Comparing Mass- and Rate-based Approaches to 111(d) Implementation

MASS-BASED APPROACHES	RATE-BASED APPROACHES
MASS — How does it work? — RATE	
The state goal is expressed as a maximum number of tons of carbon dioxide that may be emitted by covered plants for each time period. As long as the covered plants emit at or less than that number, the state goal is achieved for that time period.	The state goal is expressed as a number of pounds of CO2 per megawatt hour of generation from covered plants. As long as the covered plants produce electricity at or below the prescribed rate—after adjusting for energy efficiency, renewables and other allowed credit—the state goal is achieved.
MASS — Emissions & Growth? — RATE	
A mass-based approach constrains overall emissions leading at least in theory to a certain environmental outcome. Because the rate-to-mass conversion may take growth through 2030 into account, a mass-based approach can also allow for load growth and even increased emissions. In addition, the proposal does not require new sources to be covered by the mass emission limit—although there are good reasons why a state will want to include them. Some have also suggested a mass budget could be adjusted up or down in the future if load growth assumptions prove wrong.	A rate-based approach does not constrain overall emissions, and so in theory this approach could lead to an increase in emissions. A rate-based approach allows for load growth.
MASS — How are emissions reductions captured? — RATE	
A mass-based approach captures all emissions reductions that occur at the covered plants, whatever the reason for those reductions, without the need to design and implement a crediting mechanism for those reductions. Importantly, reductions can be captured from activities or events that EPA or a state might not allow a state to credit in the rate-based context, or that may be difficult to credit.	In order to credit emissions reductions or avoided emissions that result from activities outside the fence line of power plants—such as through energy efficiency or renewable energy projects—a state must design and implement a crediting mechanism for each type of credit. This is the biggest administrative challenge in the rate-based context that does not exist in the mass-based. Some eventualities that reduce emissions may not affect the emissions rate, such as plant retirements or when demand is reduced for reasons that cannot be credited. In addition, credits and the crediting process that creates them can be legally challenged, including through citizen suit actions.
MASS — Will allowed tons or credits be available to use for compliance? — RATE	
Allowed tons are available up front on day 1 for use by regulated power plants as part of the state's emissions budget. This provides up-front certainty to covered plants that allowed tons will be available for compliance.	Credits are issued by the state through a crediting mechanism. In states where existing natural gas units perform below the goal, they generate credits for each hour of operation. The issuance of many credits, however, depends on the applications of those who carry out projects, such as energy efficiency measures. Credit supply is therefore uncertain as compared to mass-based approach. Uncertainty can be managed by promoting activities that earn credits through a clear and efficient crediting mechanism that is deployed at the start of the program.
MASS — How is the level of effort allocated across entities? — RATE	
The state must allocate or otherwise distribute its emissions budget, i.e. the allowed tons a state's plants may emit in a given year, for use by power plants. Allowed tons have value and states can allocate or distribute that value to achieve specific ends. Allocation or distribution decisions can be challenging, but also represent an opportunity to address impacts or achieve complementary goals.	The state can apply the EPA-prescribed rate to every portfolio or power plant, or the state can prescribe different rates to different portfolios or types of plants so long as the state overall meets the EPA-prescribed state goal. Differentiating rates by portfolio or plant type introduces complexity and may require corrective measures in the event the approach does not achieve the overall EPA-prescribed state emissions rate goal, but it does provide a way to allocate effort differently for different portfolios or plants. Credits benefit the producer of the credit.

MASS-BASED APPROACHES		RATE-BASED APPROACHES
MASS	**What is the impact on multi-state coordination?**	RATE
Multi-state coordination will be easier in a mass-based context for several reasons: mass-based states can be linked at any time so long as each state has faith in the integrity of the tons from the other states and EPA has approved the state's budget; and mass-based goals do not have to be averaged when states decide to link because they are additive. If a mass-based state goal is treated as a budget of allowed tons, or allowances, each allowance represents the authorization to emit one ton of CO2; "a ton is a ton" regardless of the state of issuance. This means each state can keep its mass-based goal and trade with other states that do the same.		Multi-state coordination faces greater hurdles for rate-based approaches because EPA proposes that states must first average their rates together to arrive at a single rate for all connected states. This is because where there are differences between state rate-based goals: (a) a credit from one state is not the same as a credit from the other state; (b) trading credits seems to amplify the competitive disadvantage posed for the state with the more stringent rate; and (c) trading leads to shifts in generation that potentially undermine achievement of the environmental goal. Yet the requirement to merge state goals means some states will have to adopt a more stringent rate when collaborating with other states—a significant political challenge. If in the final rule EPA allows states with different rates to trade rate-based credits, additional work is needed to identify ways to counteract competitiveness and leakage effects to make that approach workable for states.
MASS	**How do new plants factor in?**	RATE
EPA proposed that states have the option of covering new plants. States that cover new plants may add the emissions from the new plants into their emissions budgets and avoid creating an uneven playing field between new and existing plants.		EPA proposed that states have the option of covering new plants. States that include new plants may find it easier to comply with the state's emissions rate goal, because new plants in many states generate at a rate below the prescribed state rate.
MASS	**What is the economic effect?**	RATE
A mass-based approach places value on avoided tons of carbon dioxide and increases the relative cost of generating from higher emitting sources compared to lower emitting sources. This effective carbon price on each ton of carbon dioxide emitted by covered plants serves as the economic incentive for plant-level emissions reductions, dispatch changes, energy efficiency, or other emissions reduction measures that reduce total CO2 emissions within the state.		A rate-based approach does two things: it effectively imposes a carbon price on plants that generate electricity at a rate higher than the prescribed rate, while also providing a subsidy (a payment) to generators that operate below the prescribed rate. This has the effect of subsidizing generation that emits below the emission performance standard while discouraging generation that emits above the standard.
MASS	**How does the approach affect competitive electricity markets?**	RATE
Under a mass-based approach in a competitive wholesale electricity market, fossil units have a new operating cost that gets added to their bids. The cost is tied to the carbon emissions, so that units with greater emissions per unit of power produced will have a higher cost. The carbon price changes the order that units are dispatched. A multi-state or regional market-based trading approach results in a consistent carbon price signal that affects units in the region uniformly; whereas a state-by-state carbon price means units of the same type in different states may be affected differently.		Under a rate-based approach in a competitive wholesale electricity market, fossil units that operate below the prescribed rate will earn a subsidy that decreases the units' operating cost and the amount of their bids to the ISO/RTO. Other units have to obtain credit(s) at a cost, thereby increasing their operating costs and the size of their bids to the ISO/RTO. In this way, rate-based approaches move some units up and push other units back in the dispatch order. A regional emissions rate approach places all units in the region on a level playing field (with a uniform credit price), while state-by-state implementation or different state rates means uneven competition.