emissions will be emitted in the first year, although allowances will be held for 38 tons. Such a scenario will allow a bank to build up early in the program.

This concept of early banking draws parallels to the SO₂ and NO_x allowance markets. It is expected that utilities will begin buying and banking allowances during the first phase of the program, as the second phase of CAMR will be increasingly difficult to comply with. As a result, allowances in phase two of CAMR will begin to become very scarce and considerably more expensive.

EPA models peg the price of a first year allowance at \$1,450 per ounce in 1999 dollars (see *fig.2*), but prices will ultimately be determined by the cost and availability of mercury reduction retrofits, which appears volatile at the moment.

Evolution Markets believes prices will gain significant strength once the program commences, as many of the retrofits promising significant reductions are being tested and will not be commercially available in the near term. In addition, many major utility companies that are in the throws

Fig. 2: EPA Allowance Price Projections (\$ 1999)



Source: US EPA

of installing massive reduction equipment, are beginning to realize that available control technology is becoming increasingly expensive with stricter regulations on the horizon.

Many of these companies are pushing back installation of these retro-fits and taking advantage of the currently discounted SO₂ allowances as a means to comply. As a result, fewer facilities than originally anticipated will be able to meet the first phase of CAMR by “co-benefit” technology and may ultimately be forced to buy early mercury allowances.

According to the “2006 Annual Energy Outlook” published by the Energy Information Administration (EIA), electricity generators are expected to retrofit about 126 giga-watts of coal-fired capacity with ACI technology, a costly mercury specific reduction system, in order to comply with the CAMR caps. As such, the EIA expects mercury allowance prices to increase steadily from 2010 on, to about \$3,875 per ounce in 2030.

Additionally, regulatory scenarios are certain to impact the liquidity, volatility, and pricing of mercury allowances. Some states will participate in CAMR unabridged, others will participate in the trading program with additional state regulations, and the rest will not allow trading in any form. A regulatory scenario in which cap and trading provisions vary state-by-state will translate into a fragmented market. The impact of this fragmented market is likely to be less trading liquidity, resulting in lower volume trades and higher transaction costs. It is also expected that initial price discovery will become more difficult.

With all these factors taken into account, it is certain that mercury allowances will be more complex and volatile than past emission trading programs, allowing traders and utilities with a commanding understanding of the regulations and technological developments the opportunity to profit in the wake of a continually evolving market.

Evolution Markets publishes the Executive Brief to inform markets and encourage discussion on important issues confronting energy and environmental markets. We encourage your feedback on the issues presented here and your input on future editions of the Executive Brief.

State	Budget (ounces)		Proposal	Trading	Challenge
	2010-17	2018+			
Texas	148,992	58,816	CAMR	Yes	
Indiana	67,104	26,496	consider more stringent	maybe	
Ohio	65,792	25,984	consider more stringent	Yes	
Pennsylvania	56,928	22,464	CAMR or tougher state regs	Yes	
Illinois	51,008	20,128	90 pct by 2009	FWA	Yes
North Dakota	50,048	19,744	CAMR	Yes	
Kentucky	48,800	19,264	Undecided	maybe	
West Virginia	44,608	17,600	CAMR	Yes	
Missouri	44,576	17,600	CAMR	Yes	
Michigan	41,696	16,448	CAMR phase I, then 90 pct by 2015	FWA	
Alabama	41,248	16,288	CAMR	Yes	
Florida	39,424	15,584	70 pct of CAMR for phase I, phase II full	Yes	
Georgia	39,264	15,488	consider more stringent	maybe	
North Carolina	36,256	14,304	CAMR	Yes	
Wyoming	30,464	12,032	CAMR	Yes	
Tennessee	30,208	11,936	CAMR	Yes	
Wisconsin	28,480	11,232	Undecided	maybe	Yes
Iowa	23,264	9,184	CAMR	Yes	
Kansas	23,136	9,120	CAMR	Yes	
Oklahoma	23,072	9,120	CAMR	Yes	
Colorado	22,592	8,928	CAMR	Yes	
Minnesota	22,240	8,768	soft goal of 90 pct from 2010-14	maybe	Yes
Louisiana	19,232	7,584	CAMR	Yes	
Navajo Nation	19,200	7,584	Undecided	maybe	
Virginia	18,944	7,488	CAMR, may have trade restrictions	Yes	
South Carolina	18,560	7,328	80 pct CAMR in phase I	Yes	
Arkansas	16,512	6,528	Undecided	probably	
Utah	16,192	6,400	Undecided	probably	
Maryland	15,680	6,176	80 pct by 2009, 90 pct by 2013	no buying	
Arizona	14,528	5,728	consider more stringent	Yes	
Nebraska	13,472	5,312	TBA	maybe	
New York	12,576	4,960	50 pct by 2010, 90 pct by 2015	No	Yes
Montana	12,064	4,768	CAMR + more stringent state caps	Yes	
New Mexico	9,568	3,776	CAMR	Yes	Yes
Mississippi	9,312	3,680	CAMR	Yes	
Nevada	9,120	3,584	CAMR with allocation changes	Yes	
Washington	6,336	2,496	CAMR with allocation changes	Yes	
Massachusetts	5,504	2,176	85 pct by 2008, 95 pct by 2012	No	Yes
New Jersey	4,896	1,920	90 pct by 2007	No	Yes
Oregon	2,432	960	CAMR + 60 pct by 2018	Yes	
Delaware	2,304	896	80 pct by 2009, 90 pct by 2013	No	Yes
South Dakota	2,304	928	CAMR	Yes	
New Hampshire	2,016	800	80 pct by 2013	No	Yes
Ute Indian Tribe	1,920	768			
Connecticut	1,696	672	90 pct by 2008	No	Yes
California	1,312	512	Undecided	Maybe	Yes
Hawaii	768	288			
Alaska	320	128			
Maine	32	32	considering STAPPA/ALAPCO rule	No	Yes
Total	1,216,000	480,000			

Source: Argus Air Daily, www.argusmediagroup.com. Information current as of June 2006.