July 2009 Edition

Cap and Trade 101

A Federal Climate Policy Primer

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SUMMARY

The same fossil-fuels roller coaster that is whiplashing our economy is also overloading our atmosphere with carbon. Fortunately, the same actions that will curb greenhouse-gas emissions will also let us break through to a clean-energy economy—an economy that ends our addiction to oil and other dirty fossil fuels.

If we are to seize this opportunity, however, a change is required: We must stop treating Earth's atmosphere as a free dumping ground for pollution. The key to making polluters pay for emissions is a system known as "cap and trade." A cap-and-trade system enforces an economy-wide limit on greenhouse gas emissions; sets realistic goals for reducing emissions over time; sets commonsense rules of the road; and harnesses the creativity and dynamism of the market to achieve these goals.

All cap-and-trade systems are not equal, however. We can judge them on a few basic principles that ensure maximum effectiveness and financial protection for families. Cap and Trade 101 lays out the key questions.

In 2009, the US Congress is debating a sweeping new clean-energy policy. The American Clean Energy and Security (ACES) Act proposed by Representatives Henry Waxman of California and Edward Markey of Massachusetts and passed by the US House of Representatives creates a national cap-and-trade program. The act also spurs clean energy in many other ways. This primer evaluates ways of designing a cap-and-trade system, including the Waxman-Markey bill and other approaches under consideration in the US Senate.[1]

Climate policy that works is built on three principles: efficiency, effectiveness, and fairness. To satisfy these three criteria, Sightline recommends a particular cap-and-trade design: one that is comprehensive, operates upstream, is auctioned, limits the use of offsets, and has built-in protections for families. Here's what these terms mean.

Comprehensive. Cap and trade should cover all measurable emissions of greenhouse gases to ensure an efficient, economy-wide transition away from carbon-based fuels.

Upstream. For simplicity's sake, cap and trade should operate as high as possible in the supply chains for fossil fuels—as close as is convenient to the point at which fossil fuels enter the economy. This approach means that far fewer than one-tenth of one percent of businesses will have any direct interaction with the cap-and-trade system. Cap and trade does not create any paperwork for families or small businesses.

Auctioned. Permits to emit greenhouse gases should be sold at frequent public auctions, not distributed free—"grandfathered"—to historic polluters. Auctioning prevents windfall profits for energy companies, allows the proceeds of the auctions to serve the public interest, and prevents market manipulation and "gaming."

Grandfathering the privilege to pollute would take money from low-income consumers and give it to the predominantly wealthy shareholders of energy companies. Of course, political pressures make free distribution attractive to policymakers. If permits are distributed for free, lawmakers can minimize the negative consequences by requiring that recipients who later sell their permits dedicate the sale revenue to benefiting the public.

Limited offsets. Offsets offer an alternative to carbon permits for meeting cap-and-trade goals. Offsets certify that whoever bought them paid for carbon-cutting efforts undertaken elsewhere, in sectors or places exempt from the cap. Offsets can be an effective part of climate policy if they are strictly limited, well-defined, and closely regulated.

Built-in protections. Revenue from auctioning cap-and-trade permits should go, first and foremost, to compensate families for the burden of expensive energy. The revenue can be distributed in various ways, including:

1. **Cap and Dividend.** A full rebating of all auction proceeds equally per person.
2. **Cap and Rebate.** Rebating certain auction proceeds to low- and moderate-income families.
3. **Cap and Caulk.** Dedicating a share of proceeds to upgrading the energy efficiency of housing.
4. **Cap and Invest.** Investing a share of auction proceeds in green-collar-job programs—giving disadvantaged families a chance to gain from the new opportunities of the clean-energy economy.

Each of these varieties is a form of cap and trade. Trading affects how firms comply with the program, while "dividend," "rebate," "caulk," and "invest" simply describe how the revenue is distributed.

Carbon tax shifting, commonly discussed as a rival policy to cap and trade, is actually more a complement than an alternative. A carbon tax shift combines fees on greenhouse-gas emissions with dollar-for-dollar reductions in other taxes. British Columbia's carbon tax shift, implemented in July 2008, is a model policy that other jurisdictions would do well to emulate. It can be readily integrated into cap and trade in the form of an auction "reserve price" to create a hybrid policy that is stronger than either a carbon tax shift or a cap-and-trade system individually.

INTRODUCTION

What is cap and trade?

Climate change is not only one of the greatest challenges of our time, it's also an epic opportunity. When we rise to the challenge through smart solutions, we will also unleash a wave of new economic development, generating jobs and revitalizing local economies. We already have the technology to jump-start a clean-energy economy. The ingenuity and dynamism of the marketplace can expand on these technologies over the coming years, generating broadly shared prosperity while safeguarding our climate.

But seizing this opportunity will require us to adopt policies that effectively curb climate-changing emissions. At base, the threat of climate disruption stems from a single fact: We treat the atmosphere as a free dumping ground. No one has to pay to pollute our shared air. The result has been increasing concentrations of climate-warming gases—an overloading of carbon in the atmosphere—along with other maladies of our energy system such as oil addiction and the volatile prices that come with it.

Jump-starting a transition to a clean-energy economy means, above all else, putting a price on climate-warming emissions: *no more free dumping*. The way to make polluters pay, while guaranteeing that we'll meet emissions-reduction goals, is to implement a system called "cap and trade." Cap and trade commits us to responsible limits on global warming emissions; gradually ratchets down those limits over time; and harnesses the power of the marketplace to reduce emissions as smoothly, efficiently, and cost-effectively as possible, allowing the economy to adjust and thrive.

What does "cap and trade" mean?

Cap: A "cap" is a legal limit on the quantity of greenhouse gases our economy can emit each year. Over time, the legal limit diminishes—the cap gets tighter—until we've hit our targets and launched a clean-energy economy. The cap acts as a solid backstop behind all other climate policies. Energy efficiency standards for vehicles and appliances, smart-growth plans, building codes, transit investments, tax credits for renewable energy, public investment in energy research and development, utility regulatory reforms—all manner of public actions can move us toward our climate goals. *But the cap is our only guarantee that we will get there*. There is no substitute for the certainty of an emissions cap.

Trade: "Trade" means that, by law, companies may swap among themselves the permission to emit greenhouse gases. In other words, there is a market for pollution "permits" or "allowances." The point of such a trading system is to put a price on pollution that will travel throughout the economy, motivating businesses and families to find ways to trim greenhouse gases. By turning the permission to pollute into a

commodity that is bought and sold, everyone up and down the economic ladder gets new opportunities to make and save money. Trade hitches the flexible power of the marketplace—the mobilized ingenuity of millions of diverse, dispersed, innovative, self-interested people—to our climate goals. Cap and trade is a compelling combination: guaranteed results, flexible means.[2]

Putting a price on pollution may well support or even drive up energy prices. But fossil fuel prices are already up because of basic supply and demand; were cap and trade in effect already, it would probably simply put a floor under prices, not raise them further in the near term. Besides, a well-designed trading system encourages efficiency, innovation, and lowest-cost solutions. In the long term, cap and trade will reduce demand for dirty energy and make emerging clean technologies more and more affordable.

Most important, a well-designed cap-and-trade climate policy allows us to take charge of our energy future, rescuing ourselves from our fossil-fuel dependence. It redirects the proceeds of energy prices toward the common good. In short, cap and trade done right allows us all to share in not only the costs but also the benefits of the new economy.

Much depends, then, on the design of cap and trade. Different cap-and-trade proposals vary on how both "cap" and "trade" function. These differences have profound implications for the fairness and effectiveness of climate policy. Explaining these differences is the purpose of this primer.

How does cap and trade work?

Here are the basic steps to operating a cap-and-trade system:

1. **Tally greenhouse-gas emissions.** For example, track fossil fuels at the points where they enter the economy: the pipeline or oil tanker. The Congressional Budget Office estimates the number of US companies at such entry points as 7,400.[3]
2. **Set a cap.** Decide how much carbon pollution to allow in the program's first year and require permits for emissions: one permit per ton of carbon dioxide or its equivalent in other heat-trapping gases (known as CO_2 equivalent, or CO_2e). The number of permits will match the cap to ensure we hit our goals. (A cap does not limit emissions from individual citizens; no paperwork for families or small businesses is required. Instead, it affects wholesalers or suppliers of fossil fuels and similar big "upstream" businesses. Price signals travel downstream through the economy to other businesses and to consumers.)
3. **Distribute permits.** Permits can be valid for a single year, or for a multi-year period. One method for distributing them is auctioning; another is to give them away free on the basis of past emissions ("grandfathering"), past energy sales, or some other criterion. Permit holders can buy and sell allowances among themselves. That's the "trade" part.

4. **Enforce the cap.** Affected businesses (for example, those that bring fossil fuels into the economy) will file periodic reports verifying that they hold enough permits to cover their emissions. Authorities will audit reports to deter misrepresentation. They will curb speculation and gaming by overseeing the permit market.
5. **Step it down.** Each year, distribute fewer emissions permits, on a predictable, published schedule that takes us to our targets. The gradual nature of this transition maximizes choice and flexibility in a way that narrowly targeted climate policies cannot match.

Within this general description, cap and trade can vary, depending on how a specific system is designed. Key design choices make a world of difference.

IN BRIEF: WHY CAP AND TRADE?

- **It's tested and proven.** A cap-and-trade system worked cheaply and efficiently to reduce acid rain pollution in the United States in the 1990s.
- **It's cost-effective.** A cap provides market incentives to steadily reduce pollution in a cost-effective and efficient manner, encouraging a healthy shift away from the instability and insecurity of fossil fuels.
- **It's economically sound.** Today, we stand at the top of the pollution staircase. It would be dangerous and risky to jump to the bottom or run down too fast. Instead, cap and trade allows our businesses and families to step down, stair by stair, at a pace that is safe and manageable. We can adjust through fuel efficiency and increased renewable-energy resources like solar and wind power. Cap and trade offers us a path to success in the new energy economy: maximum flexibility, clear and feasible goals, and a predictable timeline.
- **It's a prudent, long-term investment.** The key to our long-term prosperity and a stable economy is a shift away from oil. This shift can work for businesses and consumers alike, allowing us to take charge of rising energy costs, invest in new technologies, and ensure a smooth transition. Right now, we're sending billions of dollars a year out of local economies to pay for dirty energy.
- **Most importantly, the cap is the only policy guarantee.** No policy measure can substitute for setting a solid cap on the greenhouse gas emissions that are allowed into the atmosphere; it's our firm guarantee that we will meet crucial pollution targets.

What's the status of cap-and-trade proposals?

Cap and trade has emerged as the most popular climate policy solution, in both Europe and North America. It's based on successful cap-and-trade programs for other pollutants such as airborne sulfur dioxide, first implemented in the 1990s in the United States. The European Union has operated a limited carbon cap-and-trade system since 2005.

President Barack Obama advocated a cap-and-trade system with 100 percent auctioned permits in his proposed budget.[4] In spring 2009, the US Environmental

Protection Agency declared that carbon dioxide and a handful of other greenhouse gases are pollutants that can harm human health and welfare. The announcement paves the way for regulating the gases as pollutants for the first time in the United States. In other words, if Congress does not act, a US president and regulatory agencies can.

On June 26, 2009, the US House of Representatives passed the American Clean Energy and Security Act, sponsored by Representatives Henry Waxman of California and Edward Markey of Massachusetts. Often called Waxman-Markey, this bill is much more than a cap-and-trade plan. It includes robust provisions for developing clean energy, improving energy efficiency, creating green jobs, and adapting to a warmer world.[5] The act gets good marks on three of the five criteria above: comprehensive, upstream, and built-in protections. It is less exemplary on auctioning permits and limiting offsets. The bill would cap carbon emissions at 17 percent below 2005 levels by 2020, gradually lowering the cap to 83 percent below 2005 levels by 2050.[6]

In the Senate, several committees will consider the house bill and develop their own legistlation.[7] Senator Maria Cantwell of Washington State has prepared a variant on cap and dividend as a draft bill.[8] Other members have also floated bills.[9]

Cap and trade is not just a national phenomenon. Elected leaders in jurisdictions throughout North America have committed to designing and implementing cap-and-trade policies. They started by setting bold greenhouse-gas goals—cutting emissions by as much as 75 percent by 2050.[10] In the Northeast United States, the Regional Greenhouse Gas Initiative (RGGI) aims to stabilize certain emissions immediately, and effect a 10 percent reduction by 2018.[11] States in the US Midwest created the Midwest Greenhouse Gas Reduction Accord (MGGRA) with similar goals.[12]

The largest regional agreement, both in area and in population, is the Western Climate Initiative (WCI), which unites leaders from Arizona, British Columbia, California, Manitoba, Montana, New Mexico, Ontario, Oregon, Quebec, Utah, and Washington.[13] WCI's collective goal is reducing overall emissions to 15 percent below 2005 levels by the year 2020. The WCI leadership council, composed of representatives of the member states, developed a cap-and-trade plan in 2008.[14]

Oregon and Washington's legislatures began consideration of these plans in early 2009, but momentum dissipated when President Obama called for—and leaders in the US House of Representatives began work on—a national cap-and-trade law. Leaders in the US Senate have pledged action before the end of 2009.

Even without federal action, the three regional cap-and-trade agreements—the MGGRA, RGGI, and WCI—encompass more than more than half the people in Canada and the United States (see Figure 1).

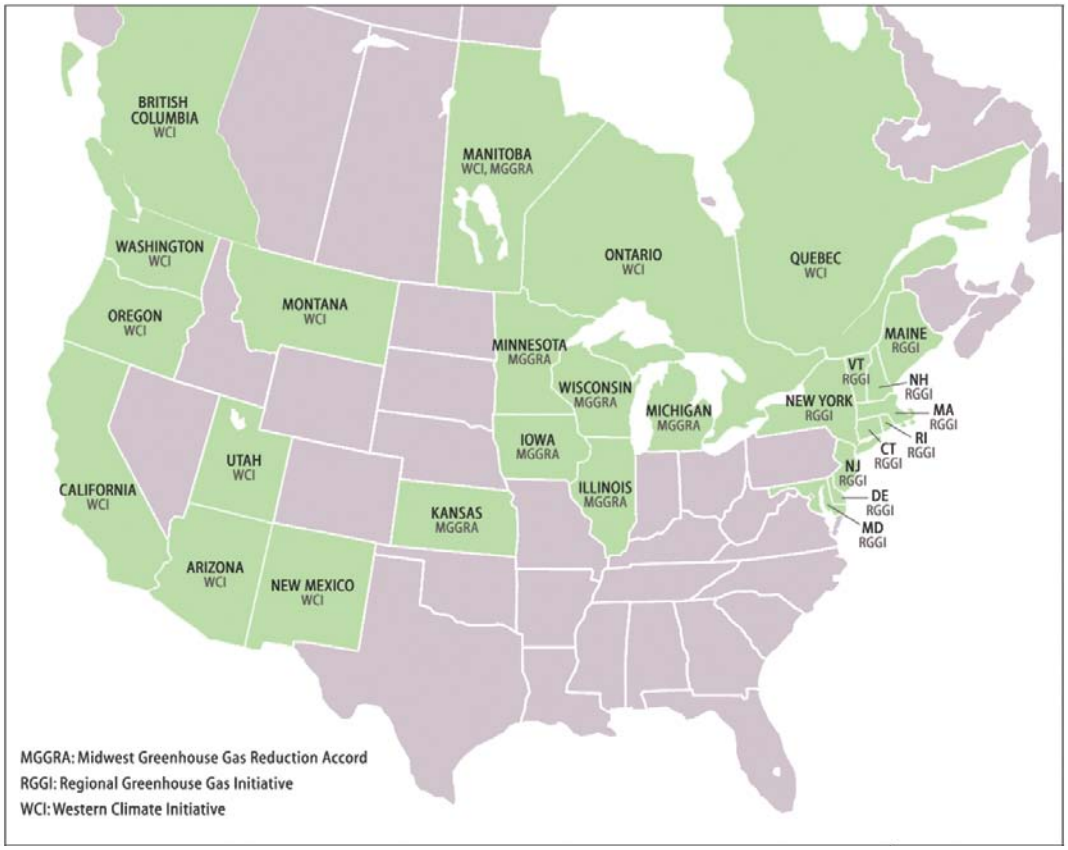


Figure 1. *Twenty-eight states and provinces are forming regional cap-and-trade systems.*

What are the main design variables in a cap-and-trade program?

Think of cap and trade as a climate-protection machine with five main dials, each of which controls part of the machine. The five are:

1. **Scope:** Which gases and industries are covered?
2. **Point of regulation:** Which people or companies must hold permits?
3. **Allocation:** How are the permits distributed initially, by auction or for free? (And subsidiary to that, how long does a permit last? Who can you sell it to? Can you save it for later? How many may one company hold?)
4. **Offsets:** May companies, as a substitute for making their own cuts, pay others outside the cap to cut emissions? (And, if they may, how many such "offsets" are allowed? How are they regulated and certified?)
5. **Revenue use:** If some or all permits are auctioned (or given free with stipulations as to the use of their resale value), what should authorities do with the proceeds?

How to tell whether a cap-and-trade program is well designed

Cap-and-trade programs should embody three core principles.

1. **Effectiveness:** Climate policy should cut global-warming pollution gradually enough for businesses and families to adjust but at a pace rapid enough to meet the targets recommended by science and set by law. In short, it should be capable of causing emissions to decline by 20 percent (below 2005 levels) by 2020 and by more than 80 percent by 2050.
2. **Efficiency:** Climate policy should chart the most cost-effective route. It should be simple, flexible, and market-oriented; it should minimize cheating and gaming. We have neither the time nor the money for a strategy that's wasteful, poorly conceived, or vulnerable to manipulation.
3. **Fairness:** Climate policy should share equitably the economic burdens and benefits of climate stewardship. In fact, climate policy should redress some of the injustice of climate change itself.

WHAT DO WE MEAN BY "FAIRNESS"?

The fairness principle deserves elaboration. Climate change is a universal menace, threatening hardships for everyone. But not everyone will suffer equally. Perversely, those least to blame for causing it are most vulnerable to it, whether in low-lying Bangladesh, the Ninth Ward of New Orleans, or the floodplains around Chehalis, Washington, where small towns and rural areas were inundated with floodwaters in the spring of 2008.[15]

Throughout North America, climate change promises to widen the gap between economic winners and everyone else. Seniors, children, and low-income families, particularly in rural areas, face the worst climate insecurity. Low-income families are most likely to live in floodplains or fire-prone forests. (Or, if low-income families have a home in the woods, it's their only home, not a second one.) They're unlikely to have the means to move to safer ground. They're unlikely to have air conditioning for the heat waves that scientists predict. What's more, they are less likely to have health insurance to protect themselves from whatever disasters or hardships come.[16]

Forestry workers in British Columbia may see massive job losses by 2012 from the climate-induced plague of pine beetles laying waste to the forests.[17] Reservation-dwelling Native Americans and First Nations are vulnerable because of their dependence on fisheries, forestry, and agriculture. Farm laborers also face disproportionate hardship: crop failures and dwindling irrigation water will lead to "not hiring" signs across farm counties.

A certain amount of climate change is already unavoidable, and it will punish the blameless. Smart climate policy, therefore, should especially protect low-income families.

What cap-and-trade design works best?

The principles of effectiveness, efficiency, and fairness described above lead to a particular cap-and-trade system design, which has five crucial characteristics:

1. It is *comprehensive* in scope.
2. Its point of regulation is *upstream*.
3. Its permits are allocated by *auction*.
4. Its offsets are *strictly limited*.
5. It uses auction revenues to provide *built-in protections for working families*.

The rest of this primer elaborates on those key terms: *comprehensive*, *upstream*, *auctioned*, *offsets*, and *built-in protections for families*. Along the way it comments on proposals under consideration in Congress.

SCOPE: COMPREHENSIVE

Scope determines how much of our total greenhouse-gas output is covered by cap and trade—that is, which greenhouse gases and from which sources. Carbon dioxide is the main greenhouse gas, accounting for 81 percent of the United States' contribution to climate disruption. Fossil-fuel combustion is the main source of CO_2.[18]

Existing cap-and-trade systems are limited in scope. Europe's system, launched in 2005, covers only electric power plants and certain heavy industries; the Regional Greenhouse Gas Initiative of the Northeast states covers only the former.

A cap is like a roof: it needs to cover the whole building. In other words, it works best when it covers all measurable emissions of greenhouse gases from all measurable sources. Such comprehensiveness will dramatically increase the policy's effectiveness, and will also guarantee the cheapest and most efficient reductions possible. Leaving gases or sources "out" means forcing those that are "in" to do more than their share.

However, there are emissions sources that currently pose too many challenges to cap effectively, such as timber and agriculture. In such cases, the best way to reduce emissions is through standards and other innovative policies. It is also possible to include these sectors of the economy in an "offset" program that would encourage emissions reductions by paying for them. (See page 13 for more on offsets.)

Waxman-Markey is comprehensive in scope, including essentially all fossil fuels, along with certain other measurable greenhouse gases. It even creates a smaller, separate cap-and-trade system from hydrofluorocarbons, rare but potent industrial greenhouse gases. The Congressional Budget Office estimates that Waxman-Markey's cap would cover about 72 percent of US emissions in 2012; by 2020, it would cover 86 percent of emissions.[19] Other Senate bills are also comprehensive, although they are more-abbreviated proposals (several pages each, rather than Waxman-Markey's 1,428 pages) and do not include detailed provisions to cover as many gases as Waxman-Markey.

POINT OF REGULATION: UPSTREAM

The *point of regulation* is the place in the economy where cap and trade actually creates new legal requirements: "downstream," where consumers buy fossil-fuel energy; "midstream," where retailers and other fuel handlers sell it; or "upstream," where fossil fuels first enter the economy.

Emissions of CO_2 are readily calculated from fuel volumes: if you know how much and what grade of coal or gasoline is burned, all you need is a basic conversion chart to know how much CO_2 went into the air.[20] This property of fossil fuels makes it possible to operate a cap-and-trade system almost entirely on the basis of sales information that energy companies already gather. These companies already report some of that information to public agencies under existing laws, such as those governing motor fuels taxes. In short, we can run a cap-and-trade system with very little new paperwork.

By implementing cap and trade "upstream" before the fuel fans out through the distribution system, we can run a cap-and-trade system without any required actions for more than 99.9 percent of companies (and for 100 percent of families). Fossil fuels enter our economy through a handful of choke points. The Pacific Northwest and British Columbia, for example, get oil from just four oil pipelines, plus tanker docks at just five oil refineries along Puget Sound and the Strait of Georgia. This region gets natural gas from three pipelines. Coal arrives on a handful of railroads, and coal- and gas-fired electricity zips in on three large transmission lines.[21] Each of these portals is a natural point of regulation.[22]

Cap and trade would require that fossil-fuel energy handlers—either purchasers or sellers—record fuel volumes and obtain emissions permits for the carbon that will be released when those fuels burn.

Waxman-Markey mostly operates upstream, targeting roughly 7,400 companies, including oil and natural gas suppliers. It also regulates coal at power plants, downstream from the mines where it originates, but still fairly far upstream in the energy economy.[23] The bill's reporting and permitting requirements would affect few small businesses and no individuals. Other congressional proposals are also upstream: Cantwell's draft proposal, for example, is even further upstream than Waxman-Markey, falling on the economy's "first sellers" of carbon fuels. Under Cantwell's proposal, coal miners, not power generators, would need carbon permits.

REDUCTIONS OUTSIDE THE CAP: OFFSETS

Offsets could improve the cost-effectiveness of cap and trade while bringing substantial side benefits. Unfortunately, they could also gut the cap, making it no more than a sham. The devil is in the details.

Offsets are certified cuts in emissions that are outside the cap, either legally or geographically, but that are counted towards meeting emissions goals. For example, a cement company in the Northwest that plans to emit 100 tons of carbon dioxide might choose to acquire 90 tons of permits at auction and supplement its obligation by purchasing 10 offsets, perhaps from a dairy farmer in the Midwest who installs a

methane-capture system to trap gases created by decomposing manure. The cement company's demand for offsets, and willingness to pay for them, means that the atmosphere is spared the greenhouse gases from the manure that would otherwise have been released. To use the offsets under cap and trade, the cement company would present authorities with documentation of the offsets as a substitute for providing an equal number of carbon allowances.

Ideally, offsets could lessen the financial burden for polluters meeting carbon caps while expanding the sectors of the economy that are cutting emissions. Offsets can either reduce greenhouse gas emissions, or "sequester" them by removing them from the environment, usually by planting or preserving carbon-absorbing forests. Their main advantage is their ability to tap the cheapest carbon-reducing opportunities wherever they may be—whether in reductions at port-city cement plants or in new technologies on Heartland farms—thus easing the transition to lower levels of emissions. Because greenhouse gases are not local pollutants but global ones, it doesn't matter to the atmosphere whether the CO_2 is emitted in India or Indiana.

Among their potential advantages is that offsets provide an opportunity to cut carbon emissions from timber, agricultural, and other industries that for various reasons are not included in the cap-and-trade program. And they can channel investments into projects in developing nations—a shift that sends money from developed countries, which are largely responsible for greenhouse gases, to poorer nations that are likely to suffer more greatly from the effects of climate change.

Unfortunately, offset programs are also risky enough that, if handled poorly, they could jeopardize the heart of cap and trade. It can be difficult to verify the emissions reductions that offsets represent, whether it's estimating the amount of carbon absorbed by protected forests or verifying that investments in clean energy in a developing nation are delivering what was promised. For example, the world's largest offset program, the Clean Development Mechanism (CDM), which allows countries participating in the Kyoto Protocol to invest in carbon-cutting offset projects in developing countries, has run into serious criticism.[24] Analysts have found that the program allowed offsets from numerous projects that would have been undertaken even without the offset program.[25] In other words, CDM offsets allowed polluters to comply with their legal obligations without actually trimming emissions anywhere.

Another worry is that allowing polluters to pay for offsets rather than reduce their own emissions could postpone much-needed innovation, slowing the arrival of new technology that can ultimately benefit developed and developing nations alike. In fact, too heavy a reliance on offsets rather than emissions reductions could delay the embrace of cleaner industries, renewable energy, and freedom from imported oil.

Moreover, for the participants in a cap-and-trade program, offsets raise the specter of unfairness. The sectors of the economy that fall under the cap, such as energy companies and large industrial polluters, will have to pay to reduce their emissions, while the sectors that fall outside the cap and are eligible for offsets are able to profit from their carbon-cutting investments.

All these disadvantages explain why Senator Cantwell's draft bill bans all offsets—

an option with a strong policy rationale. Still, it may be possible to seize offsets' benefits and avoid their pitfalls, with the appropriate precautions. An effective program would include the following assurances for offsets:

- **Additional:** The offsets must ensure that emissions cuts, whether capturing gases from cow manure or preventing logging, would not have occurred without the offsets. In other words, the reductions should be "additional" to those that are already required or planned.
- **Prevent leakage:** The offsets cannot give credit for simply shifting polluting behavior from one location to another, a problem termed "leakage." For example, a power company in China cannot be allowed to sell offsets for reducing its use of coal at one facility if it is simply shifting its use of coal to another site.
- **Permanent:** The emissions reductions must be long-lasting. For instance, if a timber company wants offsets for replanting trees on cleared land, there must be assurances that the carbon-dioxide-absorbing trees will not simply be logged later.
- **Enforceable:** The offsets must be enforceable in court. If the tree-planting reductions are eliminated—say, in a forest fire—the permit holder or offset provider must be obligated to reduce emissions elsewhere.
- **Quantifiable:** The carbon dioxide reductions must be carefully measured and verified. Approved offsets should be available for review in a public registry.
- **Discounting:** It's impossible to eliminate uncertainty associated with offsets, so their value should be discounted relative to the emissions they're covering. For example, to offset four tons of emissions, a polluter might be required to provide five tons' worth of offsets.
- **Limited:** In order to manage the risks of offsets and also obtain real near-term reductions in pollution, offsets should be limited in number. And to boost certainty and administrative ease, regulators should also consider other limitations, such as geographic or project-type restrictions, in order to allow only the highest-quality offsets.

Waxman-Markey sets a goal of cutting the nation's approximately 6 billion tons of annual carbon dioxide emissions to slightly more than 5 billion tons by 2020.[26] However, the bill allows for a substantial use of offsets: 2 billion tons split between domestic and international projects. The domestic offsets are valued equally with permits; international offsets are not discounted until 2018. That means offsets could be used to meet the bill's reduction goals until the early 2030s.[27]

Put another way, the amount of greenhouse gas emissions could actually increase for more than a decade, if polluters used the maximum allowable offsets. Still, that's a big "if." Some observers believe offsets will find only modest usage under Waxman-Markey. Offsets, they argue, are likely to be in somewhat short supply, driving their price higher than what it would take for permit holders to make emissions cuts of their own.[28] The Congressional Budget Office projects that in 2020, offsets will amount

to only one-third of the limit in Waxman-Markey.[29] An analysis from the World Resources Institute predicts emissions cuts that will actually beat the early goals thanks to offsets, stricter pollution regulations for uncapped industries, and a program to slow the loss of tropical forests that are also part of the legislation.[30] Whether Waxman-Markey adequately restricts and regulates offsets is a critical question for the Senate to consider.

ALLOCATION: AUCTION

Allocation is how emissions permits are distributed. Acting on behalf of citizens, authorities can give them away for free—on the basis of past emissions, past energy production, or some other criterion—after which permit holders can trade them among themselves. Or authorities can sell permits at regularly scheduled auctions, allowing emitters such as utilities and refineries to purchase the credits they expect to need. After the permits are auctioned, a "secondary market" would allow permit holders to buy extras or sell unneeded ones. Waxman-Markey uses a hybrid approach in which some permits are auctioned, some given away outright, and others given away but with the requirement that revenue generated when the permits are traded is reimbursed to ratepayers or invested in clean energy and other programs.

Free distribution of permits might sound like a good option, on the assumption that giving away permits wouldn't raise energy prices. But free distribution is actually far more disruptive than auctioning.[31] Supply and demand—not producers' costs—determine the price of permits, and the cap establishes the supply of carbon permits. Kristen Sheeran of Maryland's Saint Mary's College and James Barrett of Redefining Progress explain:

> Try buying World Series tickets from a scalper. Would he charge you any less if he found the tickets on the ground? Of course he wouldn't. . . . The supply and demand for tickets is the same no matter how much the scalper paid for them, and so the price he charges you will also be the same no matter how he got them.[32]

Cap and trade puts the same price on climate pollution whether the permits are given away, auctioned, or some mix of the two. The only difference—and it's an extraordinarily important difference—is who gets the extra money that consumers are paying for energy: the scalper (fossil-fuel companies) or the public treasury (on behalf of all citizens). Giving away carbon permits is just like handing out money. In economic terms, it's a windfall profit. How big would these windfalls be? The US Congressional Budget Office answers:

> If . . . all of the allowances were distributed for free to producers in the oil, natural gas, and coal sectors, stock values would double for oil and gas producers and increase more than sevenfold for coal producers, compared with projected values in the absence of a cap.[33]

Waxman-Markey initially auctions about 15 percent of permits, although the

percentage rises to about 70 percent by 2030.[34] It gives 7 percent of permits to coal and oil companies for free in its early years, which will provide them with windfalls, but it phases these free permits out by 2030. Waxman-Markey specifies how to distribute most of the remaining permits to a wide variety of public and private entities and dictates how those entities will use the proceeds of the permits' sale. The Energy and Commerce Committee, which Rep. Waxman chairs, concluded that in the years leading up to 2025, some 55 percent or more of permits (including those auctioned and those distributed free to certain recipients) will go to ensuring climate fairness, by mitigating the burden of energy prices.

For example, Waxman-Markey gives 30 percent of permits to electric utilities (not to power generators but to electricity retailers) along with a requirement that they rebate the value of those permits—after trading them on the open market—to their customers in equal lump-sum payments. Another 9 percent of permits go to natural gas utilities, with similar requirements that they pass the value to their customers through efficiency programs and rebates. This mechanism is less transparent and universal than auctioning permits, but it may prevent most windfalls. Electric and gas utilities, after all, are closely regulated across the United States.

How to auction

As auctions of public assets go, auctioning carbon permits is not especially complicated. Specialists in financial auctions have already designed a rigorous set of rules and procedures for the Northeast's Regional Greenhouse Gas Initiative.[35] Other cap-and-trade systems would be wise to follow the same strategy.

Although some technical details remain undecided or debatable, here's a sketch of one workable, fair, transparent, and efficient auction system:

> Carbon permits are tagged to a particular starting date (their "vintage" or "compliance period" [36]), but they will be freely and indefinitely "bankable." That is, if you own a 2012 permit, you may save it for use in any future year. (In effect, this gives permits a start date but no expiration date.) Conversely, you may never "borrow" a future permit and use it now. (Waxman-Markey provides for unlimited "banking," and tightly limited "borrowing.")
>
> Auction bidders must qualify in advance by showing evidence that they have the money to cover their bids. They themselves need not be energy companies or other greenhouse-gas emitters. Other parties—brokers, for example—are also welcome to bid. Some observers argue for limiting auction participation to fossil-fuel energy firms, because they believe that financial and securities firms are more likely to attempt market manipulation. In fact, the more potential participants, the harder it becomes to manipulate a market: collusion is more likely among a small pool of bidders (see sidebar "The Gaming Worry"). (Waxman-Markey allows a very wide range of organizations to participate in its carbon auction.)
>
> Auctioning is conducted in a format called "uniform price, sealed bid, single round." In this type of auctioning, all bidders submit a single, confidential bid

sheet specifying the quantity of each vintage of permits they wish to buy at each price level. High bidders win, but all winning bidders pay the same price for all their permits: they pay the price of the highest rejected bid ("uniform price"). Auctions are quarterly, and each auction includes several vintages. To stabilize prices and make them transparent, the earliest batch of permits for any vintage is sold as much as four years early. (Waxman-Markey follows this auction procedure.)

To prevent market manipulation and collusion, no participant is allowed to buy more than a certain share of the permits sold at a single auction. RGGI recommends a limit of 25 percent; Waxman-Markey sets the limit at 5 percent.[37] Equally important, all participants are required to reveal any third party on whose behalf they are acting. Auction officials monitor the market for signs of gaming and manipulation, just as regulators keep the financial markets for stocks, bonds, and commodities futures open and fair. As a further hedge against gaming, auction officials set a price floor or "reserve price," below which no permits are sold. Any permits for which the reserve price is not met can be permanently retired or banked by the government for later sale in the event of unexpected price increases. (Waxman-Markey observes these and other protections against market manipulation.)

All participating jurisdictions in a single cap-and-trade system sell their permits at the same coordinated, quarterly auctions, and all permits are equally valid throughout the capped region. Through "linkage," a share of permits from other cap-and-trade systems with similarly rigorous controls and safeguards are also honored; for example, a US cap-and-trade program and the European Emissions Trading System might honor each other's permits.[38] (Waxman-Markey allows any recipient of free permits to offer them on consignment at the federal government's main auction, which would be supervised by the Environmental Protection Agency. Each seller could set its own reserve price; the federal government's general reserve price would be $10 in 2012, when the program starts, and would rise by 5 percent, plus inflation, each year. Waxman-Markey allows linkage with other cap-and-trade systems, at the discretion of federal authorities.)

One potential price stabilizer to which Sightline recommends saying "no" is the use of price ceilings, also called "off-ramps." A price ceiling is a permit price at which authorities announce they will sell extra permits, above and beyond the scheduled annual permits for emissions. An off-ramp would punch a hole in the cap, slowing progress and discouraging other trading systems from linking with our own. It would also erase a strong incentive for investment in clean energy: the knowledge that the cap is unyielding, regardless of price.[39] (Waxman-Markey has no off-ramp; instead, it includes a cleverly designed "strategic reserve" that would provide extra price stabilization without rupturing the cap.)

THE GAMING WORRY

Worries about "gaming" or market manipulation sometimes crop up as an objection to cap and trade, often with reference to recent shenanigans in the financial markets. Some fear that a cap-and-trade system could be manipulated to artificially raise—or lower—permit prices to generate profits for a few at the expense of consumers. While distrust and concerns about scamming a carbon market are understandable, they're not warranted.[40]

To put some of these fears to rest, it's informative to look at existing cap-and-trade programs. Neither of the two programs regulating greenhouse gases nor a third controlling acid rain pollutants has been corrupted by gaming or market manipulation.

The European Union's Emissions Trading Scheme (ETS) was the world's first cap-and-trade program restricting carbon dioxide releases when it started in 2005. The system has succeeded in creating a Europe-wide carbon market and trading program.[41] There have been hiccups in the ETS, including an initial overallocation of allowances to polluters and some price volatility. Yet the problems are fixable and are already being addressed as the program evolves. The challenges are not attributable to a fundamental flaw in the policy or to lack of regulatory oversight. And the market has grown more robust as the number of traders has increased, making price manipulation difficult.[42] Partly thanks to the ETS, the EU is on track to meet its emissions reduction obligations under the Kyoto Protocol.[43]

The Regional Greenhouse Gas Initiative (RGGI), with a membership of 10 Northeastern and Mid-Atlantic states, held its first auctions in September 2008. Additional auctions are scheduled. While still in its early days, RGGI appears to be off to a good start, with low permit prices and no evidence of gaming.

The US Acid Rain Program has a track record dating to 1995. The program regulating power plants has exceeded expectations, beating the SO2 emissions cap years ahead of schedule and costing only one-fourth of what was expected.[44] After more than a decade, analysts have concluded that the SO2 cap-and-trade program has also been free of gaming.[45]

In short, cap-and-trade programs are already up and running with no evidence of sinister manipulation. That's no surprise to specialists who study markets. The very nature of carbon permit markets makes them hard to game, unlike California's "spot" electricity market, and not terribly prone to speculative bubbles, unlike real estate and subprime mortgages. Mortgages and pollution permits are very different commodities; a mortgage is a promise to pay a debt—a promise that a mortgage holder may not be able to keep—while a carbon permit is an allowance to emit fixed quantities of pollution.[46] Carbon markets are not like "spot" power markets either, in part because electricity must be supplied immediately to consumers, while firms need permits to cover their emissions at most only once a year, eliminating the urgency to acquire them at any particular time.

In a poorly designed cap-and-trade program, traders might try to hoard permits and manipulate prices to harm consumers. Yet commonsense rules of the road can address

the gravest concerns. To minimize price volatility, authorities can ensure transparency about prices and the number of permits available, both at auction and on secondary markets where permits are traded. Authorities can also restrict the share of permits that any single entity can hold, to perhaps a few percent of the total permits in circulation for any year.

Other particulars of market design also help. The larger the permit-trading market and the more linked it is with other cap-and-trade systems, the more stable prices will be. Making permits perpetually bankable also stabilizes prices. For example, a hydro-dependent utility can use banking to accumulate a cushion of permits for use in an unexpected December cold snap during a "low-water" year, when the utility must generate (or import) more coal-fired power. Opening auctions to all bidders with adequate financial reserves, conducting auctions frequently and early, and limiting the number of permits any one actor may hold—all these things will keep prices stable and prevent market manipulation.

There are also built-in disincentives for manipulation. The public doesn't want it because it could raise power bills, and the market participants themselves, the polluting firms, don't want to pay more to pollute. Both provide strong motivations for keeping the system honest. As with any policy, a cap-and-trade system's success will ultimately depend on oversight and vigorous public institutions. But there is every reason to believe that a well-crafted and -regulated system for auctioning and trading carbon permits can function smoothly and cost-effectively.

Waxman-Markey seems well crafted to prevent gaming, incorporating all the key design elements mentioned here along with several others.

REVENUE: BUILT-IN PROTECTIONS FOR FAMILIES

If carbon allowances are auctioned rather than allocated for free, the resulting revenue could be substantial. President Obama's budget, which called for 100 percent auctioning, estimated revenues of $79 billion.[47] While Waxman-Markey calls for less auctioning, its scheme would still generate billions of dollars. What should we do with these public funds?

The possibilities include distributing the revenue among citizens; investing in clean energy; helping consumers deal with rising energy costs; boosting efficiency in homes and buildings; easing transitions for affected workers and energy-intensive export industries; funding training in green-collar jobs; or some combination of these. Auctioning permits lets us take charge of price increases rather than being victims of volatile supplies and suppliers. It also ensures that permit revenue revitalizes local economies rather than enriching distant energy producers.[48]

But let's underline a point that is easy to miss: A comprehensive cap-and-trade system guarantees declining emissions. It is, all by itself, a complete strategy for reducing greenhouse gases. Nothing else needs to be done to limit emissions of capped gases. (Other strategies are needed for noncapped sources, such as CO_2 released from forestry.)

Other, complementary policies—incentives for renewable energy, public investments in energy efficiency, training in green-collar jobs, energy-saving building codes, and scores of other smart steps—will smooth the transition. But they probably will not accelerate the reduction in emissions.

The cap itself will set the pace. Except in unusual circumstances such as steep recessions or sudden spikes in energy-market prices, the economy will generate exactly as much greenhouse-gas pollution as permitted by the cap—and no less. Why? Because carbon permits will be limited in number and valuable. Under a cap, complementary climate policies do not reduce emissions, they lower the price of permits.

For example, transportation fuel handlers who must possess carbon permits will charge—or maintain—higher prices (because the cap curtails fuel supply). High fuel prices will stimulate conservation, as they already are doing; sales of fuel-efficient vehicles will increase; families with two vehicles will opt for the more-efficient one; transit ridership, walking, and cycling will proliferate; and some drivers will combine or cut discretionary trips. Ultimately, high fuel prices will encourage investment in low-carbon alternatives, from streetcars to sidewalks, and will nurture more-efficient communities, as demand grows for housing that's near stores, services, and jobs.

Complementary policies and programs—transit infrastructure investments, fuel-economy rules, carpooling incentives, smart growth policies—will give consumers more ways to cope with an economy in transition from dirty fuels to new clean-energy sources. And they will keep the prices of gasoline and diesel lower than they would otherwise be. In fact, if these complementary policies are successful, the price of emissions allowances won't be very high.

However, if these complementary policies aren't successful, the cap will create a price signal for emissions reductions—a signal that's self-adjusting to meet the conservation targets. The cap can do the job, guaranteed, all by itself. Complementary policies and programs cannot guarantee results.

This reasoning has a corollary: If the cap is sufficient, we do not need to use auction revenue to reduce emissions. The revenue can be used to smooth the transition to clean energy, to support programs that complement cap and trade, and to moderate the price increases it may otherwise cause.

Above all, however, the revenue can be used to ensure fairness. Climate change is brutally unfair; so are high energy prices. But auctioned cap and trade can correct those injustices by compensating families.

Taking charge of energy prices

With or without climate policies, energy prices have been rising for a decade (see Figure 2).[49] Auctioning permits gives us the opportunity to take charge of price increases and share the benefits widely—even while we safeguard the climate and stimulate local jobs.

Low-income families have been taking it on the chin from high prices, as energy takes a growing share of their budgets. As of 2005, when energy prices weren't yet as high as in 2008 and 2009, low-income families in the United States were already devoting almost 15 percent of their household budgets to residential energy, more than

four times as much as better-off families. High energy prices siphon money from people in the bottom half of the income scale to the energy-company shareholders at the top.

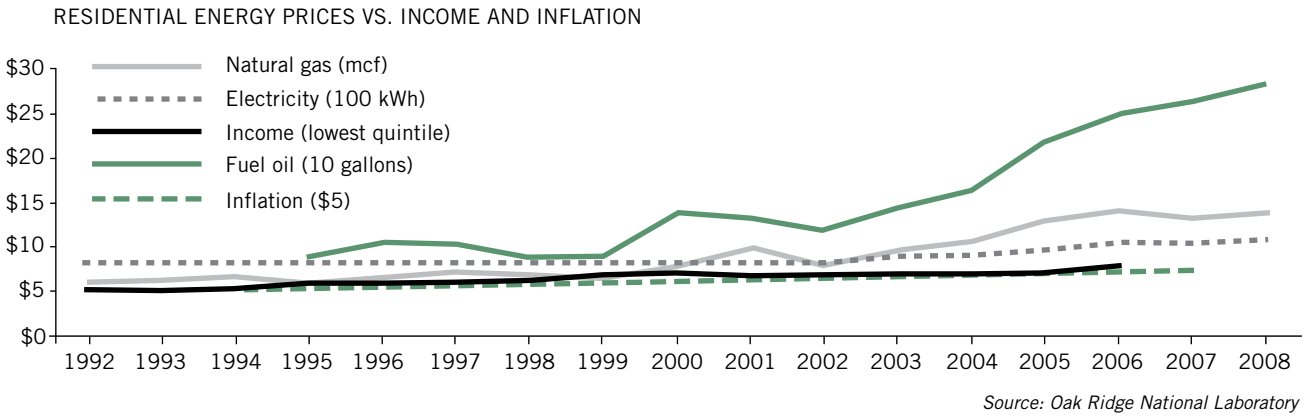


Figure 2. *Even before 2008, energy prices have risen faster than inflation or income.*

In recent years energy prices have been high, despite the global recession, not because of cap and trade but because of supply and demand. Oil and gas are in short supply; global demand is strong. The result: escalating prices. Prolonging our dependence on fossil fuels will leave us in this market vise.

Placing a cap on emissions, though it will maintain or even increase energy prices, will also direct the price premium to the public treasury. Auctioned cap and trade lets us take charge of price increases and ensure that the money goes to local economies, not distant oil drillers; families, not energy companies; and community projects, not historic polluters.

Here are five ways those revenues could be usefully directed.

Option 1: Dividends for all

The simplest use for auction revenue is to rebate all of it to families on an equal per-person basis. This "Cap and Dividend" plan prevents financial losses for families. Everyone pays more for energy; everyone gets a dividend check.[50] A $15/ton carbon dioxide charge would yield almost $200 a year per person in the United States. It'd be like the Alaska Permanent Fund, which pays out an annual share of oil earnings to each resident of the state.

The net effect of Cap and Dividend, shown in Figure 3, is to take the sting out of climate pricing for low- and middle-income families. They pay more for energy, but their climate dividend covers the expense.

Cap and Dividend wouldn't end poverty or reverse the widening income gaps that plague our continent. But it would mitigate some of the unfairness of climate change itself.

Cap and Dividend can help reduce some of the unfairness of climate change by giving a hand to low- and middle-income families. But is it fair nationwide? Does

the West Coast, with its clean electricity from hydropower dams, benefit at the expense of the Midwest and South, which get much of their power from carbon-spewing coal plants?

Despite its dependence on coal-fueled energy, the Midwest actually could benefit from a cap-and-trade program, according to an analysis by the Chicago Council on Global Affairs.[51] It concludes that the region's strong manufacturing base could capitalize on the nation's shift to a low-carbon economy, while its agricultural industries could profit from the demand for offsets.

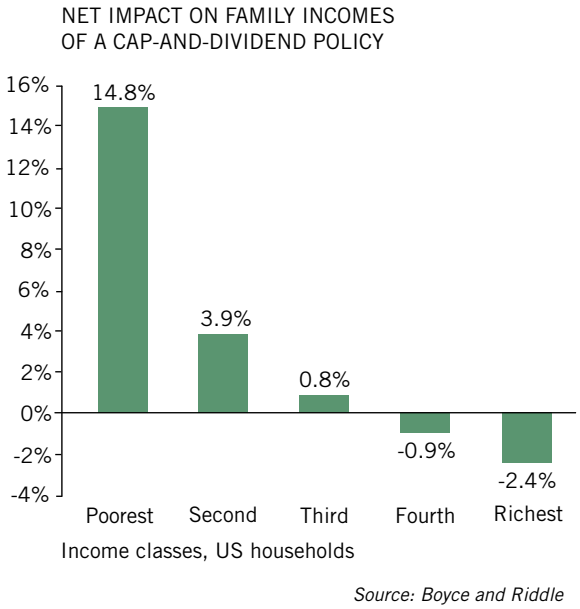


Figure 3. *Cap and dividend moderates the regressive effects of climate disruption.*

What's clear from multiple studies is that the regional fairness issues are small, especially when compared with the economic equity issues if cap-and-trade legislation fails to include a rebate program. While coal-reliant regions could see higher electric bills than areas using more renewable energy, they'll save elsewhere relative to other regions. That's because the cap covers all carbon emissions, including transportation, home heating, and other fuels. This means that the regional disparities largely, though not entirely, even out.[52]

Cap and Dividend isn't the only way to make climate pricing fair, but it may be the simplest. It also has the advantage of creating a strong political constituency for perpetuating the cap-and-trade system—every family will benefit from regular dividends. Like Social Security, Cap and Dividend will entrench itself politically as a universal benefit. What it doesn't do is smooth the transition to a clean-energy economy through complementary programs funded from auction revenue.

Unlike other options for investing auction revenue (listed below), Cap and Dividend would use almost all of the proceeds of the auction. The other options are all "mix and match"; Cap and Dividend stands alone.

Representative Chris Van Hollen of Maryland proposed a cap-and-dividend bill in the House, before Waxman-Markey passed. It would have auctioned all carbon permits, banned offsets, and returned 100 percent of what was collected back to US residents. Senator Maria Cantwell of Washington State has drafted a bill that rebates 75 percent of auction proceeds to residents.

Waxman-Markey also offers dividends, in two ways. In its early years, it does so only in a roundabout, unequal way: it distributes 30 percent of permits to electric utilities and requires that they distribute their value in equal lump sums to their

customers. Utilities using electricity from more-polluting fuel sources, such as coal, will get more free permits. As a result, utility-bill rebates will vary. The political reason for this approach is that it is likely to appease coal-state members of Congress, and the policy rationale may be to equalize regional difference in coal dependence. But the result will be a second-best policy: as noted above, regional differences are small, when one considers not only electricity but also other energy and the energy used to manufacture goods. Besides, energy utilities do not know how many people share each electric meter, nor can they ensure that landlords will share rebates with tenants.

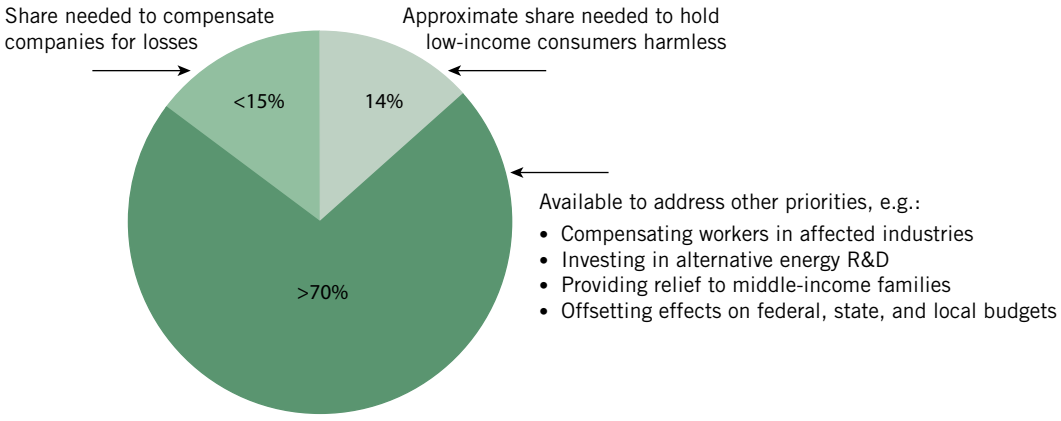
Starting in 2026, Waxman-Markey begins paying direct per-capita dividends to all legal US residents. Free permits to fossil-fuel companies, utilities, and most other entities phase out by 2030, by which year authorities will be auctioning 70 percent of permits. The proceeds of these auctions will all flow back to residents as rebates: 15 percent as special rebates for low-income families (see next section) and 55 percent as equal, per-capita rebates for all legal residents. Low-income families will receive both rebates.

Option 2: Rebates for low-income families

Another approach to shielding families from high energy prices comes from the Washington, DC-based Center on Budget and Policy Priorities (CBPP).[53]

This plan gives dividends only to families with very low incomes, to buffer them from cost increases. It's Cap and Dividend, but only families who need it most get a dividend. Call it "Cap and Rebate." CBPP suggests compensating the poorest fifth of families for energy price increases and also providing some assistance to those in the second fifth of the income ladder. The poorest fifth of families, according to CBPP, stand to pay $750 extra each year for fuel and other goods, once climate policy boosts energy prices enough to reduce emissions by an initial 15 percent.

The good news is that Cap and Rebate isn't an exorbitant proposition. Auctioning permits would generate seven times more money than would be needed to cover the extra costs for poor and near-poor families (see Figure 4).



Source: Center on Budget and Policy Priorities

Figure 4. *Auctioning carbon permits can generate the resources needed to address crucial priorities.*

CBPP pays special attention to the practical details of delivering money to millions of poor families in the United States:

> No single mechanism is likely to reach most of the low-income population. Fortunately, there are two existing delivery mechanisms that, between them, can largely accomplish this task: the Earned Income Tax Credit (EITC) and the electronic benefit transfer (EBT) system that states already use to provide various types of state and federal assistance such as food stamps and Medicare's prescription drug benefit to low-income families and individuals through a debit card.

EBT debit cards and the EITC could together reach three-fourths of eligible low-income US families immediately and a greater number later, as outreach campaigns bring more and more families onboard. Other mechanisms can't match that promise.

If lawmakers choose, they could expand income assistance to middle-class families by enacting a progressive payroll-tax refund instead of, or in addition to, the EITC. In this way, the climate dividend could go to people further up the income ladder.

Cap and Rebate is both elegant and practical. It matches funds neatly to needs. It would be easy to administer once passed. And it is frugal, leaving significant revenues available for other uses.

Waxman-Markey essentially adopts CBPP's approach. It auctions 15 percent of permits immediately (and more later) and uses the revenue from this portion for low-income rebates. The Congressional Budget Office estimates such rebates might be worth $161 for a single adult in 2012, and would grow over time if carbon prices rise.[54]

Option 3: Help families save energy with "Cap and Caulk"

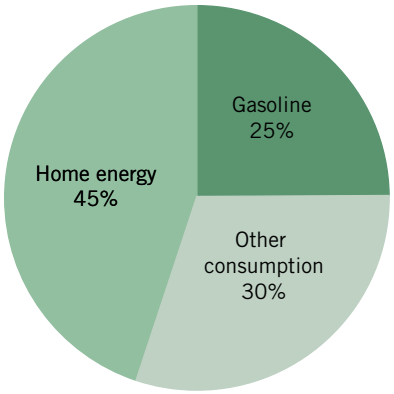
A third way to build protections for families into cap and trade is to direct auction proceeds to energy efficiency in ways that benefit low-income families in particular—by weatherizing homes, for example.[55] This strategy can help to compensate for the unfairness of climate change even while it tempers emissions. It's a natural complement to Cap and Rebate.

After three decades of public support for low-income weatherization, community action agencies still have a long way to go. In the Pacific Northwest states, for example, a scant 4 percent of the almost 5 million houses, apartments, and mobile homes have been treated.[56] Nationwide, perhaps two-thirds of low-income homes still need weatherization.[57] Fortunately, President Obama's economic stimulus package and his 2009 budget both include huge new investments in low-income weatherization—investments that will effectively double the pace of weatherization in Washington State, for example.[58]

Oak Ridge National Laboratory has looked at energy efficiency upgrades for families as a way to offset higher energy prices[59] and concluded that they won't be enough. Even if gains in efficiency or a Cap and Caulk program keep home-energy expenses level, they won't compensate for increased expenses for transportation and

consumer goods. Home-energy price increases are likely to account for less than half of the "hit" that higher energy prices exact (see Figure 5). Besides, no public program of energy retrofits is ever likely to reach as large a share of families as do cash benefits.

Conversely, as Oak Ridge's research shows, climate dividends that cover the average cost of energy price increases for low-income families won't suffice either. A small share of low-income families, living in older single-family and mobile homes, have energy consumption far above the norm. For these households, home energy upgrades are essential.



Shares of cost increase for the poorest 20 percent of population by product category

Source: Center on Budget and Policy Priorities

Figure 5. *The cost bite from climate pricing on low-income households goes well beyond home energy.*

For all these reasons, Cap and Caulk is a good complement to Cap and Rebate but no substitute for it; it's an opportunity to lower bills and emissions.

Option 4: Invest in jobs and a clean energy economy

Converting the United States over the next few decades to a place of compact, walkable communities that run on superefficient, renewable energy system—a climate-safe economy—will be a lot of work: *paid* work.[60] But for all the exciting announcements of solar jobs and green-tech investment that pepper the newspapers, the skill sets of today's workers are not yet aligned with the needs of this future.

A fourth good use for cap-and-trade auction revenue is to spend a portion of it training a green-collar workforce for the clean-energy trades. In many sectors of the economy right now, a limiting factor on seizing the opportunities of the new energy economy is a shortage of mid-skill labor.[61] For example, low-income weatherization programs across the Pacific Northwest are currently crippled by a scarcity of crew chiefs qualified to supervise retrofits on job sites.

To grow green-collar jobs for disadvantaged, low-skill workers, auction revenue might best be spent on expanded public funding for narrowly focused training programs in community and technical colleges that lead to vocational certificates or degrees in the trades: carpenters trained in green building, plumbers capable of installing commercial-scale solar water heaters, electricians educated in photovoltaics and advanced energy-system controls, machinists who can produce windmill turbines and carbon-fiber aircraft parts, metalworkers skilled in forging bicycle frames and ultralight components for the automobiles of the future, and forest managers knowledgeable about carbon sequestration.[62]

Waxman-Markey dedicates 0.5 percent of permits to supporting workers in transition, including training programs. After 2022, this figure would rise to 1 percent.

Other options

Several other uses for revenue from carbon-permit auctions recommend themselves:

- Funding research and development for new clean energy systems and related transformational technology, especially efficient and renewable energy technology that can be exported to fast-growing developing countries. Low-carbon energy research and development yields huge returns. Because the benefits of energy research tend to spread far beyond state or provincial borders, public R&D funding should most sensibly come from national government, rather than from state and provincial governments. (Waxman-Markey allocates 1.5 percent of permits for this purpose, by awarding these permits free to relevant public agencies. Those agencies will then sell the permits and use the proceeds for R&D. It gives another 3 percent of permits to the auto industry to invest in clean-car technology development; this allocation phases out by 2027.)
- Funding incentives and programs to reduce greenhouse-gas emissions from tropical deforestation. (Waxman-Markey initially earmarks 5 percent of permits towards preventing deforestation, scaling back to 2 percent after 2030.)
- Funding public infrastructure for a climate-safe future, such as transit services; sidewalks and bikeways; and retrofits for public-sector structures such as schools, public buildings, fire stations, and streetlights. (Waxman-Markey allocates 10 percent of permits to states, to fund renewables and efficiency, including in public buildings. It also reserves a small but growing share of permits to maintain revenue neutrality for the federal government: to pay for efficiency upgrades in federal operations and to cover any energy price increases.)
- Assistance for energy-intensive exporters who compete in global commodities markets. To prevent leakage of jobs and emissions into economies without carbon limits (or other environmental or labor standards), some permit value may be reserved to keep these firms in North America and underneath a carbon cap. This could be accomplished either by financing efficiency upgrades to manufacturing equipment, or via border-adjustment tariffs. (Waxman-Markey gives 15 percent of permits for free to such firms; it phases them out over time.)
- Funding transitional assistance for workers in industries such as fossil fuels. Because cap and trade will transform the energy economy gradually, most workers will be able to switch jobs at natural moments in their careers, but the transition can be eased further by workforce development programs and financial support. (The 0.5 percent of permits mentioned above for worker transitions in Waxman-Markey includes both financial support for displaced workers and green-job training.)
- Supporting programs to allow adaptation to climate disruption as it unfolds, both domestically and abroad. (Waxman-Markey dedicates 3 percent of permits to this purpose and increases this allocation over time, reaching and stabilizing at 12 percent in 2027.)

- Supporting conversion to clean energy abroad. (Waxman-Markey devotes 1 percent of permits to this purpose initially, and ramps it up to 4 percent after 2027.)
- Waxman-Markey also awards a lot of permits to fossil-fuel companies, including 2 percent to oil refiners and 5 percent to merchant coal plants. It also hands out permits to pay for carbon-capture and -storage projects at coal plants. Such allocations seem largely designed to buy political support from powerful industries.

CARBON TAX VS. CAP AND TRADE

Many commentators draw a sharp contrast between cap and trade and an alternative way to put a price on pollution: a carbon tax. In fact, cap and trade and carbon taxes are overlapping sets of policy designs. Like cap and trade, carbon taxes can have a range of scopes, points of regulation, and price schedules. And they can be fair or unfair, depending on how the revenue is used.

A comprehensive, upstream, auctioned cap-and-trade system is very similar to a comprehensive, upstream carbon tax. The main difference is what's certain and what's uncertain. Under a carbon tax, elected officials set the price of carbon, and the market determines the quantity emitted; in auctioned cap and trade, elected officials set the quantity of carbon emitted, and the market sets the price.

There are four other, smaller differences:

1. A carbon tax is somewhat less vulnerable to gaming than cap and trade. But as with other taxes, a carbon tax can be rendered ineffective through loopholes and exemptions.
2. A carbon tax may be simpler to initiate and administer quickly.
3. Cap and trade allows us to link state, regional, and national carbon permit markets with each other and with international ones, which may contain the costs of climate solutions.
4. Cap and trade can create its own durable political constituency. Businesses that have bought and banked carbon permits—and that have invested their resources in the expectation of a fixed declining cap—will oppose actions that reduce the value of those permits.[63]

Fortunately, we don't have to choose between a cap and a tax. We can combine the two and capture the strengths of each in a self-adjusting carbon tax or an auctioned cap-and-trade system with a price floor.

Cap and trade has far more political momentum in the United States than does a carbon tax, so this chapter concentrates on how to infuse what works best about a carbon tax into a cap-and-trade system. First, though, we review British Columbia's pioneering 2008 carbon tax shift—a carbon tax that pays for offsetting reductions in other taxes.

The British Columbia model

British Columbia put a carbon tax shift into effect on July 1, 2008, just five months after announcing the plan. An exceptionally clean and elegant policy, it is built on four principles:[64]

1. **Revenue neutrality—shifting taxes from "goods" to "bads."** Like Cap and Dividend, the tax shift returns all its proceeds to individuals and businesses through reductions in other taxes.
2. **Phased implementation—an economy-friendly timeline.** Carbon taxes rise from $10 per metric ton of carbon dioxide equivalent (CO_2e) in 2008 to $15 in 2009, then $20 in 2010, and so on up to $30 per ton in 2012. On the other side of the equation, personal and corporate income taxes decline on a similar schedule.
3. **Tax benefits—built-in protections for low-income families.** BC's income-tax reduction benefits everyone who pays income taxes, but it benefits low-income families the most. In addition, low-income families will get an annual and escalating Climate Action Dividend.
4. **Comprehensive, upstream coverage.** The carbon tax falls on nearly all greenhouse gases emitted from the burning of fossil fuels within the province: gasoline, diesel, natural gas, coal, heavy fuel oil, propane, and kerosene.

The province's carbon tax shift starts small, as it should. But it could finish bigger. Continuing the annual tax-rate increases beyond 2012 would help deliver now on its promise of climate security and market opportunity. Advance notice of high or rising carbon prices are as important as the future prices themselves. If families and businesses know now that the price of fossil fuels will stay high or rise, they'll make different decisions about where they live and work, and what homes, cars, and appliances they buy. Businesses will invent different products, market different services, and invest in different technologies.

Another enhancement to BC's law would be to make the tax shift self-adjusting, so that emissions levels automatically trigger tax-rate adjustments. If emissions aren't diminishing fast enough to match provincial targets, carbon taxes would automatically rise and income taxes automatically fall. A self-adjusting carbon tax shift combines the simplicity of a carbon tax with the climate-protection certainty of cap and trade. Of course, it also diminishes the price certainty of the carbon tax, because businesses cannot easily predict future tax rates.

Cap + tax: a hybrid

Combining a carbon tax with cap and trade creates a robust system that sets a lower limit on the carbon price. By establishing a bid floor, or "reserve price," in the auction of permits, climate policy becomes more predictable for polluters. As Ebay users know, nothing gets sold unless its reserve price is met.

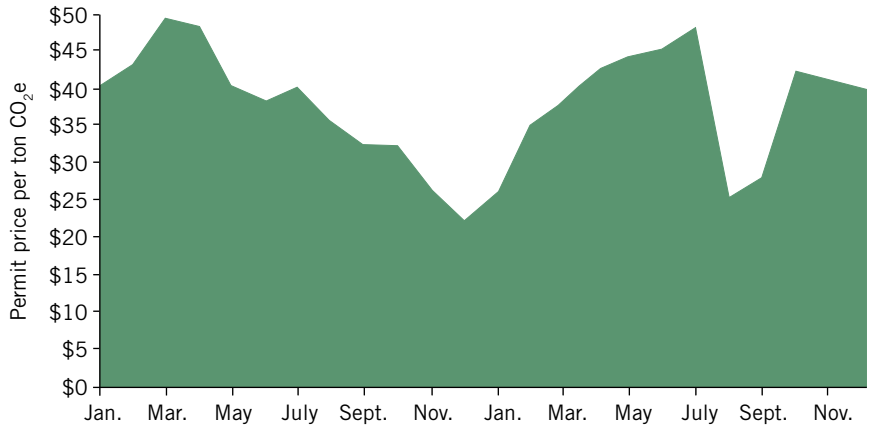


Figure 6. *The price of carbon permits might vary in auctioned cap and trade.*

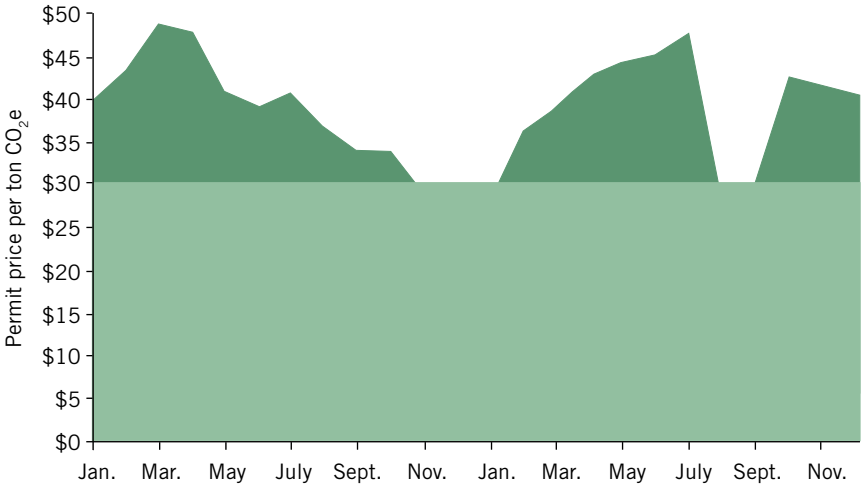


Figure 7. *Adding a carbon tax—or reserve price—to auctioned cap and trade puts a floor under carbon prices.*

Imagine this case: To reduce emissions by 2 percent in a certain year, let's say that the price must be $40 per ton of CO_2e. Under an auctioned cap-and-trade system, permits will sell for $40 on average. (One possible outcome, with the price of auctioned permits varying around $40, is shown in Figure 6.)

When the prices are high, everyone will pay attention to their emissions; when prices drop, so will attention. The variability of prices could weaken the incentive to embrace clean energy.

A carbon tax (see Figure 7) puts a floor under the price of carbon and tells everyone in advance what that floor will be. It ensures that the incentive for clean energy remains strong. It also gives certainty to business about prices and to government about revenue.

By building the carbon tax into cap and trade as a reserve price, we eliminate administrative duplication. If we set a reserve price of $30 per permit, we've effectively implemented a $30 carbon tax.

That's the upside of Cap + Tax. The downside is the risk of gaming, which emerges only where the geographic scopes of caps and taxes do not align. For example, in North America, only British Columbia and Quebec have carbon taxes at present, and their rates are different. To reduce the risk of profiteering and other unintended consequences, a smart solution would be for the United States to set a reserve price for cap-and-trade auctioning that matches or exceeds BC's carbon tax rate.

Waxman-Markey sets a 2012 reserve price of $10 per ton for its auctioned permits and allows any recipient of free permits to sell their permits through the federal government's auction. Under Waxman-Markey, eventually, when a large share of permits are auctioned rather than given away for free and when most of the proceeds are rebated to residents, the nation will have the benefits of both cap and trade and of a carbon tax shift. What's more, Waxman-Markey's reserve price is not only indexed to inflation but also rises by an extra 5 percent per year. In 2020, it will be almost $15 (in 2009 dollars). By 2050, it will have risen to almost $64 per ton.

CONCLUSION: THE CAP

As of mid-June 2009, Waxman-Markey is the likely vehicle for a US national cap-and-trade system. It will, like any far-reaching and contested legislation, probably emerge from Congress imperfect: intense pressures from scores of interests are coming to bear on lawmakers. Still, as compromised as are some of its provisions (too little auctioning, too loose a cap initially, too many offsets), it remains a giant leap toward a clean-energy economy. As it moves through Congress, citizens can extend that leap by communicating to their elected representatives that they want its flaws corrected—perhaps by drawing on some of the other Congressional proposals—and its strengths defended.

Seizing the economic opportunities of a clean-energy future, while avoiding the perils of climate disruption and oil addiction, is arguably the defining challenge for our time. We have exciting chances to slash emissions through low-carbon energy sources such as wind and other renewables and through a revolution in energy efficiency. Similarly, we have an abundance of ways to curb hard-to-track emissions at landfills, industrial facilities, and factory farms. We may be able to soak carbon dioxide out of the atmosphere by restoring forests and grasslands to historic richness. We may even perfect underground carbon storage.

To ease compliance with the cap, we will need a host of other smart policies and innovations: complete, compact neighborhoods that free us from long, tiresome commutes; pay-as-you-drive insurance; bounties on juice-hogging old appliances and gas guzzlers; efficiency standards for buildings, vehicles, and appliances; weatherization brigades to retrofit low-income homes; continuous, separate, citywide bikeways and walkways; pervasive for-profit and nonprofit car-sharing; richly networked, flexible, and reliable public transit; loans for efficiency upgrades that are repayable on your

utility bill or property tax; and more.

It's a bracing challenge, and the clock is ticking. But the most important step—bar none—is the cap. With a firm, legal, comprehensive cap, emissions will decline. Without one, there's no guarantee. In the absence of a cap, we could do everything else on the list—even including radically high regulatory standards—and still watch emissions grow.

The key to smart climate policy is putting a price on carbon—ideally through a comprehensive, auctioned, upstream cap-and-trade system with limited offsets and built-in protections for families. Anything else is second best.

NOTES

1 This primer was prepared based on the May 21, 2009, version of Waxman-Markey, summarized here: http://energycommerce.house.gov/Press_111/20090602/hr2454_reported_summary.pdf.

2 It's possible to have a cap without the trade, in which firms must purchase permits at auction but cannot sell them to other firms. But the ability to trade permits helps reduce the cost of the program by harnessing the efficiency of the market to find the cheapest and easiest reductions wherever they are available. Simply put, a firm that can profit from selling its unneeded permits is a firm that will think hard about how to cut emissions.

3 Emissions associated with the generation of electricity in one state for consumption in another create some complexities, but they're manageable. Certain emissions of greenhouse gases from industrial facilities, such as perfluorocarbons from aluminum smelters and carbon dioxide from cement factories, also require slightly more work than simply tracking the entry of fossil fuels into the capped jurisdiction's economy. Number of US firms from Congressional Budget Office, Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009," Washington, DC, June 5, 2009, http://www.cbo.gov/doc.cfm?index=10262.

4 President Obama's budget included a cap-and-trade program with full auctioning. See, among others, Kim Chipman and Catherine Dodge, "Obama Plan Has $79 Billion From Cap-and-Trade in 2012," Bloomberg.com, February 26, 2009, http://www.bloomberg.com/apps/news?pid=20601130&sid=aAO_KEIgeOOc.

5 House Resolution 2454, http://www.govtrack.us/congress/bill.xpd?bill=h111-2454.

6 The inclusion of a "strategic reserve" of permits in the bill effectively tightens the cap from a 17 percent reduction to something like a 19 percent reduction in 2020. To establish the reserve, authorities would withhold a share of each year's permits, typically 1-3 percent of them, and deposit them in a reserve. If carbon-permit prices spike upward, rising by 60 percent above the average price over the previous three years, authorities would begin releasing permits from the reserve.

7 Darren Samuelsohn, "And now, bill's supporters try counting to 60," *E&E News*, June 29, 2009.

8 Senator Cantwell's draft bill from Cantwell Senate staff, private communications, May and June 2009.

9 Kate Sheppard, The Scoop on Climate and Energy Bills in Congress, Grist, June 10, 2009, http://www.grist.org/article/2009-climate-legislation-congress.

10 For a look at how Northwest jurisdictions are tackling climate change, see Sightline Institute, "Backgrounder: How Do the Northwest's Climate Strategies Stack Up?," http://www.sightline.org/research/energy/res_pubs/backgrounder-climate-policy.

11 Regional Greenhouse Gas Initiative, www.rggi.org.

12 Midwestern Greenhouse Gas Reduction Accord, www.midwesternaccord.org.

13 Western Climate Initiative, www.westernclimateinitiative.org.

14 Western Climate Initiative, "Statement of Regional Goal," August 22, 2007, http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13006.pdf.

15 Alan Durning, "Climate Fairness," Sightline Daily Score Blog, January 24, 2008, http://daily.sightline.org/daily_score/archive/2008/01/24/climate-fairness. See also Sightline Daily

Score Blog, "Special Series: Climate Fairness," http://daily.sightline.org/daily_score/series/climate-fairness.

16 Unequal impacts of climate change from J. L. Gamble et al., US Climate Change Science Program and the Subcommittee on Global Change Research, Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems, US Environmental Protection Agency, July 2008, http://www.climatescience.gov/Library/sap/sap4-6/final-report; J. Andrew Hoerner and Nia Robinson, "A Climate of Change: African Americans, Global Warming, and a Just Climate Policy for the US," Environmental Justice and Climate Change Initiative, July 2008, http://www.rprogress.org/publications/2008/climateofchange.pdf; and Rachel Morello Frosch et al., "The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap," USC Center for Sustainable Cities, May 2009, http://college.usc.edu/geography/ESPE/perepub.html.

17 Mark Hume, "Ravaged Area Plans for 'Social Chaos,' Report Says," Globe and Mail, July 23, 2008, http://www.theglobeandmail.com/servlet/story/LAC.20080723.BCBEETLE23/TPStory/TPNational.

18 Percentage from the Energy Information Administration, "Emissions of Greenhouse Gases Report," December 3, 2008. Cement and aluminum production emit carbon dioxide from their industrial processes, and forest clearing releases carbon dioxide as well. Other gases such as methane also contribute to climate change. Greenhouse gases include carbon dioxide, methane, nitrous oxide, hydro- and perfluorocarbons, and sulfur hexafluoride, along with some other, less-common gases. Anthropogenic methane comes from leaking natural gas lines; from anaerobic decomposition of organic matter in landfills, sewage lagoons, rice paddies, and livestock manure piles and ponds; and from the digestive tracts of cattle. Nitrous oxide comes from agricultural practices, including nitrogen fertilizers and animal waste handling, as well as from some industrial processes such as acid production and from burning fossil fuels in internal combustion engines.

19 Share of emissions covered from Congressional Budget Office, Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009," Washington, DC, June 5, 2009, http://www.cbo.gov/doc.cfm?index=10262.

20 Fossil fuels are essentially long chains and rings of carbon molecules, held together by energetic carbon-carbon bonds. Combustion is the process of breaking these bonds, releasing the energy, and sending off the carbon molecules, one by one, sandwiched between oxygen molecules. Other pollutants released by combustion, such as acid-rain-causing sulfur dioxide and the brain toxin mercury, are mostly born out of impurities in the fuel, but carbon is the fuel. Thus, CO_2 isn't so much a byproduct of burning fuel as it is the main product. And this fact of chemistry is a stroke of genuine luck for climate policy: it makes CO_2 the easiest of all pollutants to monitor.

21 Energy infrastructure from Alan Durning et al., Cascadia Scorecard 2005 (Seattle: Sightline Institute [formerly Northwest Environment Watch], 2005), http://www.sightline.org/publications/books/cs2005/scorecard05, especially chapter 7, "Special Section: Energy and Security."

22 For transportation fuels, another logical point of regulation would be the "terminal rack": wholesale facilities that load petroleum products onto trucks, trailers, and rail cars. Currently, the US Internal Revenue Service and many state revenue departments collect gasoline and diesel taxes at the terminal rack—a logical choice because virtually all highway fuels flow through the rack,

and sales volumes are carefully measured by buyers and/or sellers. A "cap at the rack" system can piggyback on the state-level tax systems—systems that already accurately account for imports and exports, and that have careful auditing controls for fuel volumes.

23 Number of affected companies from Congressional Budget Office, "Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009," Washington, DC, June 5, 2009, http://www.cbo.gov/doc.cfm?index=10262.

24 Madhusree Mukerjee, "Is a Popular Carbon-Offset Method Just a Lot of Hot Air?," Scientific American, June 2009, http://www.scientificamerican.com/article.cfm?id=a-mechanism-of-hot-air.

25 Lambert Schneider, "Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement," World Wildlife Fund, November 5, 2007, http://assets.panda.org/downloads/oeko_institut__2007____is_the_cdm_fulfilling_its_environmental_and_sustainable_developme.pdf.

26 US emissions are from the Energy Information Association's "Emissions of Greenhouse Gases Report," December 3, 2008, http://www.eia.doe.gov/oiaf/1605/ggrpt/carbon.html.

27 The Waxman-Markey legislation includes a chart with the annual greenhouse-gas reduction goals in section 721. Assuming polluters use the maximum allowable offsets each year, this adds 1.8 billion tons of carbon dioxide emissions to the goals (the number is less than 2 billion because international offsets are worth slightly less beginning in 2018, though even the 1.8 billion figure is an estimate because of a provision allowing for up to 1.5 billion in international offsets if sufficient domestic offsets are not available), http://energycommerce.house.gov/Press_111/20090518/hr2454_ans.pdf.

28 Joe Romm, "How I learned to stop worrying and love Waxman-Markey, Part 1: WRI calculates it will lead to a 31%* or higher cut in U.S. GHGs by 2020," Climate Progress blog, May 10, 2009, http://climateprogress.org/2009/05/10/waxman-markey-2020-ghg-cuts-wri/; and Joe Romm, "How I learned to stop worrying and love Waxman-Markey, Part 2: In praise of domestic offsets," May 12, 2009, http://climateprogress.org/2009/05/12/waxman-markey-domestic-offsets/.

29 Projected offsets from Congressional Budget Office, "Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009," Washington, DC, June 5, 2009, http://www.cbo.gov/doc.cfm?index=10262.

30 John Larsen, "The American Clean Energy and Security Act: Key Elements and Next Steps," May 28, 2009, World Resources Institute. http://www.wri.org/stories/2009/05/american-clean-energy-and-security-act-key-elements-and-next-steps. This analysis looks at the effects of offsets in reducing greenhouse gas emissions in context of other provisions of Waxman-Markey. It concludes: "The bill contains substantial complementary requirements including emissions performance standards for uncapped sources and emission reductions from forest preservation overseas. When these are taken into account, GHG emissions would be reduced by 28 percent below 2005 levels by 2020 and 75 percent below 2005 levels by 2050. When additional reductions from requirements related to international offsets—used for compliance with the federal cap and trade regime—are also factored in, potential emission reductions from the bill would be even greater. They could reach up to 33 percent below 2005 levels by 2020 and up to 81 percent below 2005 levels by 2050, depending on the quantity of offsets used."

31 Clark Williams-Derry and Eric de Place, "Why Free Allocation of Carbon Allowances Means Windfall Profits for Energy Companies at the Expense of Consumers," Sightline Institute, February 2008, http://www.sightline.org/research/energy/res_pubs/windfalls/windfalls.

32 Kristen Sheeran and James Barrett, "A Critical Question in the Climate Debate," E3 Network, January 8, 2008, http://www.e3network.org/resources/SheeranBarrett2008.pdf.

33 Windfall figures assume a 23 percent reduction in greenhouse gas emissions and an associated increase in energy prices. See Peter R. Orszag, "Approaches to Reducing Carbon Dioxide Emissions," Congressional Budget Office, November 1, 2007, http://www.cbo.gov/ftpdocs/87xx/doc8769/11-01-CO2Emissions.pdf.

34 Auction share in 2030 from Congressional Budget Office, "Cost Estimate: H.R. 2454 American Clean Energy and Security Act of 2009," Washington, DC, June 5, 2009, http://www.cbo.gov/doc.cfm?index=10262.

35 Chris Holt et al., "Auction Design for Selling CO_2 Emissions Allowances Under the Regional Greenhouse Gas Initiative," University of Virginia, Cooper Center for Public Service and Resources for the Future, October 26, 2007, http://www.coopercenter.org/sitefiles/documents/rggi_final_report.pdf; and Chris Holt et al., "Auction Design for Selling CO_2 Emissions Allowances Under the Regional Greenhouse Gas Initiative: Addendum: Response to Selected Comments," University of Virginia, Cooper Center for Public Service and Resources for the Future, April 8, 2008, http://www.rff.org/focus_areas/features/Documents/Auction_Design_Addendum_April08.pdf.

36 To be more precise, "vintage" and "compliance periods" are slightly different concepts, though the differences matter little for this introductory discussion. A permit's "vintage" is the period during which it becomes valid; a "compliance period" is the time during which businesses must match their emissions with permits.

37 RGGI auction structure from Regional Greenhouse Gas Initiative, "Executive Summary," http://www.rggi.org/docs/RGGI_Executive_Summary.pdf.

38 One complication about linkage is that it raises the risk that flaws in one cap-and-trade system might become flaws in all of them. For example, the European system has had a problematic history with offsets: some of the offsets honored have been of dubious value. Linking with Europe's system creates the risk of reinforcing those problems even if offsets honored in Europe have no standing in WCI, for example. Northwest firms might buy more European allowances, while European firms bought more dubious offsets.

39 Sometimes "off-ramps" are called "price caps" or "circuit breakers" or given the misnomer "safety valves." Some varieties of off-ramps are less problematic. For example, to dampen unexpectedly high carbon prices, the RGGI system allows more offsets into circulation temporarily, while some federal proposals allow for the government to increase the quantity of carbon permits in circulation but decrease the supply of future permits by a proportional amount. Waxman-Markey establishes a "strategic reserve" of allowances that may be used during any price spikes. These allowances are purchased from the international offsets market or withdrawn from future years' allowances.

40 An example of the "gaming worry" is Rachel Morris, "Could Cap and Trade Cause Another Market Meltdown?," Mother Jones online, June 8, 2009, http://www.motherjones.com/politics/2009/06/could-cap-and-trade-cause-another-market-meltdown?page=1; a better-

reasoned counterargument is Kevin Drum, "Will Derivatives Ruin Cap and Trade?" Mother Jones online, June 8, 2009, http://www.motherjones.com/kevin-drum/2009/06/will-derivatives-ruin-cap-and-trade.

41 A. Denny Ellerman and Paul L. Joskow, "The European Union's Emissions Trading System in Perspective," Massachusetts Institute of Technology prepared for the Pew Center on Global Climate Change, May 2008, http://www.pewclimate.org/eu-ets.

42 Nina Chestney, "Loophole aids speculation in EU carbon market," Reuters, April 29, 2009, http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE53S5PX20090429?sp=true.

43 European Environment Agency, "Annual European Community greenhouse gas inventory 1990–2007 and inventory report 2009," May 29, 2009, http://www.eea.europa.eu/pressroom/newsreleases/2009-greenhouse-inventory-report.

44 Environmental Protection Agency, "Acid Rain Program 2007 Progress Report," January 2009, http://www.epa.gov/airmarkt/progress/arp07.html; Zachary Coile, "'Cap-and-trade' model eyed for cutting greenhouse gases," San Francisco Chronicle, December 3, 2007, http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/12/03/MNMMTJUS1.DTL&hw=Cap+trade+Acid+Rain&sn=001&sc=1000

45 Despite that success, some worried about a temporary jump in the price of SO2 pollution permits in 2004 and 2005. An EPA analysis concluded that the increase was primarily the result of a cautious industry responding to regulation uncertainties and a tightening of pollution limits. The situation was exacerbated by soaring gas prices that followed a disastrous hurricane season. In January 2006, permit prices dropped substantially. The EPA analysis notes that energy prices did not rise for consumers and concluded that the temporary spike was not evidence of volatility or gaming. Environmental Protection Agency, "Allowance Markets Assessment: A Closer Look at the Two Biggest Price Changes in the Federal SO2 and NOX Allowance Markets," white paper, April 23, 2009, http://www.epa.gov/airmarkets/resource/docs/marketassessmnt.pdf.

46 In simplistic terms, the recent bust in the housing market occurred when consumers signed on to mortgages they could not afford, and banks and insurers backed these unsound loans. Regulators failed to adequately oversee and police the institutions. Real estate prices swelled, then the housing bubble burst, triggering a global financial meltdown.

47 Kim Chipman and Catherine Dodge, "Obama Plan Has $79 Billion From Cap-and-Trade in 2012," Bloomberg.com, February 26, 2009, http://www.bloomberg.com/apps/news?pid=20601130&sid=aAO_KEIgeOOc.

48 The advantages of auctioning and disadvantages of free allocation from many places on the Sightline Daily Score Blog, http://daily.sightline.org/search?SearchableText=grandfathering&portal_type=blog.

49 Chart is from Joel F. Eisenberg, "Short and Long Term Perspectives: The Impact on Low-Income Consumers of Forecasted Energy Price Increases in 2008 and a Cap-and-Trade Carbon Policy in 2030," US Department of Energy, Oak Ridge National Laboratory, December 30, 2007, http://weatherization.ornl.gov/pdf/CON503-FINAL.pdf.

50 This plan is also known as "Skytrust," "Cap and Rebate," and "Cap and Share." See http://www.capanddividend.org and http://www.capandshare.org.

51 John Livingston et al., "Embracing the Future: The Midwest and a New National Energy

Policy," Chicago Council on Global Affairs, June 8, 2009, http://www.thechicagocouncil.org/UserFiles/File/Task%20Force%20Reports/09%20Energy%20Task%20Force%20-%20Exec%20Summary.pdf.

52 Resources for the Future, a non-partisan D.C-based think tank, examined a number of different climate policies, including a form of Cap and Dividend, for regional and equity impacts when the nation is divided into 11 regions. Researchers found that once you consider all emission sources, and not just electricity, the variations are minor.

California-Nevada and New York could receive a modest net inflow of money from the dividends. The Plains states could get back a little less than they pay in higher fuel costs. But even those variations are pretty small potatoes, and even the Plains states get the large majority of their money back from a Cap-and-Dividend program.

A second study by students at Middlebury College using data from University of Massachusetts researchers looked at the equity question by dividing the nation into four regions. They, too, found a small shift of money – about $64 per person annually – from the Midwest to the West.

And a third study by the Oak Ridge National Laboratory examined energy expenditures for low income households. It concluded that the regions with the highest emissions for electricity are not the same as the regions with the highest emissions for gasoline. That's a key point. Because different forms of energy use aren't closely correlated, regional variations in total emissions tend to be smoothed out.

Clark Williams-Derry, "Cap-and-Cashback: Regional Fairness," Sightline Daily Score Blog, March 11, 2009, http://daily.sightline.org/daily_score/archive/2009/03/11/cap-and-cashback-regional-fairness-1; Dallas Burtraw et al., "The Incidence of U.S. Climate Policy: Where You Stand Depends on Where You Sit," Resources for the Future, Discussion Paper, September 2008, http://www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=20545; James Hand and Brian Swartz, "Analyzing the Regional Effects of Peter Barnes' 'Sky Trust' Proposal," Middlebury College, January, 2008, http://community.middlebury.edu/~jisham/papers/Analyzing%20the%20Regional%20Effects%20of%20the%20Sky%20Trust%20Proposal%204-1-08.pdf; and Joel Eisenberg, "The Impact of Carbon Control on Electricity and Gasoline Expenditures of Low-Income Households," Oak Ridge National Laboratory, April 2008, http://weatherization.ornl.gov/pdf/CON-504.pdf.

53 Robert Greenstein et al., "Designing Climate Change Legislation That Shields Low-Income Households From Increased Poverty and Hardship," Center on Budget and Policy Priorities, May 9, 2008, http://www.cbpp.org/10-25-07climate.pdf.

54 Rebate value estimated in the Congressional Budget Office Cost Estimate for H.R. 2454, American Clean Energy and Security Act of 2009. June 5, 2009, http://www.cbo.gov/ftpdocs/102xx/doc10262/hr2454.pdf.

55 For a fuller discussion, see Alan Durning, "Cap and Caulk: How Smart Climate Policy Can Cut Our Energy Costs," Sightline Daily Score Blog, February 27, 2008, http://daily.sightline.org/daily_score/archive/2008/02/27/cap-and-caulk-how-smart-climate-policy-can-cut-our-energy-costs.

56 Number of low-income homes weatherized assembled from, among others, US Department of Energy, "Weatherization Activities in the States," http://www.eere.energy.gov/weatherization/state_activities.cfm; Washington Department of Community, Trade, and

Economic Development, "Weatherization," http://www.cted.wa.gov/site/500/default.aspx; and Dan Elliot, coordinator, Weatherization Assistance Program, Oregon Housing and Community Services Department, Salem, private communication, December 2007. Number and type of housing units from US Census Bureau, "State and County QuickFacts," http://quickfacts.census.gov/qfd.

57 Share of unweatherized homes from Weatherization Assistance Program, Technical Assistance Center, http://www.waptac.org.

58 Unfinished weatherization work in Washington estimated by Chuck Ebert, director, the Energy Project (a program of the Opportunity Council), Bellingham, Wash., private communication, December 10, 2007; stimulus spending for weatherization from Alan Durning, "Clean-Energy Stimulus," Sightline Daily Score Blog, May 28, 2009, http://daily.sightline.org/daily_score/archive/2009/05/28/clean-energy-stimulus; and Michael Cooper, "Stimulus Funds Spent to Keep Sun Belt Cool," New York Times, June 7, 2009, http://www.nytimes.com/2009/06/08/science/earth/08weatherize.html?_r=1.

59 Joel F. Eisenberg, "Short and Long Term Perspectives: The Impact on Low-Income Consumers of Forecasted Energy Price Increases in 2008 and a Cap-and-Trade Carbon Policy in 2030," US Department of Energy, Oak Ridge National Laboratory, December 30, 2007, http://weatherization.ornl.gov/pdf/CON503-FINAL.pdf.

60 See Anna Fahey, "Green Pay Day," Sightline Daily Score Blog, April 22, 2008, http://daily.sightline.org/daily_score/archive/2008/04/22/green-pay-day.

61 David R. Baker, "State Has Serious Green-Collar Labor Shortage, Summit Attendees Say," San Francisco Chronicle, January 15, 2008, http://www.ecy.wa.gov/climatechange/CATdocs/Calif_gls.pdf.

62 David Prince and Davis Jenkins, "Building Pathways to Success for Low-Skill Adult Students: Lessons for Community College Policy and Practice from a Statewide Longitudinal Tracking Study," Community College Research Center, April 2005, http://www.dataqualitycampaign.org/files/publications-building_pathways_to_success_for_low-skill_adult_students-040105.pdf.

63 A carbon tax that pays out all its revenue in equal dividends, like Cap and Dividend, might also create its own constituency. But because it would not create any property rights in permits, a carbon tax cannot motivate businesses to support it politically. Businesses possessing banked permits or permits for future years (or permits given to them for free) will have a vested interest in protecting the value of these assets by opposing efforts to relax the cap.

64 Sightline has been promoting tax shifting since 1994. See especially Alan Thein Durning and Yoram Bauman, Tax Shift (Seattle: Sightline Institute [formerly Northwest Environment Watch], 1998), http://www.sightline.org/publications/books/tax-shift/tax.

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