Greenhouse Gas Emissions Allowance Allocations

This policy brief outlines various options for distributing greenhouse gas emissions allowances under a cap-and-trade program. In general, because total emissions are capped, the allocation of allowances does not affect the environmental integrity of a cap-and-trade program, only the distribution of costs among regulated entities, consumers, and others. In addition, allocation represents a significant source of value and can be used as one way of compensating firms or individuals affected by climate change policy or raising funds for other desirable objectives. The basic allocation decisions involve whether to freely allocate emissions allowances—and, if so, to whom; whether to auction the allowances—and, if so, how; or whether to use some combination of free allocation and auctioning. If free allocation is chosen, the basis for distribution must be determined. Grandfathering allowances based on historical emissions, or allocating based on environmental performance, energy input or even product output are all valid bases for allocation, but each has implications in terms of who benefits from the value of the allowances. Other decisions that must be evaluated include the baseline year that is chosen, and whether allocations are "updated" to reflect more current emissions, inputs, or outputs. If allowances are auctioned, the type of auction and frequency will need to be determined. Policymakers will also need to decide how the revenue generated by the auction will be used. Many of the same purposes—including easing the transition for affected firms and consumers and supporting new technologies—can be achieved using either an auction or free allocation. No matter which option is chosen, some entities will benefit more than others.

An important component of any national policy to address climate change will be to establish mandatory limits on greenhouse gas emissions. This can be accomplished most cost-effectively by harnessing market mechanisms—such as a cap-and-trade program—to spur emissions reductions. Under a cap-and-trade system, a limit is placed on the overall emissions from covered sources and such sources must hold "allowances" for any greenhouse gas (GHG) emitted. An allowance is typically defined as a permit to emit one ton of greenhouse gases.

One of the most controversial issues in the design of a cap-and-trade program is the question of how the emission allowances will be distributed. Because a cap-and-trade program in essence creates a valuable new commodity (by some estimates potentially worth many billions of dollars) decisions about the allocation of allowances represent a large distributional equity issue and will result in competing claims. Allowance allocation presents both a challenge and an opportunity—no allocation formula will satisfy everyone and yet allocation itself can be used to compensate affected firms and to ease the transition to a new program.

Key questions that must be answered include whether allowances should be given away for free (and if so, to whom), sold via an auction, or distributed using some combination of the two. If policymakers decide to provide a substantial free allocation, it will be necessary to specify who will receive these allowances and on what basis (e.g., past or current emissions levels, some benchmark performance standard, output, or another basis). If the allowances are

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auctioned, decisions must be made regarding what type of auction and how the funds generated will be used. If a combined approach is preferable—with some allowances given away and the rest auctioned—policymakers will have to determine how much of each and on what basis.

The state of California is grappling with the question of how to allocate GHG emission allowances if it includes a cap-and-trade program in response to AB32. As part of this process, the Market Advisory Committee (MAC) to the California Air Resources Board recommended a set of principles to be followed in distributing allowances.[1] These principles include the following:

- Reduce the cost of the program to consumers, especially low-income consumers;
- Avoid windfall profits where such profits could occur;
- Promote investment in low-GHG technologies and fuels (including energy efficiency);
- Help to ensure market liquidity.

The U.S. Climate Action Partnership (USCAP)—a group of leading companies and non-governmental organizations (NGOs) working to advance U.S. climate policy—developed its own guidance regarding the allocation of allowances under a national cap-and-trade program:

> *An emission allowance allocation system should seek to mitigate economic transition costs to entities and regions of the country that will be relatively more adversely affected by GHG emission limits or have already made investments in higher cost, low-GHG technologies, while simultaneously encouraging the transition from older, higher-emitting technologies to newer, lower-emitting technologies.*
>
> — U.S. Climate Action Partnership

Such principles are valuable in helping to guide allocation decisions; however, it is important to remember that a cap-and-trade program can achieve its environmental objectives regardless of how allowances are allocated. Allocation is a question of distributional equity and compensation, not one of environmental- or cost-effectiveness. However, allocations or the revenues from selling at least some portion of the allowances can be used for a variety of purposes including addressing or adapting to climate change or helping to reduce the regressive impacts of existing distortionary taxes.

This Pew Center Congressional Policy Brief discusses key decisions and their implications related to the distribution of GHG emissions allowances.

Free Allocation vs. Auction of Greenhouse Gas Emissions

The potential value of the allowances to be distributed under a U.S. cap-and-trade program has been estimated to be in the tens of billions of dollars annually.[2] For this reason, the method used to allocate GHG emissions allowances will have significant distributional consequences—who will get what share of the value of the allowances—for regulated entities as well as other affected parties. In addition, the determination of how to distribute emissions allowances may have implications for the cap-and-trade program's political acceptability and administrative feasibility.[3] While the allocation method does not change the overall mitigation cost, if revenues are used for certain purposes (e.g., reduction of taxes), broader economic benefits can be realized.

The next sections outline the rationale for and implications of various approaches to allocation and auction.

Why should allowances be given away for free?

A system in which regulated sources are given some portion of allowances free of charge is similar in practice to traditional "command and control" environmental regulation that allows sources to emit up to a permitted level for free. This is the case, for example, under the Clean Air Act's new source performance standards.

Under the acid rain program of the Clean Air Act (the successful program to control sulfur dioxide emissions that many look to as a model for cap-and-trade programs), allowances are distributed for free to emitters based on a combination of historic electricity generation and emission performance benchmarks.[4]

One argument for providing free allowances to regulated entities is that these firms will bear the costs of changing their equipment and practices to comply with new GHG limits. Many argue that the private sector firms facing this constraint will more efficiently allocate resources to achieve the emission reductions at the least cost.

To some, charging firms (by way of an initial full auction) for an environmental service that they have always used for free would in effect take away a presumed property right with no transition or compensation.

In addition, policymakers may want to design an allocation approach that distributes allowances to mitigate actual cost burdens (or lost value) resulting from the cap-and-trade program.[5] This is especially true for firms in competitive markets or where differing regulation between regions could affect a firm's ability to pass along additional program costs.

Free allocation can be used to compensate firms that are especially vulnerable to international competition, specifically those competing with firms in countries or regions without similar climate policies. For example, the chemical, aluminum, and cement industries are often thought to be vulnerable to foreign competition such that domestic price increases may result in additional foreign imports and increased emissions in those regions.

An emissions trading program creates a price on every unit of emissions and this price will be included to some extent in the price of electricity and other energy intensive goods, hence prices for these goods will rise. Free allocation may shield some customers from this additional cost. This is especially true in regulated electricity markets where local regulators are likely to require utilities to pass along savings from their free allocation. In contrast, an auction forces firms to pay for allowances for all of their emissions and not just the gap between what they are allocated and what they are allowed to emit. Because new markets are inherently volatile, requiring the purchase of all allowances exposes firms more directly to greater price risk.[6]

Allowances could also be given to non-regulated entities in order to achieve other policy goals. For example, allowances could be given to states, which could then sell them and use the proceeds to subsidize energy costs or efficiency investments for low-income customers. Allowances could also be allocated to a trust fund and proceeds from the allowance sales used for technology programs, to mitigate the economic costs of the cap-and-trade program to affected firms, workers, or other entities, or to address the consequences of climate change. By helping to ease transition, free allocation can help achieve buy-in of newly regulated firms to a climate change policy.

Why should allowances be auctioned?

Auctioning allowances is in keeping with the "polluter pays" principle, and there is precedent for the government to charge for certain goods and services previously provided without charge, such as leases on federal lands for natural resources or licenses for radio frequency.[7]

The total value of allowances in a GHG cap-and-trade program will likely be far greater than past emission trading programs. A number of studies have suggested that providing 100 percent of the allowances to covered entities free of charge would over-compensate firms because many will be able to simply pass some or all of their costs of compliance through to their customers.[8] Higher prices in combination with the revenue from the sale of allowances and free allocation may result in a firm seeing revenue increases that exceed cost increases, or what is commonly known as "windfall gains."

Distribution of allowances in the first phase of the EU Emissions Trading System (EU-ETS) was based on historic emissions and most were freely given to sectors covered under the program (with up to 5 percent auction allowed). Only four member states chose to include any auctioning.[9]

In the first phase, over-allocation to companies that were capable of passing on the full marginal cost of allowances (such as deregulated electric utilities) contributed to windfall profits in the electric power sector in Germany and the UK. One estimate for UK electricity generators put this windfall as high as £500 million (approximately $1 billion) during the first year.[10] Some estimates indicate that the windfall in these deregulated electricity markets could have been eliminated with an allocation of 40 to 60 percent of historic emissions, depending on the particular market. In general, the over-allocation issue resulted in part from lack of good baseline data in the early "learning" phase. In the second phase of the program, EU member states will be able to auction up to 10 percent of their allowances, and more than half plan to auction some amount. For the third phase, a variety of options—including a full auction to the electricity sector—are being considered.

Another argument often cited for using an auction is that it can lead to positive changes in the behavior of firms by providing a greater incentive for the transition to low-GHG emitting technologies. An auction rewards firms that have already reduced their emissions through investment in cleaner fuels or lower carbon technologies, and thus reduces concerns about giving credit for early action to those investing in innovation. An auction would also be fairer to new entrants because they would see the same cost as their competitors. With free allocation, there is the danger that new, more energy efficient firms entering a market will see a cost disadvantage compared to existing firms. (This is dealt with in the EU-ETS and the U.S. acid rain program by the establishment of a reserve of allowances for new entrants.)

Auction makes it easier to deal with those sources exiting the market because they would simply stop buying allowances. On the other hand, a free allocation that depends on a facility's continued operation may indirectly subsidize the continued operation of that firm and provide an incentive for firms to extend the life of a less efficient operation past its economically justified life.[11]

Another argument for using an auction is that an auction with revenue recycling could reduce the overall cost of the policy to society. Auction revenues can be used by government to reduce existing distortionary taxes on productive resources like labor and capital. While complicated to achieve, if such taxes were replaced by a tax on an environmental externality, the policy could both improve overall economic performance while achieving the desired environmental result.[12]

Auction revenues can also be used to fund environmentally desirable programs and policy objectives, or minimize the cost of the cap-and-trade program to certain affected parties, including businesses and consumers, especially lower income individuals particularly hard hit by higher energy costs.

Under an auction system, the government avoids the difficult challenge of having to determine the equitable distribution of allowances. Evaluating equities in such a distribution requires an understanding of the costs across regulated entities or sectors in order to determine how much cost will be absorbed by each, and how much will be passed along.

Is a combination of freely giving out allowances and auctioning the rest the best method?

A combined approach of allocating some allowances for free and selling some through auction could be a pragmatic alternative, and is gaining traction in proposals both in the U.S. and abroad. Using a combination of free allocation and the auctioning of some percentage of greenhouse gas emission allowances would involve making the determination as to what percentage of allowances should be auctioned versus allocated for free. Determining the precise amount needed to compensate firms for their additional costs or to keep them "whole" could be extremely difficult and time consuming. In fact, it is unlikely that any approach will perfectly compensate all parties as such an objective would require perfect information which is impossible to obtain.

The greater the ability of firms to pass along the additional cost of the allowances, the smaller the need for compensation. A 100-percent free allocation could be seen as giving firms too large an allocation of a valuable commodity. Indeed, the scope of value involved in an economy-wide cap-and-trade program is potentially enormous.

Most policy discussions see a role for at least a small auction in ensuring the smooth functioning of the market, particularly when the market is in its infancy. As with the acid rain program, a small auction can help with price discovery (information on what allowance price the market will bear) and ensuring to program participants that at least some allowances will be available in the marketplace.

Further, providing at least some allowances through auction can raise needed revenues to support related objectives. Shifting to more auction over time in essence recognizes that free allocation is a transition strategy. An auction will also make it easier to deal with new entrants and those exiting the market, and could provide a chance to replace more distortionary taxes on capital and labor over time.

Recent domestic proposals that combine free allocation and auctioning of emissions allowances include the following:

- The U.S. Climate Action Partnership (USCAP) recommends initially distributing a significant portion of allowances for free to capped entities

and economic sectors particularly disadvantaged by the secondary price effects of a cap, including the possibility of funding transition assistance to adversely affected workers and communities. USCAP also recommends that free allocations to the private sector should be phased out over a reasonable period of time.[13]

- The National Commission on Energy Policy (NCEP) proposes an initial 50/50 split between free allocation and auction, with the number of allowances given at no cost diminishing in favor of a more complete auction over time. The Commission believes that allocating emissions in this manner will effectively direct substantial resources to aid in the transition to a low-carbon economy and at the same time fairly compensate major affected industries for short-term economic dislocations incurred as a result of the policy.[14]

- The Market Advisory Committee to the California Air Resources Board recommended that auctioning should be a key part of allowance allocation under the cap-and-trade program, but that the state should retain flexibility to allocate a share of allowances for free to certain sectors.[15]

- The Regional Greenhouse Gas Initiative (RGGI), a cooperative effort by ten Northeast and Mid-Atlantic states to design a regional cap-and-trade program, has included as part of its model rule the requirement that at least 25 percent of a state's allowances be dedicated to strategic energy or consumer benefit purposes, such as energy efficiency, new clean energy technologies and ratepayer rebates. Power plants can also purchase these allowances for their own use and the funds generated from these sales will be used for beneficial energy programs.[16] A majority of RGGI states have announced their intention to auction 100 percent of their allowances.

Cap-and-trade legislation introduced in the 110th Congress has also included proposals for distributing allowances using both an auction and free allocation. Table 1 provides more detailed descriptions of the allocation approaches in selected legislative proposals.

Options Within a Free Allocation of Greenhouse Gas Emissions Allowances

Within a free allocation of any amount, there are decisions to be made regarding the basis for providing free allowances, including the metric and timeframe.

One method is to use historical emissions information ("grandfathering") as a basis for allocating allowances. The first phase of the EU-ETS used historical emissions as the metric for allocating allowances. Another example is the U.S. acid rain program, which used a three-year average of historical heat input multiplied by an environmental performance benchmark that varied by fuel type and power plant category as the basis for allowance allocation without any updating. The NO_x Budget Trading Program allowed states to determine the allocation formula: in general, states took a similar approach to the acid rain program, although some states did provide for updating, whereby the allocation formula incorporated newer data over time.

With respect to U.S. climate programs currently under development, under the Northeast Regional Greenhouse Gas Initiative (RGGI), the states agreed to apportion the region's emission allowances among the states largely on the basis

Table 1 *Selected Allocation Approaches Proposed in the 110th Congress*

Lieberman-Warner Discussion Principles

Free Allocation

- 20% to power plants (transitions to zero in 2035) based on heat input with fuel adjustment factors and a portion of this set aside for new entrants
- 20% to industry based on pre-enactment historical emissions with a portion of this set aside for new entrants
- 10% to electricity load-serving entities (LSEs) based on electricity delivered
- 8% for early action in 2012 (phasing to zero in 2020)
- 4% to states based on state population and historical state emissions
- 4% to U.S. coal mines
- 7.5% to farmers and other landowners to keep carbon in plants and soils
- 2.5% to transportation sector for activities to reduce GHG emissions from the sector

Auction

- 24% from 2012-2014, rising to 52% in 2035
- Auction proceeds to be used for technology (including carbon sequestration and reducing vehicle-miles traveled) and mitigating effects on economically disadvantaged communities and on wildlife

Bingaman-Specter S.1766—Low Carbon Economy Act

Free Allocation

- 53% to industry, declining 2%/year in 2017
- 9% to states based on state population and historical state emissions
- 8% for carbon capture and geological sequestration
- 5% of allowances set-aside for agricultural
- 1% for those registering GHG reductions prior to enactment

Auction

- 24% from 2012-2017, rising to 53% in 2030
- Auction proceeds to be used for technology (12%), adaptation (8%), and low income groups (4%)

McCain-Lieberman S. 280—Climate Stewardship and Innovation Act

Free Allocation

- Encourage investments that increase efficiency of processes generating GHG emissions
- Credit reductions before 2012
- Provide sufficient allocation for new entrants

Auction

- EPA administrator to determine allocation/auction split considering consumer impact, competitiveness, economic efficiency, etc.
- Auction proceeds to be used for, among other things, development of advanced low- or zero-emission technologies

Kerry-Snowe S. 485—Global Warming Reduction Act

Free Allocation

- Allowances to be distributed in a manner consistent with the goals of the Act, including mitigating effects on consumers, worker transition assistance, promoting economic growth, etc

Auction

- Determined by the President and requires unspecified amount of allowances to be auctioned
- Auction proceeds to be used in a manner consistent with meeting the goals of the Act, including reducing GHG emissions

Olver-Gilchrest H.R. 620—Climate Stewardship Act of 2007

Free Allocation

- Encourage investments that increase efficiency of processes generating GHG emissions
- Credit reductions before 2012
- Provide sufficient allocation for new entrants

Auction

- EPA administrator to determine allocation/auction split considering consumer impact, competitiveness, etc.
- Auction proceeds to be used for, among other things, development of advanced low- or zero-emission technologies

Waxman H.R. 1590—Global Warming Pollution Reduction Act

Free Allocation

- Criteria to include transition assistance and consumer impacts

Auction

- Requires unspecified amount to be auctioned

of each state's total emissions. It is now up to each state to determine how these allowances will be allocated to sources. The program begins in 2009, and thus far most states are considering full auctioning of their allowances and none have developed metrics for free allocation yet.

The following sections outline the options associated with freely allocating allowances and the associated implications for affected entities.

What metric should be used in allocating emissions allowances? The metric to be used as a basis for allocation could be historical emissions, fuel or another input, product output, or some other benchmark. Implications of various approaches are described in Table 2.

Table 2 *Options for the Metric Used in Allocating Allowances*

Metric Options	Implications for Affected Entities
Historic emissions	• Leaves every emitter "whole" • Smaller reward for cleaner plants • Potential "windfall" if allocation level is too high
Fuel or other input	• Easy to measure • Rewards less efficient plants
Product output (Market share)	• Rewards more efficient plants • Easy to measure for certain sectors, cumbersome for others • Potential "windfall" if allowances given to non-emitting sources
Benchmark (Standard factor based on emission rate multiplied by output or input)	• Rewards more efficient and lower-emitting plants • Flexible—can adjust factor to make easier or harder on various categories of emitters • Cumbersome to address variety of outputs produced

What timeframe should be used in allocating allowances? Once the metric has been determined, policymakers will need to decide what timeframe to use as the basis for allowance allocation. As part of this determination, one question to ask is whether the metric should be averaged over a period of years or if the maximum over a specific period should be used. Table 3 describes the implications of several options.

Table 3 *Options for the Time Period to be Used as the Basis for Allocating Allowances*

Time Period Options	Implications for Affected Entities
Single year	• Easy to calculate • Any one year will be unfair to someone • Benefits entity with relatively high emissions in that year if allocation is based on emissions or fuel input • Benefits good performers against benchmark that year if allocation is based on benchmark
Average of multiple years	• Evens out unusually high or low years—less chance of picking a good or bad year for any one emitter • Missing data may be difficult to address • If future years are used, may be incentive to increase emissions if period includes future years • Benefits entities with relatively high emissions or relatively good performance in those years
Maximum over a period	• Adjusts for different companies/ sectors peaking at different times • Does not reward early reducers • If future years are used, may be incentive to increase emissions if period includes future years • Benefits entities reducing emissions at beginning of time period

In addition, policymakers need to determine if the information used in determining the baseline for allocating allowances should be updated going forward based on new information, or if the historical information is sufficient. Table 4 describes the implications of updating and not updating the baseline for allocating allowances.

Should only the regulated entities receive allowances? It is not necessarily the case that the point of regulation or covered entity is the one that receives free allowances. Some portion of allowances could also be given to other entities affected by the program in order to reduce the economic impact of the emissions cap. For example, while electric power generators are entities likely to be covered by the cap-and-trade program, some portion of allowances could be given to their customers—such as energy-intensive industries—to provide relief from higher electricity costs and reduce concerns about international competitiveness.

Table 4 *Options for the Information Used in Calculating the Baseline for Allocating Allowances*

Baseline Calculation Options	Implications
Updating	• Accommodates growth in production (including new entrants) potentially minimizing consumer prices in that sector • Allows changes in markets, competition, plant closures, and new entrants to be considered and accommodated • Encourages increases in emissions, if based on emissions • Encourages increases in output and emissions, if based on output • Benefits growing entities and potentially consumers
No Updating	• Does not provide incentive to increase emissions • Growing firms will struggle more to meet compliance obligations than non-growing firms • Windfall to entities that have reduced production • Requires set-aside for new entrants • Benefits entities that have improved efficiency more than competitors and plants with decreasing production levels at beginning of time period

Table 5 *Options for Allocation to Affected Parties*

Entity Options	Implications
Emitters only	• Consistent with goal of free allocation to address compliance costs • Benefits emitting facilities
Affected entities	• Could allocate to affected entities, such as consumers or their proxies such as load serving entities
All product generators or producers	• Benefits lower-emitting facilities, proving a subsidy for what may be an expensive, but cleaner technology choice • Not all non-emitters are in need of additional subsidies as some pass on increased costs to the market in the form of higher prices
State or federal government funding for public policy objectives (Allowances are subtracted from the pool)	• Can be used to help alleviate electricity/product price impacts of program • Could provide source of funds for end-use efficiency and other public benefit programs • Additional administrative burden associated with distributing benefit to non-emitters (public) • Benefits public with expense borne by industry • May not pursue most cost-effective reductions or pick winning technologies

Allowances could also be given to government or other entities for supporting public policy objectives such as the development and deployment of technologies aimed at reducing greenhouse gases, capturing and storing carbon, and improving energy efficiency. Table 5 on page 9 lists some of the potential recipients of allowances and possible implications.

Options Within the Auctioning of Emission Allowances

Auctioning of greenhouse gas emission allowances would involve requiring the regulated entities to bid to purchase emissions allowances. If an auction is employed to distribute emission allowances, important issues to consider include the design of the auction (e.g., who can and cannot participate in the auction, the type of auction employed, and the frequency with which the auction is held) as well as how to use the funds generated through the auction.

How should emission allowances be auctioned? Important objectives of auction design are to promote competition and to encourage entry into the market, therefore the widest possible participation from many sectors should be encouraged. In general, the higher the number of bidders, the greater the competition and auction revenues. On the other hand, small bidders may not participate directly because of high transaction costs, and the regulatory agency will face transaction costs associated with each bidder. This could be addressed by allowing "dealers" to participate in the market on behalf of smaller entities.[17]

There are many types of auctions that could be used to distribute allowances in a cap-and-trade program. The two broad categories that are often discussed are ascending-bid auctions and sealed-bid auctions. Ascending-bid auctions allow bidders to raise their bids during the auction. In a sealed-bid auction, bidders submit final offers only. The bids are submitted confidentially as demand schedules which specify how many allowances a bidder would be willing to buy at any given price. The regulatory agency would then add the bids together to form an aggregate demand curve. The market clearing price would be the point where the aggregate demand curve equals the supply of allowances and all bidders above this price would be declared winners.[18]

The U.S. Environmental Protection Agency (EPA) auctions a small percentage (approximately 2.8 percent) of the allowances it distributes annually to regulated entities under the acid rain program. Each participant is required to submit a sealed bid containing the number of allowances desired and the purchase price to the EPA in advance of the auction. EPA then distributes the allowances on the basis of bid price, starting with the highest priced bid and continuing until all allowances have been sold or there are no more bidders. EPA does not set a minimum price for allowances.[19]

Determining how frequently to hold the auction will be important as well. An auction that included all of the allowances but was held infrequently could reduce transaction costs and promote competition between existing firms. However, smaller but more frequent auctions

can be more responsive to short-term price fluctuations, may provide more immediate information to the market on supply and demand, encourage participation from smaller firms that may not have sufficient funds to purchase several years worth of allowances, and alleviate concerns that a few large firms may buy significant portions of the allowances.[20]

How should the funds generated through the auction be used? In addition to determining how auctions will be run, decisions will need to be made regarding how funds generated will be used. Options for use of funds generated through the auction include reducing existing taxes, funding environmentally desirable programs and policy objectives (including those associated with reducing or responding to climate change), minimizing the cost of a cap-and-trade program on certain affected entities (including consumers), and addressing competitiveness concerns. Just as with decisions concerning who should receive allowances, determining the use of auction revenues will involve difficult political tradeoffs.

Conclusion

While determining who receives free allowances and how many allowances are sold are key design elements of a cap-and-trade program, they relate to distributional equity rather than the environmental effectiveness of the policy. Objectives beyond achieving the emissions target through a cap-and-trade program—such as supporting a transition to a lower-carbon economy through technology and assistance to affected parties—can be achieved either through allocation or auction, or through a combination of both.

Different sectors (and even different firms within a sector) can have significantly different abilities to pass along costs of purchasing allowances to consumers, so consideration of the competitive environment is important. Further, within a free allocation, there may be a variety of acceptable metrics for a sector such as electric power generation with a standard product (electricity), while certain metrics (e.g., "benchmarking") may prove complicated for other sectors—such as some diverse categories of manufacturing. As a result, the approach to allocation may vary from sector to sector. Further, methods for free allocation or even the percentage of free allocation can change over time.

Many emerging programs transition from a generous free allocation to a full auction over time. A mixed approach that combines both some free allocation and partial (and expanding) auction offers important flexibility in meeting environmental and economic objectives.

Key Decisions in Determining the Method of Allocation

- What percentage of allowances will be distributed using free allocation vs. auction? Should that percentage change over time?
- What metric should be used in allocating allowances in a given sector?
- What timeframe should be used in allocating allowances?
- Who should receive allowances?
- What type of auction should be employed?
- How should the funds generated through the auction be used?

End Notes

[1] The California Global Warming Solutions Act of 2006, or AB32, requires a 25 percent cut in carbon dioxide pollution produced in the state by 2020 in order to bring emissions levels to 1990 levels. The Market Advisory Committee (MAC)—comprised of national and international experts—was convened by California's Secretary for Environmental Protection to advise the Air Resources Board on the development of a plan to reduce the state's greenhouse gas emissions, including the design of an appropriate cap-and-trade program. See Recommendations of the California Market Advisory Committee to the California Air Resources Board, *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*, June 30, 2007 found at http://www.climatechange.ca.gov/documents/2007-06-29_MAC_FINAL_REPORT.PDF

[2] Estimates in the range of $50 billion to $100 billion in annual value are not uncommon. The total value of the allowances is not the same as the cost of the cap-and-trade program. Instead, this value is a transfer from those paying higher energy or emissions costs to those that initially receive the allowances. The total program cost would likely be much smaller. See Kopp, Raymond J., Resources for the Future, *Allowance Allocation* (May 2007) available at http://www.weathervane.rff.org/Backgrounders/RFF-BCK-AllowanceAllocation.pdf

[3] The method of allocation may affect the overall cost to society if, for example, the revenues from an auction are used to reduce distortionary taxes on capital and labor, thereby reducing the net cost of the program. See Nordhaus, Robert R. and Kyle W. Danish, Pew Center on Global Climate Change, *Designing a Mandatory Greenhouse Gas Reduction Program for the U.S.* (2003) available at http://www.pewclimate.org/global-warming-in-depth/all_reports/mandatory_ghg_reduction_prgm/

[4] For additional information on Title IV of the Clean Air Act, see http://www.epa.gov/air/caa/title4.html

[5] See the National Commission on Energy Policy's *Allocating Allowances in a Greenhouse Gas Trading System*, March 2007, found at http://www.energycommission.org/site/page.php?report=32

[6] In a trading program with strict limits on allowance supply (no offsets allowed) and strict compliance timing requirements (no banking or borrowing), small changes in either supply or demand (e.g., a cold week causes increased demand for coal and increased demand for allowances) will cause large fluctuations in allowance prices increasing industry risk.

[7] See discussion in California Market Advisory Committee report, p. 59.

[8] See CBO Economic Budget and Issue Brief, *Trade-Offs in Allocating Allowances for CO_2 Emissions*, April 25, 2007.

[9] Betz, Regina and Misato Sato, *Emissions trading: lessons learnt from the 1st phase of the EU ETS and prospects for the 2nd phase*, Climate Policy 6 (2006), 351-359.

[10] See Recommendations of the California Market Advisory Committee to the California Air Resources Board, *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*. June 30, 2007 found at http://www.climatechange.ca.gov/documents/2007-06-29_MAC_FINAL_REPORT.PDF

[11] This issue could be addressed by requiring allowances to be returned when a plant shuts down, unless it opens another U.S. facility.

[12] For a more complete discussion of some of the gains that can theoretically be achieved by changing tax policy and why achieving such gains may be difficult in practice, see Stavins, Robert, Judson Jaffee and Todd Schatzki, *Designing an Effective U.S. Climate Policy: Key Issues, Implications and Tradeoffs*, Analysis Group, June 2007.

[13] See the U.S. Climate Action Partnership's *A Call for Action—Consensus Principles and Recommendations from the U.S. Climate Action Partnership*, a Business and NGO Partnership, January 2007 found at http://www.pewclimate.org/docUploads/USCAP%20Report%20FINAL%20070117.pdf

[14] See the National Commission on Energy Policy's *Energy Policy Recommendations to the President and the 110th Congress*, April 2007, found at http://energycommission.org/files/contentFiles/NCEP_Recommendations_April_2007_4656f9759c345.pdf

[15] See Recommendations of the California Market Advisory Committee to the California Air Resources Board, *Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California*, June 30, 2007, found at http://www.climatechange.ca.gov/documents/2007-06-29_MAC_FINAL_REPORT.PDF

[16] See Regional Greenhouse Gas Initiative (RGGI) Model Rule found at http://www.rggi.org/modelrule.htm

[17] Hepburn, Cameron, Michael Grubb, et al, *Auctioning of EU ETS phase II allowances: How and why?* Climate Policy 6 (2006) 137-160.

[18] Ibid.

[19] For more information see the Environmental Protection Agency's *Acid Rain Program Allowance Auction Fact Sheet* found at http://www.epa.gov/airmarkets/trading/factsheet-auction.html

[20] Hepburn, Cameron, Michael Grubb, et al, *Auctioning of EU ETS phase II allowances: How and why?* Climate Policy 6 (2006) 137-160.

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