Nicholas Institute for Environmental Policy Solutions
Working Paper
NI WP 09-07
October 2009

Allowance Price Containment Options for Cap-and-Trade Legislation

Peter Maniloff*
Brian Murray†

*Nicholas School of the Environment, Duke University
†Nicholas Institute for Environmental Policy Solutions, Duke University

Contents

INTRODUCTION

This working paper examines allowance price containment options under the type of greenhouse gas (GHG) cap-and-trade program now being debated in the U.S. Congress. It first explains why price containment has been deemed a critical feature of any federal cap-and-trade program and then describes how price containment is handled in the Waxman-Markey bill (The American Clean Energy and Security Act of 2009, hereafter referred to as H.R.2454) that passed the House of Representatives this summer. It introduces some possible modifications to that approach that parties are considering and concludes with issues that the Nicholas Institute for Environmental Policy Solutions has started to internally examine. It proposes further research that may help to guide policy modification by the Senate if needed.

WHY ALLOWANCE PRICE CONTAINMENT?

A cap-and-trade system imposes a fixed limit on GHG emissions, issues allowances equal to that limit, and gives regulated entities the right to trade the allowances to meet their compliance obligations. This creates a market for GHG allowances and a price at which allowances trade between parties. The allowance price gives the most direct measure of the cost of compliance with the policy.

Table 1. Allowance price estimates from government studies of H.R. 2454.

Study	2015 allowance price – core estimate ($/tCO$_2$)	2015 allowance price range ($/tCO$_2$)	Notes
EPA[a]	$13	$13–$24	ADAGE and IGEM models Upper end estimates with no international offsets available
EIA[b]	$22	$14–$65	NEMS model Imputed from 2020 values reported
CBO[c]	$19	na	Economic synthesis – no structural economic model used

a. http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf

b. www.eia.doe.gov/oiaf/servicerpt/hr2454/index.html

c. http://www.cbo.gov/ftpdocs/102xx/doc10262/hr2454.pdf

Government agencies such as the Environmental Protection Agency (EPA), the Energy Information Administration (EIA), and the Congressional Budget Office (CBO), as well as numerous academic and privately funded studies, have informed the cap-and-trade debate. The government analyses typically rely on models that generate estimates of the policy's macroeconomic effects (e.g., GDP, consumption), energy market impacts (e.g., price of petroleum, natural gas, coal, electricity), and the GHG allowance price. The government agencies' allowance price estimates for H.R. 2454 are given below.

By and large, the core allowance price estimates from these studies line up with macroeconomic effects that are expected to be small relative to the size of the economy and expected future economic growth rates—e.g., less than 1%–2% reduction in baseline real GDP in 2030, which will have grown substantially from current levels with or without the policy in place. Whether energy sector effects are deemed large or small is a matter of perspective, as prices and demand for some carbon-intensive fuels, such as coal, are subject to substantial change, while some other fuels and electricity price effects are more muted. It is not the purpose of this paper to try and convince the reader that these economic effects are worrisome or not. Rather, we simply point out that these analyses provide the latest range of government- sanctioned estimates for allowance prices that lawmakers can consider as they debate H.R. 2454 in the Senate. Other estimates from industry groups and environmental NGOs vary, with some

estimates suggesting very small effects, and others estimates projecting much larger impacts (NRDC 2009; NAM 2009).

One way to view the situation is that the core estimates reported in Table 1, representing in some sense the agencies' "best" estimates, may be deemed economically acceptable to a critical mass of lawmakers, but the upper end of the range gives cause for concern. Factors that determine where allowance prices will fall include supply of international and domestic offsets, the adoption of low- carbon technologies (e.g.,carbon capture and storage[CCS], which enables the decarbonization of coal use), and the adoption of demand-side technologies and behaviors that reduce the consumption of GHG-intensive products. If these factors are slower to emerge than expected, prices could gravitate toward the high end of the range. If they happen quicker, allowance prices could fall to the lower end. Factors such as unanticipated changes in economic activity or annual weather patterns also can lead to volatility in the allowance market, especially if flexibility mechanisms, such as banking and borrowing, are restricted in some way.

With this uncertainty, both chambers of Congress have called for assurances that some sort of "emergency off ramp" be in place to counter allowance prices that appear to be spiraling out of control. While much of the concern is on the high end of the price spectrum, investors in low-carbon technologies may find the prospect of extremely low prices to be problematic. Such low prices also may be indicative of forgone opportunities for further cuts in emissions. We refer to the types of measures called for by Congress as *allowance price containment mechanisms.*

WHAT PRICE CONTAINMENT MECHANISMS ARE IN H.R. 2454?

H.R. 2454 employs a flexible price collar approach to constraining allowance prices. A flexible price collar has two aspects: a limited reserve fund of permits available at a high price, and a price floor at the primary permit auctions.

The limited reserve fund will be available at quarterly auctions. These auctions will have a minimum price of $28 in 2012, $29.40 in 2013, and $30.87 in 2014 (all 2009 dollars). After 2014, the minimum auction price will 160% of the three-year rolling average of daily permit closing prices. Only a limited number of permits will be available at these auctions— at most 5% of annual permit allocations from 2012–2014 and at most 10% after 2014. This flexible price ceiling accommodates a tradeoff between a desire to mitigate unexpected price shocks and a desire to maintain aggregate emissions caps.

The reserve fund will be filled initially with annual allotments from inside the cap—1% of annual allowances from 2012–2019, 2% from 2020–2029, and3% from 2030–2050. Additionally, any permits that are not purchased at auction will be allocated to the reserve fund.

Proceeds from reserve fund auctions will be used to purchase international offset credits. Those credits will refill the reserve fund at a rate of 0.8 domestic credits per internationally offset ton. This discount reflects greater uncertainty by some about the long-term environmental stability of international offsets from reduced deforestation, as well as administrative uncertainties about additionality (would the deforestation have happened without the offset purchase?) and verification (did the deforestation actually happen despite the offset purchase?).

Regular permit auctions will have a minimum sales price. This price floor will ensure that if demand for permits is lower than expected, low-cost emissions reductions will still be achieved. The price floor will be $10 (2009 dollars) in 2012, increasing at 5% per year plus inflation. Permit banking will ensure that permit trading prices will not dip significantly below the minimum auction sales price between auctions.

POTENTIAL MODIFICATIONS

Even while retaining this basic architecture for the allowance reserve, there are a number of key changes that could be made. We list a few of these key issues in Table 1 and discuss them further below.

Reserve as the difference between two caps

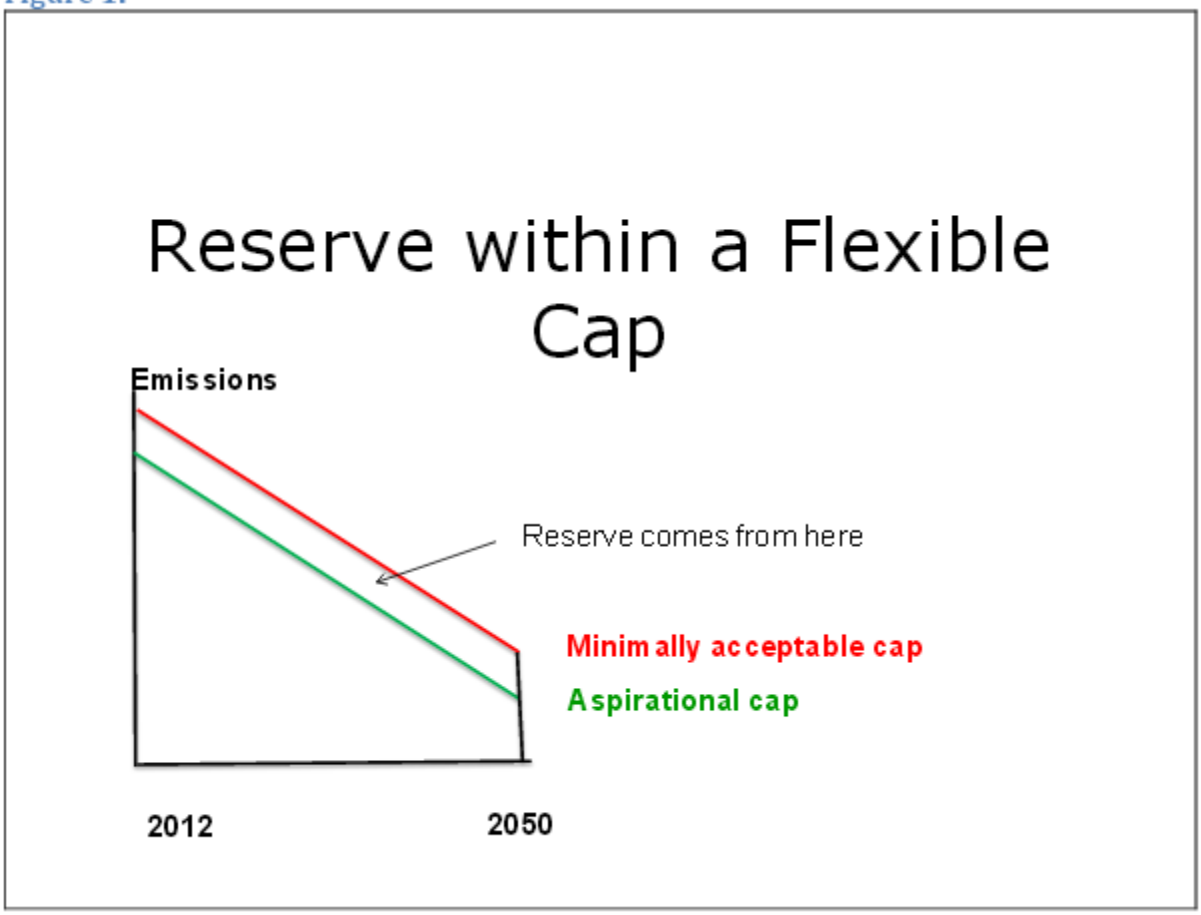
A fundamental issue is whether permits in the reserve fund should be pul led from inside or outside the cap. A conceptual reframing would be to think of two caps— a stringent, aspirational cap that is met if no reserve allowances need to be accessed, and a less stringent but acceptable cap that reflects the possibility that all reserve allowances could be necessary to meet the price containment objectives. As shown in Figure 1, the reserve fund would comprise the difference between the two caps. In this framework, we would think about the two different caps as different goals and set the reserve fund quantity accordingly.

Table 2. Potential changes to the price containment mechanisms.

Potential Modification	Type of change	Issues at play
Two-cap approach	Conceptual framework	Conceptual framing – What do the permits in the reserve fund represent? Do they come from inside or outside the cap?
Reserve price	Short-term price containment	A lower reserve price can ensure stronger price containment, but will necessitate more frequent use of the reserve fund and thus result in greater aggregate emissions.
Reserve fund annual quantity	Short-term price containment	The annual quantity should be set in conjunction with the reserve price to ensure that the mechanism can contain expected demand shocks at or near the target reserve price.
Reserve fund cumulative quantity	Long-term mechanism integrity	If the total cumulative reserve size is too low, then the reserve fund will eventually be exhausted and the price containment mechanism will no longer work. If it is set too high, then the policy will result in excess emissions.
Alternative to an auction	Distribution, dynamic efficiency	Rather than auctioning and having all emitters face the same price, allowances could be targeted to certain emitters to guarantee a maximum price for at least some of their compliance obligation
Hard price ceiling	Policy architecture	A hard price ceiling would provide strong price containment at the expense of potentially large increases in emissions.

The minimum price for the reserve auctions, which we call the "reserve price," determines how often the reserve fund will be used. A lower reserve price means that the reserve mechanism will be used more often, generating greater price certainty over small and near-term fluctuations. However, it also means that the reserve fund of allowances would be accessed more frequently due to demand shocks such as weather or economic fluctuations (Murray, Newell, and Pizer 2009). The annual size of the reserve fund must be higher to consistently meet demand at a lower reserve price. In Figure 2, a small increase in demand can overwhelm the reserve mechanism at a low reserve price, but it takes a much larger demand spike to deplete the reserve mechanism at a higher reserve price. This is fundamentally because lower prices mean more emissions permits, and fewer emissions permits means higher prices.

Figure 1.



A lower reserve price (and thus higher annual disbursements from the reserve mechanism) could result in exhausting the reserve mechanism. This would necessitate either loosening the minimally acceptable cap, refilling the mechanism with additional offsets, or letting the total reserve empty. If the total reserve fund runs out of permits, then the mechanism will no longer be able to mitigate demand shocks.

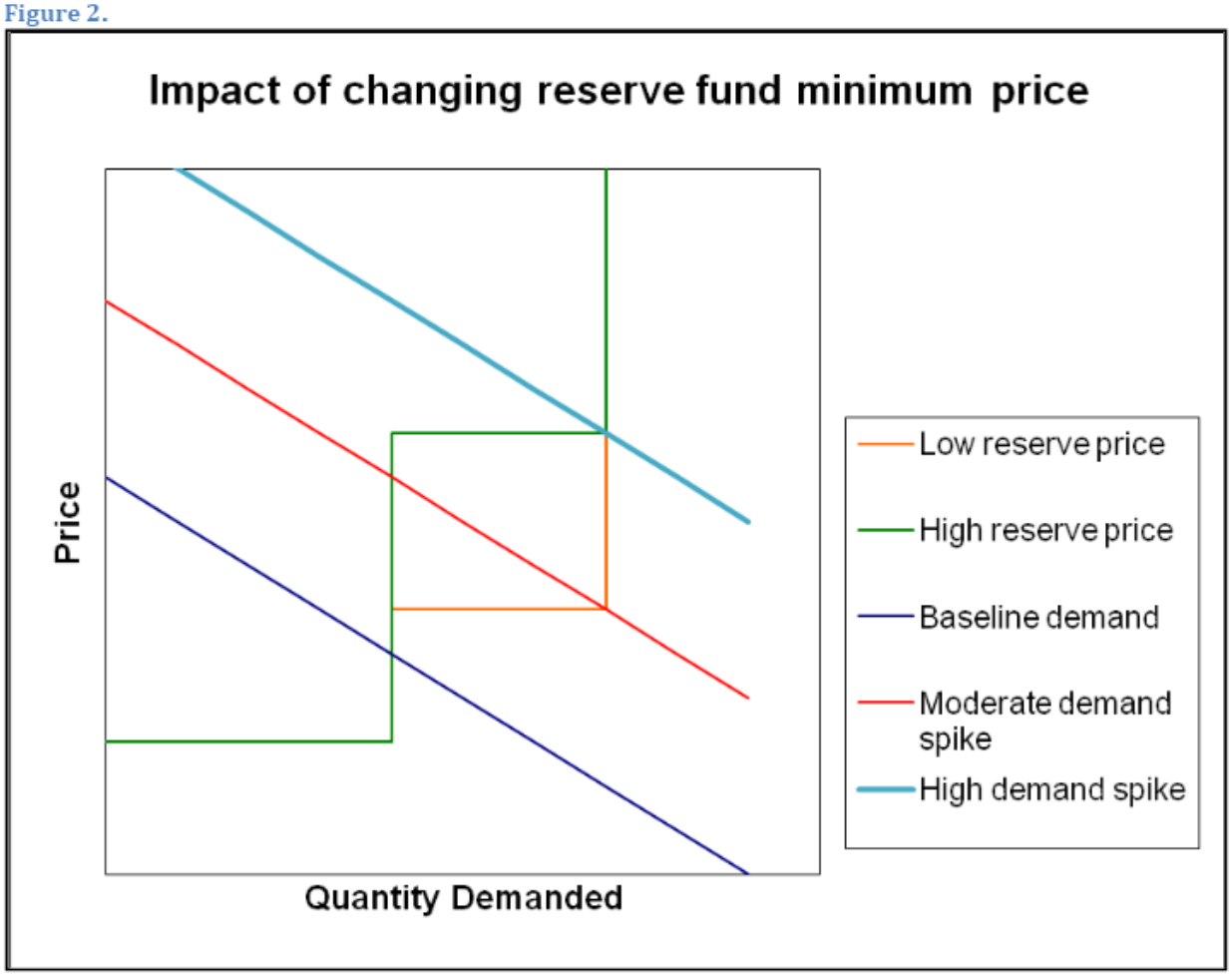
Reserve price and size manipulation

H.R. 2454 specifies that after 2014, the minimum reserve price will be 160% of the 36-month rolling average of the allowance market price. If prices are consistently at or near the trigger price during the 2012–2014 period, this could result in a rather rapid increase in the reserve price after 2014, which would exacerbate risks from higher prices. To avoid this risk, the rolling average approach could be replaced by a continuation of the steady 5% escalation from 2012–2014, or the price could be determined at the discretion of an independent board. However, if demand for permits were sufficiently high to cause ever-increasing trigger prices under the currently proposed mechanism, that same demand could overwhelm the reserve fund at lower trigger prices. In other words, if there is a fundamental shortage of allowances, the situation may be more difficult to remedy unless either the reserve price is higher or the quantity of allowances released from the reserve is expanded.

As discussed in Murray, Newell, and Pizer (2009), the reserve trigger price and total reserve size are related. A low trigger price means that the reserve will be used more often, and thus will need to be larger in total if the need persists. This can be accomplished either by filling the reserve with more permits initially or by refilling it with more offsets, such as is called for with the international deforestation offset

reserve provisions in H.R. 2454. However, adding offsets to the reserve does not do much to contain prices if it simply diverts them away from the offset market where they would serve a similar purpose. It would somehow need to capture a supply of offsets that would otherwise not be available to the U.S. market. Under H.R. 2454, this is accomplished by moving international deforestation allowances to the reserve only when the aggregate limit on their use as international offsets is close to exceeded.

Figure 2.



One possibility for using an expanded supply of offsets to fill the reserve would be to allow for "second-tier" offsets that are not eligible for "first-tier" status as a regular, tradable offset because the credited practice is new and somewhat uncertain in its impact. In order to encourage innovation, the government could pay for these second-tier offsets out of reserve auction revenues and then allow these to be accessed for price relief if necessary. These projects could be evaluated based on the EPA Administrator's confidence that they would result in actual emission reductions; projects with lower certainty of emissions reductions could be assigned domestic permits at a rate less than some set percentage (e.g., 80%) of claimed emissions reductions. It may make sense only to access these second-tier offsets from the reserve only after the "regular" reserve allowances are used first.

Alternatives to an auction

One of the consequences of using an auction to distribute reserve allowances is that if demand for allowances at the reserve price exceeds the amount offered at auction, the price will get bid up. The bid price should still settle at a level that is below where the market would have taken it had the allowances not been made available from the reserve—in other words, it still dampens any potential price rise. However, this does add some

uncertainty for all market participants about what their maximum price exposure would be. Auctioning, in many ways, makes all market participants equal, but this means they have equal exposure as well. An alternative to auctioning the reserved allowances might be to allocate them directly to emitters at a fixed price. Since there may be a high demand for these additional allowances at that price— and assuming the intention is still there to limit the size of the reserve release— the government may choose to target these for specific parts of the emitter population most in need of relief. Thus, although market demand may still push up allowance prices higher, at least part of the compliance pool can be covered at a guaranteed lower cost by certain emitters.

Hard versus flexible price collar

Another option is a hard price collar in which the EPA Administrator would maintain a firm price ceiling, selling an unlimited number of permits at that price. This option would maintain strong confidence that the price will remain in a known range. However, if demand for permits (and thus emissions) is high, it could result in extremely high emissions and a dramatic loosening of the environmental stringency of the policy. Additionally, a hard price collar coupled with permit banking constrains future policymakers from tightening caps, even if new information warrants such tightening.

WORK UNDERWAY TO INFORM THESE DECISIONS

There are several open questions embedded within the price containment structure and refinement options referenced above. The Nicholas Institute, often in collaboration with other entities, has been a critical source of ideas and counsel on price for legislative staff drafting price containment options since the strategic reserve first emerged in the Lieberman-Warner process in 2008 and through its evolution in the Waxman-Markey bill. We continue to work in this area at the invitation of Senate staff as they refine price containment issues on the current draft. We are using a mix of conceptual framing, empirical analysis, and outreach to help address the following questions that staff and stakeholders have:

- How far apart— conceptually and practically— are a strategic reserve and a safety valve? How can this be explained to stakeholders who may see them as worlds apart? What are the implications of alternative devices in stemming short-term price volatility and long-term trends?
- Regardless of whether it's a reserve or a safety valve, at what upper-end price should relief be exercised? How should this change over time?
- If relief is through an allowance reserve, several secondary issues arise, such as
    - What is an appropriate reserve size and annual tranche limit?
    - What is the most effective means to issue the additional allowances (auction, direct allocation, etc.)?
    - How much should offset limits and the reserve be linked?

We will continue to work with staff and stakeholders to find answers to these questions as they develop legislative text for a Senate bill that includes strong yet flexible price containment provisions.

REFERENCES

Center for Clean Air Policy (CCAP). 2008. Preventing market disruptions in cap-and-trade programs. http://www.ccap.org/docs/resources/543/Market%20Disruptions%202008.pdf.

Evans & Peck. 2007. National Emissions Trading Taskforce: Possible design for a greenhouse gas emissions trading system; Further definition of the auction proposals in the NETT discussion paper. http://www.ceem.unsw.edu.au/content/userDocs/Auction_Design_Report.pdf.

Murray, B. 2008. Size of tranche for infusion of reserve allowances. Nicholas Institute memorandum. Durham, NC: Nicholas Institute for Environmental Policy Solutions, Duke University.

Murray, B.C., R.G. Newell, and W.A. Pizer. 2009. Balancing cost and emissions certainty: An allowance reserve for cap-and-trade. *Review of Environmental Economics and Policy 2* (Winter): 84–103.

National Association of Manufacturers (NAM). 2009. Analysis of the Waxman-Markey bill using the National Energy Modeling System (NEMS/ACCF-NAM 2). http://www.accf.org/media/dynamic/3/media_387.pdf.

Natural Resources Defense Council (NRDC). 2009. A clean energy bargain: More jobs, less global warming pollution, and greater security for less than the cost of a postage stamp a day. http://www.nrdc.org/globalWarming/cap2.0/files/bargain.pdf.