Control of Greenhouse Gases Difficult with Cap-and-Trade or Tax-and-Spend

Jonathan A. Lesser

The Nobel Prizes are out, and Al Gore—global warming's Cassandra-in-chief—has been awarded the Nobel Peace Prize. Perhaps he is correct and the debate over global warming *is* over—not because his dire predictions are valid, but because collectively we love to be frightened. Thus, let us suppose the question is no longer whether, but what type of federal climate change regulations will be enacted.

In the policy arena, the main battle is between cap-and-trade programs and carbon taxes. Of course, there are other skirmishes, such as the debate over raising Corporate Average Fuel Economy (CAFE) standards, but those are tangential, directed toward reducing U.S. dependence on petroleum. (Higher CAFE standards will not accomplish that goal, but I will leave that explanation to a future column.) Most politicians are pushing cap-and-trade programs modeled after those that have been used to reduce emissions of sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) under the Clean Air Act. Cap-and-trade proposals are popular because they lull consumers into thinking that somebody *else* will bear the costs of reducing carbon emissions. A few brave souls, like Rep. John Dingell of Michigan, are proposing a carbon tax instead. With a carbon tax, consumers will easily see they are the ones paying for reduced carbon emissions. They are likely to be less politically malleable as a result.

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Which approach—cap-and-trade or carbon taxes—is better? Each has its benefits and drawbacks. Emissions taxes are straightforward, but they do not directly control emissions levels. Under this approach, one must determine an overall emissions reduction goal and then estimate the change in consumer behavior at various tax levels that will achieve that goal. Cap-and-trade programs begin with an emissions goal. (If the government sets a cap of 8 million tons of SO_2 emissions per year, then emissions cannot exceed that amount: end of story.) Nevertheless, these programs require several additional components. First, they require an initial allocation of the allowances to polluters. European countries allocated too many allowances in their first cap-and-trade approach. As a result, the market price of allowances fell to zero. Second, these programs require an ability to measure emissions. (With an emissions tax, one only has to measure the fuel input, which is easier.) Third, these programs re-

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quire a central exchange where emissions allowances can be bought and sold.

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A CARBON CAP-AND-TRADE PROGRAM WILL NOT WORK

Proponents of a cap-and-trade approach point to that approach's success in reducing SO_2 and NO_x. No doubt about it, in that context, cap-and-trade has been successful—certainly far more so than the old-style command-and-control approaches that were and, to some extent, still are used. However, the analogy of current cap-and-trade proposals to those programs quickly fails. If cap-and-trade works for SO_2 and NO_x, why won't it work for carbon and other greenhouse gases (GHGs)? A GHG cap-and-trade program for carbon will work—but only up to a point—and it will be less efficient and more costly than a carbon tax.

If we want to control methane, which is a far more potent greenhouse gas than carbon dioxide, we need to find a way to cap emissions from our bovine, porcine, and equine friends.

Here is why. Cap-and-trade programs are best suited for pollutants that are produced by relatively few sources (coal plants, oil refineries, and similar facilities) whose emissions can be accurately measured. Man-made SO_2 and NO_x emissions come from almost exclusively from coal- and gas-fired power plants, oil refineries, and other large industrial sources. That is clearly not the case with CO_2, which is emitted with every breath we take and every fossil fuel we burn. Moreover, if we also want to control other GHGs, especially methane, which is a far more potent greenhouse gas than carbon dioxide, we need to find a way to cap emissions from our bovine, porcine, and equine friends. Granted, there have been some truly useful suggestions: Greenpeace is encouraging Australians to eat less beef and more kangaroo. Some in Norway are murmuring about reducing moose populations. (Moose, it seems, are prone to extreme flatus. Woe is the scientist tasked with measuring such.)

In the United States, one-third of carbon emissions come from mobile sources—planes, trains, automobiles, ships, and so forth. Agriculture is another major source, even if U.S. ranchers do not raise kangaroos or moose. If a cap-and-trade program is to succeed, it will have to account for the millions of tons of methane emissions from all sources. In fact, if we are really to take Gore to heart, then we should subject the carbon dioxide we exhale with every breath to the cap. Thus, forget "heavy breathing."

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Ridiculous? Perhaps. However, the alternative is to exclude millions of emissions sources, which reduces the efficiency of any cap-and-trade scheme. Should farmers be required to purchase methane allowances for their livestock? Environmentalists argue that they should if livestock is a major source of GHGs. What about everyone who owns an automobile? What about owners of private aircraft and boats? How can all of these GHG sources be brought into a cap-and-trade program efficiently and cost-effectively?

Ridiculous? Perhaps.

Remember, a cap-and-trade program only works if emissions can be measured accurately and cheaply. If the costs of measuring and accounting for GHG emissions, to say nothing of controlling them, are greater than the market price of allowances, then a cap-and-trade program will be worthless. The potential for such an inevitability is the key drawback of a carbon cap-and-trade approach, and it explains why an approach that was successful in addressing SO_2 and NO_x emissions cannot have the same measure of success if used to reduce GHG emissions.

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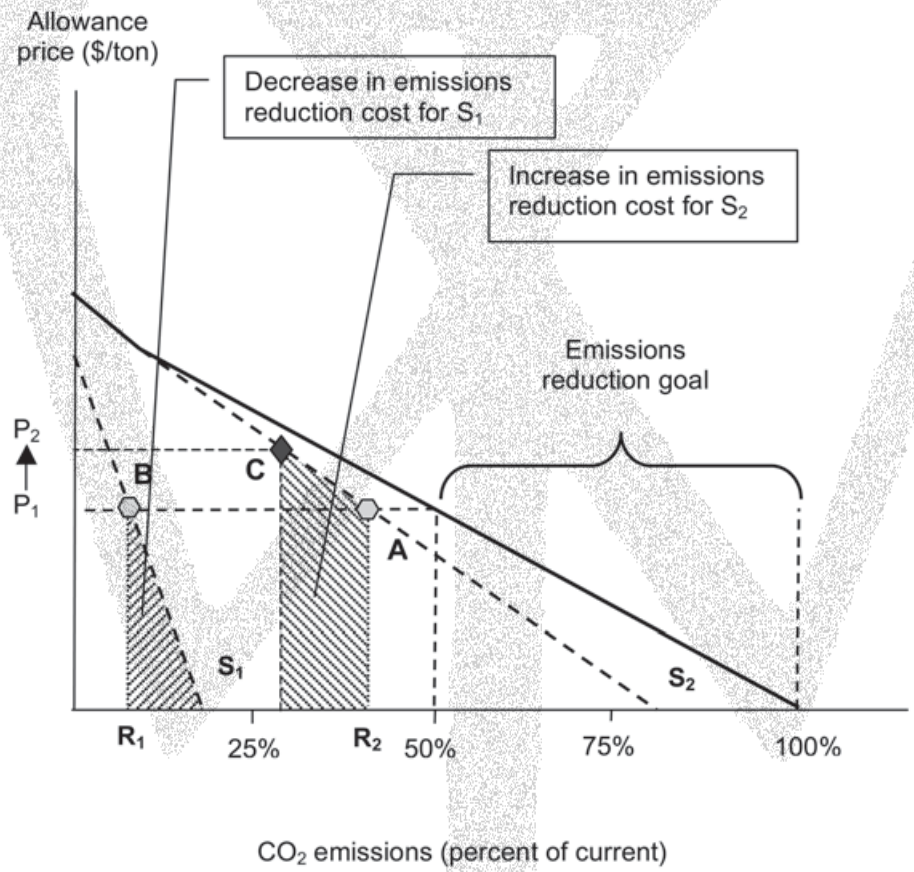
Cap-and-trade programs work only if all (or at least most) of the major emissions sources are included and can be measured accurately. For carbon emissions, the only way to do that is to measure fuel consumption and Btu content. For example, natural gas will have a different Btu content depending on the mix of component gases (e.g., methane, ethane, butane, and other gases) that natural gas contains. It is straightforward to measure fuel use and heat content for large stationary sources, like electric generating plants and oil refineries, but the cost of tracking and measuring all mobile source emissions will be prohibitive. As for all of those bovine, porcine, and equine emissions, one doubts

Exhibit 1. Impacts of Restricting Emissions Sources Subject to a Cap-and-Trade Program



In Exhibit 1, there are two sources of CO_2 emissions, S_1 and S_2. Source S_2 accounts for about 80 percent of total CO_2 emissions, while source S_1 accounts for about 20 percent. If the overall emissions reduction goal is to halve current emissions (50%), then a cap-and-trade program applied to both sources will result in an allowance price of P_1. Each source will reduce emissions to levels R_1 and R_2, respectively (shown as points A and B). Now suppose source R_1 is exempted from the cap-and-trade goal, but that the overall reduction goal remains the same, halving current emissions. Then, source S_2 will be forced to reduce its emissions by over 50%, resulting in a reduction to point C. The resulting allowance price will increase to P_2. Society will be worse off, as the cost of achieving the reduction will increase by the difference in the two shaded areas.

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whether Bessie, Porky, and Mr. Ed will want to be hooked up to various, er, measuring devices.

Cap-and-trade proponents offer several alternatives. One is that we can ignore GHG emissions from some sources and focus only on sources that can be measured easily. True—however, if those sources constitute a major percentage of total emissions, it may be impossible to reach the desired emissions reductions levels. For example, if Cassandra, er, Gore, says that by the year 2050 we must reduce overall emissions greenhouse gas 80 percent below current levels, then excluding large swaths of emissions sources requires larger emissions reductions for sources that do fall under a cap-and-trade program.

How much larger? A bit of algebra reveals the answer. For example, suppose we exclude all privately owned vehicles from the cap-and-trade program. If those sources account for 20 percent of the emissions, then the sources of the remaining emissions sources would have to reduce emissions by 100 percent. A moment's reflection reveals that any cap-and-trade program will obviously fail if the cap is set to zero unless we start creating "anti-carbon." (While growing trees absorb carbon for a time, that carbon eventually returns to the atmosphere.) In general, the effect of eliminating emissions sources from the cap-and-trade program raises the price of allowances and reduces the economic efficiency of the program (**Exhibit 1**).

There is a clear conflict between instituting policies to reduce emissions from coal-fired power plants while increasing the demand for electricity to power millions of electric vehicles.

Not to be left out, a number of states plan to develop their own cap-and-trade systems. In addition to the Regional Greenhouse Gas Initiative that encompasses a number of states in the eastern United States, there is also the Western Climate Initiative, which covers six states, plus British Columbia and Manitoba. Although there are reassurances that "coordinated" programs will be proposed by the end of this year, such programs will likely conflict with mandates for in-state renewable resource development. One already-recognized problem is a desire to rely more heavily on electric vehicles to reduce GHG emissions. Even if that is an economically efficient approach, there is a clear conflict between instituting policies to reduce emissions from coal-fired power plants while increasing the demand for electricity to power millions of electric vehicles.

BY ANY OTHER NAME

Rather than excluding millions of transportation emissions sources, one could hold vehicle manufacturers responsible. For example, rather than requiring individual vehicle owners to buy and sell carbon/GHG allowances, automobile manufacturers could be assessed an estimated carbon footprint, based on the number and types of vehicles they sold.

As with all of these GHG approaches, there are a number of problems. First, the cost of the allowances would be passed on to consumers in the form of higher vehicle prices. Second, such an approach would not address existing vehicles.

Third, the approach would penalize consumers who drive less than the average and subsidize those who drive more. Ironically, the "carbon footprint" approach would encourage more driving and higher emissions, as consumers seek to reduce the effective carbon tax per mile driven. Moreover, such an outcome describes the ultimate flaw in the approach: it is a carbon tax in disguise, albeit a costly and inefficiently administered one.

Not a perfect solution, but at least it would pass a "smell" test.

If policy makers are amenable to a carbon tax "in disguise," why not follow Representative Dingell's lead and adopt a direct carbon tax, at a lower cost? Such a tax would capture all fossil fuel emissions—mobile and stationary sources alike. Revenues from the tax could be "recycled" to reduce other, market-distorting taxes. However, a carbon tax would not address agricultural methane emissions. Perhaps the best alternative solution would be to impose a "head tax" (or other appropriate labeling) on cattle, pigs, sheep, and so forth, based on the average emissions of each. Not a perfect solution, but at least it would pass a "smell" test.

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