Yesterday I developed a basic overview of the different categories of allowances in California's GHG trading program. As promised, this post considers the number of allowances that California will freely give to specific industries.

Why do we care about industry allowances?

First, allowances have value and the Air Resources Board (CARB) has chosen to give many allowances to industries that CARB believes have "transition risk" and "emissions leakage risk." Transition risk means that some industries could lose profitability thus preventing them from investing in cost-effective emission reductions. Emissions leakage is the risk that, due to carbon pricing in California, demand for goods will shift to outside California where no carbon pricing exists. In other words, the risk that industry could close shop and move out-of-state in response to cap-and-trade. Industries that have difficulty passing through costs due to interstate competition are most at risk. Giving allowances to these industries for free mitigates these risks.

Second, as mentioned yesterday, a large portion of auction allowances—and thus auction revenue—could come from the allowances that are leftover after giving allowances to industry.

This chart provides an estimate of industry allowances in relation to all other allowance categories. What follows is a description of how I reached that estimate.

California cap-and-trade allowance categories with industry estimate

Some things to note about the relative number of industry allowances. Industry allowances are roughly comparable to POU (public utility) allowances. In 2013–2014, most of the remaining allowances are devoted to industry (at least half of the remainder). In 2015, additional allowances become available but the industry allowances remain relatively constant, meaning that many more allowances will be auctioned in 2015 and beyond.

The cap-and-trade regulations use a rather complicated formula to allocate allowances to industry. The formula is intended to accomplish several goals:

1. Provide transition assistance to certain industries. Transition assistance, not surprisingly, should decrease over time.

2. Provide leakage assistance to certain industries. Leakage assistance stays relatively flat over time.
3. Reward industries that reduce their emissions.

The industry assistance regulations contain tables that identify eligible industries, identified by NAICS (an industry classification) sector. The formula used relates unit output for each industry to an average emissions level. Eligible industries receive free allowances based on their output, not their emissions. These industries still must obtain sufficient allowances to cover their emissions. Thus free allowances are decoupled from emissions, rewarding industries that take steps to reduce their emissions.

Each industry is assigned an Industry Assistance Factor. This factor represents the amount of assistance (free allowances) the industry receives as a percentage of output. In 2013–2014, all eligible industries have a 100% Industry Assistance Factor. In 2015–2017 and again in 2018–2020, some industries will receive less than 100%, scaling down to 75%, 50% and 30% depending on the industry. Industries with a high assistance factor should be those with high risk of leakage. The result is that assistance for most industries decreases over the life of the trading program.

The other important aspect of the industry assistance is the baseline emissions level. In developing its assistance formula, CARB aimed to give sufficient allowances, on average, to cover 90% of an industry’s average emissions.

Thus we can develop a rough estimate of industry allowances by taking 90% of industry emissions and then applying the other assistance factors by industry sector. Industry emissions for 2010 are summarized in an excel spreadsheet available here. I used these numbers to develop the chart below. Note that a few eligible sectors have no reported emissions. Estimates for 2013–2020 assume a constant rate of industry emissions. For these reasons, this should be considered a rough estimate that might be significantly lower than the actual number of industry allowances. (It is also likely that there are other errors in this estimate that I have failed to consider.)

Rough estimate of industry allowances in California's GHG trading program.

This estimate demonstrates how industry allowances, if output does not drastically

change, should decrease over time. The major drops are due to drops in the industry assistance factor along with a decrease in another variable, the "cap adjustment factor" (this accounts for the decreasing cap so that the proportion of industry assistance stays relatively constant compared to the total number of allowances, all other things being equal).

Next week I will put all these estimates together to get a range of auction revenue. And if anyone has better numbers on industry allowances, please let me know!

Code and data are available at Github. Figures created using the ggplot2 package in R.