CATF WHITE PAPER:

EPA Must Retain the Requirement that Rate-based States Seeking to Engage in Interstate Trading Merge their Target Emission Rates

CLEAN AIR TASK FORCE

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INTRODUCTION

EPA's proposed Clean Power Plan recognizes that by working together, states can more efficiently reduce carbon dioxide ("CO_2") emissions from existing power plants. The proposal allows states to "jointly demonstrate emission performance by [power plants]. States can design their plans to reduce tons of CO_2 on a mass basis or reduce the rate at which power plants emit CO_2. In the case of a rate-based plan EPA proposed that states "would demonstrate that all affected [power plants] subject to the multi-state plan achieve a weighted average CO_2 emissions rate that is consistent, in aggregate, with an aggregation of the state-specific, rate-based CO_2 emission guidelines that apply to each of the participating states." Under a mass-based approach states would add together the tons of CO_2 their states must eliminate from their power plants and meet that combined tonnage budget.

In order to comply with the Clean Power Plan, a multi-state plan must demonstrate that it will be equivalent in stringency to the state-specific targets set by EPA in the aggregate. EPA should finalize a rule that retains the requirement that states submitting joint or multi-state plans "merge" their state emission rate targets and meet that new rate. Relaxing this requirement would create a perverse incentive to build and operate generation in a state with a more lenient target and would therefore lead to an overall emissions increase as compared to the state targets EPA set.

Operation of power plants obviously drives their emissions. Power plants are generally called on to operate in order of those that can produce electricity at the lowest cost. Power plant owners offer their electricity to the grid at a cost based on fuel, heat rate, variable operating and maintenance costs and the costs associated with abating pollutants such as NO_x and SO_2. Once the Clean Power Plan is implemented these costs will also include the cost of abating. That cost will be the product of: 1) the price of carbon credits in each state; and, 2) the difference between the state emission rate target and the individual power plant's emission rate. Importantly, if state emission rate targets vary by state (as they would if the targets are not merged) then otherwise identical fossil plants will have different CO_2 costs; plants in states with less stringent target rates will have a lower CO_2 costs and those in states with more stringent targets will have a higher CO_2 costs.

If states work together to comply with the Clean Power Plan and are not required to merge, or otherwise average, their rates, the difference in carbon credit costs could result in plants with lower emission rates being displaced by power plants with higher emission rates. A lower-emitting power plant with a higher carbon credit cost would have to incorporate that cost when they offer to sell their electricity to the grid and may be outbid by a higher-emitting plant in another state that has a lower carbon credit cost. This displacement of low emission rate generation with high emission rate generation will increase overall system emissions and operating costs as compared to the Clean Power Plan under which the merger of state emission rate targets is required. This leakage problem already exists for states with differing state emission rate targets within the same

power market. But, allowing interstate trading without requiring the merger of state rates has the potential to exacerbate the problem by spreading it nationwide as fossil and renewable units in states around the U.S. with relatively lax state emission rate targets realize a strong economic incentive (the value of the carbon credit cost) to run and generate credits that can satisfy the obligations of states with relatively more stringent state emission rate targets. The result would be higher overall system emissions because these credits could not have been generated by the operation of cleaner fossil or renewable resources states with stringent targets. Nevertheless, without the merger requirement, these credits could be used to offset and dilute the fossil emissions in those states. Where this results in out-of-merit order dispatch, relaxing the merger requirement will also result in higher overall compliance costs.

In the final Clean Power Plan, EPA should retain the requirement that multistate plans must merge their emission rate targets and demonstrate compliance with a target equivalent to the individual state rate targets in the aggregate.

I. Relaxing the Merger Requirement Results in More Emissions and Greater Compliance Costs

To illustrate the problem, the spreadsheet below provides a quantitative example of how the failure to retain the rate merger requirement between rate-based states engaged in interstate trading could lead to more emissions and greater operating costs. The example depicts two states in the same power market. In the example, State A has a target emission rate under the Clean Power Plan of 850 lbs./MWh and State B has a target emission rate of 1600 lbs./MWh. *See* cells F13 and G13. State A's power mix is characterized by relatively low-emitting coal (1995 lbs./MWh) and gas (878 lbs./MWh) units. See cells C6 and C7. By contrast, State B has relatively high-emitting coal (2058 lbs./MWh) and gas (913 lbs./MWh) units. *See* cells C8 and C9.

Under "business-as-usual" ("BAU") (i.e., no Clean Power Plan), the units in State A tend to economically dispatch before the units in State B because they are more efficient, providing power at a lower cost per unit of electricity. This can be seen in highlighted cells C17 to E21. The total dispatch cost for this scenario is found in cell E24 ($3572). The total BAU emissions from the two states is found in cell E27 (84.1 tons).

The spreadsheet then compares two Clean Power Plan scenarios: one in which interstate trading is allowed with separate rate goals and another (as per the Clean Power Plan proposal) in which interstate trading is allowed but the merger of the state target rates is required. Under the "separate" goals scenario, the fossil units in State A must meet the 850 lbs./MWh target while the units in State B may meet the 1600 lbs./MWh target. While trading between the states creates an effectively equal allowance price (F14/G14), the more stringent target for State A means that the cost of compliance for units there is higher – as reflected in the higher credit costs (F15/16 and G15/16). This in turn means a higher dispatch price for the units in State A, meaning that they will dispatch less while the relatively lower dispatch price units in State B will dispatch more, although this is out-of-merit order and solely due to the different emission rate targets for the two states. As a result, generation shifts decidedly to State B (compare cells F21/G21 to cells C21/D/21) even though its units are less efficient/higher heat rate than State A's units.

In this scenario, higher-emitting, higher-cost units are dispatched (out-of-merit order) before lower-emitting, lower-cost units. This is because the higher-emitting, higher-heat rate units in State B have an economic incentive to run before the lower-emitting, lower-heat rate units in State A – again, solely because of the differing state emission rate targets. The result is more emissions and higher electricity costs.

Contrast this to the scenario, as required in the Clean Power Plan proposal, under which State A and State B's rate targets are required to be merged. Again, due to trading, the carbon credit cost is the same in both states. However, due to the rate merger, the units in both states now must meet a common rate target of 1150 lbs./MWh (cells J13 and K13). As a result, the carbon credit costs and dispatch prices now reflect the underlying efficiency of the units (J15/16 and K15/16). These dispatch prices ripple through the generation resulting in a return to merit order dispatch. As a result, the units in State A now provide the majority of the generation (compare J21/K21 to F21/G21). Because, relative to the unmerged scenario, the lower-emitting/lower-cost units are now dispatching in merit order, the emissions and costs of the "merged" scenario are lower relative to the "separate" rate scenario. Compare emissions (cells L27 vs. H 27) and costs (M24 vs. I24). These differences are summarized at N24/O24 and N27/O27.

In this example, relaxing the requirement that rate-based states seeking to trade must merge their emission rate targets would lead to 20 percent more emissions and nearly 50 percent higher dispatch costs (O24 and O27).

Note too the impact on the natural gas combined cycle ("NGCC") units. In State A, the NGCC unit emission rate is higher than the state target rate (878 lbs./MWh > 850 lbs./MWh). Therefore, that NGCC unit will have to surrender credits to offset its emissions if it continues to run. In State B, the relatively higher-emitting NGCC unit's emission rate is much lower than State B's target emission rate (913 lbs./MWh < 1600 lbs./MWh). Because its emission rate is below the state target rate, the NGCC unit in State B generates emission credits every hour it runs. However, if emissions credit trading between States A and B is allowed under the "separate" rate scenario, the credits generated by the NGCC unit in State B can also be used to satisfy the obligations of affected sources in State A. This is so even though the NGCC unit in State B has a higher emission rate than State A's target emission rate.

The emissions consequences are clear: emissions are higher under a trading scenario where credits generated by a 913 lbs./MWh unit can satisfy State A's 850 lbs./MWh target rate than if State A's obligations had to be met by in-state sources of power with emissions rates below 850 lbs./MWh. In fact, under the "separate" rate scenario, the NGCC unit in State B has an extra incentive to run because it not only can generate and sell credits in State B, it can sell those credits in State A. Once again, under the "separate" rate scenario, higher-emitting resources (e.g., the 913 lbs./MWh NGCC in State B) have an incentive to run harder while lower-emitting resources (e.g., 878 lbs./MWh NGCC in State A) has an incentive not to run and will have to purchase offsetting credits.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Illustrative Implications of Merging Rate-Based Goals**														
2															
3		Input	Calc	Input	Input										
4		HR	ER	Fuel	VOM										
5		Btu/MWh	Lbs/MWh	$/MMBtu	$/MWh										
6	State A Lo ER Coal	9,500	1,995	3.00	5.00										
7	State A Lo ER Gas	7,500	878	5.00	2.00										
8	State B Hi ER Coal	9,800	2,058	3.00	5.00										
9	State B Hi ER Gas	7,800	913	5.00	2.00										
10						Lo ER	Hi ER			Lo ER	Hi ER				
11			BAU (No CPP)			CPP; w/ Inter-State Trading; Separate Goals				CPP; w/ Inter-State Trading; Merged Goals				Diff btwn 2 CPP Cases	
12			State A	State B	Total	State A	State B	Total	Diff v BAU	State A	State B	Total	Diff v BAU	#	%
13	State Goal (lbs/MWh)	input				850	1,600			1,150	1,150				
14	Credit Price ($/Ton)	input				10	10			10	10				
15	Coal Credit Cost ($/Mwh)	calc				5.73	2.29			4.23	4.54				
16	Gas Credit Cost ($/Mwh)	calc				0.14	(3.44)			(1.36)	(1.19)				
17	Coal Dispatch Price ($/Mwh)	calc	33.50	34.40		39.23	36.69			37.73	38.94				
18	Gas Dispatch Price ($/Mwh)	calc	39.50	41.00		39.64	37.56			38.14	39.81				
19	Coal Generation (Mwhs)	input	40.0	30.0	70	20.0	40.0	60		40.0	20.0	60			
20	NGCC Generation (Mwhs)	input	20.0	10.0	30	10.0	30.0	40		30.0	10.0	40			
21	Total Generation (MWhs)	calc	60	40	100	30	70	100	0	70	30	100	0		
22	Direct Coal Dispatch Cost ($)	calc	1,340	1,032	2,372	670	1,376	2,046	-326	1,340	688	2,028	-344	-18	
23	Direct Gas Dispatch Cost ($)	calc	790	410	1,200	395	1,230	1,625	425	1,185	410	1,595	395	-30	
24	Total Direct Dispatch Cost ($)	calc	2,130	1,442	3,572	1,065	2,606	3,671	99	2,525	1,098	3,623	51	-48	-48%
25	Coal Emissions (Tons)	calc	39.9	30.9	70.8	20.0	41.2	61.1	-9.7	39.9	20.6	60.5	-10.3	-0.63	
26	NGCC Emission (Tons)	calc	8.8	4.6	13.3	4.4	13.7	18.1	4.7	13.2	4.6	17.7	4.4	-0.35	
27	Total Emissions/Reductions (Tons)	calc	48.7	35.4	84.1	24.3	54.8	79.2	-4.9	53.1	25.1	78.2	-5.9	-1.0	20%

II. Allowing Interstate Trading Under "Separate" Rates Exacerbates the Leakage Problem

Note that because States A and B are located in the same power market, some degree of emissions "leakage" exists in the absence of interstate trading and merging standards. This leakage between rate-based states with different rate targets in the same power market will likely persist to some extent simply as a result of the disparate economic incentives for units within each state. Nevertheless, requiring "merger" of the rate targets could blunt this effect in states within the same power market that allow interstate trading between their affected sources.

Importantly, the prospect of introducing interstate trading without requiring merger of state emission rate targets risks metastasizing this leakage problem far beyond states within the same power market to states in all corners of the U.S. regardless of where they are located. To see this, we must simply modify the above example to one in which State A and State B are in different power markets and are either allowed to trade with "separate" emission rate targets or must "merge" their targets. In this case, other things equal, relaxing the merger requirement would provide economic incentives for higher-emitting, less efficient units in State B to run and sell credits to affected power plant owners in State A risking increased net emissions. Retention of the proposed merger requirement, however, would align the Clean Power Plan incentives with the efficiency of the sources in underlying power mix, resulting in less emissions at lower cost for the same amount of generation.

III. The Problem of Leakage is Likely to be Widespread if the Merger Requirement is Relaxed

CATF believes that the problem illustrated by the example above is fairly representative of many states under the Clean Power Plan proposal. According to EPA's NEEDS database, there is a wide range of CO_2 emission rates between coal units in each state and these ranges overlap, creating the potential for out-of-merit order dispatch in states in the same power market and incentives for higher-emitting units to run before lower-emitting units in states that trade with each other under "separate" rate targets.

Perhaps even more compelling is the fact that 26 states have target emission rates that are below the proposed section 111(b) new source performance standard emission rate for natural gas combined cycle units ("NGCC") (1000 lbs./MWh). That is, there is a real risk that if EPA fails to retain the rate merger requirement, NGCC units in states that have a target emission rate above that of their NGCC units would be able to run and generate credits that could be used in states whose state target emission rates are lower than the emission rate for those units. Once again, this will erode the emission performance of the CPP because higher-emitting resources could be used to satisfy the emission targets in stringent states -- states in which a comparable NGCC unit would not generate credits and in fact would have to purchase credits to continue to run. If EPA's proposed merger requirement for rate-based states seeking to participate in interstate trading is retained, this perverse effect would be avoided and the full emissions benefits of the Clean Power Plan maintained.

IV. Confining Interstate Trading to RECs Does Not Mitigate the Leakage Problem

Some have suggested that the rate merger requirement could be relaxed only for interstate trading of renewable energy credits ("RECs") between states choosing to comply on a rate-basis. But, this would create a variant of the same problem discussed above. In both of our hypothetical states, State A and State B, renewable energy resources would have an incentive to run and generate credits. The number of credits generated would be the difference between the renewable resources' emission rate (0 lbs./MWh) and that state's target emission rate. But, the number of credits generated by a renewable resource would be vastly different between State A, whose state emissions rate target is 850 lbs./MWh and State B, whose state emissions rate target is 1600 lbs./MWh. The same renewable resource would generate nearly twice as many credits per hour of operation in State B as if it were located in State A. If these credits could be then traded on an undiscounted basis to affected power plants for use in State A, these credits would offset and dilute a much greater amount of fossil unit emissions in State A than those generated by the same renewable resource had it been located in State A. That is, use of these credits would allow greater continued use of fossil resources. In this way, emissions in State A will be higher than they would have been had the states been required to merge their state emission rate targets as a condition of participating in interstate REC trading.

In sum, EPA must retain the requirement in the proposed Clean Power Plan that states choosing to comply on a rate-basis via interstate trading merge their state emission rate targets or the result will be significantly higher net CO_2 emissions and compliance costs.