Chapter 15
Carbon Offsets in California: Science in the Policy Development Process

Barbara Haya, Aaron Strong, Emily Grubert, and Danny Cullenward

Abstract Natural and social scientists are increasingly stepping out of purely academic roles to actively inform science-based climate change policies. This chapter examines a practical example of science and policy interaction. We focus on the implementation of California's global warming law, based on our participation in the public process surrounding the development of two new carbon offset protocols. Most of our work on the protocols focused on strategies for ensuring that the environmental quality of the program remains robust in the face of significant scientific and behavioral uncertainty about protocol outcomes. In addition to responding to technical issues raised by government staff, our contributions—along with those from other outside scientists—helped expand the protocol development discussion to include important scientific issues that would not have otherwise been part of the process. We close by highlighting the need for more scientists to proactively engage the climate policy development process.

Keywords Carbon offsets • Climate change policy • Carbon markets • Science and policy

15.1 Introduction and Background

Natural and social scientists in the field of global climate change are increasingly stepping out of purely academic roles to inform and support policy that is science-based. This chapter explores the roles that science and scientists play in climate policy development using an example from the California climate policy process. Beginning in the spring of 2013, we participated in the public process for

B. Haya, Ph.D. (✉)
Stanford Law School, Stanford, CA, USA
e-mail: bhaya@berkeley.edu

A. Strong, M.A. • E. Grubert, M.S.
Stanford University, Stanford, CA, USA

D. Cullenward, Ph.D.
University of California, Berkeley, Berkeley, CA, USA

J.L. Drake et al. (eds.), *Communicating Climate-Change and Natural Hazard Risk and Cultivating Resilience*, Advances in Natural and Technological Hazards Research 45, DOI 10.1007/978-3-319-20161-0_15

developing two new carbon offset protocols in California. We relay our experiences as scientists in these processes with two main goals. First, we describe the types of input we and other natural and social scientists provided to regulators, in order to shed light on how scientific issues emerge in policy development and the associated role scientists play in practice. Second, we hope this example will encourage interested scientists to engage the climate policy process more directly. Fundamentally, we believe that scientists' active participation in climate policy development can improve policy outcomes and generate useful research agendas.

The primary theme of our work is supporting the robustness of California's offsets policies, a topic on which most of our efforts focused. As used in discussions of global climate change, another term—*resilience*—most commonly refers to the ability of communities or nature to adapt to the uncertain impacts of climate change. In the context of climate change policy, *robustness* offers a similar framing. It refers to the ability of a policy to reliably meet its goals despite substantial uncertainty in predicting or measuring its outcomes (Lempert and Schlesinger 2000).

The concept of policy robustness is particularly relevant in the context of policies concerning carbon offsets because of the deep scientific and behavioral uncertainties involved in calculating accurate emission reductions from offset projects. Because greenhouse gas emitters in a climate policy system that recognizes offsets—such as California's carbon market—use offset credits to justify increased emissions within the policy system's boundaries, it is critical that offsets accurately represent true emission reductions. Meeting this standard is no simple matter, however, as it requires scientifically complex and inherently uncertain methodologies.

The uncertainty stems from the need to calculate emission reductions by comparing an offset project's emissions against an inherently unknowable counterfactual scenario: the emissions that would have occurred without the offset project. Both estimates are subject to uncertain physical, social, and economic drivers. In light of this uncertainty, ensuring that offset credits represent true emission reductions requires conservative decisions about project and baseline emissions to ensure that protocols actually reduce the credited emissions reductions. Accordingly, our participation in California's public policy development processes focused on ways to preserve the robustness of the two offset protocols on which we worked.

The chapter is organized as follows. We begin with an overview of California's climate mitigation policies, describing how offsets fit into the state policy system, as well as the key challenges offsets pose for policy-makers. Next, we describe our activities as stakeholders in the public process for developing new offset protocols. We illustrate our work with a handful of examples that highlight scientific issues that emerged in the policy process, including issues that the regulatory agency identified for public input, as well as those issues we raised in our independent capacity. In the final section, we offer some concluding thoughts about our experience and the various roles we and other scientists played in these policy processes. Finally, we encourage other environmental scientists to explore proactive models of policy engagement.

15.1.1 California's Climate Policy

In 2006, California passed the Global Warming Solutions Act (AB 32), launching the state's comprehensive approach to climate mitigation policy. Its key feature is a legally binding requirement to reduce statewide greenhouse gas (GHG) emissions back to 1990 levels by the year 2020. To accomplish this goal, state law delegated broad authority to the California Air Resources Board (CARB), which developed a suite of climate policy instruments over the last several years (CARB 2008, 2014a). The most prominent is California's cap-and-trade program. This program applies to California's electricity, industrial, and fuels sectors, covering about 85 % of statewide emissions.

Briefly, cap-and-trade carbon markets set an overall limit (or *cap*) on anthropogenic greenhouse gas emissions within the covered sectors. The regulator then issues tradable emissions allowances, with the total number equal to the cap. Each emissions allowance credit confers the right to emit one tonne of GHG pollution (measured in tonnes of CO_2 equivalent, tCO_2e). Covered entities must submit one allowance per tCO_2e of pollution they emit. Since allowances are tradable, if a regulated emitter can reduce emissions more cheaply than the price of a permit, it can do so, freeing up permits to sell to others who face costlier mitigation opportunities. This lowers compliance costs compared to a system in which each emitter must meet an established standard without trading.

Carbon offsets extend the flexibility of this approach by allowing covered entities to seek lower-cost emission reduction opportunities outside of the carbon market—for example, in another state or in an economic sector not covered by the cap—instead of reducing emissions within the capped sectors. The financial benefits to regulated emitters are straightforward: expanding the range of mitigation opportunities outside the capped system through offsets reduces compliance costs. Since climate change is driven by the global stock of GHGs in the atmosphere, reducing one tonne of emissions has the same effect regardless of location.[1] As we discuss below, however, accurately calculating the net emissions reductions raises new challenges.

15.1.2 Offsets in California

Companies subject to the cap-and-trade market can use offset credits to cover up to 8 % of their total emissions. This limit on the use of offsets appears significantly more generous when expressed as a percentage of the total mitigation required in the carbon market: if all regulated parties use the maximum amount allowed, offsets

[1] Though other pollution impacts that are coincident with the greenhouse gas emissions may have important local and regional effects, including on public health

would contribute about half of the total emission reductions expected under California's climate policy through 2020 (Haya 2013).

Carbon offsets in California work as follows. CARB issues offset credits for projects that follow approved protocols. The protocols themselves determine what project activities are eligible and define the methodologies by which projects estimate their emission reductions. Thus, offset protocols must be designed to anticipate all of the emissions-related drivers that apply in a given sector—a task that typically involves complex issues of environmental and social science.

Although the decision to develop a new protocol lies entirely at CARB's discretion, offset protocol methodologies must meet certain standards. State law and market regulations both require that emission reductions from offsets be "real, additional, quantifiable, permanent, verifiable, and enforceable."[2] Each of these terms has a formal legal definition. The most challenging requirement has been *additionality*, defined in AB 32 as crediting only those emission reductions that are made "in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur."[3] CARB's climate regulations provide more context on how additionality is to be tested, requiring the use of a "conservative, business-as-usual scenario."[4]

The regulations also directly address uncertainty and risk management, defining conservative scenarios as those whose "project baseline assumptions, emission factors, and methodologies that are more likely than not to understate net GHG emission reductions or GHG removal enhancements for an offset project to address uncertainties affecting the calculation or measurement of [net GHG reductions]."[5]

Finally, it is important to recognize that political perspectives on offsets vary widely. Many stakeholders, including most major emitters in the market, are strongly supportive of offsets as a mechanism to keep compliance costs low. After all, the supply of offset credits is widely expected to meaningfully reduce carbon market prices relative to a market without offsets (Borenstein et al. 2014; EPRI 2013). In contrast, several nonprofit stakeholders have expressed concerns about whether California's offsets truly represent reductions in GHG emissions. For example, two environmental groups sued CARB, claiming that the agency's decision to evaluate additionality using a performance standard at the protocol level does not satisfy the requirements of AB 32. The trial court rejected the plaintiffs' claims, finding that CARB had the necessary legal authority to adopt its performance standard approach. The court then applied a highly deferential standard to review CARB's treatment of additionality in each of its existing protocols (*Our Children's Earth Foundation v. CARB* 2015). Beyond highlighting the political opposition to offsets, this decision suggests that future legal challenges to CARB's protocol methodologies would face a difficult legal test under which the regulator is likely to prevail.

[2] Cal. Code Regs. tit. 17, § 95802(a)(14); see also Cal. Health & Safety Code § 38562(d)(1)-(2).

[3] Cal. Health & Safety Code § 38562(d)(2).

[4] Cal. Code Regs. tit. 17, § 95802(a)(4).

[5] Cal. Code Regs. tit. 17, § 95802(a)(76).

15.1.3 Critical Issues for Carbon Offsets

Offsets raise a number of technical challenges, and CARB's two new protocols are no exception. A carbon market maintains its environmental integrity only if the offset credits it recognizes represent actual net reductions in greenhouse gas emissions. In practice, however, uncertainty about those reductions requires detailed scientific input and is often the subject of significant controversy.

A critical task for policy-makers is establishing a robust standard for offset additionality. An offset project is considered additional only if it occurred because of the financial investment made in return for offset credits. In other words, an offset program should only credit those emission reductions it causes and should not credit reductions that would otherwise have occurred. This standard is necessary to ensure that any climate policy system that accepts offsets achieves its intended emission reductions. But additionality is difficult to achieve in practice. Several studies have shown that a large portion of credits generated by the Clean Development Mechanism (CDM, the Kyoto Protocol's offsets program) were non-additional projects that would have occurred without the financial incentive of offset credits and thus do not represent net emission reductions (Cullenward and Wara 2014; Haya 2009; Haya and Parekh 2011; Wara 2008). As a result, their use by countries to meet Kyoto Protocol targets came at the expense of real reductions in greenhouse gas emissions.

Two issues further complicate the basic question of establishing whether offset credits represent real additional emission reductions. First, uncertainty analysis is particularly important for offset projects in the land-use and agricultural sectors, where emissions vary widely across location, crop, and ecosystem types. Second, there is the risk that offset program incentives cause emissions to increase outside of offset project boundaries. The most egregious example involves offset credits in the CDM awarded for the destruction of hydrofluorocarbons (HFCs), a potent family of greenhouse gases emitted as byproducts in the production of certain refrigerants. Manufacturers realized they could earn greater profits from destroying HFCs than from the sale of the refrigerant itself. There is strong evidence that they increased their production as a result of this incentive, creating surplus HFC byproducts that they subsequently destroyed to earn offset income (Wara 2008). Beyond enticing non-additional credits, the income from HFC-related offsets might have discouraged national governments from directly regulating HFC emissions, in order to maintain offset project eligibility—an effect that has been documented for a range of other project types (Figueres 2006).

Although the problems observed in past offset systems remain relevant, it is important to recognize that CARB's approach to additionality is different than that of its predecessor, the Kyoto Protocol's CDM. The CDM requires individual offset project applicants to evaluate their counterfactual emissions scenarios and demonstrate additionality for each individual project. In contrast, the California system makes these determinations at the protocol level by defining project eligibility criteria. Once CARB has approved a protocol, a project applicant needs only to demonstrate compliance with the protocol's eligibility criteria in order to earn credit. Given the use of up-front project eligibility criteria, robust protocol design is particularly critical to ensuring that California's offset credits represent real emission reductions.

Finally, we note the importance of CARB's early offset protocols as institutional precedents in American climate policy. As one of the first legally binding climate policies in the United States, California's cap-and-trade system has already become a standard point of reference for climate policy design. In turn, CARB's treatment of complex and uncertain scientific issues in its offset protocol development process will surely set an important example for others.

15.1.4 Proposed Mine Methane Capture and Rice Cultivation Protocols

By the beginning of 2013, CARB had approved four offset protocols covering projects in the following areas: (1) forestry, (2) urban forestry, (3) livestock waste management, and (4) destruction of ozone-depleting substances. We participated in the policy development process for two new protocols: (1) mine methane capture and (2) rice cultivation, which we describe briefly here for background.

CARB approved the Mine Methane Capture (MMC) protocol in April 2014 (CARB 2014b), following a year of development and stakeholder engagement. The protocol awards credits to projects that capture methane that otherwise would have been released into the atmosphere from coal and trona[6] mining activities. CARB's MMC protocol recognizes two types of projects. Methane can be captured for use as a fuel, such as by injecting captured gas into natural gas pipelines or using it to fire an on-site power plant. Alternatively, MMC projects can destroy methane without putting it to productive use through flaring or oxidation. In any of these cases, methane (CH_4) is converted to carbon dioxide (CO_2), a much less potent greenhouse gas.

At the time that this chapter was written, CARB was in the process of developing a rice cultivation protocol and responding to comments submitted on a discussion draft of the protocol released in March 2014. This protocol would credit reductions in methane emissions from changes in rice cultivation practice in California and the South Central United States. Rice cultivation produces methane emissions because production fields are submerged under water for a large portion of the year. This causes biomass to decompose without oxygen, producing CH_4 rather than CO_2. Methane emissions can be reduced if the fields are submerged for less time or if less biomass is left on the field to decompose anaerobically.

[6] Trona is a mineral mined as the primary source of sodium carbonate in the United States.

15.2 Science in the Policy Development Process

In April 2013, CARB established technical working groups to bring together stakeholders to inform the development of two new offset protocols. The working groups included offset project developers, project verifiers (who verify that project developers have met the protocol's requirements), representatives from industries facing compliance obligations in the carbon market (i.e., offset buyers), environmental nonprofit staff, academic research scientists, representatives from organizations that develop offsets standards for voluntary carbon markets, and state and federal officials from outside agencies. Each working group convened approximately once every three months, though additional discussion continued between meetings.

15.2.1 The Interdisciplinary Nature of Climate Change Policy Development

As a preliminary matter, we note that the scientific and technical expertise needed to ensure the environmental integrity of carbon offset protocols spans a wide range of disciplines. For example, the MMC and rice cultivation protocols drew on experts—including a number of outside scientists, in addition to our group—who provided advice on statistical uncertainty assessment, biogeochemical and ecological modeling, field measurements of gas fluxes, economic analysis, life-cycle analysis, basic mineralogy, engineering of mine construction, wildlife ecology, insect population dynamics, the sociology of agricultural crop production practices, modeling hydrological connectivity above- and belowground, state and federal water law, land-use law, environmental law, and organizational theory. As this list indicates, there are many opportunities for a variety of scientific experts to proactively engage the climate policy process—no agency has all of the necessary experts on staff.

15.2.2 What Did We Do?

Our participation in the offset protocol development process included a wide range of activities. We interfaced with a variety of stakeholders, including CARB staff, CARB board members, offset project developers, and nonprofit groups. Similarly, our communications ranged from informal conversations in person to formal written comment letters. As members of the technical working groups for each protocol, we attended meetings at the agency's headquarters in Sacramento and brought attention to issues we viewed as critical to the environmental integrity of the draft protocols as they developed, based on detailed independent analysis.

We provided our assessments to CARB staff as informal communications and later submitted formal comment letters during public comment periods in the administrative process. At times when we believed that CARB was not adequately addressing critical concerns, we spoke with individual CARB staff and board members outside of the formal working group process, occasionally with the participation of other stakeholders; we also raised our concerns through public testimony at formal board meetings.

The overarching goal of our involvement was to apply our research team's interdisciplinary expertise to helping ensure the environmental quality of the protocols. We did not use a single set of methods in our contributions, but rather, each of us brought methods from our respective disciplines to our shared goal. Below, we offer examples of scientific issues that highlight the kinds of input we offered in an effort to ensure that California's offset protocols reflect the best available science and are robust in the face of significant uncertainty.

Our examples are organized according to different ways that scientific issues arose in the policy development process—at the agency's request or according to our independent review of the protocols—rather than by protocol or chronology. In this way, we hope to illustrate both how science was used in developing the protocols and what roles scientists can expect (or be expected) to play in such processes.

15.2.3 Scientific Issues Raised by the Agency

Our first category of scientific engagement in the policy development process focuses on those issues that CARB proactively identified, either via agency staff asking stakeholders directly for input or by inclusion on agency-drafted meeting agendas. We review one such example in this section.

15.2.3.1 Scale of Uncertainty Assessment in Model-Estimated Emissions from Rice Cultivation

If the proposed rice cultivation protocol is adopted, it will become the first California protocol to use a computer-based model to estimate emission reductions. Using a model is necessary in this case because direct field measurements of emissions are technically challenging, costly, and time-consuming. The proposed protocol relies on a mechanistic biogeochemical model, the DeNitrification-DeComposition (DNDC) model, originally developed at the University of New Hampshire (2012).

The DNDC model is used to estimate offset project emissions and emission reductions. Through the technical working group, we—along with other scientists, including DNDC model developers, biogeochemists, and agricultural experts—addressed questions about model uncertainty and validation, the model's ability to estimate emissions of the potent GHG nitrous oxide (N_2O), and specific biogeochemical parameters used in the model.

Models are by definition simplifications of complex processes and are not perfectly accurate. Accordingly, the draft protocol applies a *deduction* that reduces the model-estimated emission reductions to conservatively account for any model error. Early drafts of the protocol included this deduction, but applied only one value for all eligible projects. Since DNDC must be field-calibrated to particular crop types, however, we were concerned that a blanket assessment of an uncertainty deduction for model error was too general and would not reflect the uncertainty of the model as it would be applied in the rice cultivation protocol—specifically, to fields in different ecosystems, with different cultivars, and in different regions around the country.

We focused our attention on how finely to parse assessments of model uncertainty, raising this issue in both formal and informal comments. Ultimately, the draft protocol included separate uncertainty deduction calculations for each of the rice-growing regions, rather than a single uncertainty deduction for all applications of the model. Furthermore, CARB decided to update the uncertainty deduction coefficients on an annual basis, a feature that will make the protocol more robust in light of new information. On the other hand, there is no formal mechanism for updating the model itself in response to newly published scientific information that directly affects relevant calculations. In the end, the potential for model structures and inputs to change highlights the profound challenge of integrating active scientific research into a fixed policy structure. Inevitably, there will be trade-offs between the adaptability of the protocol to new information and the stability of compliance rules that offset project developers desire.

15.2.4 Scientific Issues We Raised

A second category of scientific engagement describes our independent evaluation of issues that emerged during the protocol development process, as opposed to the assessment of issues on which CARB specifically requested input. In this section, we discuss examples of issues we raised about the conservative estimation of emission reductions from individual projects, additionality assessment, and the risk of unintended consequences caused by interactions between offset protocols and other policies. In some cases, we raised questions that were not being addressed at the time, and in others, we advanced new perspectives on issues that were already under agency consideration.

15.2.4.1 Statistical Bias in the Rice Cultivation Emissions Model

Statistical bias occurs when a prediction repeatedly over- or underestimates real-world outcomes. A model is unbiased if its outcomes are equally likely to over- and underpredict actual emissions as determined by direct field measurements. An unbiased model may still over- or underestimate the reductions achieved by an individual offset project, but the uncertainty deduction factor (discussed above) ensures that over-crediting is still avoided with a high degree of certainty. However, a model that has not been validated as statistically unbiased for the project types credited under the protocol may result in an overestimation of the emissions reduced by those project types, even after the uncertainty deduction factor is applied.

During the rice protocol development process, CARB staff referred to hundreds of field measurements that had validated the DNDC model, finding no trend in the estimates. Thus, they concluded that the model was not biased. We were concerned, however, that some of the project types eligible under the protocol were not included in the data used to validate the model. Noting this gap, we argued that an assessment of bias at the level of the entire DNDC model was insufficient, and that project-type specific assessment of model bias was warranted. To avoid over-crediting, we suggested that CARB approve the eligibility of a project type under the protocol only if the DNDC model has been validated to have no statistical bias for the type of activities credited by that project type. As of this writing and to the best of our knowledge, CARB staff provided the technical working group with only a list of published references, not the actual data from the model runs used in the bias assessment.

As CARB continues to collect field data to validate the model, we hope to view the complete dataset on which CARB validates the DNDC model. This example illustrates the important role scientists play in reviewing the technical basis of policy—in this case, the methods used to assess statistical bias in an emissions model, in order to avoid over-crediting. It also illustrates the importance of transparency and access to data, both of which are necessary to enable scientific review.

15.2.4.2 Additionality of Methane Capture at Abandoned Mines

Our second example in this category concerns the treatment of additionality in the MMC protocol. CARB determines the additionality of different project types by assessing whether the project activity is *common practice* among a relevant population; a project type is considered additional if it is not common practice. Applying this approach to methane capture at abandoned mines under the MMC protocol, CARB staff studied abandoned underground mines in the United States, finding that "few currently capture and destroy mine methane. Methane capture and destruction is therefore deemed not to be business-as-usual at these mines" (CARB 2013, p. 7). This language suggests that CARB was prepared to deem all abandoned mine methane control projects additional under the MMC protocol.

The case of methane capture at abandoned mines demonstrates the importance of assessing additionality for subcategories of project types and not just for the entire population of possible projects as a whole. It also highlights the value of performing a conservative quantitative assessment to examine compliance with the protocol level additionality standard. While only 38 of the more than 10,000 abandoned mines in the United States have implemented methane capture projects, these 38 mines emit one third of all methane released from abandoned mines in the country (Ruby Canyon Engineering 2013a). Thus, existing methane capture projects at abandoned mines are correlated with high rates of methane emissions—exactly as one would expect, given that the costs of capturing methane decrease as the rate and concentration of methane emissions at mines increase.

If all abandoned mines were eligible for MMC offset credits, the protocol could generate non-additional credits from projects that would have proceeded regardless of the financial incentives offsets provide. Indeed, if methane capture project development trends at abandoned mines from the last two decades were to continue, the volume of non-additional credits enabled by CARB's initial common practice assessment would likely far exceed methane capture from truly additional projects enabled by the financial incentive created by the offsets program as assessed by Ruby Canyon Engineering (2013b).

A more detailed analysis of abandoned mines suggested a path forward. Currently, most methane capture at abandoned mines occurs at mines that captured methane for pipeline injection when they were active. In fact, all mines that captured methane and were closed within the last ten years continued to capture methane after being abandoned. Methane capture at this subcategory of mines is undoubtedly common practice. Accordingly, CARB narrowed its eligibility criteria in the final protocol it adopted in April 2014, excluding those abandoned mines where methane had been captured and injected into pipelines when the mine was active (CARB 2014b, p. 14).

Our calculations showed that this approach excludes most, but not all, of the non-additional crediting that would conceivably be generated under CARB's initial definition of common practice at abandoned mines. While most non-additional methane capture is excluded from crediting by the narrowing of CARB's eligibility criteria for abandoned mines, past trends suggest that a smaller amount of methane capture may still be cost-effective on its own. We performed a quantitative analysis on the narrowed pool of eligible projects.

We found that if past trends in the development of new methane capture projects at abandoned mines that never previously captured methane were to continue, the expected generation of credits from non-additional projects is likely to be small compared to the expected effect of the protocol on new project development. Our analysis further indicated that under-crediting from conservative methodologies used to estimate emission reductions from abandoned mines under the protocol can reasonably be expected to counterbalance this non-additional crediting.[7] In other words, even though it is likely that some abandoned mines that would have chosen to implement methane capture technology regardless of the offset credit could generate credits under the protocol, the total quantity of offset credits generated by the protocol is unlikely to exceed the net emission reductions enabled by the protocol.

---

[7] For a more detailed description of this assessment, please see comments submitted by Barbara Haya on behalf of our research team dated February 14, 2014, "RE: Comments on the informal draft of the Mine Methane Capture (MMC) Projects Compliance Offset Protocol released 31 January 2014" available on California Air Resources Board's Workshop Comments Log: http://www.arb.ca.gov/lispub/comm2/bccommlog.php?listname=discussion-draft-ws.

As a result, we concluded that the protocol is expected to meet the additionality requirement defined under AB 32.

In addition to describing how the regulator's approach to a particular technical issue evolved during the MMC protocol development process, this example illustrates a methodological issue that speaks to the broader architecture of California's offsets policy. CARB's common practice approach appears to be designed to avoid the subjectivity of other eligibility metrics by referring to objective measurements of the frequency of emission-reducing activities. Nevertheless, we believe that this approach belies a persistent analytical subjectivity. As the abandoned mine issue shows, how CARB defines the population of project types against which it makes its common practice determination has important implications for the additionality of the offset protocol as whole. This example illustrates the importance of performing additionality assessments on subcategories of projects and conservatively excluding subcategories that could be considered common practice. More broadly, it also shows that the decision to use a common practice standard does not avoid the need for careful risk assessments of possible outcomes; these assessments remain necessary to identify appropriate project eligibility criteria that contain the risk of over-crediting.

15.2.4.3 Potential Conflicts with Clean Air Act Implementation

Our final example concerns a prospective impact that could occur beyond offset project boundaries. Here, our analysis focused on the potential for California's MMC protocol to interfere with other states' implementation of regulations under the federal Clean Air Act. The problem is this: although California's offset regulations exclude as ineligible those offset projects whose emission-reducing activities are separately required by law, they do not consider the incentive California's offset protocols create to keep legal standards in other jurisdictions low.

Under the Clean Air Act, any major new source of greenhouse gases is required to apply for a Prevention of Significant Deterioration (PSD) permit from its state environmental agency. In turn, the state agency is required to determine the best available control technology (BACT) for that particular project. State agencies have broad discretion in setting each project's BACT, with limited room for the federal Environmental Protection Agency (EPA) to review their findings. We expressed concern that California's MMC protocol would create incentives for out-of-state agencies to keep GHG BACT standards for mines artificially low. After all, were an out-of-state regulator to require methane destruction under the BACT determination for a PSD permit that methane destruction project would become ineligible for offset credits (and revenues).

In order to mitigate this risk, we recommended a do-no-harm precaution, temporarily excluding from the MMC protocol those mines that would require a PSD permit under the Clean Air Act. Once a specified number of PSD permits were issued to comparable mines, however, we suggested the MMC protocol could then expand its eligibility to mines that required PSD permits—so long as the early BACT determinations indicate that this course would be appropriate. Ultimately, these issues were not addressed in the adopted protocol and will be monitored informally.

15.3 Conclusions

The development of two new carbon offset protocols in California provides a rich case study in science-based policy-making. As public members of the technical working groups established by the California Air Resources Board, we both observed and contributed to the scientific discussions that arose during the course of protocol development. In addition to responding to the issues and questions raised by CARB directly, we—along with other outside scientists—played an essential role in expanding the protocol development discussion.

Most importantly, our engagement focused extra attention on the robustness of the protocols, providing strategies to avoid over-crediting despite substantial uncertainty in predicting protocol outcomes. Robustness is critical in the development of carbon offset protocols because of the significant scientific and behavioral uncertainty involved in accurately calculating emission reductions from individual projects. Fundamentally, this uncertainty stems from the challenge of estimating emission reductions (and the number of offset credits awarded) against an inherently unknowable counterfactual scenario of what would have happened without the offset program. Because offset credits are used in place of emission reductions within existing climate policy systems, methodological decisions must be made conservatively and guided by scientific risk assessments in order to avoid weakening these systems. Protocols should also be responsive to new scientific information and changes in the socioeconomic drivers of emissions. By conducting independent analyses of these kinds of issues, we aimed to increase the agency's capacity to evaluate key risks and improve the robustness of the offset protocols.

Finally, we hope the examples in this chapter encourage more members of the scientific community to seek ways to actively engage the development of climate policies. Although the offset protocols on which we worked were certainly informed by traditional scientific publications, our experience shows how the full treatment of scientific issues in the policy process occurs more through direct participation than literature reviews. Many of the critical policy questions involving science and uncertainty analysis would be difficult, if not impossible, to anticipate from a detached distance. In addition, their successful resolution depends on professional relationships built through iterative interactions in the policy process. Collectively, these factors suggest the need for more academics to explore ways to actively engage the climate policy process in the future.

References

Borenstein S, Bushnell J, Wolak FA, Zaragoza-Watkins M (2014) Report of the market simulation group on competitive supply/demand balance in the California allowance market and the potential for market manipulation. Energy Institute @ Haas working paper #251. https://ei.haas.berkeley.edu/papers.html. Accessed 2 Mar 2015

California Air Resources Board (2008) Climate change scoping plan: a framework for change. Sacramento. http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed 2 Mar 2015

California Air Resources Board (2013) Staff report: initial statement of reasons, proposed regulation to implement the California cap-and-trade program, appendix A, staff report and compliance offset protocol, mine methane capture projects (4 Sept 2013), Sacramento. http://www.arb.ca.gov/regact/2013/capandtrade13/capandtrade13isorappa.pdf. Accessed 2 Mar 2015

California Air Resources Board (2014a) First update to the climate change scoping plan: building on the framework. Sacramento. http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf. Accessed 2 Mar 2015

California Air Resources Board (2014b) Compliance offset protocol mine methane capture projects: capturing and destroying methane from US coal and trona mines. Sacramento (25 Apr 2014). http://www.arb.ca.gov/cc/capandtrade/mmc_oal_april2014.pdf. Accessed 2 Mar 2015

Our Children's Earth Foundation v. CARB, 234 Cal. App. 4th 870 (Cal. Ct. App. 2015)

Cullenward D, Wara M (2014) Carbon markets: effective climate policy? Science 344:1460–1461

Electric Power Research Institute (2013) Exploring the interaction between California's greenhouse gas emissions cap-and-trade program and complementary emissions reduction policies. EPRI report #3002000298. http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002000298. Accessed 2 Mar 2015

Figueres C (2006) Sectoral CDM: opening the CDM to the yet unrealized goal of sustainable development. Int J Sustain Dev Law Pol 2(1):5–26

Haya B (2009) Measuring emissions against an alternative future: fundamental flaws in the structure of the Kyoto protocol's clean development mechanism. Energy and Resources Group working paper ER09-001, University of California, Berkeley. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1562065. Accessed 2 Mar 2015

Haya B (2013) California's carbon offsets program: the offsets limit explained. http://bhaya.berkeley.edu/docs/QuantityofAB32offsetscredits.xlsx. Accessed 2 Mar 2015

Haya B, Parekh P (2011) Hydropower in the CDM: examining additionality and criteria for sustainability. Energy and Resources Group working paper ER11-001, University of California, Berkeley. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2120862. Accessed 2 Mar 2015

Lempert R, Schlesinger P (2000) Robust strategies for abating climate change. Clim Change 45:387–401

Ruby Canyon Engineering (2013a) Abandoned coal mine methane offsets protocol: background information on performance standard and additionality. http://www.arb.ca.gov/cc/capandtrade/protocols/mmc/rce_amm_background.pdf. Accessed 2 Mar 2015

Ruby Canyon Engineering (2013b) Letter from Ronald C. Collings to Jessica Bede. Subject: California Air Resources Board: proposed compliance offset protocol mine methane capture projects, dated August 19, 2013. http://www.arb.ca.gov/regact/2013/capandtrade13/capandtrade13.htm. Accessed 22 Oct 2013

University of New Hampshire (2012) DNDC user's guide version 9.5. Institute for the Study of Earth, Oceans, and Space. University of New Hampshire. http://www.dndc.sr.unh.edu/model/GuideDNDC95.pdf. Accessed 2 Mar 2015

Wara M (2008) Measuring the clean development mechanism's performance and potential. UCLA Law Rev 55:1759–1803