

## Containing the Costs of Climate Policy

This policy brief outlines various options for containing costs under a cap-and-trade program to reduce greenhouse gas (GHG) emissions. Although cap and trade is generally considered a more cost-effective approach than traditional regulation, excessive allowance prices are a concern, particularly in the early years of a program when some low carbon technologies are not likely to be commercially available. High allowance prices could mean high compliance costs for regulated firms and high energy prices for consumers. A number of the design elements of a cap-and-trade policy—including the stringency of the emission reduction targets and the distribution of allowance value—will influence the cost of the policy. However, uncertainty regarding allowances prices, and in particular short-term price volatility and persistently high prices, are of concern to stakeholders. Policy options to address these concerns include allowing facilities to bank allowances, permitting firms or the government to borrow allowances from future allocations, allowing (or expanding) the use of offsets, allowing the use of multi-year compliance periods, setting a ceiling on allowance prices, or even relaxing the cap or emission targets associated with the policy. Each of these options has strengths and weaknesses and their desired results must often be weighed against the reduced certainty of meeting the environmental objective. A number of these policies, such as banking, could be established as part of the overall policy from the beginning of the program. Others could be set to be triggered automatically if allowance prices reach a certain level or at the discretion of a market oversight entity. It is likely that any viable cap-and-trade proposal will include a variety of cost containment mechanisms.

*Reducing U.S. greenhouse gas (GHG) emissions is the central objective of recent Congressional policy proposals to address climate change.* A market-based mechanism, such as cap and trade, is often at the core of these proposals because it is widely believed to be the most cost-effective method to achieve the necessary reductions. Under a cap-and-trade system, a declining limit—the cap—is placed on overall GHG emissions from covered sources. The government creates allowances, typically defined as a permit to emit one ton of GHGs, equal to the level of the cap and distributes them via an auction or free of charge to covered sources. Covered firms must hold an allowance for any GHG emitted during the compliance period.

Those firms that are able to easily and cheaply reduce their emissions will need to purchase fewer allowances and can sell any excess allowances to those that find it relatively more expensive to make emission reductions. This provides firms with the flexibility of deciding when, where, and how emissions will be reduced. Importantly, the emergence of a market in allowances will establish a “price” for each ton of GHG emitted, providing an incentive for the development of new low- and zero-emitting technologies throughout the economy.

### Concerns About Costs

Policy makers and those potentially affected by climate policy have raised concerns about a cap-and-trade

policy resulting in significant costs to the U.S. economy. Any program that puts a price on the emission of GHGs—an activity that was previously free of charge—will by definition make the cost of doing business in many sectors of the U.S. economy more expensive. Those sectors that produce or use carbon-intensive fuels—such as coal, oil, and (to a lesser extent) natural gas—and their residential, commercial, and industrial customers will be affected.

The costs of climate policy can be estimated in a number of ways, including the compliance costs borne by those with a regulatory obligation, the price of emissions allowances themselves, and the resulting changes in energy prices and effect on gross GDP. The costs of compliance for sectors and individual firms will be

influenced by their opportunities to reduce emissions and the cost of purchasing allowances.

Allowance prices represent the cost of reducing an additional ton of GHGs. For example, if the allowance price is \$25 per ton, in theory all emission

reductions that can be made collectively for less than that amount will have already been pursued, given current conditions. Short-term costs will reflect the ability of firms to switch from high- to low-carbon fuels, such as from coal to natural gas, and to pursue energy efficiency improvements. Longer term costs will be dictated in large part by the availability of low- or zero-emitting technologies to replace high-carbon-emitting technologies.

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Using cap and trade as a policy to address GHG emissions is in and of itself a cost containment mechanism and should help lower the overall cost to society of reducing GHG emissions. Choices in the design of the program, including the stringency of the targets, the initial allocation of emission allowances, and the use of any revenues generated by the program, will also affect the costs of the policy.<sup>1</sup> For example, the more stringent the reductions associated with the cap-and-trade program, the higher the overall costs of the program. The scope of offsets and availability of technologies are also important drivers. In addition, the initial distribution of allowances will likely affect the distribution of net costs across entities and the overall cost of the program. For example, providing some number of free

allowances to regulated entities would decrease compliance costs to those entities, but could somewhat increase the overall macroeconomic costs of the program compared to the case where the auction revenue was used to reduce taxes on income and savings.<sup>2</sup> However, if auction revenues are used for

additional government expenditures, then free allocation would likely result in lower overall macroeconomic costs than auctioning.

While it is not possible to accurately predict potential costs of climate policy, a number of groups have developed models to estimate them. Model structure and assumptions vary; however, the results can be used to draw broad insights regarding the costs of various policy options and

the impact of factors such as technology and availability of offsets. For a discussion of factors influencing economy-wide cost projections, see the Pew Center's policy brief, *Insights from Modeling Analyses of the Lieberman-Warner Climate Security Act (S. 2191)*.<sup>3</sup>

While these economic studies focus on mitigation costs only, such costs should be weighed against the costs of inaction which many studies suggest are significant.<sup>4</sup>

The focus of this brief is to discuss the range of options proposed in an effort to reduce two types of cost uncertainty related specifically to allowance prices—short-term allowance price volatility and sustained high allowance prices.

### Short-Term Allowance Price Volatility

Unexpected fluctuations in prices are not uncommon in cap-and-trade programs. For example, SO<sub>2</sub> permits in the U.S. Acid Rain Program, NO<sub>x</sub> Trading Credits in Southern California's Regional Clean Air Incentives Market (RECLAIM), and European Union Allowances (EUAs) in the initial phase of the European Union Emission Trading Scheme (EU ETS) have all experienced substantial price volatility.<sup>5</sup> Volatile swings in allowance prices and the uncertainty they create can mean increased financial risk to firms, consumers, and investors in markets for energy and energy-intensive goods and services.

Allowance price volatility arises from a relatively fixed supply of emission allowances created by the overall cap, combined with fluctuations in the expected demand for emission allowances. Given

available options for reducing emissions, each firm's demand for allowances will be a function of its current emissions level, how many allowances it receives in any initial allocation, and the price at which it can purchase additional allowances on

the market. External factors that cause fluctuations in allowance demand, and thus the price of allowances, will be driven by the weather, conditions in energy markets, the level of economic activity, and the availability of new technologies. Extreme outdoor temperatures, for example, can

increase energy and fossil fuel demand, boosting the demand for emission allowances and causing an upswing in the allowance price. Similarly, relative fuel price differentials between coal and natural gas can impact fuel-switching opportunities and affect allowance demand. The interconnected nature of weather, fuels, electricity usage and GHG emissions can give rise to an increase in allowance price volatility, especially in an immature market where participants have limited historical experience.

### Sustained High Allowance Prices

It is widely understood that a sufficient price signal is needed to provide a continuing incentive to achieve the transition to a low carbon economy. Sustained high allowance prices will have ripple effects throughout the economic system. For example, sustained high allowance prices may lead to a large and rapid shift in demand for lower carbon natural gas (fuel switching) in the electricity sector. Such a large increase in demand for natural gas will raise natural gas prices, impacting not only electricity producers but

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also manufacturers that use natural gas as a feedstock and home owners who use natural gas to heat their homes. At the same time, high allowances prices and expectations of sustained high prices will drive investment in existing low carbon options and stimulate innovation in new technologies that will lower costs in the future.

High allowance prices could also increase the risk that scheduled emissions reductions under a climate policy would be halted if future policymakers are forced to decide between perceived short-term economic stability and addressing climate change. For instance, in the Regional Clean Air Incentives Market (RECLAIM) emissions market established in California in 1993 to regulate NO<sub>x</sub> and SO<sub>x</sub> emissions, sustained high allowance prices resulted in companies being exempted from program requirements when prices spiked to very high levels (e.g., \$45,000/ton).<sup>6</sup> Moreover, if firms come to expect that sustained high prices will prompt the government to provide exemptions for certain firms or sectors, there may be less investment in alternative fuels and technologies.<sup>7</sup>

Most cost containment options modify the cap-and-trade program to provide additional flexibility to firms in meeting their compliance obligations or expand the availability of allowances and thus lower the allowance price either as part of the basic proposal or when certain criteria are met. Policy options for addressing cost containment and their strengths and weaknesses are the focus of the rest of this brief.

## Cost Containment Options: Where and When Flexibility

### Banking Allowances

A number of cap-and-trade proposals allow covered sources to bank, or hold for future use, any allowances purchased or (if applicable) received free of charge. Covered sources could also be allowed to bank offsets. Banking is likely to be utilized by firms if they believe that the price of allowances or offsets will be higher in the future or that the quantity of available allowances will be lower.

Banking helps reduce short-term price volatility by adding intertemporal (timing) flexibility. Firms will want to bank allowances when the cost of reducing additional emissions, and thus the price of allowances, is believed to be low compared to future periods. If prices rise in the future, firms can use their banked allowances rather than purchasing additional allowances in the market. This boost in supply would help alleviate demand pressure in periods when fluctuations in weather, fuel prices, or economic conditions cause allowance prices to rise.

An additional strength of this approach is that it motivates early action by encouraging sources to make larger emission reductions in the near term than needed to satisfy compliance requirements, thereby advancing environmental objectives. In periods with relatively low allowance demand (e.g., a mild winter, an economic downturn, low technology costs), banking will prevent prices

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from falling too far, helping to alleviate volatility on the low end of the price range and preserve incentives for innovation. Over the longer term, this intertemporal flexibility results in lower economy-wide impacts because firms are able to optimize their reduction schedules over time.

### Firm-Level Borrowing

Intertemporal flexibility is also increased by allowing firms or the program administrator to borrow allowances from the future. A number of recent policy proposals contain a provision to allow covered sources to borrow allowances from future allocations to be used to cover a percentage of the current year obligations. As long as the policy includes a provision requiring the sources to pay back the borrowed allowances, the long-term environmental budget or cumulative cap can still be met. Some proposals also include a cost of borrowing (e.g., interest), either in dollars or tons.

The inclusion of firm borrowing is often justified to help avoid short-term allowance price volatility (and specifically large price spikes). It allows firms greater flexibility to minimize their compliance costs and optimize their emission reductions over time. For example, if a firm intends to invest in low carbon technology ten years in the future, borrowing allowances from that future allocation and using them for their current compliance obligation can help the firm lower its overall compliance costs. Because climate change is a long-term problem,

to some extent the timing of the reductions is not a significant issue as long as the longer term cumulative cap remains intact.

One concern associated with allowing borrowing in a cap-and-trade program is that borrowing allowances, particularly in a situation in which the overall cap on emissions is declining, may significantly increase future allowance costs. This is of particular concern if new low carbon technology does not come on-line as anticipated. A related concern is the possibility that covered sources may, through lobbying or bankruptcy, arrange for their allowance loans to be forgiven. Debt forgiveness in this context will compromise the long-term cumulative cap. Another concern with borrowing from the future (and thus delaying some emissions reduction effort) is that

near-term efforts may be more beneficial to the climate than later efforts (e.g., to avoid passing certain thresholds).

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### Economy-Wide Borrowing

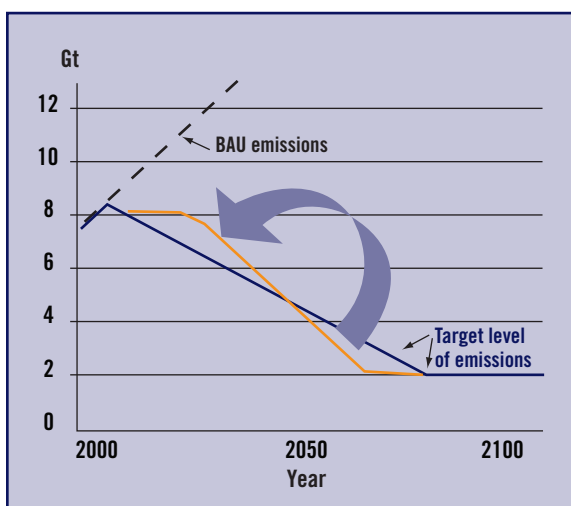
Instead of individual firms borrowing from their future allocation, the program administrator could also borrow allowances from the future. This type of borrowing is sometimes referred to as economy-wide or system-wide borrowing and involves transferring a number of allowances from future compliance periods to the current period and then releasing them into the market (through allocation or auction). In effect, this bends the targeted level of reductions over time by increasing the number of available

allowances in the near term but reducing the number available in the future (changing the shape of the reduction trajectory from the blue line to the orange line in Figure 1).

System-wide borrowing may be useful to deal with macroeconomic costs that may develop should the costs of low carbon technology turn out to be higher than expected. If low carbon technology is slower to materialize or turns out to be more expensive than anticipated, allowance prices could be higher than predicted and could remain so.

As with firm-level borrowing, system-wide borrowing is likely to make meeting future targets more difficult. But in this case, the future targets are economy-wide, therefore meeting them will be more difficult for all market participants rather than for a single firm. While this approach will have macro benefits in the near term, it may be seen as inequitable by those market participants

**Figure 1** *System-wide Borrowing*



that have aggressively reduced their own emissions but face stiffer future targets and higher allowance prices because of delays in achieving reductions in other sectors or firms.

### Domestic and International Offsets

An offset represents the reduction, removal or avoidance of GHG emissions from a source not covered by the cap-and-trade program that is used to compensate for GHG emissions occurring within the program.<sup>8</sup> Because it does not matter from an environmental perspective where the emission reductions occur, many of the recent cap-and-trade proposals in the United States and the international GHG trading programs allow firms facing compliance obligations to use offsets.

Offsets can provide significant cost containment if emission reductions outside of the cap are less costly than those inside the cap. For example, if it is less costly to reduce emissions from a farm than emissions from an electricity generator, allowing the farm to generate emission offsets through its reductions and sell these to the generator will allow the emission reduction goal to be met while reducing the demand for GHG allowances. This will, in turn, reduce allowance prices.

The economic benefits of including offsets in cap-and-trade programs have been demonstrated through a number of modeling exercises. Models that significantly limit the number of offsets have shown higher allowance prices and GDP impacts. (See the Pew Brief, *Insights from Modeling Analyses of the Lieberman-Warner Climate Security Act* (S. 2191) May 2008.)

A considerable challenge associated with the inclusion of offsets in a cap-and-trade program relates to the determination of what qualifies as an offset, and the related monitoring, verification, and compliance issues. While most experts agree that offsets must be real, measurable, and permanent emission reductions that occur in addition to what is required by law or exceeding common industry practice, ensuring that this will happen in practice requires careful policy design.<sup>9</sup>

The use of international offsets is further complicated by the fact that the unregulated sector is outside of the country. In addition, some are opposed to international offsets because their use might encourage capital flow outside of the country. For a more thorough discussion of the use of offsets in a cap-and-trade program, see the Pew Center's Congressional Brief, *Greenhouse Gas Offsets in a Cap-and-Trade Program*.

### Strategic Allowance Reserve

A strategic allowance reserve could be constructed to provide additional allowances into the program should price reach a specific level. A "reserve of allowances" could be built in a number of ways. It could be filled with allowances not sold at auction, with allowances borrowed from future periods, with offsets that are converted into allowances or even with current allowances that essentially expand the cap. Any or all of the above could be used to provide a reserve of allowances that would be released into the market at a specific price.

Depending on how this reserve is constructed, it could be seen as a mechanism to contain costs and to limit system-wide borrowing to some specific level. Alternatively, it could be used as an absolute price ceiling if the reserve is large enough, especially if it is filled with allowances that are in excess of the current cap.

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In addition to determining how to fill the reserve, the government will also have to develop a method for distributing the reserve allowances. One option would be to hold a reserve auction in which the additional

allowances are auctioned. An example of this was the "cost containment auction" proposed in the June 2008 Boxer-Lieberman-Warner legislation (S. 3036). In this plan, EPA would establish a reserve of 6,000 million allowances taken from the pool of allowances available for the years 2030-2050. These would be distributed in cost containment auctions held from 2012-2027. In the first year of the program, 450 million allowances would be auctioned at a fixed price (in the range of \$22-30/ton, exact price to be determined by the President). Notably in this proposal, the number of allowances available in the cost containment auction would decrease every year and the minimum auction price would increase at the rate of inflation.

One serious concern about an allowance reserve is that it may not contain enough allowances to actually avoid a long-term price increase. If so, competition to buy the reserve allowances would drive their price up to the market level, enriching the government but failing to reduce prices. While it would be impossible to ensure that a reserve pool would be large enough to prevent this problem without borrowing an unrealistic number of allowances from the future, it is possible that offsets could be placed in the reserve pool along with, or instead of, allowances. For example, a very large number of offsets could be available from avoided tropical deforestation or other international emission reduction efforts, and these could be used to fill a reserve pool large enough to avoid most imaginable price increases.

### Multi-Year Compliance Deadlines

A multi-year compliance period would mean that firms did not have to turn in their compliance permits (allowances and offsets) yearly but instead after some number of years. Multiyear compliance allows firms to borrow fully from their future allocation but without repayment interest.

An advantage of allowing multiple years for compliance rather than a single year is that firms can optimize their reduction schedule and minimize their compliance costs over time. A disadvantage of this approach, however, is that firms can put off taking action. Furthermore,

it may reduce market liquidity if the compliance window is too long and may cause a scenario where large numbers of buyers are in the market for allowances at the same time, perhaps right as the compliance deadline looms.

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The result could be a rather large temporary spike in the price of allowances.

Staggering the deadlines for compliance such that some firms turn in their allowances

one month and others turn in their allowances in a different month can help avoid the previous issue of having all buyers looking for allowances at the same time. Staggering compliance deadlines, however, may significantly increase program complexity, especially if there are price-triggered program changes. In the Regional Greenhouse Gas Initiative (RGGI), for example, should allowance prices reach \$7 per ton, the restrictions on offset usage are lifted somewhat and if prices reach an even higher price—\$10 per ton—these restrictions are further eased. With staggered deadlines for compliance, the timing and duration of these triggered changes becomes much more complicated.

An alternative structure for multiyear compliance and/or firm level borrowing is to have overlapping compliance periods like those currently used in the EU trading program. In this program allocation occurs in January but the compliance deadline is in March. Also, firms can utilize their allocation for the upcoming year for the previous year's compliance.



### Extended Compliance Period

The government could also start with a shorter compliance period but extend this deadline if allowance prices reach a certain specified level. For example, the compliance period might be changed from 1 year to 5 years, although reporting could still be required every year. This option helps to relieve the short-term demand pressure for permits. This longer compliance window allows firms the flexibility of having more time to manage their compliance obligation without having to borrow and may provide additional time for low carbon capital stock turnover.

As with other options set to trigger when allowance prices reach a certain level, this option complicates the regulatory certainty for firms. And if a firm procrastinates in terms of meeting their reduction obligations, this extension may

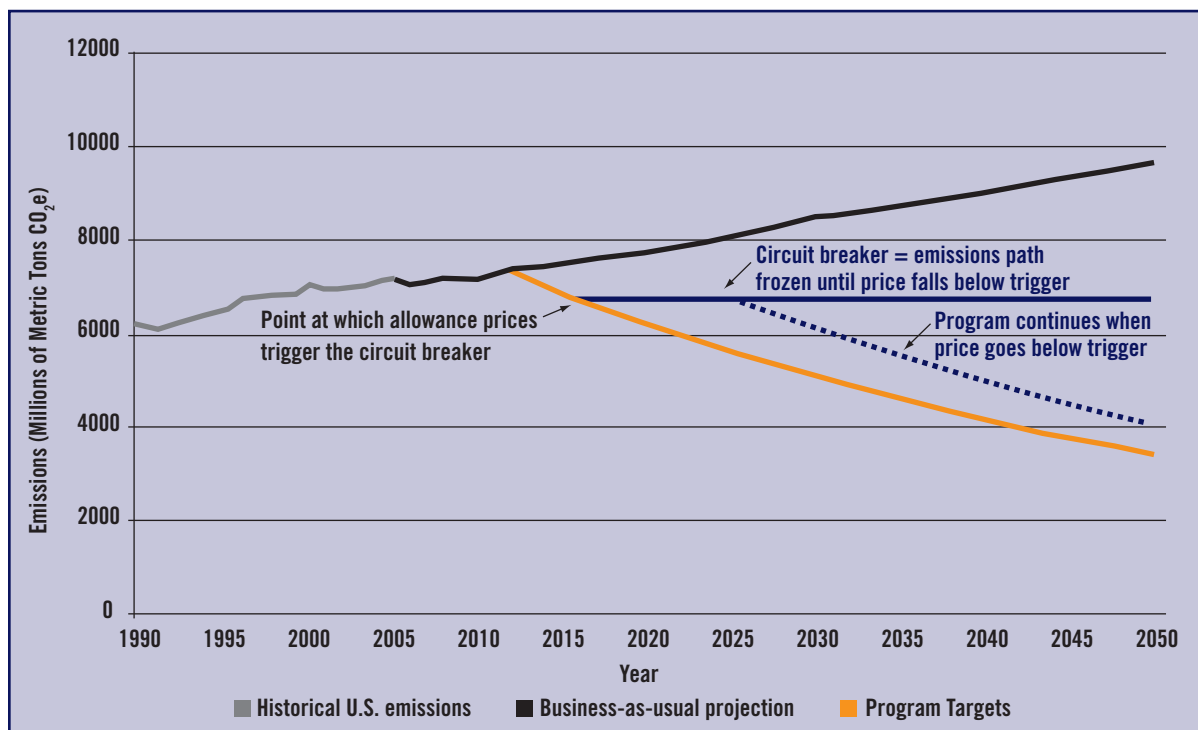
only serve to make compliance that much more difficult in future years.

### Relaxed Targets (Circuit Breaker)

Sustained high allowance prices can also be addressed by simply adjusting a program's target level or timeline of reductions should allowance prices reach some specific level. This option has been called the "the circuit breaker option" and is similar in many respects to the price ceiling approach discussed in the next section.

With the circuit breaker approach, the scheduled decline in the cap's targets and timelines is delayed or cancelled if the price of allowances rises too high. The cap is essentially frozen as long as the allowance prices remain above a known price. See Figure 2 for a hypothetical example of a circuit breaker and the effect it could have on emission targets.

**Figure 2** *Illustration of the Circuit Breaker Option*



Although it is likely that the price acceleration will be slowed or even reversed, prices may still rise beyond the price that triggered the circuit breaker. As a result, there is no price certainty, nor is there environmental certainty.

### Cost Containment Options: Providing Increased Price Certainty

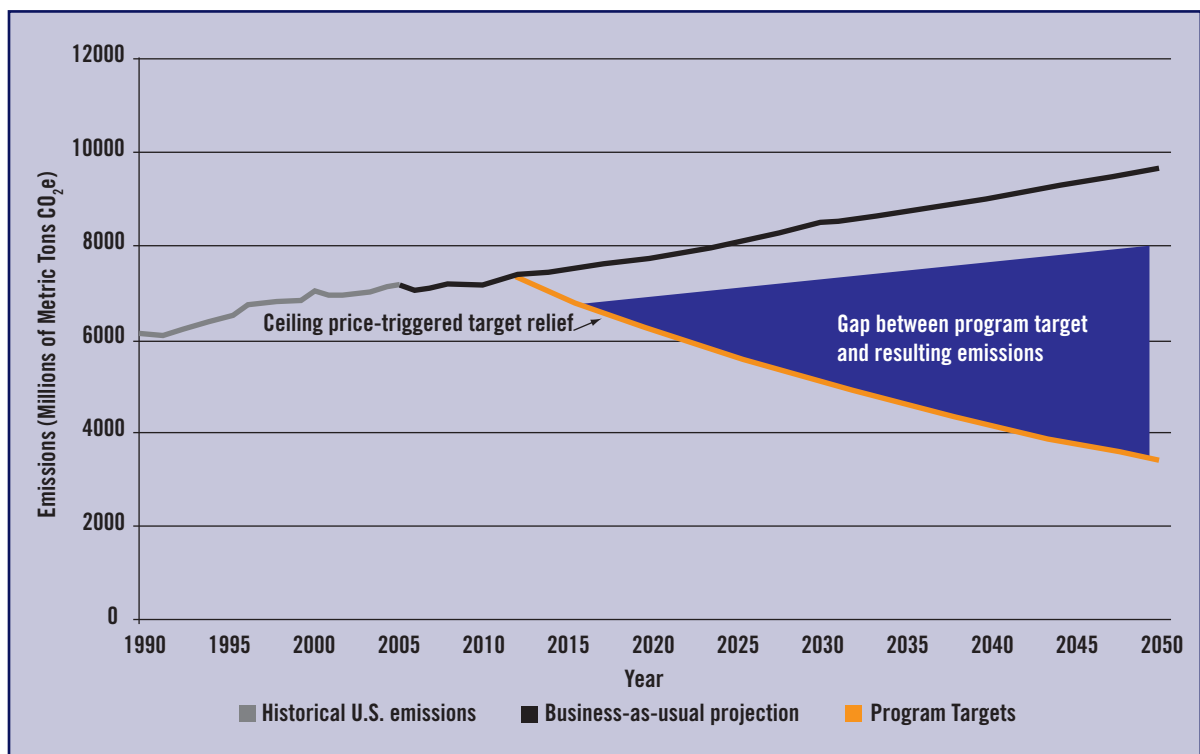
Cap and trade sets a limit or fixed cap on the quantity of emissions each period, while allowing market forces to determine the price of emission allowances. This quantity-based approach is helpful in ensuring that environmental objectives are met. However, while it achieves greater emissions certainty, it creates uncertainty about the price of allowances and the ultimate cost of compliance. A number of proposals have been developed to introduce more cost certainty into a cap-and-trade program.

### Price Ceiling

One way to provide price certainty is to have a ceiling on allowance prices. When the allowance price hits this specified level, the government could sell additional allowances at this price or firms could simply pay into a fund without having to acquire allowances. Either way, once the allowance price reaches the level of the price ceiling, the cap-and-trade program would behave like a tax on emissions. For example, the Bingaman-Specter proposal (S. 1766) includes a technology accelerator payment provision (called a “safety valve” in earlier versions of the proposal) that allows covered sources to purchase unlimited additional allowances once the price reaches a level specified in the legislation.

While it provides a higher degree of cost certainty because it ensures that the price of allowances

**Figure 3** *Potential Effect of a Price Ceiling on Emission Reductions*



never exceeds the specified threshold, this option may result in emission levels that exceed the program's capped level. Figure 3 shows an example of a price ceiling and its potential effect on meeting the program targets.

Depending on the level at which the price ceiling is set, firms may choose to simply pay into a fund or obtain the additional government-issued allowances rather than make additional reductions. This could have a significant effect on the emission targets. If the price ceiling is set too low, this option could also significantly reduce the incentives for low carbon technology innovation. As with determining the appropriate tax level to motivate the necessary technological change, determining the appropriate level at which to set the price ceiling will be challenging. See the Pew Center's Congressional Brief, *Tax Policies to Reduce Greenhouse Gas Emissions*.

### Compliance Penalty

Another method for providing more specific price or cost certainty within the cap-and-trade program is to establish a penalty price for noncompliance. As long as the penalty is only a price and does not require payback of emissions exceeding compliance, this penalty can be set so as to provide an upper bound on allowance prices. If allowance prices rise above the penalty, firms would have the incentive to pay the penalty rather than buy additional allowances or make further emission reductions.

In order to distinguish this option from a pure price ceiling, penalties often include a requirement to pay back those tons not in compliance. A number of existing emission market programs contain a compliance penalty with this provision, including the U.S. Acid Rain Program, currently set at \$2,000 per ton of excess SO<sub>2</sub> or NO<sub>x</sub> and the EU ETS Phase II penalty of 100 euros per ton of CO<sub>2</sub>.<sup>10</sup> All of these programs require a firm to replace the tons in addition to paying the penalty on each ton over their compliance obligation.

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### Implementation Options

#### Price-Triggered Mechanisms

A number of cost containment policies discussed in this brief—offsets, banking, borrowing, etc.—can be included in the overall design of a cap-and-trade program and operate as options that can be used at any time. Having them always available has a number of advantages, including providing program transparency, automation, and a degree of certainty for investment and planning purposes.

A number of the cost containment options covered in this brief, however, could be used or expanded if the price of allowances reaches a certain level. In other words, they are “triggered” by a specific allowance price. For example, in the Regional Greenhouse Gas Initiative (RGGI), 3.3 percent of a firm's compliance obligation can be fulfilled using offsets at the onset of the program. However, if the allowance price exceeds

a certain threshold, this percentage can be expanded to 5 percent, and if it reaches an even higher threshold it expands to 10 percent.<sup>11</sup>

Although these triggered mechanisms may provide additional flexibility in dealing with allowance price uncertainty, this approach can increase program complexity and administrative costs. In addition, consideration should be given to the price level at which these options would take effect. A level too low would result in a continuous option (calling into question the usefulness of a triggered approach) and a level too high would limit its cost containment benefits. Further, some have argued that an explicit price should not be included in the proposal, but rather a price range, to minimize potential gaming of the system. If a specific price is known ahead of time, market participants may be able to adjust their behavior to trigger the mechanism.

### **Oversight Board**

Although not a cost containment option in and of itself, some recent proposals have recommended the creation of a carbon market oversight board. This entity would likely be responsible for balancing a smoothly functioning carbon market with the long-term environmental integrity of the emissions cap and for protecting the economy from excessive harm resulting from high allowance prices. The board could monitor and report on the functioning of the market and implement additional cost containment measures when it determines this is appropriate. For example, the Boxer-Lieberman-Warner proposal (S. 3036) considered by the full Senate in June 2008, included a Carbon Market Efficiency Board.

Establishing a market oversight board could have both positive and negative implications for cost

containment. On the positive side, it would likely have the benefit of being flexible and able to respond to market information by making program adjustments (e.g., allowing more offsets) should allowance prices rise too quickly. Of concern, however, is the uncertainty that it creates for market participants. Trading participants rely on expectations about supply and demand to formulate their strategy. A board with the discretion to adjust the market fundamentals creates uncertainty, particularly if its proceedings lack transparency. In addition, there is concern that it may interfere with the ultimate development of financial products (like derivatives or index funds) that serve as cost management and hedging tools.

Creating a carbon market oversight board also has a number of implementation challenges, including the time it would take to set up a board with the necessary institutional authority and expertise.<sup>12</sup> Determining the qualifications of board members and ensuring that they are as insulated as possible from political pressures is crucial to its credibility, yet may prove challenging.

### **Box 1** *Cost Containment Benefits of Complementary Policies*

Many believe that a cap-and-trade policy is not the only policy needed to reduce GHG emissions. Additional policies address information barriers and other market failures that inhibit technology development and deployment. Some sources and product users may not efficiently be covered by a cap-and-trade policy. While complementary policies have their own associated costs, they may contribute to a reduction in the costs of meeting the emission targets of the climate policy. Policies to encourage energy efficiency, like rebates, tax credits, accelerated depreciation, and consumer dividends will promote lower energy use and help meet the emissions cap.

**Table 1** *Cost Containment Approaches From Proposals of the 110<sup>th</sup> Congress*

Bill	Cost Containment Provisions
<p><b>Boxer-Lieberman-Warner</b> S. 3036 – June 2008 Lieberman-Warner Climate Security Act of 2008 Substitute amendment considered by full Senate in June 2008</p>	<p>30% limit on supply of domestic and international offsets, with additional limits on each category Creates cost containment auction using future year allowances Borrowing up to 15% per company Creates Carbon Market Efficiency Board to monitor trading and implement specific cost relief measures, including increased borrowing and expanded offsets Allows banking</p>
<p><b>Bingaman-Specter</b> S. 1766 – July 2007 Low Carbon Economy Act</p>	<p>Provides certain initial categories including biosequestration and industrial offsets President may implement use of international offsets subject to 10% limit \$12/ton CO<sub>2</sub>e “technology accelerator payment” (i.e., safety valve) starting in 2012 and increasing 5%/year above inflation Allows banking</p>
<p><b>McCain-Lieberman</b> S. 280 – July 2007 Climate Stewardship and Innovation Act</p>	<p>30% limit on use of international credits and domestic reduction or sequestration offsets Borrowing for 5-year periods with interest Allows banking</p>
<p><b>Sanders-Boxer</b> S. 309 – January 2007 Global Warming Pollution Reduction Act</p>	<p>Includes provision for offsets generated from biological sequestration “Technology-indexed stop price” freezes cap if prices high relative to tech options</p>
<p><b>Kerry-Snowe</b> S. 485 – February 2007 Global Warming Reduction Act</p>	<p>Includes provision for offsets generated from biological sequestration Allows banking</p>
<p><b>Olver-Gilchrest</b> H.R. 620 – January 2007 Climate Stewardship Act</p>	<p>15% limit on use of international credits and domestic reduction or sequestration offsets Borrowing for 5-year periods with interest</p>
<p><b>Waxman</b> H.R. 1590 – March 2007 Safe Climate Act of 2007</p>	<p>Not specified</p>
<p><b>Markey</b> H.R. 6186 – June 2008 Investing in Climate Action and Protection Act</p>	<p>15% limit on use of domestic offsets 15% limit on use of international emission allowances or offset credits Creates an Office of Carbon Market Oversight within FERC Borrowing for 5-year periods with 10% interest Allows banking</p>

## Key Design Questions

There are a number of policy options that can help reduce allowance price volatility and control costs in a cap-and-trade program. First and foremost, a program that includes multiple sectors as well as access to offsets (both domestic and international) is a fundamental design choice that will minimize program costs. With such a program, however, there are other policy options that can be used. Each will have different implications, both for the functioning of the carbon market and for the ability of the program to meet its environmental objectives. Policymakers should consider a number of questions in devising an approach to limiting costs in a cap-and-trade program:

- What type of costs (and whose costs) are the target of the proposed cost-containment mechanism?
- Will the cost containment mechanism result in a significant delay or even the inability to meet the program's emission reduction targets?
- How much of a dampening effect will the cost-containment policy have on incentives to invest in low carbon technologies?
- If borrowing is allowed—how much and from what time period? Also how quickly do borrowed allowances need to be paid back, and will an “interest” payment be required?
- If a strategic reserve is utilized—how large should it be and how should it be “filled”?
- If choosing a triggered approach to any of the mechanisms, how will the trigger price(s) be determined?
- Will the trigger price be explicit in the policy proposal?
- Do the cost containment options increase the potential for gaming and market manipulation?
- Should a new oversight entity be created to monitor the performance of the carbon market? If so, should it have the discretion to alter the structure of the cap-and-trade program if it determines allowance prices are too high (e.g., allowing further use of offsets)?

## End Notes

- <sup>1</sup> For more information on the trade-offs in setting targets and timetables and the distribution of allowances, see the Pew Center's Congressional Briefs, *Greenhouse Gas Emission Reduction Timetables and Greenhouse Gas Emissions Allowance Allocation*.
- <sup>2</sup> Providing free allowances to those entities with a compliance obligation can serve to compensate them for their additional control costs and ease the transition to the new program. Taking into account relevant sector characteristics, such as those that are exposed to trade or competitiveness impacts, will help to lessen the cost to these industries. Although this approach will not impact the overall efficiency of the compliance market, it will raise distributional and equity concerns, as well as concerns over possible windfall gains as a result of the free allocation. In addition, giving allowances out for free forgoes the opportunity to use allowance auction revenues to reduce distortionary taxes elsewhere in the economy, which is believed to improve overall economic efficiency. For more information see the Pew Center's Congressional Policy Brief, *Greenhouse Gas Emissions Allowance Allocation*.
- <sup>3</sup> *Insights from Modeling Analyses of the Lieberman-Warner Climate Security Act (S. 2191)*, Pew Center on Global Climate Change. May 2008.
- <sup>4</sup> Center for Integrative Environmental Research (CIER), *The U.S. Economic Impacts of Climate Change and the Costs of Inaction*, University of Maryland, 2007, found at [www.cier.umd.edu/climateadaptation/](http://www.cier.umd.edu/climateadaptation/). Bin, Okmyung, et al., *Measuring the Impacts of Climate Change on North Carolina Coastal Resources*, prepared for the National Commission on Energy Policy, March 2007, available at <http://econ.appstate.edu/climate/NC-NCEP%20final%20report.031507.pdf>. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007*, found at [www.ipcc.ch](http://www.ipcc.ch).
- <sup>5</sup> Ellerman, A. Denny and Paul Joskow, *The European Union's Emissions Trading System in Perspective*, Pew Center on Global Climate Change, May 2008.
- <sup>6</sup> Ellerman, Denny A., Paul L. Joskow, and David Harrison, Jr. *Emissions Trading in the U.S.—Experience, Lessons, and Considerations for Greenhouse Gases*, Pew Center on Global Climate Change, May 2003.
- <sup>7</sup> Farrell, Alexander and Lester Lave, *Emissions Trading and Public Health*, Annual Review of Public Health, 2004.
- <sup>8</sup> For more information see Offset Quality Initiative, *Ensuring Offset Quality—Integrating High Quality Greenhouse Gas Offsets into North American Cap-and-Trade Policy*, July 2008 found at <http://www.pewclimate.org/docUploads/OQI-Ensuring-Offset-Quality-white-paper.pdf>.
- <sup>9</sup> Offset Quality Initiative, July 2008.
- <sup>10</sup> For additional information on the components of these programs see <http://www.epa.gov/airmarkt/progsregs/arp/basic.html#options> for the U.S. Acid Rain Program and [http://ec.europa.eu/environment/climat/pdf/bali/eu\\_action.pdf](http://ec.europa.eu/environment/climat/pdf/bali/eu_action.pdf) for the EU ETS.
- <sup>11</sup> For more information on the use of offsets in the RGGI program see <http://www.rggi.org/offsets>.
- <sup>12</sup> Tatsutani, Marika and William A. Pizer. *Managing Costs in a U.S. Greenhouse Gas Trading Program—A Workshop Summary*, Discussion Paper 08-23, Resources for the Future, July 2008.

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