By weight or by rate? EPA offers states little direction for converting CO2 metric

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The U.S. EPA’s proposed rule to reduce carbon dioxide allows states to convert their goals from a carbon intensity rate to mass of carbon, but it neglects to tell them how.

This weight-or-rate question is one of the earliest a state must answer before it can design policies that lower greenhouse reductions. The choice is freighted: A rate-based model is agnostic on economic growth, but could make the math of compliance complex, while a mass-based goal means guessing on future economic growth and using complicated models to set the goal, but makes compliance far simpler.

"Do you accept the complexity of the front end or the back end?" said Tim Profeta, director of the Nicholas Institute for Environmental Policy Solutions at Duke University. If a state decides to develop a mass-based program, a good deal of the complexity is in the up-front modeling, where the execution should be, "but a lot of the execution is simpler when you have a mass-based target," he said.

The EPA released its proposed Clean Power Plan on June 2, along with hundreds of pages of technical support documents. The plan, a key part of President Barack Obama’s goal to reduce U.S. contributions to global warming, would lower carbon dioxide emissions from the U.S. power sector by 19.2% by 2030 from 2012 levels, according to SNL Energy data.

As part of the proposed rule, the EPA provides each state with a carbon reduction goal measured as a ratio of pounds of carbon dioxide per megawatt-hour, and it allows states to choose their own policy path to achieve those goals. It also, explicitly, allows states to convert those goals from a ratio to a mass-based target, measured in tons of carbon dioxide.

States interested in such a conversion would turn to a technical support document called "Projecting EGU CO2 Emission Performance in State Plans," which makes a few suggestions of different types of models a state might consider. But the key phrase in the document may be, "The EPA seeks comment on whether to assist states that seek to translate the rate-based goal into a mass-based goal."

Which is another way of saying the agency is not sure how to do it best.

"They basically say, ‘If you want to convert to mass, then you have to do some modeling,’ said Anthony Paul, a Center for Climate and Electricity Policy fellow with Resources for the Future, a think tank. ‘That’s basically all they say.’

Strategically speaking, the primary advantage of a rate goal may be that it can be met regardless of changes in demand due to economic or demographic growth. Mathematically, a state that lowers the rate of its electrical system can produce as much or as little power as it needs and still meet the EPA’s goals.

But calculating that compliance is complicated. A carbon intensity rate is the amount of carbon dioxide emitted divided by the amount of electricity sold. States can increase the denominator by adding zero-emission renewable energy, and they can reduce the numerator by making coal plants, which have the highest greenhouse gas emission rate in the electricity sector, run more efficiently or retire. They also may be able to remove both generation and emissions by building new natural gas plants which are not governed by the existing power plants rule. Most challenging, they may decide to implement energy efficiency measures. States can calculate the
amount of energy not used by installing better lighting or more efficient dryers and add that lost energy or "negawatts" into the denominator.

All of this calculation is complex and requires a lot of interpretation of the rule requirements, Profeta said.

With a mass-based goal, the state is promising to keep total emissions from power plants under a certain level by 2030, measured in tons of carbon dioxide. Complying with a mass-based goal is much simpler, because there's much less math or verification. An energy efficiency program, for example, will reduce demand, which means running generators less and thus fewer emissions. Replacing coal plants with natural gas plants means lowering a state's overall emissions, as does adding in renewable plants.

Mass-based goals also slot into existing cap-and-trade programs more easily. Both California's cap-and-trade program and the Regional Greenhouse Gas Initiative in the Northeast use mass of carbon to measure compliance.

But mass goals also force states to make guesses about economic growth. If a state models too little growth, and demand outstrips predictions in the middle of the compliance period, the state may find itself forced to implement expensive policies to get into compliance in the last years of the plan. A state that projects too much growth may find itself implementing expensive policies that overshoot its target.

This same logic leaves some room for gaming the system. A state could project substantial growth, which would produce more emissions by mass, and thus set a goal that would be easier to reach.

States also may be able to reach out to experts including regional transmission organizations that have long experience projecting electrical system growth.

"The RTOs and the ISOs are sophisticated at projecting electricity demands," Paul said.

Either way, states will have to choose between rate and mass goals almost before they make any other decisions, and the EPA has left them little guidance in how they do it.

"The point is that a rate target leaves flexibility for economic growth or stagnation, in a sense, but doesn't provide any certainty about emissions and vice versa with a mass goal," Paul said. "With a mass goal, certainty on emissions, but costs could be especially high."

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