RESOURCES *for the* FUTURE

RFF Report: State Policy Options to Price Carbon from Electricity

North Carolina Fact Sheet

We examine the opportunity to reduce greenhouse gas emissions in the electricity sector in North Carolina.

We examine the opportunity to achieve emissions reductions using carbon pricing through cap and trade and renewable energy policies. An emissions cap limits the maximum emissions and the cap declines over time. Trading of emissions allowances ensures that emissions reductions are achieved where it is least expensive to do so. Policies promoting renewable energy are another way to achieve emissions reductions that can be pursued separately or in combination with cap and trade.

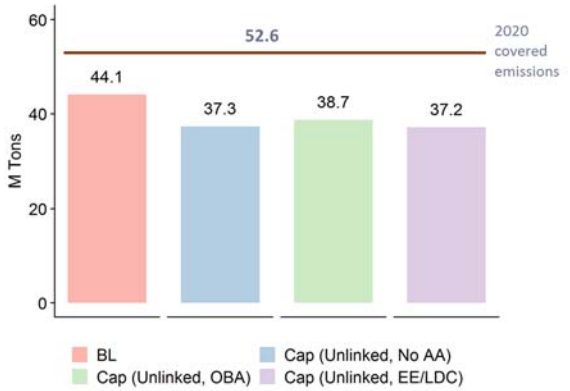
We explore the design of cap and trade by focusing on an important feature of how tradable emissions allowances are initially "allocated." As indicated in the figure labels, one option is direct allocation to regulated entities through a method known as output-based allocation (OBA). Another option is to invest half the allowance proceeds in energy efficiency (EE) and to allocate half to local utilities (local distribution companies) for rate relief (LDC). A third option is to make no allocation within the electricity sector, and instead direct allowance proceeds to the General Fund (No AA). We also explore the possibility of linking a cap-and-trade program in North Carolina with the multi-state Regional Greenhouse Gas Initiative (RGGI).

We conduct the analysis using a detailed model of the electricity sector and explore policy scenarios beginning in 2020 and running through 2030. We assume the emissions cap declines by 3% of 2020 levels each year, falling by 30% by 2030. Because what happens in the final year 2030 will be strongly influenced by what is expected to happen in the model after that year, and because that year is so far in the future, we focus our attention on the results for 2026. We present our main findings below.

1. Emissions reductions can be achieved at very low cost

Figure 1 illustrates that baseline emissions are already expected to fall from 2020 levels going forward. Our projected baseline is nearly on course to achieve the emissions cap through 2026 without a carbon price. Nonetheless, the cap-and-trade policy options achieve even greater emissions reductions, as we explain below.

Figure 1. Emissions in 2026 under cap-and-trade scenarios

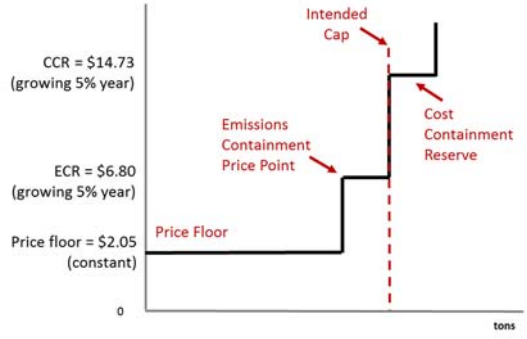


The cap-and-trade scenarios achieve cumulative reductions by 2030 of about 150 million tons measured from 2020 emissions levels. The falling baseline emissions projection contributes much of emissions reductions compared to 2020 emissions levels; nonetheless, measured against the improving baseline, cap and trade achieves additional cumulative reductions of 81 million tons.

2. Low allowance prices accelerate emission reductions.

We imagine a design for cap and trade borrowed from RGGI with cost control features including an "emissions containment reserve" and a "price floor" as illustrated in Figure 2. These features prescribe minimal accepted prices for some portion of the emissions cap. Ten percent of the allowances will not enter the market at auction prices below the emissions containment reserve price, and no allowances enter at prices below the price floor. These important cost management features translate low allowance prices into significant additional emissions reductions.

Figure 2. The allowance supply schedule (2026 prices/2015 real$)



Low prices yield an additional 4% annual emissions reduction by 2030, and 10.4% additional cumulative reductions over the decade compared to2020 levels, beyond what is required by the cap. The additional reductions are achieved because the cost management features reduce the number of allowances that enter the market when prices are below the emissions containment reserve price trigger or the price floor. The cost management features are implemented in an auction, but we note these features can be implemented even when allowances are given away for free by use of a consignment auction, with auction proceeds returned to the original holders of allowances.

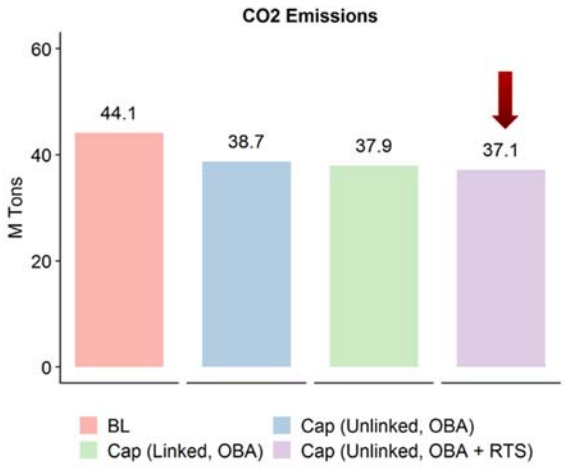
3. Renewable energy policy achieves emissions reductions at greater cost than cap and trade but also creates important clean energy infrastructure for the future.

The renewable energy policy we model requires in-state wind and solar generation to grow by 1% of electricity consumption per year. By 2026 this policy in isolation results in emissions of 39.7 million tons (MT), a reduction from 2020 levels and from the baseline, but greater than the emissions outcome achieved by cap and trade (approximately 38 MT, varying across scenarios). The renewable energy policy also requires more upfront capital investments than cap and trade.

However, the renewable policy succeeds in approximately doubling the amount of renewable capacity and generation compared to cap and trade, thereby providing important new infrastructure and valuable experience with renewables integration that puts the state in a better position for the future.

An option used in many states is a combination of policies to achieve cost effective emissions reductions in the near term and to put in place a renewable energy infrastructure for the future. The combination of policies leads to the lowest emissions as illustrated in Figure 3.

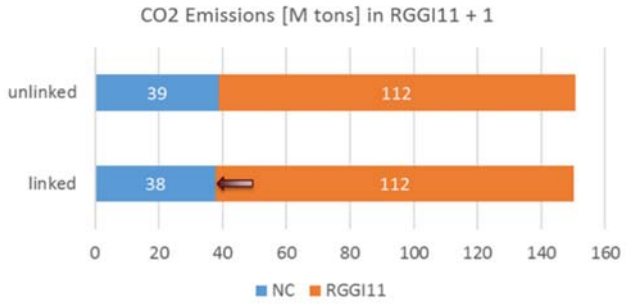
Figure 3. Emissions in 2026



4. The "trade-ready program design" we model could link seamlessly with the Regional Greenhouse Gas Initiative.

Adopting the RGGI program design makes linking straight forward. Allowance prices in North Carolina are similar to prices expected in the eleven state RGGI region (including VA and NJ) so linking results in little shift of emissions, and in fact slightly reduces total emissions in the combined region, as illustrated by Figure 4 for the OBA allocation scenario. Linking provides greater resiliency for the program and stability for allowance prices in face of uncertain weather, fuel prices, etc., while preserving state autonomy and programs.

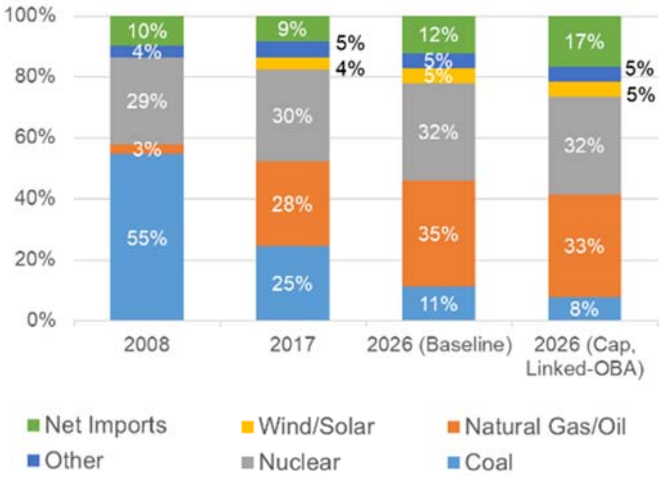
Figure 4. CO_2 emissions fall when the programs are linked.



5. Emissions in North Carolina (and across the country) are falling over time.

The electricity sector in North Carolina is transitioning toward cleaner generation. Capacity factors at Duke Energy's coal units have fallen by half over the past decade. Drawing on forecasts by EIA, EPA and utility Integrated Resource Plans, we construct a baseline projection for next decade. Figure 5 illustrates our expectation that by 2026 natural gas and nuclear would each represent about one-third of electricity generation in the state in the absence of clean energy policy, with coal representing only 11 percent. A cap ensures further emissions reductions are realized and provides a strong signal for investors and innovators seeking to expand clean energy.

Figure 5. Historic and projected generation in North Carolina (Historic source: EIA).



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