policy brief

NI PB 11-04 | June 2011 | nicholasinstitute.duke.edu

Examination of the Carbon Fee Alternative for the State of California

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The California Air Resources Board (ARB), as a result of a recent court decision, is required to provide information about a carbon fee as one of several alternatives to reduce emissions of greenhouse gases.[1] Other alternatives include direct regulation of facilities, cap and trade, and a mix of sectoral strategies. This paper examines the carbon fee as an option for controlling greenhouse gases and compares it to other regulatory alternatives, such as the cap-and-trade approach ARB initially decided to take.

Definitions and General Description of Features

A carbon fee is a charge levied on the carbon content of a fuel or the equivalent emissions produced when the fuel is used. A carbon fee is an example of a *Pigouvian tax*, which is a charge levied on some economic activity that generates a negative externality that would otherwise go uncharged.[2] In the case of a carbon fee, the otherwise uncharged externality is the social cost of the climate change threat induced by an additional unit of greenhouse gas emission (GHG) produced when the fuel is used. A "carbon" fee is typically associated with carbon dioxide (CO_2) emissions, but it can, in principle, be applied to other GHGs such as methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Primary features of a carbon fee

The primary purpose of a carbon fee is to reduce GHG emissions by assigning them a price, thereby raising the cost of processes and products that generate the emissions and providing incentives to switch to lower-emitting activity. The main objective is to provide a clear, long-term signal of the price that parties will face for their GHG emissions, and thereby give an economic incentive to investments and other actions taken to reduce these emissions. The charge is typically a fixed amount per unit, such as dollar per ton of carbon dioxide (CO_2) equivalent, but can be designed to start relatively low and rise over time to ease in the transition.[3]

Another feature of a carbon fee is that it is a potential source of levies that can be used for various purposes, ranging from public expenditure on programs related to the central GHG goals, to reducing other taxes imposed on businesses and households, to simply returning the revenues directly to businesses or households through a dividend or "feebate" type of program. The potential use of carbon fees subject to California law is discussed below.

Experience with Carbon Fees Elsewhere

Table 1 lists examples of carbon fees (taxes) that have been enacted in jurisdictions around the world. Most of these operate at the national level, but some are at the state or provincial level. There is fairly wide variation in the rates imposed and the sources of carbon covered. In some jurisdictions, such as in Europe, the carbon fee can be seen as complementary to a comprehensive cap-and-trade program (the European Union Emissions Trading System, [EU-ETS]). In other cases, such as Boulder, Colorado, the fee can be seen as a (perhaps temporary) substitute for a broader, more comprehensive program. In Canada, provincial taxes in Quebec, Alberta, and British Columbia can be viewed

1. *Association of Irritated Residents et al. v. California Air Resources Board et al.*, Superior Court of California, San Francisco County, No. CPF-09-509562 (order dated 03/18/11) (unpublished).
2. Named after the early-20th-century English economist Arthur Pigou.
3. If other GHGs are included in the fee, they would be charged in terms of CO_2 equivalence, which is established in terms of their global warming potential (GWP) relative to a ton of CO_2. For instance, methane is 25 times more potent than CO_2 (IPCC 2007); therefore, its GWP is 21, and one ton of methane emissions is equivalent to 21 tons of CO_2 emissions.

as a means to help achieve the emission reductions that Canada has agreed to under the U.N. Framework Convention on Climate Change's Kyoto Protocol, in light of the fact that Canada has not implemented a cap on emissions at the national level.

Retrospective analyses of carbon fees are still scarce because many of the programs are so new. Prospective modeling anticipates that the British Columbia system will reduce three million tons of CO_2 annually (British Columbia 2008). Real environmental results are still forthcoming, but they are expected to be modest because the initial fee or tax is initially set low. It is important to note that the British Columbia carbon fee program will be augmented by a cap-and-trade system to achieve further GHG emissions reductions.

Norway in 1991 established some of the world's highest carbon taxes. The taxes mostly targeted the transport sector and excluded such industries as cement manufacture, which are prone to leakage. Bruvoll and Larsen (2004) used a general equilibrium model to predict what emissions would have been, absent the tax. They found that the tax reduced emissions by 2.3%. Bruvoll and Larsen surmise that reductions were modest because the sector they targeted—gasoline and transport—has a highly inelastic demand curve. In other words, during the period that the tax was implemented, few viable substitutes for transport fuels were available.

Anderson (2009), looking more broadly over Europe, similarly finds modest emissions reductions resulting from a tax. By 2004, taxes reduced GHG emissions by 3.1%, on average. The exception among these cases appears to be Denmark, which applied taxes to energy consumed for heating purposes (Andersen 2009). Miller (2010) cites several studies, which find that Denmark's taxation approach has reduced GHG from businesses and households by up to 15% (Prasad 2009; Andersen, Dengsee, and Pedersen 2000).

Several countries other than those in Table 1 are either now considering a carbon tax (U.K., South Korea, Taiwan, South Africa) or recently deliberated on and decided against one (France, Slovenia, Japan, New Zealand). Australia recently announced plans to implement a carbon tax in 2012 as a transitional strategy to a cap-and-trade program.[4]

The experiences above suggest that carbon fees and taxes have been taken seriously by other jurisdictions as a means to address the GHG problem and perhaps as a form of fiscal policy. Several Scandinavian countries experimented with carbon-related taxes back in the early 1990s, but they were often on parts of the energy mix, not comprehensive, and have changed over time as climate and energy policy has evolved. The Kyoto Protocol agreement is structured around national caps, but individual countries can implement their own national strategies, including a tax if they choose. The existence of carbon taxes in some European countries suggests that governments there feel the need to supplement the cap-and-trade program, especially in light of the fact that not all sectors are covered by the EU-ETS. Because many countries have just recently implemented a tax, and the tax is often mixed with other strategies, it is hard to determine how successful these programs have been or will be.

Key Carbon Fee Design Decisions

Should a carbon fee be implemented in California, several key design issues must be addressed, as outlined below.

Sectors covered

Our presumption is that the sectors potentially subject to the carbon fee would be those that were slated to be covered under ARB's preliminary draft regulation for cap and trade. These include electricity, transportation fuels, natural gas, and large industrial sources emitting 25,000 tons or more.[5]

Fee level

Should a carbon fee be adopted, the state must determine its level and whether (how) to change the level over time. Table 2 lists several options for setting the carbon fee level.

4. http://www.bloomberg.com/news/2011-02-24/australia-to-set-tax-on-carbon-emissions-starting-july-2012-gillard-says.html.
5. *Preliminary Draft Regulation for a California Cap-and-Trade Program*, California Air Resources Board, November 24, 2009

Table 1. Current examples of carbon fee (tax) around the world.

Country/State	Amount (in USD at April 2011 exchange rates per metric ton CO_2)	Comment
Denmark	$17.47 (90 DKK/ton)	As of 2008[a,b]
Norway	$5–70 (25–380 NOK/ton)	As of 2011
		Varies per CO_2; some can be covered with emissions trading scheme
Sweden	$188.38 (€130/ton) for households and services	As of 2010[c]
	$31.88 (€22/ton) for sectors subjected to leakage and outside EU ETS	Much higher prices for general level compared to industry level
	$21.73 (€15/ton) for sectors subjected to leakage and inside EU ETS	Various exemptions[d]
Finland	$28.97 (€20/ton)	As of 2010
		Only traffic and heating fuels[e]
Switzerland	$40.43 (36 Swiss franc/ton)	As of 2010
		Companies participating in cap and trade can be exempt[f]
France		Plan for $24.62/ton (€17/ton) tax currently abandoned[g]
Ireland	$21.72 (€15/ton)	As of 2010
		Relief for electricity generation, chemical reduction, and electrolytic/metallurgical processes[h]
Canada		
Quebec	$3.11 (C$3/ton)	As of 2009[i,j]
British Columbia	$20.79 (C$20/ton)	As of 2011
		Will rise to $31.19/ton (C$30/ton) July 2012[k,l]
Alberta	$15.60 (C$15/ton)	As of 2008[m]
Costa Rica	3.5% on fossil fuels market price	Steady percent rate since 1997[n,o]
India	$3.19 (50 rupees/metric ton of coal [1 short ton of coal = 2.86 short tons of CO_2[p]])	As of 2010
		Only for coal, both produced in and imported to India[q]
United States		
California	4.8 cents	As of 2008
		Applies only to Bay Area Air Quality Management District[r]
Colorado	$7 .71	As of 2008
		On electricity consumption in the city of Boulder, CO[s]
		Expires March 2013[t]
Maryland	$5 .51	As of 2010
		From any stationary source in Montgomery County, MD[u]

a. http://www.ees.uni.opole.pl/content/03_10/ees_10_3_fulltext_01.pdf.
b. http://www.nrel.gov/docs/fy10osti/47312.pdf.
c. http://www.norway.or.jp/Global/SiteFolders/webtok/PDF/20_Years_of_CO_2_Taxation_in_Sweden.pdf.
d. http://www.iea.org/textbase/nppdf/free/2008/Sweden2008.pdf.
e. http://www.environment.fi/default.asp?contentid=147208&lan=en.
f. http://www.bafu.admin.ch/co2-abgabe/05179/05314/index.html?lang=de.
g. http://www.telegraph.co.uk/finance/newsbysector/energy/7507015/France-ditches-carbon-tax-as-social-protests-mount.html.
h. http://www.taxireland.ie/TaxFind/ContentHTML/ParsedHTML/AITIManuals_HTMLFILES%5CITM_HTMLFILES%5Cc33.t2.st3.html.
i. http://www.cdhowe.org/pdf/backgrounder%20118_English.pdf.
j. http://www.torys.com/Publications/Documents/Publication%20PDFs/CCB2007-6.pdf.
k. http://www.nytimes.com/cwire/2011/03/22/22climatewire-british-columbia-survives-3-years-and-848-mi-40489.html?pagewanted=2.
l. http://www.sbr.gov.bc.ca/documents_library/notices/British_Columbia_Carbon_Tax.pdf.
m. http://www.cbc.ca/news/business/story/2008/01/08/renner-carbon.html.
n. http://www.policyarchive.org/handle/10207/bitstreams/20176.pdf.
o. http://www.nytimes.com/2009/04/12/opinion/12friedman.html.
p. http://www.eia.doe.gov/cneaf/coal/quarterly/co2_article/co2.html.
q. http://www.indiaenvironmentportal.org.in/files/India%20Taking%20on%20Climate%20Change.pdf.
r. http://articles.sfgate.com/2008-05-22/news/17155215_1_carbon-dioxide-greenhouse-gas-emissions.
s. http://nexus.umn.edu/Courses/Cases/CE5212/F2008/CS7/CS7PPT.pdf.
t. http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=7698&Itemid=2844.
u. http://solveclimate.com/news/20100525/maryland-county-carbon-tax-law-could-set-example-rest-country.

Table 2. Alternative criteria for setting the level of the carbon fee.

Criterion	Description	Advantages	Disadvantages
Social cost of carbon (SCC)	Economic value of the damages caused by an additional ton of CO_2 equivalent	Consistent with the underlying Pigouvian concept that the fee causes the product to reflect its true cost to society	Wide range of estimates depending on studies of varying methodologies and scope[a]
"Pain threshold"	Level above which the economic costs of the fee are deemed too burdensome for affected parties	Pragmatic, recognizing need to reduce shocks especially in early years Can be combined with strategy to start fee low and phase increases over time	Difficult to determine which single level meets this criterion Easy to manipulate politically
Technology goal	Set at level sufficient to stimulate investment in key technologies deemed critical to achieving long-term reductions (e.g., renewable power, electric vehicles)	Clear rationale to avoid weak or stranded investment May be easier to estimate initially than alternatives above	Involves government picking "winner" technologies and may be difficult to match dynamics of technology and cost changes over time
Comparable prices elsewhere	Set within range of carbon fees or prices found in other systems (fee-based or cap and trade)	Easy to determine Harmonizing across jurisdictions reduces leakage	Other systems will reflect particular scope and criteria that may be at variance with values and objectives of California program

a. The federal Interagency Work Group on the Social Cost of Carbon (IWGSCC 2010) conducted a comprehensive exercise to estimate the SCC for regulatory analysis. Mean values for 2010 ranged from about $5 to $35 per ton CO_2, depending on time discount rates from 2.5% to 5%. The 95% percentile value at a 4% discount rate is about $65/ton.

Emissions basis

The next question is, what is the exact quantity of emissions subject to the fee? The standard case would be for all emissions in the covered sector to be subject to the fee. An alternative that has been considered by the California Environmental Protection Agency (CalEPA 2011), the umbrella agency in which ARB resides, is to assess a marginal fee only on emissions above some set level.

To compare, consider a plant planning to generate one million tons of CO_2 emissions in a given year. Suppose the carbon fee is set at $15 per ton. Under the full fee system, the plant would pay $15 million in fees for the year if it operated as planned. Suppose instead that the fee is assigned on all emissions in excess of 900,000 tons. Then the plant would pay $1.5 million to operate as planned. In both cases, the firm's monetary incentive to reduce emissions from 1 million to 900,000 tons is the same (save $1.5 million), but the total amount the government receives in revenue would be quite different. Importantly, however, there would be no incentive to reduce emissions below 900,000 tons under the marginal fee approach, but there would be a continued incentive to do so under the total fee approach, since all tons incur a cost.

If a marginal fee were selected, the state would need to determine the threshold (baseline) level for each covered entity, below which no fee would be assessed. This could be determined based on a range of factors, such as a fixed percentage of historic emissions or a sectoral threshold standard (e.g., emissions per unit output), or it could be customized for each individual plant's condition.

Point of regulation

A critical question is, where and when to assign the fee? The set of emissions covered by Assembly Bill (AB) 32 (California Health and Safety Code §38570[b]) is established in the AB 32 Scoping Plan.[6] The Scoping Plan sets out a cap-and-trade program, which would cover about 85% of California's greenhouse gas emissions. ARB's Preliminary Draft Regulation (PDR), released in November 2009, reflects the approach to cap and trade approved by the Board in the AB 32 Scoping Plan. The PDR's point of regulation proposes to target large sources that emit at least 25,000 tons of greenhouse gases, including electricity generators and industrial and transportation sources. So a key issue is, at what point in the chain from fuel extraction to combustion to end use is the fee directly applied? This is often referred to as the point of regulation. Options for the point of fee assignment (regulation) and their relative advantages are included in Table 3.

6. http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm.

Table 3. Fee assignment point options.

Fee Assignment Point	Description	Example	Pros/Cons
Upstream	On fuel content	Assign fee on carbon content of all natural gas, coal, transportation fuels used in California	Relatively easy to administer, as number of fuel producers is small relative to number of users Difficult for "imported" emissions such as electric power generated in another state and transmitted to California Not easily imposed on non-fossil fuel sources (e.g., methane emissions from landfills)
Downstream	Assign fee to final consumer of good responsible for emission	Fee imposed at gas pump or in electric power bill, for all Californians, based on consumption of the carbon-emitting product	May have greater impact on use/efficiency if directly levied on final consumer Cost ultimately falls on final user anyway through market price adjustments May have higher transaction costs if levied on millions of consumers directly
Midstream	At point of large stationary sources of combustion	Fee charged to power plants and factories based on actual GHG emissions there	Lower transaction costs since imposed on few, relatively large emitters Direct incentives for emission reduction activities, emission leaks, etc.

The direct cost of a fee to emitters will not change if the point of regulation is set upstream, midstream, or downstream. As long as it coincides with the carbon (CO_2 or other GHG) contained or emitted, the amount charged will be the same no matter where the fee is levied. However, the most substantial cost variations that arise with different points of regulation likely are administrative in nature. The monitoring and transaction costs associated with a fee will generally be smaller on a per-ton basis if imposed at a point where there are relatively few entities responsible for a relatively large amount of carbon in an easy-to-monitor form. As suggested in Table 3, this is typically more likely with upstream regulation. For example, imposing a fee on transportation carbon may be more easily (less costly) accomplished at the refinery or fuel-supplier level, with relatively few suppliers transacting in fuel, rather than on emissions at the tailpipe level assessed downstream on millions of drivers. Midstream may involve assessment at thousands of gas pumps across the state. So in principle, there may be a reduction in administrative and monitoring costs if assessed upstream.

It is important to note that a downstream system may have some indirect cost-saving advantages, in terms of spurring efficiency improvements. That turns on the assumption that those who most directly bear the price impact have a comparably large incentive to save energy and the attendant emissions reductions that efficiency improvements will bring. Under an upstream system, such pricing effects may not be as apparent to the downstream energy user (Niemeier et al. 2008) since the cost is embedded in the cost of the input, rather than directly assessed based on the activity of the downstream party. ARB's economic modeling of cap and trade showed that savings from efficiency improvements significantly lowered the total compliance costs of the cap-and-trade program.

One other possible advantage of downstream assessment is that it may be easier to target relief for low-income households if that is the point of regulation. Certain households could be exempted from the fee. This would be more difficult if the fee is assessed upstream and flows down to all households.

Key points of comparison between carbon fee and alternatives

Table 4 highlights the main distinctions between a carbon fee and three regulatory alternatives.[7] There is no real meaningful comparison between a fee and taking no action, other than the fundamental notion that one addresses the GHG problem and the other does not. So we focus instead on comparisons with the other alternatives that seek to address the problem.

Source-specific regulatory requirements, sometimes referred to as "command-based" regulations, directly mandate the actions that each entity covered by the regulation must take. For example, they may require that a certain industrial facility install a specific process that reduces or eliminates GHGs, they may put an absolute limit on the GHGs that can be generated by the plant, or they may impose an emissions standard (emissions per unit of output) on the facility. This approach clearly addresses the GHG problem, but it requires very specific actions at each facility and information

7. The fourth alternative, adopting a variation of the proposed strategies and measures, is a broad mix of approaches which defies straightforward comparison to a fee.

about each facility's processes to effectively address the problem. Although benefit-cost analysis may have informed the specifics of the technology mandates, the total cost of meeting the GHG targets is not a primary consideration of implementation of this approach.

Table 4. Comparison of carbon fee to regulatory alternatives.

Alternative	Similarities to Carbon Fee	Dissimilarities to Carbon Fee
No action	None	Leaves business as usual Takes no direct action to reduce GHG emissions No revenues raised
Source-specific regulatory requirements	Regulates GHG emissions directly Incentivizes investment in low-carbon technologies	Each source's compliance obligations are directly mandated Typically offer no flexible market-based mechanisms to substitute less costly mitigation actions for more costly actions No revenues raised
Cap and trade	Puts price on GHG emissions Promotes more abatement at less costly sources and less abatement at more costly sources Incentivizes investment in low-carbon technologies	Imposes absolute limit on emissions from covered sector Carbon price varies with market conditions rather than remaining fixed under the fee Carbon fee raises revenues always; cap and trade can raise revenue with auctions or give away permits for free Requires oversight of a new market in carbon allowances to deal with trading transparency and market risk, among other things

In contrast to the command-based approach, both the carbon fee and cap and trade are regulatory instruments designed to take economic efficiency into account. Both of these economic instruments shift more of the abatement toward the less costly abatement options as entities decide to abate more if they can do so for less than the carbon price or fee.[8] Likewise, they allow for less abatement from high-cost sources, as entities either decide to pay a carbon fee that is less than their marginal abatement cost, or purchase allowances from others who can abate for less under cap and trade.

The primary distinction, however, between a carbon fee and cap and trade involves a choice between price and emissions certainty. A carbon fee can guarantee a price that will be paid for each unit of covered emissions, but cannot guarantee the total emissions that will result. Cap and trade, on the other hand can guarantee (or at least mandate) an aggregate emissions level, but not the price at which an emissions allowance will trade. The issue of price versus emissions certainty has been well debated in the environmental economics literature. Given that abatement costs and GHG damages have a range of uncertainty around them, the approach economists will recommend depends on whether a marginal variation in emission damages is expected to be worse than a marginal variation in costs. There is no consensus on this point. Earlier papers (Weitzman 1974; Pizer 2002) suggested that variation in costs was likely a larger problem, and recommend a fee (tax) as a likely preferred alternative. Nordhaus (2001) also argued for a tax. More recent work by Murray, Newell and Pizer (2009) suggests the opposite may be the case, or that a hybrid price-quantity instrument may be preferred. The political processes elsewhere (e.g., Europe, Australia and northeastern U.S.) have tended to favor an emissions cap for the GHG problem, while as discussed above other jurisdictions have experimented with a tax.

Administratively, both a cap and taxes can be quite similar. Depending on the point of regulation, both may require reporting, monitoring, and verification of covered entities' GHG emissions. However, there are two primary administrative differences. First, a cap operates though the creation of a market among buyers and sellers of GHG permits or trading allowances, whereas a tax or fee does not. Second, a tax may be administered and enforced to a degree through existing taxation mechanisms, preventing the need for an environmental regulatory agency to create such a system from whole cloth. Regulators create a market by setting a cap and distributing allowances.

The cap level and number of allowances are based on emissions estimates. If the estimates are incorrect, a cap can fail to deliver expected GHG reductions, as the early experience of EU ETS suggests (Ellerman, Convery, and de Perthius 2010). To create price certainty, a cap requires the use of such cost containment mechanisms as offsets—low-cost GHG

8. As pointed out above, however, a "marginal" carbon fee charged only on a fraction of a plant's emissions might undermine the incentives for continued abatement. Under a cap, the abatement incentives would continue as long as there are any emissions that can be abated for less than the price of carbon.

reductions generated from unregulated sources—as well as an allowance reserve.

Because a fee, like a cap, would place a price on carbon emissions, both systems—particularly when implemented at the state level—are prone to leakage. That is, regulated entities with high GHG emissions or energy costs have an incentive to shift or relocate activity to states without carbon regulation. A cap alternative can address leakage through the use of free allocation to trade-exposed, energy-intensive industries, such as was proposed in the federal American Clean Energy and Security Act.[9] For a fee, other administrative mechanisms such as a border adjustment may be necessary to address leakage. Zhang and Baranzini (2004) review the existing empirical literature on carbon fees to conclude that they do not appear to contribute to leakage problems. They surmise that most fees are sufficiently low so as to not place industries at a competitive disadvantage.

Potential Effect on Other Environmental and Social Goals

Although the primary goal of the carbon fee is to reduce GHGs, the processes that generate GHG emissions also produce other forms of pollution, and the activity there affects other economic and social outcomes. For instance, fossil fuel combustion can generate, in addition to CO_2 emissions, particulate matter (PM), mercury, ozone, nitrogen oxides (NO_x), and other air pollutants; discharges that affect water quality; and solid waste. Moreover, industrial entities generate economic activity that benefits workers, suppliers, and investors. While the effects of GHG emissions are global in nature—a ton emitted in California has essentially the same climate change impact as a ton emitted in China—these other environmental and economic effects are more localized. This leaves open the possibility that the most efficient actions to deal with the GHG problem may create non-uniform effects on local populations. AB 32 mandates that ARB consider increases in emissions of toxic air contaminants and criteria air pollutants as "co-pollutants." In particular, ARB is required to examine potential localized impacts on co-pollutants of GHG policies.

One might ask whether it makes sense to require the GHG regulatory instrument (fee or an alternative) to adequately account for these other interaction effects, or whether it is best to deal with those problems with policy instruments directly aimed at those problems. For example, federal, state, and local governments can (and do) address PM, mercury, and ozone problems with environmental regulations directly aimed at those pollutants. Should responsibility for those pollutants also be stacked onto the GHG regulation? Perhaps the issue is how best to avoid taking actions on GHGs that will exacerbate these problems, requiring costly adjustments to other regulations to correct them. The state must ultimately decide how best to mix these issues.

It is worth noting, however, that all of the regulatory options for GHGs have interaction effects with these other problems. Doing nothing could exacerbate the status quo at entities that would otherwise be regulated; entity-specific command-based regulations essentially fix the amount of pollution control in any one place; cap and trade allows for compliance obligations to be traded; and a carbon fee allows for compliance obligations to be bought, leading to more emission reductions in places where abatement costs are cheapest, and more emissions in places where abatement costs are highest. Under either the cap-and-trade or fee approach, emissions reductions will shift toward places that are most economic for reductions.

Administrative Features of Potential Application in California

The discussion above addresses four steps that an administrative agency such as ARB must consider in designing a carbon fee, and contrasts fees to other instruments, including a cap and direct regulation. The administrative steps to creating a fee include sectoral coverage, fee level, emissions basis, and point of regulation (fee assignment). In theory, a carbon fee is fairly straightforward to design and administer, at least compared to the other regulatory alternatives. In practice, however, a fee may be more challenging to design and administer in California, owing to legal distinctions between what constitutes a tax and a fee. The discussion that follows moves from a general examination of what administrative issues a state would need to consider, to what challenges ARB might face in practice.

Once the state makes decisions about coverage, how and where to set the fee, and on what emissions basis, it needs to develop data to track the carbon (GHG emissions) on which the fee is assessed. As Table 3 suggests, the amount of data conversion required depends on where the state sets the point of regulation. An upstream system requires only data on carbon content in fuels and data on fuel use. A midstream or downstream system designed more to mimic sources

9. H.R. 2454, also known as the Waxman-Markey bill, which passed the House of Representatives in 2009.

targeted under the Preliminary Draft Regulation for cap and trade might require emissions data at the regulated source (midstream) or emissions estimates in the production and use of the final product (downstream).

Presumably, the California Energy Commission and ARB, through various regulatory programs under AB 32, including the agency's GHG inventory efforts, have already developed much of these data for California. Monitoring the environmental effectiveness of a fee depends in part on the point of regulation. Fuel use data are necessary for agencies to monitor an upstream system, whereas emissions estimates or product use are necessary to monitor the environmental effectiveness of a mid- or downstream system.

In theory, a key administrative advantage to fees is that they may be levied and enforced through established taxation methods rather than developed from the ground up through agencies charged with environmental regulation. In other words, a federal carbon fee, similar to a fuel excise fee, could be levied and collected by the U.S. Department of the Treasury instead of the U.S. Environmental Protection Agency. Under an upstream system, fuel suppliers would account and pay for such fees, much like other taxes to which they are accustomed. A California corollary to administer Treasury's functions would be the Department of Finance.

In British Columbia, a Western Climate Initiative partner to California, retail gasoline establishments collect the fee and remit revenues along with other taxes to the provincial tax authority. Because a fee is based on tax payments and not directly on emissions, noncompliance could be achieved through cheating or evasion. Accordingly, enforcement against tax evasion would take place in large part through established tax auditing systems.

Depending on what type of emissions basis the state would select, a fee—much like an auction allocation system under cap and trade—holds the potential to generate millions of dollars in revenue per year (EAAC 2010). As in the case of an allowance auction, the state must then decide how to use those revenues. If the state opts to return values to the public, revenues in concept may be applied to the same uses as values from a cap-and-trade allowance system.

ARB's Economic and Allocation Advisory Committee (EAAC 2010, 33–34) identified four potential uses of allowance value, including reducing the disproportionate impact on low-income households of higher fuel prices caused by a cap or fee; financing government expenditures; reducing income or sales taxes; and providing public dividends in such forms as direct payment or a trust fund for education. The Alaska Permanent Fund, which recycles oil-extraction royalties to Alaskans, is one example of a dividend model. British Columbia harnesses a revenue-neutral approach to reduce personal and corporate income taxes. In terms of revenue, the carbon fee between 2008 and 2009 collected $846 million and reportedly resulted in net reductions of $230 million to taxpayers there (Plumer 2010).

So far, this paper has used the terms *fee* and *tax* interchangeably, since they both have the same effect in pricing carbon. But in California the two terms connote very different uses of the money collected. As a result, a carbon tax and a carbon fee may be very different in practice. In broad terms, taxes in California that flow to the state's General Fund require a legislative supermajority (two-thirds) vote.[10] Under a tax, there are no restrictions on how revenues might be disbursed. By contrast, fees historically have not required legislative action in order for agencies such as ARB to collect them, but the legislature must direct how revenue collected is appropriated. California's constitution allows agencies to establish fees to pay for environmental damages and the cost to administer programs to address them. In fee parlance, the state is able, without legislative supermajority vote, to recoup costs associated with benefits conferred on fee payment. Indeed, ARB in 2010 promulgated a fee regulation to cover the cost of AB 32 implementation.

Over the years, California courts, as well as a more recent 2010 ballot initiative known as Proposition 26, have left subject to legal interpretation how agencies such as ARB may levy and use fees. Proposition 26, which voters passed last November, amends the California Constitution to require a two-thirds vote in the Legislature for many new fees and taxes. Horowitz, Hecht, and Enion (2010) find that Proposition 26 could "erect significant barriers" to many environmental programs in California, including AB 32. They write: "To the extent that future AB 32 fees go beyond amounts necessary to compensate the state for benefits conferred on industry alone, those fees potentially could be classified as taxes under the Proposition 26 regime" (Horowitz, Hecht, and Enion 2010).

10. California Constitution, Article XIIIa (2).

Until Proposition 26's passage in November 2011, the central case that has guided fee use in California is the Sinclair Paint Co v. State Board of Equalization (1997).[11] Unlike taxes, the state must levy fees in a way that is proportionate to the benefit received or cost created by the fee payer. The burden is on the state to demonstrate the costs of the regulatory activity. The Sinclair decision is typically interpreted to require that regulatory programs funded by fees be connected to fee payers beyond the general public. For instance, state park fees can only be levied on park users and not on members of the public not using the park.

With these important distinctions between a tax and a fee in California in mind, whether and how such programs might operate and who would operate them could look very different in practice. In order to implement a carbon tax in California, the legislature would by two-thirds supermajority need to approve the tax. By almost all accounts, such a scenario is extremely unlikely now and for the foreseeable future. Alternatively, with sufficient signatures, the question of whether to levy a carbon tax could be placed on the ballot and put to a vote. But it would require significant outside resources to mount an effort to pass such a measure.

Assuming, hypothetically, that such a tax would pass by legislative vote or by popular vote, the administrative steps to implementation would be consistent with those outlined above. Legislators or voters could set the tax based on criteria in Table 2 and decide whether to return revenues to the general fund, return revenues to taxpayers, or use the value for other goals as outlined by the EAAC (2010). ARB could provide carbon content or emissions data and advise where to set the point of regulation. ARB could administer the program and monitor progress towards emissions reductions. However, the Department of Finance theoretically could levy, collect, and monitor the tax as well administer personal tax reductions if the state were to harness such an approach. Because a tax targets emissions indirectly, it is necessary to return to the legislature or to voters to raise additional taxes if ARB through monitoring finds that the program is failing to achieve GHG emission reduction goals.

In contrast to a tax, additional legal and administrative considerations would likely need to be brought to bear under a California carbon fee program. Here, Sinclair likely would make such decisions as on what basis to levy a fee and where to apply to the point of regulation more complicated. The California Constitution, Sinclair, and other court decisions would also likely constrain how ARB could charge and use revenues from a carbon fee.

California agencies can levy fees without legislative authority, but they generally must then use the fees to administer programs that address harm or provide benefits, such as parks. Such requirements would constrain decisions about how to set a carbon fee. California's fee approach also likely would complicate decisions about the point of regulation. In terms of charges, fees must be levied only on those who receive the benefit of a program, such as parks, or on those who create the cost or harm. But in the case of GHGs, that could range from upstream fuel suppliers to consumers in the home. Similarly, unlike taxes, which flow to the general fund and may be used to offset income taxes or create dividends, the legislature, and not ARB, is required to decide how to allocate revenues from fees. Such requirements likely rule out ARB's ability to return fee values to such uses as creating dividends, or offsetting personal income taxes or higher fuel costs for low-income households.

Summary

As the foregoing discussion suggests, carbon fees have some advantages and disadvantages over other alternatives such as direct regulation and cap and trade. Advantages include the fact that fees place a clear and stable economic signal to incentivize carbon reduction and drive investment, and they do so in a way that does not subject parties to carbon price volatility. Compared to cap and trade, which requires regulators to collect self-reported emissions data, devise methods to allocate emissions permits and offsets, and monitor the market, a fee is relatively straightforward to set and administer. Moreover, fees in theory may be levied and collected by tax authorizes such as the Treasury or the California Department of Finance rather than by environmental regulatory agencies. Finally, in the case of a carbon tax approved by voters or the legislature, revenues can be redirected to any number of potential uses, including offsetting income taxes, creating dividends, or reducing the comparably higher fuel bills that a carbon fee or tax would bring to low-income households.

In the near term, the biggest drawback of a fee approach in California is that a fee—essentially a tax—must be approved

11. Sinclair Paint Co. v. State Bd. of Equalization, 15 Cal. 4th 866,875 (Supreme Court of California).

by either legislative supermajority or voter initiative. Such measures may be politically infeasible, and in any event, would require time and potentially significant resources to mount and pass. Successful passage and creation turns in large part on confidence that government will use revenues wisely and return value to taxpayers or households. In economic terms, it remains unclear whether a tax is as dynamic and responsive to changing price conditions as a cap-and-trade system. Finally, and perhaps most importantly, while a tax or fee may be simpler to administer than direct regulation or a cap, a central drawback is that a tax addresses environmental goals or emissions limits indirectly. Thus, there is less certainty that goals are being met. Additionally, if evidence shows that a tax is failing to sufficiently reduce emissions, it may be more difficult for political reasons to return to the legislature or to voters to levy a higher tax in order to reduce more emissions.

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