



Using carbon tax revenues to help attain climate goals: Insights for Washington State from existing programs

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STOCKHOLM ENVIRONMENT INSTITUTE

WORKING PAPER NO. 2017-05

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ABSTRACT

As many governments around the world consider carbon taxes (and other forms of carbon pricing), a common question is what to do with the revenue they generate. A growing number of jurisdictions are using at least some revenue to enhance climate change mitigation efforts. This paper explores different options for using carbon tax revenues to help achieve climate goals. The analysis focuses on the State of Washington, where several bills pending before the State Legislature would establish some form of carbon tax, with differing indications for how revenues should be spent. A key question for mitigation investments is whether to try to maximize near-term impact by focusing on the lowest-cost options, regardless of the sectors or technologies involved, or pursue strategic mitigation investments based on broader policy objectives (related or unrelated to climate change). We consider that question and related issues of funding program design and implementation. Drawing on lessons from existing GHG mitigation funding programs around the world, we discuss six pitfalls to avoid: overpaying for emission reductions, going off target, failing to make a difference, biased baselines, setting the wrong precedents, and failing to build up an adequate supply. Our assessment suggests that a successful Washington program should: (1) be strategic about how funds are invested; and (2) build as much as possible on existing efficiency, clean energy, and transportation programs. Such an approach could help to avoid those common pitfalls and ensure a sufficient supply of investment options from the program's outset.

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ACKNOWLEDGMENTS:

This paper was generously funded by a grant from the Energy Foundation. The authors would like to thank the staff of Climate Solutions, in particular Vlad Gutman-Britten, for their thought leadership and helpful contributions in framing the issues. Our research was greatly aided by input and advice from Chris Davis, Franz Litz and Gary Gero. Finally, we thank our SEI colleagues Pete Erickson and Marion Davis for their thoughtful reviews and contributions to this paper.

1. INTRODUCTION

Many U.S. cities and states have set targets to reduce greenhouse gas (GHG) emissions, aiming to do their part – and even lead by example – in the global effort to prevent dangerous climate change. Realizing those ambitions requires overcoming several challenges, however. Not only do cities and states have limited control over key sources of emissions (Broekhoff et al. 2015), but they also have limited resources to fund climate initiatives.

One way to raise revenue, and also spur businesses and consumers to find cost-effective ways to reduce emissions, is to put a price on carbon. This paper explores how subnational governments could use the revenue from a carbon tax in particular to advance their climate goals. The analysis focuses on the State of Washington, which has set both near- and long-term targets for reducing GHG emissions. The state aims to reduce in-state GHG emissions to 1990 levels by 2020, then by another 25% by 2035, and to half the 1990 levels by 2050. Yet despite having implemented a variety of programs to promote energy efficiency and boost renewable energy, Washington is falling short of its targets.

Several bills have been introduced in the Washington State Legislature this year to establish a carbon tax as a way to accelerate progress towards climate goals. A ballot initiative presented to voters last November would have done the same, but it failed amid disagreements about the best ways to allocate the revenue, as well as confusion over the fiscal implications of the measure.¹ The bills now pending before the Legislature offer differing visions of how to spend the revenues, but at least two – SB 5127 and HB 1646 – would require significant investment of tax proceeds in clean energy, transportation, and energy efficiency measures.

In the sections that follow, we examine different options for investing carbon tax revenues. The analysis focuses on Washington in particular, but the overall insights are widely applicable. A key question is whether to try to maximize near-term impact by focusing on the lowest-cost mitigation options, regardless of the sectors or technologies involved, or to pursue strategic mitigation investments based on broader policy objectives (related or unrelated to climate change). We explore that question and related issues of program design and implementation, drawing on lessons from existing GHG mitigation funding programs around the world.

We first explore why, and under what conditions, investing carbon tax revenues in GHG mitigation makes sense from a policy perspective (Section 2). Next, we discuss possible goals for a mitigation funding program, along with possible investment criteria related to those goals (Section 3). Section 4 looks at the pros and cons of creating new mechanisms to fund mitigation, versus building on existing state programs that already contribute to GHG mitigation. Section 5 identifies common pitfalls to avoid that have affected mitigation funding programs around the world. Section 6 concludes with detailed recommendations for building a successful program.

2. WHY INVEST CARBON TAX REVENUES IN GHG MITIGATION?

Many economists endorse carbon taxes as an efficient way to reduce GHG emissions (e.g. Goulder and Schein 2013). One reason is that a carbon tax can spur innovation and cost-effective mitigation actions throughout the economy, without the need to tailor regulations or subsidies to the thousands of technologies and activities that could contribute to GHG reductions. In theory, the price signal created by a tax will be more efficient at generating GHG

¹ For a brief overview, see Lavelle, M. (2016). Washington State voters reject nation's first carbon tax. *Inside Climate News*, 9 November. <https://insideclimatenews.org/news/09112016/washington-state-carbon-tax-i-732-ballot-measure>.

reductions than a comparable approach based solely on mitigation investments.² There is thus a strong argument – from a purely economic standpoint – to let the tax itself “do all the work” with respect to mitigation, and use the revenues for other purposes, such as addressing equity concerns associated with the tax’s impact on low-income households.

In practice, however, there are several reasons why it makes sense to use carbon tax revenues to fund mitigation activity. One justification is political. Surveys indicate that popular support for a carbon tax depends greatly on what the revenues are used for, and that a commitment to invest in clean energy (and other environmentally beneficial projects) can garner more support than other options (Amdur et al. 2014; Kallbekken and Aasen 2010). Investing in mitigation projects can also help build political constituencies among recipient industries or communities. Building such political support may be a critical aspect of effective policy design (Meckling et al. 2015).

There are also policy and economic arguments. First, even if a carbon tax enables Washington to meet its emission reduction targets, those targets themselves may not yet be adequate. Using carbon tax revenues to support additional mitigation could help move emissions closer to what is needed for achieving global ambitions under the Paris Agreement, for example.³

Second, although it may be an efficient policy, a carbon tax will not necessarily unlock all cost-effective mitigation opportunities, in Washington or anywhere. For instance, even if the tax covers a majority of GHG emissions, there are still significant sources that might not be subject to the tax. These include sources of non-CO₂ gases in the agriculture, forestry and land use sectors, which are hard to tax but could provide low-cost mitigation.⁴ Using tax revenues to fund mitigation projects in these sectors could extend the impact of the tax.

Moreover, even in sectors covered by the tax, not all actors may respond to the price signal as expected. For example, “market failures” and misaligned incentives in the energy sector can prevent cost-effective mitigation investments even in the presence of a tax – such as when building owners are unwilling to pay for efficiency measures if the savings would only go to their tenants (the so-called “split incentive” problem; see Vaidyanathan et al. 2013). Similarly, higher fuel prices may create only a weak incentive for policy-makers to invest in public transit or promote greater adoption of electric vehicles. And even for businesses that are responsive to carbon prices, various factors may drive inefficient investments from the perspective of long-term “decarbonization” goals (Seto et al. 2016). Using tax revenues to help address these shortcomings, such as by funding building efficiency programs and low-carbon infrastructure, could increase both the effectiveness and economic efficiency of a carbon tax policy.

Finally, there may be an important social equity dimension as well. Although a carbon tax may in principle make it cost-effective for homeowners to invest in energy-saving appliances and insulation, for example, in practice many low-income households may lack the financial resources to make these investments, or to move closer to work or school. Similarly, a carbon tax may make driving more expensive, but poorer families may not be able to afford more efficient or alternative-fuel vehicles. Directing carbon tax revenues to overcome these barriers

² According to one study, for example, a U.S. carbon tax would achieve 20 times more cumulative emission reductions than a similarly sized tax incentive for household energy efficiency measures (McKibbin et al. 2011).

³ In its “Mid-Century Strategy for Deep Decarbonization,” submitted to the latest UN climate negotiations in Morocco, the U.S. government acknowledged that the United States as a whole will need to reduce emissions to 80% below 2005 levels by 2050, to stay on a path consistent with the Paris Agreement goal of keeping global average temperature “well below” a 2°C increase. It also indicated that achieving Paris Agreement goals will require going to net-zero emissions globally in the latter half of this century (The White House 2016).

⁴ Certain emissions may be hard to tax because they do not emanate from a single, clearly owned source, or are hard to measure and verify.

can lower GHG emissions, make a carbon tax more equitable overall, and build popular support for the tax at the same time.

Still, some caveats are in order. First, regulatory solutions are sometimes more effective at driving mitigation than spending programs. Building energy standards, for instance, can more comprehensively address misaligned incentives than publicly run renovation programs with limited budgets. In the same vein, regulators in California decided that the most effective way to address methane emissions from landfills and livestock operations – sources outside the coverage of its cap-and-trade program – was through regulation (Alexander 2016).

Second, a major challenge when funding mitigation in conjunction with a carbon tax can be differentiating between activities that are already motivated by the tax, and those that truly need additional investment in order to be viable. With a carbon tax of \$15–25/ton⁵ CO₂, for example, many kinds of clean energy projects may be economically viable without additional financial support, so developers will pursue them without further revenue or incentives. Funding these activities with carbon tax revenues would not generate additional GHG reductions, but simply transfer wealth to the developers by increasing their profit margins. As described further below in Section 5.3, the challenge of ascertaining the “additionality” of mitigation measures has consistently plagued mitigation funding programs in other jurisdictions.

One way to deal with this challenge is to focus investments precisely on those activities not affected by a carbon tax, because they are outside the tax’s coverage or they are subject to the kinds of “market failures” described above. Many economists endorse this kind of “filling the gaps” approach (Marron and Morris 2016; Allcott and Greenstone 2012). Another option is to focus on mitigation measures that are clearly not cost-effective at the current tax level, but would yield significant benefits. For measures costing more than \$100/ton CO₂, such as creating bus rapid transit (BRT) systems (Millard-Ball 2008), there may be few concerns about additionality, even with a tax of \$25/ton CO₂. Whether it makes sense to invest in these opportunities in Washington depends on policy-makers’ overall goals, including goals unrelated to climate change.

3. GOALS AND CRITERIA FOR INVESTING IN GHG MITIGATION

Given the many different sources of GHG emissions and the many options for mitigation, it is clear that there is no single “right” way to invest carbon tax revenues. Each country, state or city needs to prioritize based on local conditions and what citizens care about most. Those priorities will define the goals of the mitigation funding program – which, in turn, will guide investment choices. Different goals may lead to investment in different technologies and activities, and even to different criteria for screening investments. A fundamental distinction is between programs that aim to achieve the largest possible emission reductions with the available budget, regardless of GHG source, and those that aim to achieve emission reductions while supporting broader policy goals. As explained in Section 5, programs that primarily target low-cost reductions are especially prone to some common pitfalls.

3.1 Possible goals for a mitigation funding program

In defining possible goals for a mitigation funding program, it can help to review what other jurisdictions have done. Some examples are shown in Table , including a variety of carbon

⁵ Throughout this text, we use “ton” to refer to a metric ton, or tonne.

offset programs,⁶ mitigation funds associated with emissions trading systems (ETSs), and other stand-alone mitigation funding mechanisms. Programs have differed in the specificity of their goals, and many programs have targeted more than one goal. In general, however, mitigation funding goals can be grouped into four categories:

- **Getting the cheapest reductions:** As noted above, one possible goal is to achieve the greatest volume of GHG reductions that is possible with the available tax revenue. This approach requires evaluating investment options to gauge their mitigation potential, and investing in the cheapest options (in terms of dollars invested per ton of CO₂-equivalent avoided). This is the approach taken by a variety of carbon offset programs around the world, which are designed to fund low-cost GHG reduction measures on a price-per-ton basis. Local examples include the Climate Trust in Oregon and Pacific Carbon Trust in British Columbia. Other similar programs include Australia's Emission Reduction Fund and the World Bank's Pilot Auction Facility, both of which have funded mitigation through a reverse auction process.
- **Achieving social value and economic equity:** Some actions that reduce GHG emissions can also yield other social benefits. Home weatherization programs, for example, can reduce both emissions and household energy costs. Public transit systems and commute-trip reduction programs can reduce local pollution, alleviate congestion, reduce traffic fatalities, and increase economic productivity. As noted above, carbon tax revenue can also be targeted to lower-income households to help offset the disproportionate impact of the tax on those households. State programs in California and under the Regional Greenhouse Gas Initiative (RGGI) program in the Northeast have largely invested their revenue (from the auctioning of emission allowances) in programs focused on social value and economic equity.
- **Achieving longer-term climate ambitions:** The climate targets set by Washington and governments around the world still fall far short of the deep CO₂ reductions needed to avoid dangerous climate change. Achieving those deeper reductions will require strategic, long-term thinking about infrastructure and the built environment. Some measures that might reduce GHG emissions efficiently in the near term – e.g. switching from petroleum to natural gas vehicles – may not be consistent with the most efficient, long-run path to a low-carbon economy (Erickson et al. 2015). One goal for carbon tax revenue could be to help steer investments toward low-carbon infrastructure consistent with long-term goals, and away from infrastructure that may “lock in” higher CO₂ emission levels and “lock out” much lower emission technologies, such as electric vehicles. California in particular has made low-carbon infrastructure investments a key part of its mitigation funding program, channeling more than half of cap-and-trade auction revenues into statewide and local transit projects and local “transformational community” programs.
- **Innovation, jobs and competitiveness:** The economy of the future will be low-carbon, and many public investments to address GHG emissions are motivated by a desire to get a head start and foster new job-creating industries – for instance, by enabling local projects and supporting research, development and demonstration (RD&D) of innovative technologies. RD&D efforts may have uncertain payoffs, making precise assessment of mitigation benefits difficult, but they can be an important strategy in

⁶ Carbon offset programs channel funding to GHG mitigation activities by enabling those engaged in such activities to sell their emission reductions to third parties, who are usually businesses, organizations or governments seeking to meet GHG reduction goals.

fulfilling long-term climate change goals. RD&D and similar technology incubation efforts have been a significant component of some GHG mitigation funding programs. RGGI states have channeled a portion of their cap-and-trade auction revenues into specific RD&D projects. Others, such as the Emissions Reduction Alberta program, have made accelerating development of new technologies a primary focus.⁷ California has an explicit goal of fostering in-state job creation through mitigation investments.

None of these goals necessarily precludes the others. A single program could seek to fund cost-effective investments that create jobs, move the economy towards a low-carbon pathway, and provide multiple social benefits – for example, a program that weatherizes low-income people's homes and adds rooftop solar panels. However, as discussed in the next section, achieving each goal might entail different criteria and priorities, not all of which will be fully compatible.

Table 1. Identified goals of existing climate change mitigation funding programs

	Mitigation funding program	Description	Primary goals
Carbon offset programs	United Nations Clean Development Mechanism (CDM)	The world's largest carbon offset program, established under the Kyoto Protocol. The CDM allows developed countries to fund GHG mitigation projects in developing countries, in exchange for credits that may be used to meet developed country GHG reduction obligations under the Protocol.	Provide developed countries access to cost-effective GHG mitigation opportunities Assist developing countries achieve sustainable development by supporting environmentally friendly investments <i>Source: Spalding-Fecher et al. (2012).</i>
	The Climate Trust (formerly the Oregon Climate Trust)	Non-profit program initially established to fund GHG mitigation to offset emissions from new power plants in Oregon, under Oregon's 1997 power plant CO ₂ standard.	Fund cost-effective GHG mitigation projects to offset power plant emissions <i>Source: Oregon Department of Energy (2010).</i>
	Pacific Carbon Trust	Non-profit "Crown corporation" established by British Columbia to assist the government meet its goal to become carbon neutral. Currently defunct.	Fund cost-effective GHG mitigation projects to offset BC government emissions <i>Source: Auditor General of British Columbia (2013).</i>
ETS-related mitigation funds	Emissions Reduction Alberta (ERA) – Climate Change and Emissions Management Fund (CCEMF)	Alberta requires certain large industrial emitters of CO ₂ to reduce emissions directly or fund mitigation measures, which they can do by putting money into the CCEMF. The CCEMF was initially established to fund carbon offset mitigation projects. Under ERA administration, it now focuses on supporting innovative new mitigation technologies.	"[A]ccelerate development of innovative technologies that reduce greenhouse gas emissions and secure Alberta's success in a lower carbon economy." <i>Sources: http://www.eralberta.ca/ https://www.csaregistries.ca/albertacarbonregistries/home.cfm</i>
	Regional Greenhouse Gas Initiative (RGGI)	RGGI is a cooperative program among nine Northeast states to cap and reduce CO ₂ emissions from power plants. Under this program the states auction CO ₂ emission allowances, and revenues from these auctions are used in part to fund GHG mitigation measures.	Fund "consumer benefit or strategic energy" measures, including energy efficiency, mitigation of ratepayer impacts, renewable energy technologies, and "innovative carbon emissions abatement technologies" <i>Source: RGGI (2005).</i>

⁷ See <http://www.eralberta.ca>.

	Mitigation funding program	Description	Primary goals
	California Greenhouse Gas Reduction Fund (GGRF)	Similar to RGGI states, California established in 2013 a cap-and-trade program under which it auctions a portion of GHG emissions permits. Revenues from allowance auctions are used in part to fund statewide GHG mitigation measures through the GGRF.	Facilitate (feasible and cost-effective) GHG emission reductions Maximize economic, environmental and public health benefits to the State; Foster job creation by promoting in-State GHG emission reduction projects carried out by California workers and businesses; Complement efforts to improve air quality; Direct investment toward the most disadvantaged communities and households in the State; Provide opportunities for businesses, public agencies, non-profits, and other community institutions to participate in and benefit from statewide efforts to reduce GHG emissions; Lessen the impacts and effects of climate change on the State's communities, economy, and environment; Allocate at least 25% of the available proceeds to projects that provide benefits to disadvantaged communities; and Allocate at least 10% of the available proceeds to projects located within disadvantaged communities. <i>Source: CARB (2015).</i>
GHG mitigation auction programs	Australia Emissions Reduction Fund (ERF)	The Australian government established the ERF to fund mitigation investments in support of national GHG reduction goals. The ERF solicits bids for mitigation projects through a reverse auction process.	"[P]rovide incentives for a range of organisations and individuals to adopt new practices and technologies to reduce their emissions." Fund cost-effective GHG reductions based on verified project performance <i>Sources: Commonwealth of Australia (2014); Clean Energy Regulator (2016).</i>
	World Bank Pilot Auction Facility for Methane and Climate Change Mitigation (PAF)	The PAF is a World Bank initiative designed to fund, and attract private finance to, projects that reduce methane emissions. It provides a minimum price-per-ton guarantee through the auctioning of "put" options, and relies primarily on the CDM's administrative structure (see above) for project oversight. The program was recently extended to N ₂ O reduction projects as well.	"[S]timulate investment in projects that reduce greenhouse gas emissions while maximizing the impact of public funds and leveraging private sector financing." <i>Source:</i> http://www.pilotauctionfacility.org/content/about-paf

3.2 Investment criteria for different program goals

Achieving different program goals will require different criteria for screening investments. As noted above, a key distinction is whether the program focuses primarily on getting the cheapest reductions, or targets broader or more strategic policy goals. All else being equal, getting the cheapest reductions means finding the lowest-cost mitigation opportunities regardless of economic sector or the kinds of technologies involved. This can create tension with other potential program goals, all of which seek to channel investment into certain kinds of technologies and opportunities (

Table 2. Relative importance of key investment criteria given mitigation funding goals).

More importantly, however, programs that focus on getting the cheapest reductions – such as carbon offset programs and mitigation auction programs – generally use cost per ton of CO₂-equivalent reductions as the primary metric for evaluating investment options. Two corollary criteria are also important for these programs: additionality and quantifiability. Ensuring the additionality of mitigation investments – i.e., that they truly produce emission reductions that would not have occurred without additional investment – is important to avoid wasting funds (Erickson et al. 2011). At the same time, the GHG reductions have to be quantifiable, so that different investment options can be reliably compared on a cost-per-ton basis.

Minimizing the cost per ton of CO₂ reduced may be a lower priority for programs with other goals, such as achieving social, economic and environmental co-benefits, or achieving specific types of mitigation. Quantifiability (in CO₂ terms) may likewise not be as important, since investments may be judged across a range of other metrics (e.g., social goals, jobs, and competitiveness potential). Additionality is a key criterion for maximizing the value of any investment. However, even additionality may be a secondary concern in some circumstances. With home weatherization programs for low-income people, for example, it may not matter if some would have made efficiency investments on their own, since one goal may simply be to alleviate their financial burdens (i.e., this may be a socially desirable transfer of wealth, even if it means fewer net GHG reductions). These relative priorities are summarized in

Table 2. Relative importance of key investment criteria given mitigation funding goals.

Table 2. Relative importance of key investment criteria given mitigation funding goals

If your goal is...	... then your mitigation funding program should emphasize			
	Investment targets	Cost-effectiveness	Additionality	Quantifiability
Getting the cheapest reductions	No preference	●	●	●
Achieving social value and economic equity	Activities with high social, economic, & environmental co-benefits	○	●/○	○
Achieving longer-term climate ambitions	Infrastructure & technologies that are consistent with meeting long-term goals	○	●	●
Innovation, jobs and competitiveness	New and nascent technologies with local industry potential and/or regional competitive advantage	○	●	○

● = high priority; ○ = secondary priority

4. PROS AND CONS OF DIFFERENT MECHANISMS FOR FUNDING MITIGATION

In conjunction with setting program goals, it is important for policy-makers to consider *how* carbon tax revenues will be invested in mitigation efforts. Different mechanisms may align better with some goals than others. At the broadest level, there are two options:

1. **Create new funding allocation mechanisms:** Establish a new mechanism, or mechanisms, for allocating funding to mitigation measures. The carbon tax bills before the Washington State Legislature, for example, would empower state agencies or affiliates – such as the Department of Commerce, Department of Ecology, and the Washington State University extension energy program – to solicit and evaluate proposals, and award funding to mitigation projects.
2. **Build on existing programs:** State agencies, counties, and local governments in Washington are already implementing a range of clean energy, energy efficiency, transportation, and other environmental benefit programs. Many of these programs help to reduce or avoid GHG emissions. These programs could be expanded to complement a carbon tax and achieve deeper GHG mitigation (Table 3).

Table 3. Examples of existing Washington State programs that could be expanded for GHG mitigation

Sector/program	Description	Agency
Transport		
Commute Trip Reduction Program	Technical assistance to large employers to reduce single-occupancy-vehicle commuting	WSDOT
Clean Diesel Grants Program	Provides grants for idle reduction and marine shore power systems	WA Ecology
Buildings		
Washington State Clean Energy Fund	Grants for developing and deploying clean energy technologies	WA Commerce
Energy Efficiency and Solar Grants	Grants to install solar on government and educational facilities	WA Commerce
Washington Weatherization Programs	State implementation of U.S. DOE Weatherization Assistance Program (WAP)	WA Commerce
Northwest Solar Communities	Reduces the cost of solar installation by streamlining permitting process	WA Commerce / NW SEED
Agriculture		
Washington Farm Energy Program	Technical assistance to reduce energy use and increase energy efficiency in agricultural operations	WA Agriculture

Each of these approaches has distinct advantages and disadvantages (Table 4). The advantage of the first approach is that it would allow the state to tailor investment criteria to specific program goals, whether those goals are to get the cheapest reductions or target specific kinds of technologies. A primary disadvantage, however, is that new programs take time to establish, and once established they may take an even longer time to generate a pipeline of projects in

which to invest. Different carbon offset programs around the world, for example, have nearly all faced long development and ramp-up periods, during which standards and administrative bodies were established, and project developers became accustomed to program requirements and benefits. Programs that have avoided this ramp-up have generally done so only by “piggybacking” on supply generated under prior offset programs (not just borrowing prior programs’ standards, but actively tapping into the pipeline of projects they supported).⁸ The speed of any market response to a funding program will depend on the price being offered; project developers, for example, will be willing to move more quickly and take on more risk if they are offered a higher price per ton of CO₂ reduced. But ramp-up periods of up to five years are not unusual. Both California and the UN’s Clean Development Mechanism (CDM), for example, encouraged offset project registrations at least four years prior to any compliance obligations, in part to help ensure that enough supply would be available to meet demand. And a significant component of any ramp up is simply the time it takes to get standards in place for quantifying and verifying the impact of different projects, and ensuring they are additional (see further discussion below).

For some jurisdictions, the ramp-up time associated with creating new funding allocation mechanisms may pose significant political and policy challenges. In these cases, it may be preferable to build on existing clean energy, transportation and other programs, which can be ramped up relatively quickly to absorb additional funding (or, alternatively, parallel programs can be created with similar criteria and requirements so that funding can be rapidly deployed). Their capacity to expand will depend on the nature of the program and the types of investments made, but because administrative structures are already in place and pipelines of prospective recipients have already been established, expansion can proceed much more quickly than under a wholly new funding mechanism. In both California and RGGI states, for example, officials looking to invest cap-and-trade auction revenues have relied heavily on leveraging existing energy efficiency, clean energy, and transportation infrastructure programs.

Many existing programs are set up to advance a variety of social, economic and environmental objectives; if these are also important corollary goals for mitigation funding, then building on existing programs may be an easy decision. However, while existing programs often have the effect of reducing GHG emissions, they may not be configured to explicitly consider other important mitigation goals. These include goals associated with mitigation costs, long-term climate ambitions, and jobs and innovation. One solution is to tailor existing programs to focus on criteria like additionality, GHG quantification, and costs, and to target specific kinds of activities and technologies.

Table 4. Creating new fund allocation mechanisms vs. building on existing programs

	Create new allocation mechanism	Build on existing programs
Advantages	Allows tailoring of investment criteria to mitigation funding goals	Can be expanded quickly to generate additional GHG abatement
Disadvantages	May have trouble generating enough supply for available funds, especially in early years (which may be important for political or policy reasons)	Existing programs may not prioritize GHG reduction criteria, including additionality, mitigation cost-effectiveness, and targeted technologies

⁸ Australia’s current Emission Reduction Fund, for example, has largely supported projects that were already in planning stages under a formerly proposed national emissions trading system. Likewise, the World Bank’s Pilot Auction Facility was able to quickly solicit bids for mitigation investments by reaching out to projects already developed under the UN’s struggling Clean Development Mechanism (CDM). The world’s largest voluntary offset program, the Verified Carbon Standard (VCS), has also relied heavily on the standards, institutions and projects created under the CDM.

5. POTENTIAL PITFALLS

Regardless of which mechanism is used, there are a number of potential pitfalls that mitigation funding programs can encounter, and that policy-makers should try to avoid. In this section we address six challenges – paying too much rent, going off target, failing to make a difference, biased baselines, setting the wrong precedents, and supply conundrums – that have arisen in mitigation funding programs around the world. Some of these pitfalls are already addressed in carbon tax bills currently before the Washington legislature, but others may require further consideration and attention. As a general rule, avoiding these pitfalls requires thinking carefully about the kinds of mitigation measures to target for investment.

5.1 Paying too much rent

Regardless of whether new or existing programs are used to fund GHG mitigation, an important consideration is how to allocate funding efficiently. Many mitigation funding programs – especially carbon offset programs – have sought to establish, or mimic, a market for GHG reductions, in which a single price is paid per ton of CO₂-equivalent reduction. The price can be set in different ways. Regulatory carbon offset programs, for example, are generally linked to emission trading systems, where the market price determines what buyers are willing to pay for offset credits (each representing a ton of CO₂-equivalent reductions). Programs such as Australia's Emission Reduction Fund and the World Bank's Pilot Auction Facility use auctions to solicit bids from mitigation projects, and pay them on a per-ton basis. Programs may also announce a single price per ton they are willing to pay, and solicit bids (e.g. through requests for proposals) which they then fund on a first-come, first-served basis.⁹

Using a single price to pay for GHG reductions can be administratively efficient and cost-effective, especially if the price is set through a discovery mechanism such as a market or auction. However, it can also have unintended consequences. A very wide range of technologies and practices exist for reducing GHG emissions, with widely varying costs. It can be very cheap (less than \$1 per ton of CO₂-equivalent), for example, to capture and destroy industrial waste gas emissions (Schneider 2011). By contrast, the cost per ton reduced for some types of energy efficiency and renewable energy projects can be relatively high. If a single price is paid for all activities, some may barely break even, while others receive sizable profit margins (i.e., large economic “rents”). In the earlier days of the CDM, for example, developers of HFC-23 destruction projects in China saw huge profits from selling reductions at the going market rate for CDM credits (Wara 2007).

The issue here is more than just perceptual. For a program with a fixed budget, the way to maximize mitigation impact is to make the budget go as far as possible, by paying as close to the actual cost of reductions as possible. When a single price is paid, the budget tends to get wasted. For example, one analysis suggested that the CDM's HFC-23 project developers were collectively overpaid by about 4.6 billion euros (Wara 2007). This was money that could have been more cost-effectively redirected to other mitigation measures. Although mitigation funding proposals on the table in Washington do not include industrial gas destruction as an eligible activity, the risk “paying too much rent” still exists even among different types of energy efficiency and clean transportation projects.

The lesson here is that if a mitigation fund is configured to reward projects the basis of dollars per ton of CO₂ reduced, it should seek to price-discriminate as much as possible. This can be

⁹ In its initial years, this was how the Alberta GHG reduction program and offset credit system operated; Alberta has since switched to a model of supporting RD&D of low-carbon technologies, without specifying a price paid per ton of reductions.

done in different ways. State agencies could, for example, seek individual bids from project developers and agree to pay them at their asking price, rather than a single price for all projects. They could also establish differentiated pricing for different kinds of activities, technologies or sectors, based on an assessment of typical mitigation costs. Alternatively, they could reward projects on a different basis altogether, such as by funding household energy efficiency or public transit projects on the basis of the multiple benefits they produce beyond just GHG reductions.

5.2 Going off target

Related to the issue of overpaying for GHG reductions is the issue of what kinds of reductions get paid for. The CDM, for example, was designed both to generate low-cost GHG reductions, and to promote sustainable development in developing countries. Unfortunately, these aims have not always been compatible. The global CDM market was dominated early on by HFC-23 destruction projects, due to their low cost. Those projects did little to support sustainable development (e.g. by promoting replicable technologies or infrastructure that could reduce local pollution or support low-carbon industries). In that sense, the money spent on HFC-23 destruction might have been more effectively spent on energy efficiency, clean energy, and low-carbon transportation projects.

Similar effects were observed in the early phases of Alberta's carbon offset program, when more than a third of investment went to "no-till" soil conservation projects with little or no additionality (Auditor General of Alberta 2015). Australia's Emission Reduction Fund, meanwhile, has seen a predominance of vegetation conservation projects at the expense of energy efficiency and transport (Taylor 2016).¹⁰ In California's carbon offset program, there have been zero investments in urban tree-planting projects – mostly because, despite their multiple benefits, they are too costly per ton of CO₂ reduced relative to other options. The lesson is that focusing on achieving the lowest-cost emission reductions can skew programs in undesirable ways.

Avoiding these kinds of outcomes requires clarifying program goals ahead of time, and stipulating investment criteria in line with these goals that go beyond a strict price paid per ton of mitigation. A more "technology-neutral" approach, while appealing on some levels, may not steer investment where it is most needed. Putting (relatively cheap) industrial energy efficiency on the same playing field as (more expensive) clean transportation investments, for example, could sacrifice the latter's long-term sustainability benefits for the former's short-term mitigation value.

5.3 Failing to make a difference

One of the biggest challenges with funding GHG reduction measures (as opposed to incentivizing them with a tax) is ensuring that funds actually make a difference. Nearly every program focused on paying for GHG reductions has faced questions about the "additionality" of its investments – whether funded activities were truly enabled by the funding, or would have happened regardless. This has been especially true of carbon offset programs, which put a premium on funding low-cost reductions.¹¹ As noted earlier, paying for GHG-reducing measures that are happening anyway merely pads the bottom line of entities undertaking the measures, and produces no mitigation benefit. Making additionality determinations is

¹⁰ See also: <http://www.cleanenergyregulator.gov.au/ERF/Auctions-results/November-2016>.

¹¹ The CDM in particular has been a focus of additionality concerns (Schneider 2009; Michaelowa and Purohit 2007; Wara and Victor 2008; Haya 2009), but so have offset programs in California (Mitra and Stoll 2013), Alberta (Auditor General of Alberta 2015), and British Columbia (Auditor General of British Columbia 2013), among others.

notoriously difficult, however, and can be especially hard in the presence a carbon tax or other policies and programs, which will already drive many actors to undertake mitigation without the need for extra revenue (Gillenwater et al. 2007; Gillenwater 2011).

The tension between minimizing mitigation costs and ensuring additionality is especially acute. After all, the cost of generating a reduction for a project that is happening anyway is zero – the reduction is just a byproduct of a decision that would have been made without any added incentive. Thus, it is precisely the projects with the lowest apparent cost that are often riskiest in terms of being non-additional (Au Yong 2009; Schneider 2007; Lütken 2012).

As noted in Section 2, one solution is to limit program eligibility to mitigation measures that are likelier to be additional. These can include measures without direct cost savings or other revenue streams (e.g. building bicycle lanes or pedestrian zones); measures with high intrinsic costs per ton of CO₂-equivalent reduced (e.g. public transit systems, electric vehicle fleets, or residential building efficiency renovations); and measures involving untested technologies or practices, with uncertain economics. Another option (not inconsistent with the first set) is to target investments where additionality is less important because they promote social equity goals. All of these solutions, of course, entail moving away from a goal of getting the cheapest reductions and seeking out broader benefits associated with mitigation funding.

5.4 Biased baselines

A related challenge is how to determine a baseline for mitigation activities – that is, the reference case against which to quantify an activity's GHG reductions. As with additionality, establishing the baseline can be difficult – both involve making a determination about counterfactual circumstances. And where projects are rewarded in proportion to the GHG reductions they produce, there are strong incentives to produce inflated baseline estimates in order to increase those rewards. The solution is to establish standardized, consistent rules for how baselines should be calculated. Sometimes even these standards can be “gamed”, however. For example, studies of industrial gas destruction projects under the CDM and its sister program, called Joint Implementation, have shown that project developers “legally” inflated baselines by overproducing one chemical in order to increase revenues for destroying its byproduct (Schneider and Kollmuss 2015; Schneider 2011; Schneider et al. 2010).

Avoiding biased baselines generally requires establishing rigorous methods for baseline estimation upfront, before any funds are awarded to relevant mitigation activities. Such “methodologies” (or “protocols”) take time and resources to develop, however, which can impede overall program development (see Section 5.6).

Alternatively, the incentive to game baselines can be diluted to the extent funding is not provided proportionally to GHG reductions achieved. Where the magnitude of GHG reductions is just one factor in making funding decisions, for example, or funding is provided on the basis of covering project costs, the rigor of baseline estimates and GHG quantification may not be as high a concern.

5.5 Setting the wrong precedents

A challenge for all mitigation funding programs has been establishing precedents that preclude, or complicate, future beneficial regulations – including expansion of a carbon tax. To take an obvious example, funding recipients may resist an increase in the carbon tax if such an increase would make them ineligible, because their projects would no longer be considered additional at the new tax level. The political challenge this creates may not be significant if only a few

projects are funded, but could be sizable if a large number of such projects have been funded over a long period of time.

The issue relates to more than just carbon tax incidence, however. As noted in Section 2, there are instances where the most efficient and comprehensive approach to achieving GHG reductions is through straightforward regulation. Funding mitigation projects in sectors where this is the case can create constituencies opposed to such regulations, making it difficult to enact them in the future. Under the CDM, similar concerns arose about discouraging developing countries from enacting domestic climate policies, since doing so might cut off investment in CDM offset projects (which would no longer be additional to legal requirements). The solution was to create exceptions for additionality determinations related to any laws passed after 2001 (Spalding-Fecher 2013). Such an approach may not be tenable in a single jurisdiction like Washington State, however, since it would create what effectively are inefficient subsidies to help projects comply with regulations.

The general solution for avoiding this pitfall is to be strategic about which kinds of mitigation measures can be funded. Mitigation opportunities that can be incentivized by a sufficiently high carbon tax should generally be excluded from funding support. Mitigation opportunities that might be efficiently addressed through regulations – even if those regulations are not yet being contemplated – should likewise be deprioritized. Exceptions to these rules may include measures that involve one-time subsidies for deployment of particular technologies, such as upfront energy efficiency or clean energy incentives, that avoid creating constituencies resistant to future carbon tax increases or regulations.

5.6 The supply conundrum

Particularly for programs that emphasize getting the cheapest reductions, there is a tension between achieving cost-effectiveness (and meeting related goals of additionality and quantifiability), and generating a sufficient “supply” of GHG reductions to meet available funding. It can take years to develop the standards and oversight mechanisms – including project monitoring and verification – needed to ensure additionality and accurate quantification, even for programs with limited scope. For example, the portfolio of protocols used under various carbon offset programs – including the CDM, California’s regulatory offset program, and various voluntary programs – has taken more than a decade to develop, with individual protocols often requiring months or years of development, along with regular updating and revision. Although these protocols could in many cases be adapted for use in Washington, the adaptation process itself will require time and resources.¹² The result can be a long ramp-up period, as mentioned at the top of this section, along with a fairly limited set of investment options as protocols are developed or adapted.

Another challenge is that the difficulty of determining additionality and quantifying GHG reductions differs for different types of mitigation measures. Quantifying the effects of installing energy-efficient water heaters, for example, is generally far easier than attempting to estimate the GHG reductions associated with expanding light rail or bus lines. Under existing programs, investments have tended toward “easy to quantify” opportunities, since these are the ones for which it was easy to develop and apply protocols. One implication is that it is difficult, if not impossible, to have a truly “technology-neutral” approach to mitigation investments; the

¹² Some existing protocols, such as those developed for California’s cap-and-trade programs, are already applicable for use in Washington. These protocols are limited to a handful of project types, however, and do not cover activities in the energy or transportation sectors. Others protocols, such as CDM methodologies, may require adaptation for use in Washington. Various voluntary offset programs have adopted protocols that could be applied in Washington, but these may require additional vetting for use with a state mitigation funding program.

selection of investments may be limited to those opportunities for which it is possible to have reasonably accurate additionality and quantification. Another difficulty is that some harder-to-quantify opportunities are also those with the greatest social benefits, such as public transportation systems (Bailis et al. 2016). This may pose a trade-off between trying to achieving low-cost mitigation and meeting other possible program goals.

Finally, there is also a fundamental tradeoff between trying to rigorously ensure additionality and quantifiability, and obtaining a sufficient supply of mitigation investment options, especially in the early phases of a mitigation funding program. Additional mitigation options are precisely those that are not “shovel-ready” at the outset of a program, because they are, by definition, not cost-effective under existing price incentives. Projects that are ready to go now, or that are now in planning stages – in the absence of a carbon tax – are least likely to be additional. It can take several years for a price-based program to ramp up supply sufficient to meet demand – assuming there is a strong focus on *additional* project opportunities. In general, the more stringent the standards for evaluating projects (including additionality), the more supply will be limited (Trexler et al. 2006; Erickson et al. 2011). Programs that have sought to enforce greater stringency, including the CDM, have seen long lead times before mitigation projects can be approved and start producing results (Platonova-Oquab et al. 2012).

Of course, this means one could relax standards in order to realize greater supply. But if additionality and quantification criteria are de-emphasized, this would beg the question of the program’s overall goals. Generally, these criteria should only be relaxed where doing so is consistent with other broader objectives (e.g. promoting other social benefits and economic equity, or to focus on specific types of technologies), not as a means to simply boost the apparent supply of cost-effective reductions.

6. CONCLUSIONS: BUILDING A SUCCESSFUL APPROACH

If a carbon tax is enacted in Washington, there are good reasons to dedicate a significant portion of its revenues to climate change mitigation – but taking care to avoid common pitfalls. Two keys to success can be derived from the experience of other mitigation funding programs around the world: (1) be strategic about how funds are invested; and (2) build as much as feasible on existing investment programs.

Programs that have focused primarily on getting the cheapest GHG reductions, simply allocating funds to the projects with the lowest cost per ton of CO₂-equivalent, have been most prone to the pitfalls described in Section 5. The most prominent example is the CDM, which at various points has struggled with overpaying for reductions; funding projects that do not achieve the desired objectives (from the standpoint of sustainable development); failing to ensure additionality; overestimating GHG reductions; discouraging new policies and regulations; and waiting years to build up an adequate supply. These programs have also faced long ramp-up times, due to the need for bespoke rules, standards and administrative structures focused on GHG quantification and additionality. Ironically, all of these shortcomings have ultimately undermined the programs’ cost-effectiveness – and their overall effectiveness at producing GHG mitigation.

A Washington mitigation funding program does not need to focus on getting the cheapest reductions, however. As noted in Section 2, a carbon tax can be highly effective at driving cost-effective GHG reductions throughout the economy, so Washington policy-makers can afford to be strategic about how revenues are invested. This can mean focusing on mitigation opportunities that the tax itself fails to incentivize (e.g. because of market failures), or that have high mitigation costs but fulfill broader policy objectives, such as promoting social equity, jobs,

new industries, and pollution reduction, or contributing to long-run decarbonization goals. The advantage of a more targeted approach is that it can avoid many concerns about additionality (e.g. by targeting mitigation measures with greater certainty about economic drivers); overpayment (because investments can be paid according to overall cost rather than on the basis of a single price per ton of CO₂); and setting unwanted regulatory precedents. An added advantage is that there are already a number of existing programs in Washington that could be leveraged to fulfill many of the above objectives, and that could quickly yield additional GHG mitigation (see Table 3 above).

Following this approach would not preclude targeted efforts to fund low-cost reductions – but to succeed, those efforts should emulate other successful low-cost mitigation funding programs. One example is the World Bank’s Pilot Auction Facility (PAF), which has avoided many pitfalls by focusing on distinct types of mitigation, such as methane capture and destruction, and N₂O reductions at nitric acid chemical plants, and has avoided overpaying by funding projects through a reverse auction process. The PAF has also succeeded by incorporating projects and oversight infrastructure already established under other programs, primarily the CDM.

Washington could also emulate the successful approaches taken by RGGI states and California, which is to build on existing clean energy and transportation programs, while establishing smaller new programs and mechanisms for targeted mitigation investments in specific sectors. RGGI states, for example, have funded specific kinds of mitigation projects, but with only 8% of their investments (RGGI 2016). The majority of funding has gone to building on existing energy efficiency and clean energy programs. Likewise, a majority of California mitigation funding has sought to leverage existing clean energy and transportation programs, while creating new investment vehicles targeted at specific kinds of mitigation measures, and applying multiple criteria (CARB 2015).

As noted at the outset, policy-makers in Washington and any jurisdiction seeking to adopt a carbon tax need to start by deciding what they want to accomplish with the revenue. The goals and priorities they set will shape the resulting program. Still, by considering what has and has not worked in other programs, they can avoid common pitfalls and ensure that carbon tax revenues contribute significantly to the achievement of their policy objectives.

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