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BUYING AND CANCELLING ALLOWANCES AS AN ALTERNATIVE TO OFFSETS FOR THE VOLUNTARY MARKET: A PRELIMINARY REVIEW OF ISSUES AND OPTIONS

By Anja Kollmuss and Michael Lazarus, Stockholm Environment Institute

JEL classifications: Q54, Q58
Keywords: Climate change, emission trading systems

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ABSTRACT

In recent years, businesses, local governments and individuals have set goals for reducing their emissions of greenhouse gases. In addition to directly reducing their own emissions, many of these entities have purchased carbon offsets to help achieve their mitigation goals. Yet establishing offset quality can be difficult, due to issues such as additionality, measurement, leakage, permanence, and verification. This paper explores scenarios under which, as an alternative to offsets, voluntary buyers could instead buy and cancel allowances from compliance markets. The purchase and cancellation of allowances reduces the available allowances in a cap-and-trade system, "tightening the cap" and, in principle, reducing the emissions that can be produced by covered sources. By this logic, purchasing and cancelling an allowance compels covered sources to achieve additional mitigation. Opportunities for voluntary buyers to purchase and cancel tradable compliance units currently exist in several markets, but in small quantities. If the practice of cancelling allowances remains limited to individuals and voluntary corporate buyers, it is likely to remain small and is unlikely to send a strong price signal. In the medium and long-term this might change if large numbers of sub-national actors came into play and chose to cancel allowances.

JEL classifications: Q54, Q58

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RESUME

Depuis quelques années, des entreprises, des collectivités locales et des particuliers s'attachent à ramener leurs émissions de gaz à effet de serre à un niveau donné. Indépendamment de la réduction directe des quantités qu'elles émettent, beaucoup de ces entités ont acquis des crédits de compensation carbone pour contribuer à la réalisation de leurs objectifs d'atténuation. Toutefois, la réalité de la compensation peut être difficile à établir, compte tenu des problèmes d'additionnalité, de mesure, de fuite, de permanence et de vérification. Ce document porte sur des scénarios selon lesquels, à la place des formules de compensation, les acteurs volontaires pourraient acheter des quotas sur le marché réglementé du carbone puis les annuler. L'achat et l'annulation de quotas reviennent à diminuer les quotas disponibles dans un système de plafonnement et d'échange, puisqu'il s'agit d'« abaisser le plafond » et, en principe, de réduire les émissions susceptibles d'être produites par les sources prises en compte. Logiquement, l'achat et l'annulation d'un quota obligent les sources en question à aller plus loin dans l'atténuation. Des possibilités d'achat et d'annulation d'unités négociables s'offrent actuellement aux acquéreurs volontaires sur plusieurs marchés, mais les quantités sont peu importantes. Si la pratique de l'annulation de quotas demeure limitée à des acteurs isolés et à des entreprises volontaires, elle n'a guère de chances d'envoyer un signal de prix fort. À moyen et long termes, la situation pourra évoluer si un grand nombre de collectivités infranationales entrent en jeu et décident d'annuler des quotas.

Classification JEL : Q54, Q58

Mots clés : changement climatique, systèmes d'échange de droits d'émission

FOREWORD

This paper was prepared by Anja Kollmuss and Michael Lazarus from Stockholm Environment Institute as an input to the OECD Workshop on Global Carbon Markets, 19-20 April 2010. An earlier draft was reviewed by the Working Party on Structural Policies in May 2010.

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EXECUTIVE SUMMARY

In recent years, businesses, local governments and individuals have set goals for reducing their emissions of greenhouse gases. In addition to directly reducing their own emissions, many of these entities have purchased carbon offsets to help achieve their mitigation goals. Yet establishing offset quality can be difficult, due to issues such as additionality, measurement, leakage, permanence, and verification. As an alternative to offsets, voluntary buyers[1] could instead buy and cancel[2] allowances from compliance markets. This approach has the advantage of making offset quality issues such as additionality less of a concern. The purchase and cancellation of allowances reduces the available allowances in a cap-and-trade system, "tightening the cap" and, in principle, reducing the emissions that can be produced by covered sources. By this logic, purchasing and cancelling an allowance compels covered sources to achieve additional mitigation.

Opportunities for voluntary buyers to purchase and cancel tradable compliance units currently exist in several markets: CO_2 markets such as the EU Emissions Trading System and the Regional Greenhouse Gas Initiative in the US, the SO_2 market under the US Acid Rain Program administered by the US Environmental Protection Agency (EPA) and renewable energy markets in US states with Renewable Portfolio Standards (RPS).

It is important to distinguish two situations in which entities could choose to purchase and cancel allowances, as their rationales and implications differ. In the first situation, the voluntary actor purchases and cancels allowances with the aim of decreasing allowance supply, tightening the cap, and *spurring greater reductions at facilities covered by the cap-and-trade programs*. In the second situation, the voluntary actor undertakes actions of their own (e.g. requiring or purchasing more efficient electric appliances) that indirectly reduce emissions from covered sources (e.g. electricity generators), and purchases and cancels allowances with the aim of *avoiding a corresponding increase in emissions at other sources.*

This second situation is perhaps less obvious and bears further explanation. In the second situation the entity, for example a city or a state voluntarily chooses to reduce their internal emissions. This entity is based in a country with a national cap-and-trade system but either they are not subject to a cap themselves or they are covered by the cap and choose to reduce their internal emissions beyond what the cap requires them to do. Because of the national cap, some or all of their internal emissions reductions will also be counted towards the national cap. If no such cancellation occurs, entities with more stringent standards than the national one will require fewer federal allowances and these freed-up allowances will be available for use for capped entities without stringent standards. These voluntary

[1] Voluntary buyers can include individuals, companies or sub-national entities such as cities or states.

[2] The terminology for permanently removing allowances from the market is used relatively freely. The terms 'retire' and 'surrender' allowances usually refers to using allowances for compliance purposes by capped entities. The term 'cancel' usually refers to the voluntary removal of allowances from the system. In this paper we use the term 'cancel' to refer to such voluntary action. We use the term 'retire' when we refer to the voluntary purchase and removal of compliance RECs.

mitigation actions will therefore not lead to additional national emissions reductions, but just lead to a shift ('leakage') of where the emissions reductions occur. Additional emissions reductions will only be achieved if the voluntary actor cancels allowances commensurate with the internal emissions reductions that will also be counted towards the national cap. To first order (i.e. not accounting for possible impacts on allowance prices), the emissions reductions that are achieved under the national cap are the same, whether the voluntary actor just cancels allowances (situation 1) or chooses to reduce their internal emissions and cancels allowances commensurate with the amount of leakage that would have occurred. The voluntary actor under situation 2 reduces both the demand and the supply of federal allowances, thus theoretically not impacting federal allowance prices. Under situation 1, only the supply of allowances is reduced and allowance prices might therefore rise. The actual market impacts depend on the policy design of the capped system and the current and future market conditions.

The goals of purchasing and cancelling tradable compliance units can include:

- Reducing the supply of tradable compliance units in order to enable greater overall emission reductions;
- Raising the price of tradable compliance units in order to send a stronger market signal;
- Avoiding the use of offsets because of quality/additionality concerns;

Yet not all of these goals are necessarily achievable.

Cancelling of allowances will only increase emission reductions in the near term to the extent that markets are not over-supplied. If actual emissions are below the number of available allowances, cancelling allowances may lead to additional emissions reductions in later time periods, if allowances are bankable for use in later time periods which have a tighter emissions cap. However, such reductions would be subject to greater uncertainty, as they would depend on continuation of emission trading systems over time, increasing stringency of the cap, and the assumption that voluntary allowance cancellation would not affect future cap levels.

Cancelling allowances could have the indirect effect of increasing the use of offsets by covered entities. Most cap-and-trade programs have limits on the number of offsets that can be used. Yet only if the offset limit is not expected to be reached through compliance action could cancelling allowances potentially lead to an increased use of offsets.

If the practice of cancelling allowances remains limited to individuals and voluntary corporate buyers, it is likely to remain small and is unlikely to send a strong price signal. In the medium and long-term this might change if large numbers of sub-national actors came into play and chose to cancel allowances, as is explained above.

In summary, purchasing and cancelling allowances could be an attractive option for individuals, businesses, and government entities that seek either to preserve their internal emissions reductions that go beyond the cap or to spur additional reductions by covered sources. This option will be most effective if markets are not over-supplied and the overall magnitude of such voluntary cancellations is not at a scale that would trigger a loosening of targets.

1. Introduction

In recent years, businesses, local governments and individuals have set goals for reducing their emissions of greenhouse gases (GHGs). In addition to directly reducing their own emissions through energy efficiency or other investments, these entities have sought market-based instruments to purchase emission reductions elsewhere as means to help achieve their goals. GHG offsets are the most prominent of these instruments. In the past two decades, GHG offsets have evolved from a niche commodity to multi-billion dollar industry. However, GHG offsets have come under increased scrutiny. Buying and cancelling[3] allowances from a cap-and-trade system offers an alternative to offsets for acquiring emissions reductions. The cancellation of allowances may also serve another, separate purpose where binding GHG emission cap and trade systems already exist: to ensure that emission reductions undertaken voluntarily are not "undone" by increased emissions by entities covered by the system. This paper examines the implications of allowance cancellation, considering lessons from other, related experience.

Over the last few years two distinct GHG trading markets have developed. In a **cap-and-trade system** GHG allowances are limited by the 'cap'. Trading occurs when a capped entity has excess allowances and sells them to an entity requiring allowances because of growth in emissions or an inability to make cost-effective reductions. In a **baseline[4]-and-credit system** there is no limit to the number of GHG credits that can be produced. New GHG credits (offsets) are generated every time a project is implemented. Projects are implemented in sectors or regions that are not covered by a cap and the offsets they generate are then sold to capped entities who can use these offsets instead of lowering their own emissions or buying allowances from another capped entity.

Cap-and-trade systems have almost exclusively been developed as compliance systems[5], examples include the EU Emissions Trading System (EU-ETS) and the Regional Greenhouse Gas Initiative (RGGI). Baseline-and-credit systems have been developed for both the compliance and the voluntary market: The two largest compliance programs are the offset schemes under the Kyoto Protocol: the Clean Development Mechanism (CDM) and Joint Implementation (JI).[6] Voluntary programs include the Gold Standard, the Voluntary Carbon Standard, the Climate Action Reserve and many others.

Voluntary buyers are entities, companies and individuals who are either outside a capped system or want to reduce their emissions beyond what the cap requires them to do and voluntarily choose to purchase emissions reductions. They have the option to either buy allowances or emissions reductions from the compliance market (such as EU-ETS allowances or offset generated under the CDM (Certified

[3] The terminology for permanently removing allowances from the market is used relatively freely. The terms 'retire' and 'surrender' allowances usually refers to using allowances for compliance purposes by capped entities. The term 'cancel' usually refers to the voluntary removal of allowances from the system. In this paper we use the term 'cancel' to refer to such voluntary action. We use the term 'retire' when we refer to the voluntary purchase and removal of compliance (Renewable Energy Credits).

[4] A baseline situation is a hypothetical description of what would have most likely occurred in the absence of a proposed offset project. The number of offsets created is the difference between emissions under the baseline situation minus the actual emissions. Baselines are defined in projects protocols which are developed and/or approved by each offset program.

[5] An exception is the Chicago Climate Exchange which is a voluntary cap-and-trade program.

[6] Only offsets generated under CDM and JI are eligible for compliance under the EU ETS and for compliance with the Kyoto Protocol, which makes them the largest offset programs. Demand from the EU ETS, as the largest mandatory cap-and-trade system, has dominated the purchasing of offsets in recent years. European buyers account for over 80 per cent of CDM and JI purchases to date (Capoor and Ambrosi, 2009).

Emission Reductions or CER's)) or from the voluntary market (such as offsets verified under the Voluntary Carbon Standard). In other words, voluntary buyers have the option to purchase compliance allowances, compliance offsets or voluntary offsets. As Table 1 illustrates, compliance markets are much larger than voluntary markets and allowance markets are much larger than offset markets.[7]

Table 1. Size of Carbon Markets in 2008

Market Type	Commodity	Volume ($MtCO_2e$)	Market Share by Volume	Value (MUS$)	Market Share by Value	Average Price (US$)[8]
Compliance Markets	EU ETS Allowances (EUAs)	3093	**84%**	91910	**92%**	$29.72
	RGGI Allowances	65	2%	246	<1%	$3.78
	CDM Offsets (Primary Market only)	389	**11%**	6519	**7%**	$16.76
	JI Offsets	20	0.5%	294	0.3%	$14.70
Voluntary Markets	CCX[9] (Allowances and Offsets)	69	2%	309	0.3%	$4.48
	VER[10] Market (Offsets)	54	1%	397	0.4%	$7.35

Source: Capoor and Ambrosi, 2009

The voluntary GHG market has largely focused on offsets (no data is available on the number of cancelled allowances by the voluntary market). Offset quality can be at risk due to issues such as additionality, measurement, leakage, permanence, and verification. The concept of 'additionality' is a core challenge: it is often difficult to prove that the revenue stream from offset sales was an essential part of the decision to implement an offset project or if the project would have been implemented regardless. Many studies have shown that a significant number of offsets sold under the CDM are likely to be from non-additional projects and similar criticism has been voiced over offset credits sold in the voluntary market (Haya 2010, Michaelowa and Purohit 2007, Schneider 2007). Similarly, leakage – the shift of emissions elsewhere due to the offset project – and non-permanence – e.g. the release of carbon from a forestry offset project due to fire, illegal logging or pests – can lead to offsets that do not actually achieve the claimed emissions reductions. This makes it very difficult for offset buyers to

[7] Compiling estimates of the size or volume of the offset market is challenging because metrics vary and information is often proprietary, especially within the voluntary market. Some figures for offset market activity represent total offset transactions in a given year, including both primary (by original offset providers) and secondary (resold offsets) transactions, some are for primary transactions alone, while others represent the total offsets registered or certified (which may include expected offsets generated in future years) or issued during a given year.

[8] Prices have dropped considerably with the economic crisis. In 2009, the weighted-average EUA price was €12.89 down 41% from 2008 whilst secondary CERs were down 21% from 2008, with a weighted average price of €11.80. (Point Carbon 2010b).

[9] Chicago Climate Exchange

[10] Verified Emission Reduction

establish whether offsets they are purchasing have led to an equivalent amount of additional emissions reductions or removals.

As an alternative to offsets, voluntary buyers can instead buy and cancel allowances from compliance markets, such as the EU-ETS.

This approach has the advantage of making offset quality issues such as additionality less of a concern. The purchase and cancellation of allowances reduces the available allowances in a cap-and-trade system, "tightening the cap" and, in principle, reducing the emissions that can be produced by covered sources. By this logic, purchasing and cancelling an allowance compels covered sources to achieve additional mitigation. We explore in this paper under which circumstances this theoretical concept holds true in practice.

In chapter 2 we look at existing examples of cancellation of tradable compliance units[11] such as CO_2 allowances from the EU-ETS and RGGI, SO_2 allowances from the US Acid Rain Program and Renewable Energy Credits (RECs) from US states with Renewable Portfolio Standards (RPS).

Chapter 3 evaluates the potentials and drawbacks of cancelling tradable compliance units and describes the most important factors that influence the success of such programs.

Chapter 4 looks at two different situations: first, cancelling allowances with the aim to decrease allowance supply and second, cancelling allowances to account for internal reductions and to avoid a shift in emissions reductions.

The final chapter summarizes the findings, and discusses the potential of allowance cancellation as an alternative to offsets.

[11] RECs are not allowances, we therefore use the broader term of 'tradable compliance units'.

2. Examples of Voluntary Purchase and Cancellation of Allowances, and Other Tradable Compliance Units

Several compliance programs allow voluntary buyers to cancel tradable compliance units. Table 2 shows the sample of programs discussed in this paper that allow such purchases and lists some of the NGOs that have engaged in such cancellations. This chapter looks at specific examples for each of these. The case studies are organized in chronological order, reflecting how the experience with earlier programs, such as the US Acid Rain Program, helped shape more recent programs, such as the EU-ETS.

Table 2. A Selection of Mandatory Quota Programs and Voluntary Buyers of Their Tradable Compliance Units

Name of Program	Program Start Date	Tradable unit	Tradable Compliance Unit Acronym	Allows non-capped buyers	Examples of NGO buyers
US Acid Rain Program	1995	1 short[12] ton of SO_2	SO_2 Allowance	Yes	Acid Rain Retirement Fund (US) Adirondack Council (US) Clean Air Conservancy Trust (US)
Renewable Portfolio Standard in Massachusetts, US	2002	1 MWh of renewable electricity produced	REC	Yes	MassEnergy (MA, US)
EU Emissions Trading Scheme (ETS)	2005	1 metric ton of CO_2e	EUA	Yes	Sandbag (UK) TheCompensators (Germany) Carbonretirement (UK) Climatekind (Australia)
Regional Greenhouse Gas Initiative (RGGI)	2009	1 short ton of CO_2e	RGA	Yes, determined by each state	Adirondack Council (US)

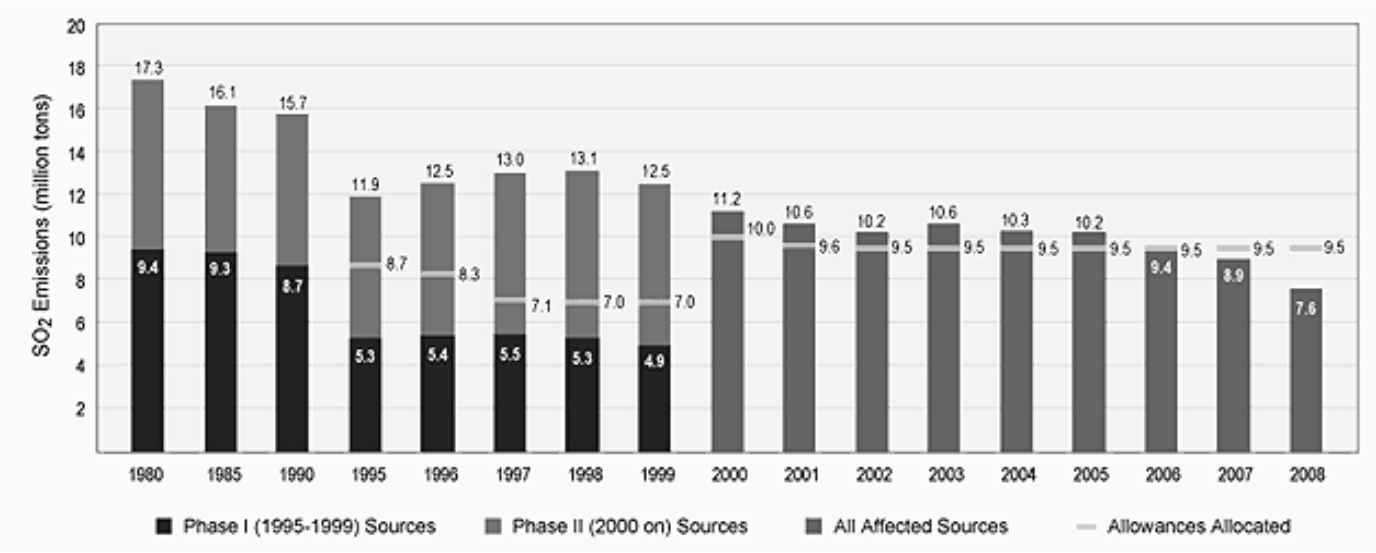
Cancellation of SO_x Allowances Under the US Acid Rain Program

In the United States, the electric power industry accounts for nearly 70% of total annual SO_2 (sulfur dioxide) emissions and slightly more than 20% of total annual NO_x (nitrogen oxides) emissions[13] which cause acid rain and smog, respectively. In order to lower SO_2 emissions from power plants, the United States enacted the Acid Rain Program (ARP) as part of the Clean Air Act Amendments of 1990. ARP was set up as a cap-and-trade program for SO_2 emissions. Phase I of the trading program started in 1995 and covered the 110 most polluting sources, Phase II began in 2000 and expanded the cap to include all large sources as well as new sources. Allowances are allocated based on historical pollution levels. Unused allowances may be sold, traded, or banked for future use. Covered entities that do not hold enough allowances are penalized at $2000 per ton (EPA 2005). The ARP is considered a success, as emissions have dropped significantly since the start of the program. As figure 1 illustrates, SO_2 emissions have dropped by 56% compared with 1980 levels and 52% compared with 1990 levels (EPA 2008).

[12] A short ton, a common weight unit used in the US, is equivalent to 907kg.

[13] The NOx Budget Trading Program (NBP) set a regional cap on NOx emissions from power plants and other large combustion sources during the "ozone season" (from May 1 through September 30). In 2009, the Clean Air Markets Clean Air Interstate Rule (CAIR) NOx ozone season program replaced the NBP. http://www.epa.gov/airmarkt/progsregs/nox/sipbasic.html For this paper, we have looked solely at SO_2 markets.

Figure 1. SO_2 Emissions of Phase 1 and 2 Sources Covered Under ARP and Numbers of Allocated Allowances



Source: EPA 2008

Under ARP, non-capped entities such as citizens and NGOs are allowed to purchase and cancel SO_2 allowances. The EPA lists four[14] NGOs that cancel SO_2 allowances, including: Clean Air Conservancy Trust, Acid Rain Retirement Fund, Adirondack Council, and Environmental Resources Trust (EPA 2009).

The ***Acid Rain Retirement Fund***, for example, is a non-profit, community educational group based in Maine which has bought 132 allowances. Their focus is primarily educational. They work with school and community groups to raise awareness about acid rain and in the process collect money for the cancellation of allowances.

The ***Adirondack Council*** (AC) is an environmental NGO in New York state with a mission to help protect the Adirondack Park and to reduce air pollution, "as the primary cause of global climate change, acid rain and mercury contamination". In 1997 a utility based in New York State donated 10,000 of their ARP allowances to the AC[15]. The AC decided to bank the allowances and to 'sell' them to donors at $50 per ton. In other words, each time someone donates $50 to the AC's Acid Rain Fund, one ARP allowance is cancelled. The money that is raised goes towards AC's general funds. To date AC has cancelled about 8,000 of its allowances. The AC has used the allowances as a tool to fundraise and to raise awareness about acid rain. The organization also purchases and cancels RGGI allowances (see below).

The total number of allowances held and cancelled by environmental organizations is not known. But it is unlikely to be more than a few thousand allowances. To put this in perspective, covered entities emitted approximately 7.6 million tons of SO_2 in 2008. At the same time, more than twice as many allowances were available for use in 2008 – a total of 16.2 million allowances: 9.5 million allocated annually and 6.7 million unused allowances banked from prior years (EPA 2008, see figure 1)

[14] According to the EPA, it is likely that other currently unlisted groups voluntarily retire SO_2 certificates. EPA does not review the operations of these four or any other NGOs.

[15] At the time allowances sold for approximately $100 per ton (EPA 1997).

Prices are currently relatively low at $75 and $40 per ton for 2009 and 2010 vintages, respectively, reflecting an over-supplied market (Evolution Markets 2010). Because of the current oversupply of allowances, the cancellation of ARP allowances has little impact on emissions reduction (see chapter 3 for further discussion).

Retirement of Renewable Energy Certificates (RECs)

In the US, many states have established mandatory Renewable Portfolio Standards (RPSs).[16] These state standards require utilities to document that a certain percentage of their electricity was sourced from renewables. Utility companies can either choose to build new renewable facilities or buy Renewable Energy Certificates (RECs) from independent power producers other utilities who have more than met their requirement. A REC represents the generation of 1 MWh of renewable energy. RECs are sold independent from the electricity produced by that renewable facility. In other words, the 'environmental attributes' of the electricity are unbundled and sold separately from the electricity generated.

Under an RPS, RECs function similar to offsets and allowances in an emissions cap-and-trade system. Just as each covered entity in an emissions trading system must surrender an allowance for every ton of emission it emits, every utility must surrender a REC for every MWh of RPS obligation it has. If compliance RECs are retired from an RPS market, the supply of eligible compliance RECs decreases[17]. Unless there is a surplus of compliance RECs, a decrease in the supply of these tradable compliance units will put pressure on the market to build more renewables to satisfy the RPS obligations.

The extent to which an RPS can push the creation of new renewables depends not only on the level of the RPS requirement but also on how eligible RECs are defined. Technology criteria spell out which types of technology can be considered as renewable (often for example, the eligibility of large hydro is limited due to the environmental and social impacts such dams can have). Of great importance is furthermore the start date. Any renewable facility built prior to the start date defined by the RPS program cannot generate RECs. If the start date is not defined, all renewable facilities can generate RECs. The sale of those RECs will only generate additional revenue for existing facilities but is unlikely to create pressure to build new facilities.

REC markets exist as two distinct markets - the compliance market and the voluntary market – in the United States, Europe[18] and Australia. Voluntary buyers can retire compliance RECs from US states with an RPS or purchase non-compliance RECs from the voluntary market. It is important to note that non-compliance RECs are not tradable compliance units. Unless compliance markets are over-supplied voluntary RECs are in general cheaper than compliance RECs. Several factors call into question if buying voluntary RECs leads to more new renewable sources being built. Since voluntary RECs are not compliance units they do not create greater scarcity in an RPS and might therefore put less pressure on the market to bringing new supplies into the market. If the incentive is purely financial, which it is in the voluntary market, the incentive has to be significant and predictable over a period of time to enable additional investments in new renewables. Voluntary US RECs are trading at around

[16] The US does not currently have a federal RPS.

[17] This only holds true if such voluntary purchases cannot count towards a state's RPS. Fourteen states, including Massachusetts explicitly prohibit voluntary green power sales from being used for RPS compliance purposes (Holt and Wiser 2007).

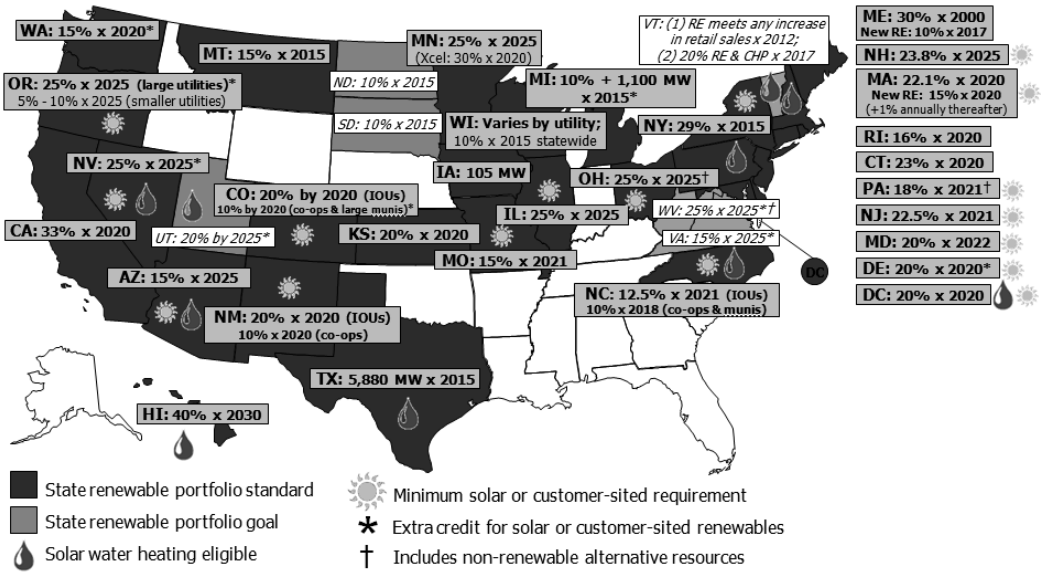
[18] Italy, Poland, Romania, Sweden, the United Kingdom, and parts of Belgium have adopted RPSs based on systems of tradable RECs.

US$1 per MWh (Evolution Markets 2009). In comparison, the Production Tax Credit available for renewables by the US government is US$21 (Union of Concerned Scientists 2009). Since the RECs revenue is so much smaller, it is unclear how much of the incentive for new renewable energy can be attributed to the sale of voluntary RECs.

In this paper, we focus on the compliance market in the US and use Massachusetts as a case study. In addition, we do not discuss the use of RECs as carbon offsets. Some offset retailers have purchased RECs and converted them to GHG offsets. The conversion of a REC to an offset can create serious issues in terms of establishing additionality and ownership. RECs are not designed as offsets and therefore do not have to undergo stringent additionality testing. Also, under certain circumstances it is possible that double counting could occur. Some market observers suggest that clear claim of ownership is essential for offsets and argue that RECs should not be used as offsets (Offset Quality Initiative 2009, Gillenwater 2007a and b).

Figure 2 shows the existing 29 state RPS mandates in the US.[19] It shows each state's renewable energy production goal and the year by which that goal has to be reached. The way this goal is reached and how renewable energy and eligible RECs are defined varies considerably from state to state (Gillenwater, 2007a).

Figure 2. State RPS in the US, March 2010



Source: Database of State Incentives for Renewable Energy 2010

Massachusetts (MA) passed an RPS in 1997 which came into effect in 2002. In 2009, the RPS requirement was that 4% of electricity be supplied from qualifying sources. The requirement rises by

[19] Although both compliance and voluntary markets of renewable energy are growing, they still make up only a small fraction of the US market. In 2008, approximately 23 million MWh (0.6% of total US electricity) were sold as RECs in the mandated RPS markets. Because RPS programs are expanding and becoming more stringent, this market is expected to grow to 100 million MWh by 2012. Another estimated 24 million MWh were sold as voluntary RECs in 2008. (Bird et al 2009).

1% each year with a final goal of 15% by 2020[20]. Covered entities can purchase RECs from qualifying resources. Under current rules those resources must have the ability to physically deliver their generation into the New England Power Pool, thus limiting the resources to the New England states, New York and two Canadian provinces. Renewable facilities that came online after Jan 1, 1998 are eligible to produce MA compliance RECs, otherwise referred to as Class 1 RECs. [21] Currently, about 15% of the RPS requirement is met by MA sources, while the rest comes from out of state RECs, generated mostly by landfill gas facilities. During the first few years, MA experienced a shortage of RECs and the prices were as high as $50 per MWh[22]. Since 2007, the supply of RECs has increased as new facilities have come online. Class 1 MA RECs traded at around $34/MWh in 2009 (Chicago Climate Futures Exchange 2009). In comparison voluntary RECs in the US market have been trading between $0.75 and $1.25 in 2009 (Evolution Markets 2009).

Several organizations offer to buy and retire RECs for consumers who want to support renewable energy generation in MA. Yet not all of these are Class I RECs that qualify for the MA RPS. The ***Energy Consumers Alliance of New England*** (ECANE) is a non-profit community organization that offers two green energy programs in Massachusetts and Rhode Island[23]. *New England GreenStart*^{SM} is a bundled program where customers of one major electric utility, National Grid, purchase electricity and RECs together – with the electricity being supplied by National Grid and the RECs being supplied by ECANE. In communities where bundled renewable electricity programs are not available, consumers can make payments for renewable energy certificates alone though ECANE's *New England Wind Fund* ^{SM}. ECANE tries to purchase RECs directly from small renewable energy producers in their states. This reduces transaction costs for such small renewable power producers and therefore provides additional support for small scale renewables. ECANE currently offers a mix of 75% voluntary and 25% Class 1 MA RECs.

NSTAR, one of Massachusetts largest utilities, has the *NSTAR Green* program under which customers can choose to buy RECs representing 50% or 100% of their electricity usage at a surcharge of 2.4 cents per kWh and 4.4 cents per kWh respectively. This surcharge is added to the Basic Service supply rate (currently 8.9 cents per kWh). NSTAR purchases 100% Class 1 RECs from a wind farm in New York State (NSTAR 2010).

No statistics are currently kept for voluntary purchases, yet market experts estimate that voluntary purchases amount to 1% or less of the MA RECs market. The current price of US$33 indicates that the MA market is not over-supplied and that voluntary purchase of Class 1 RECs is likely to be a valid choice for consumers who want to contribute to an increase of renewable energy provision.

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[20] For comparison, the current average mix of resources supplying New England includes: Coal (16%), Nuclear (29%), Oil (10%), Natural Gas (35%), Hydroelectric (5.5%), and Other (4.5%) (NSTAR 2010).

[21] In 2008 the Green Communities Act was passed which divides renewable sources in 2 categories. Class 1 includes renewable that came on-line after Jan 1, 2008, Class 2 includes older renewable facilities. Only Class 1 RECs can be used for RPS compliance. This minimum standard for Class 2 facilities was established to ensure that existing facilities can stay in operation despite the fact that they cannot be used to meet Class 1 requirements. Because Class 1 RECs theoretically require new investment and the obligation percentages are higher, they are more expensive than Class 2 RECs.

[22] The MA RPS has a price cap. Covered facilities can choose to pay the state instead of purchasing RECs when REC prices are high. The Alternative Compliance Payment (ACP) rate started at $50 per MWh in 2002 and is currently at about $60. This means that in a short market, the voluntary retirement of RECs cannot lead to price increases above the ACP. Yet, since ACP revenue is used to subsidize other renewable programs (such as residential PV installations) such voluntary action could still lead to the creation of more renewable sources.

[23] ECANE does business in Massachusetts as the Mass. Energy Consumers Alliance and in Rhode Island as People's Power & Light. The organization's URLs are www.massenergy.org and www.ripower.org.

MA is also a member of RGGI (see below). This means that the retirement of class 1 RECs is also reflected as a reduction in the state's GHG emissions inventory for RGGI. If a state does not want REC purchases to also count towards the state's RGGI cap, RGGI allowances commensurate with the emissions reductions achieved through class 1 REC purchases would need to be retired to avoid such double counting. Massachusetts (and 8 other RGGI states) established Voluntary Renewable Energy set-aside programs to address this issue for voluntary purchases of class 1 RECs (but not for compliance purchases under the RPS.) Under the new program (start July 2010) voluntary buyers can report their class 1 REC purchases to the state which will then retire RGGI allowances accordingly. If RGGI states with an RPS chose to make their RPS program supplementary to their RGGI obligations, a similar law would have to be passed for compliance purchases of class 1 RECs.

Cancellation of RGGI Allowances

The Regional Greenhouse Gas Initiative (RGGI) started in 2009 and is the first mandatory GHG cap-and-trade system in the US. Ten Northeastern and Mid-Atlantic states committed to reduce CO_2 emissions from the power sector 10% by 2018. The current annual cap on electric sector emissions is 188 million short tons.

Most RGGI member states allow non-capped voluntary buyers to purchase and cancel RGGI allowances. Very few such voluntary buyers are currently known. One of them is the ***Adirondack Council*** (AC) which also cancels SO_2 allowances (see example above). AC has a RGGI account and has participated in two auctions where they have purchased about 7000 allowances (RGGI sells them in 1000 ton blocks. Smaller purchases are not possible at RGGI auctions). For $25, AC donors can purchase 3 RGGI allowances which are then cancelled. AC has so far retired about 5000 allowances.

Although the AC program has value as a fundraising tool and to increase awareness about climate change, cap-and-trade in general and the RGGI program in particular, it is not clear whether the AC purchases will directly translate into additional emission reductions at least in the next few years, because of the extent to which the RGGI market is currently over-supplied.

Because of the economic recession and fuel switching, CO_2 emissions in RGGI states are projected to total approximately 140 million short tons in 2009. This is 26% below the RGGI cap. Allowance prices are low at around $2.05 (December 2009, RGGI no date), down 46% from the previous year. Analysts forecast that prices will fall further and stay near the price floor of $1.86 until the end of the program, unless the cap is tightened (Point Carbon, 2010).

Cancelling allowances in an over-supplied market, such as RGGI, is unlikely to produce near-term emission reductions (except possibly if done at a large enough scale to significantly reduce the over-supply). Yet it could potentially lead to emissions reductions in the future. Excess RGGI allowances in this compliance period can be banked into a future compliance period and may even become convertible to allowances in a federal system, as implied in some federal US bills. Under such circumstances, retirement of RGGI allowances today could reduce the amount of excess carried forward, and thus lead to a requirement for more emission reductions in future periods. However this benefit is not only delayed in time, but is more uncertain given that it is dependent on the continued existence of a trading system that in the future will not be over-supplied.

Cancellations of EU-ETS Allowances

The European Union Emissions Trading Scheme (EU ETS) is the largest currently operating mandatory cap and trade program. Emissions sources regulated by the EU ETS include 12,000 installations, accounting for half of all EU GHG emissions. The implementation of the EU ETS began

with Phase I (2005-2007) which - although mandatory - was primarily designed as a trial period. It is currently in Phase II (2008-2012), which coincides with the Kyoto commitment period. For Phase III (2013-2020) of the EU ETS several revisions to the scheme are planned including a single EU-wide cap to increase harmonization.

The EU-ETS allows non-regulated sources to purchase and cancel EU-ETS allowances (EUAs). Several organizations have started offering EUAs to voluntary buyers. We will highlight two such organizations: TheCompensators from Germany and Sandbag from the UK.

TheCompensators is a non-profit organization in Germany run by volunteers (many of them are researchers at the Potsdam Institute for Climate Impact Research). It was founded in 2006 and is the oldest such organization. The organization collects money from individuals and companies to cancel EUAs. TheCompensators also engages in public education campaigns about the EU-ETS. The organization's goal is to "decrease the number of emission allowances available on the market and to raise awareness on the role of each individual to combat climate change."

EUAs are purchased through a broker once enough funding is available. This means that a donor does not know exactly how many EUAs will be purchased with his money, as it will depend on the allowance prices at the time of purchase (about 25% of the donation covers broker fees and taxes). Once the EUAs are transferred to TheCompensators' emission trading account, the organization cancels them immediately. During Phase I (2005-2007) TheCompensators cancelled 1603 EUAs and in the current phase 587 EUAs (as of February 2010).

Sandbag is a non-profit organization in the UK that cancels EUAs and produces reports for policy makers and organizes public campaigns aiming to strengthen the EU-ETS and the EU's climate commitments. The organization was formed in 2008. Sandbag has 4 staff members and its operations are supported by grants from foundations and charitable trusts.

Sandbag buys EUAs directly from an EU-ETS regulated entity: Guys and St Thomas' Hospital in London which has recently built a new Combined Heat and Power unit and therefore reduced their own emissions. Sandbag buys some of the hospital's excess EUAs at market rate and in return the hospital has pledged to invest the proceeds in new energy efficiency projects.[24] So far Sandbag has cancelled 2000 EUAs from Phase II (2008 and 2009). Donors pay UK£25 per EUA independent of the current market price. Any money left over goes to fund Sandbag's campaigning activities and covers administrative costs. Sandbag emphasizes their lobbying and data analysis.

[24] If the energy efficiency upgrades lead to emissions reductions in capped sectors, these additional investments would not result in lower EU-wide CO_2 emissions (see discussion on leakage).

3. Evaluating the Effectiveness of Cancelling Allowances

Organizations who engage in cancelling of tradable compliance units often aim to educate the public about climate change and cap-and-trade systems and may pursue the following mitigation goals:

- Reduce the supply of tradable compliance units in order to enable greater overall emission reductions;
- Raise the price of tradable compliance units in order to send a stronger market signal;
- Avoid the use of offsets because of quality/additionality concerns;

Yet not all of these goals are necessarily achievable, since it might be the case that the voluntary market is too small to set a price signal or that a market is over-allocated, is subject to safety valves or other mechanisms that might release additional allowances, loosen the cap, or simply lead covered entities to purchase more offsets. This chapter focuses on these goals and their potential obstacles and evaluates the examples described in the previous chapter.

Reducing the Supply of Tradable Compliance Units

Cancelling of allowances will only increase emission reductions in the near term to the extent that markets are not over-supplied. If actual emissions are below the number of available allowances, cancelling allowances may lead to additional emissions reductions in later time periods, assuming allowances are bankable. However, such reductions would be subject to greater uncertainty, as they would depend on continuation of emission trading systems over time, increasing stringency of the cap, and the assumption that voluntary allowance cancellation would not affect future cap levels.

As noted, the US Acid Rain program and RGGI are currently over-supplied, and the EU-ETS was also severely over-allocated during Phase I (banking between EU-ETS Phases was not allowed). There is also a possibility that Phase II of the EU-ETS could turn out to be over-supplied, due to the recent economic downturn and the resulting reduction in GHG emissions. Some of the groups who currently cancel tradable compliance units from over-supplied markets do not seem to be fully aware of the limited impact of such actions and claim that cancelling allowances resulted in actual emissions reductions. Some stated that these reductions were more 'real' than buying offsets. Both Sandbag and TheCompensators, on the other hand, are aware of the risk of cancelling allowances from an over-allocated market. Sandbag states: "We can't guarantee there won't be another crash but the fact that you can bank permits into future periods means they will always have a value and so prices should remain positive […] Decisions about what level of permits to hand out after 2012 are currently being debated in Europe and will be decided over the next couple of years. Sandbag will campaign to make sure the right decisions get taken. So, Sandbag isn't just about buying permits it's about campaigning to ensure there are no more price crashes and the emissions trading market really does start working for the environment." (http://www.sandbag.org.uk/node/39)

In contrast, the Massachusetts RPS market does not seem to be significantly over-supplied. Cancelling tradable compliance units from a tight market, even if only in small numbers, is more likely to lead to intended impacts -- corresponding emissions reductions or increased renewable energy production close in time to instrument purchase and retirement. In the case of the Massachusetts RPS market, it can be assumed that any Class I RECs that are cancelled through voluntary purchases would have otherwise been used for the compliance market, banked forward for compliance in later years, or used for compliance under the RPS of another state.

In the EU, free allocation of allowances to some emitters has created windfall profits in some sectors. A recent report states that the top ten companies[25] own 35 million surplus EUAs in 2008 worth an estimated €500 million at current carbon prices (Pearson 2010). The cancellation of allowances could translate into increased value of this surplus to the extent that demand for allowances, and thus allowance prices, increase. Even if prices are unaffected (see next section) these companies could be the source, directly or indirectly, of allowances purchased for cancellation. Windfall profits cannot be circumvented by purchasing cancelling allowances from a 'good' compliance source that does not experience windfall profits (such as the hospital used by Sandbag) as it will just lead to a shift from where other buyers purchase their allowances. Each of these factors could make it difficult to advertise allowance cancellation to consumers.

Raise the price of tradable compliance units

In principle, the option of cancellation introduces added demand for allowances, which in turn should increase allowance prices. If the voluntary purchaser also undertakes emission reductions in an amount equal to the number of allowances cancelled (see situation 2 below), then the demand for allowances will decrease by a corresponding amount. To first order, the net effect would be to leave the price of allowances unaffected.[26] However, such an outcome would be very difficult, if not impossible, to verify.

The "cancelling effect" of simultaneously undertaking emission reductions and cancelling allowances depends on whether the emission reductions would have occurred had the allowances not been cancelled. The emission reduction activity, alone, has the effect of lowering allowance prices (by decreasing demand for allowances), while cancelling allowances, alone, will push prices higher (by decreasing supply of allowances). While cancelling of allowances helps to ensure that investments in internal emissions reductions also lead to overall GHG emission reductions (and are not compensated for by greater emissions elsewhere), they can also marginally increase allowance prices relative to a situation without allowance cancellation.

If the practice of cancelling allowances remains limited to individuals and voluntary corporate buyers, it is likely to remain insignificant and is unlikely to send a strong price signal. If larger actors such as cities and states get involved in such purchases, the market could become more influential. This situation and its potential price impacts are discussed in more detail in section 4.

Cost-containment features such as safely valves, price collars, allowance reserves, and offset limit triggers, used or proposed in some cap-and-trade programs, could potentially undermine the impact of allowance cancellation. Even in programs without explicit cost-containment mechanisms, policy makers could elect to weaken emission caps to make compliance easier if allowance cancellation were to occur at a scale sufficient to have a major impact on allowance prices. Experts interviewed on the topic differed in their opinions. Some thought it likely that legislation would be adjusted if prices got too high and therefore opposed the cancellation of tradable compliance units. Others thought it was unlikely that such changes would occur, because the voluntary market will remain too small to have a sufficiently large and sustained impact that could cause such a legislative backlash and because such legislative adjustments would only occur to the degree that supply did not sufficiently respond to the increased demand.

[25] These ten companies are from the iron and steel, cement, and power and heat sectors.

[26] We say "to first order" since it is difficult to say precisely how supply and demand curves would be affected. It is even conceivable that allowance prices could decrease if allowances were retired in correspondence with a voluntary entity's reduction of emissions through a technology with high marginal costs. Such action would leave marginal abatement cost (supply) curve unaffected, while reducing demand for allowances.

Avoiding the use of offsets

One of the rationales for cancelling allowances as an alternative to purchasing offsets is to avoid the major concerns related to the environmental integrity of offsets. However allowance cancellation could have the indirect effect of increasing the use of offsets by covered entities to compensate for some or all of the allowances removed from the system. Most cap-and-trade programs allow for a certain number of offsets to be used for compliance, although many have limits on the number of offsets that can be used. In the EU-ETS, these limits apply at the installation level and were set by each member state during Phase II. In Phase III, starting in 2013, the limits are no longer set by each member state but set EU-wide and will be applied at the installation level; in RGGI the limits are imposed as a percentage of an entity's compliance obligation. Yet only if the offset limit is not expected to be reached through compliance action could cancelling allowances potentially lead to an increased use of offsets. The extent to which offset use increases will depend on the relative marginal cost of offsets vs. emission reductions at covered facilities.

4. Scenarios for Allowance Cancellations

The voluntary buyer of allowances could be an individual, a company or sub-national entity such as a city or a state. There are two situations under which such a voluntary entity could potentially choose to buy and cancel allowances:

Situation 1: Cancelling Allowances without Additional Internal GHG Reductions

The voluntary entity purchases and cancels allowances from a capped compliance system and does not reduce their own emissions. Theoretically, if the purchase volume is large enough, such cancellation could lower the supply of available allowances and therefore lead to a price increase.

Situation 2: Cancelling Allowances to Account for Additional Internal GHG Reductions

In this situation, the voluntary entity is based in a capped system but not subject to a cap themselves. They voluntarily choose to reduce their personal/internal emissions. For example, country A has a national cap and trade program with points of regulation that are upstream from final users (e.g. caps on entities such as fuel suppliers for the transportation sector and electricity generators). Non-capped final users (e.g. individuals or companies) located in country A choose to voluntarily reduce their emissions through efficiency upgrades, fuel switching or reduced consumption. In doing so, they reduce energy demand and therefore emissions of capped sectors and will make it easier for capped entities to reach the required reductions set by the (absolute) national cap. In other words, because the voluntary entity is located in a country with a mandatory cap, some or all of their internal emissions reductions will be counted towards the national emissions reduction target. This is referred to as 'emission leakage'. These voluntary mitigation actions will therefore not lead to additional national emissions reductions, but just lead to a shift of where the emissions reductions occur. Additional emissions reductions will only be achieved if the voluntary actor cancels allowances commensurate with the internal emissions reductions that will also be counted towards the national cap. To first order, the emissions reductions that are achieved under the national cap are the same, whether the voluntary actor just cancels allowances (situation 1) or chooses to reduce their internal emissions and cancels allowances commensurate with the amount of leakage that would have occurred. The voluntary actor under situation 2 reduces both the demand and the supply of federal allowances, thus theoretically not impacting federal allowance prices. Under situation 1, only the supply of allowances is reduced and allowance prices might therefore rise. The actual market impacts depend on the policy design of the capped system and the current and future market conditions. Making Voluntary Action Supplementary

It is very likely that most consumers are unaware of this leakage issue. Sandbag tries to educate consumers about the problem of leakage:

> *It is true that because all electricity generators are included in the EU emissions trading scheme, and have been given fewer allowances than they need, you are already paying for them to reduce emissions, through your electricity bill. In fact, it's worth bearing in mind that if you do decide to reduce your own carbon emissions, and you take actions that reduce your electricity consumption, like fitting low energy light bulbs (or hopefully soon LEDs) then unless you buy up the corresponding amount of permits from the market you are either just helping the power companies buy fewer permits or enabling them to sell spare permits to someone else.*

People who reduce their own emissions might not want to invest the additional money to make their actions supplementary. Sandbag therefore advocates for a UK tax credit for the voluntary purchase of allowances to provide a subsidy for the cancellation of EUAs (Worthington 2009). The discussion of how to deal with the leakage caused by voluntary action in capped countries has not

really been discussed widely in the EU. In Australia, on the other hand, some of the major NGOs have issued a statement on the topic, asking for a mechanism to be included in the proposed Australian cap-and-trade system (Carbon Pollution Reduction Scheme) that would make sure that voluntary emissions reductions are accounted for by cancelling CPRS allowances (Total Environment Center 2009). This would take the onus away from individuals and place the responsibility of making their emissions reductions supplemental in the hands of the government.

Making Sub-national Mitigation Action Supplementary

Situation 2 is of special importance to sub-national actors such as cities and states that have committed to their own mitigation targets and are located in countries with binding national emissions reduction targets. Examples include many European and US cities and potentially also US states. For example, in order to achieve state mitigation efforts that are supplemental to the overall national emissions cap, federal allowances commensurate to the emissions reductions achieved need to be cancelled. If no such cancellation occurs, states with more stringent standards than the federal one will require fewer federal allowances and these freed-up allowances will be available for use in states without stringent standards. This is only the case for emissions reductions that occur in sectors that are also covered in the federal cap. On the other hand, there is no leakage issue where states or other sub-national programs reduce emission in sectors not included in the national cap. Emission-reduction obligations at these sources will lead to net reductions in national emissions even without cancelling federal allowances (National Commission on Energy Policy 2009).

If sub-national actors decide that their mitigation goals should be supplemental to the national goal, they need to cancel allowances to avoid emission leakage. Two recent US publications elaborate on how US state mitigation action could be made supplementary to potential federal cap-and-trade legislation through the cancellation of allowances (National Commission on Energy Policy (NCEP) 2009, Bianco and Litz 2009).

Sub-national voluntary actors might not be inclined to make their actions supplementary because states could potentially earn revenue through the sale of freed up allowances and other actors would have to put up additional funds for such allowance cancellation. Yet such supplementary mitigation might be vital in order to achieve the global emissions reductions required to avoid more than 2^{o} Centigrade warming. Bianco and Litz (2009) point out that if allowances were cancelled by the federal government, states would not lose any additional revenue.

Potential Impact of Making State Action Supplementary

If a state makes its mitigation actions supplemental to the national cap by cancelling allowances, national allowances will be permanently removed from the market and this will essentially lead to a tightening of the national cap. Yet since this state at the same time lowers emissions in covered sectors, it is possible that demand and supply of allowances will be reduced at the same level and therefore not impact prices (Bianco and Litz 2009). In the case that a state has a more stringent target than the federal one, but does not cancel allowances, the occurring leakage could potentially lower federal allowance prices if the emissions reductions are large enough. In other words, states or regions with more ambitious goals and policies achieve greater reductions within their borders, but these would be offset by allowing more emissions to occur in other jurisdictions, negating the emission benefit of these goals and policies.

An NCEP study calculated the size that the possible cancellation of federal allowances would have from three states that are members of the Western Climate Initiative (WCI)[27]—California, Washington, and Oregon—if a national emissions cap similar to an earlier version of the Lieberman-Warner bill (S. 2191) was implemented. WCI emissions targets are more stringent than those proposed under this federal bill. NCEP estimates that in order to make the WCI goal supplemental to the national cap those three states would have to implement additional emission reductions above the national cap and cancel a corresponding number of allowances of 473-658 million tons over the period from 2012 to 2020. This is the equivalent of about 1-1.4% of federal allowances. NCEP projects that these cancellations raise the price of federal allowances by up to US$4 by 2020, resulting in an approximate price increase of 12% allowances (National Commission on Energy Policy 2009).

The NCEP study finding appears to differ from the assertion that pairing more ambitious emission reduction policies with an equivalent amount of allowance cancellation would have no overall price effect. While we were not able to review the underlying, unpublished analysis that NCEP used, we believe it is likely that NCEP's modeling analysis compared a situation with allowance cancellation to a situation without such cancellation, *with no other mitigation policies or actions changed*. In such a case, the NCEP modeling outcome is sensible: covered entities across the US must reach a 1% lower cap, and thus achieve greater emissions reduction using the same suite of abatement options (or marginal abatement curve). Such an analysis does not, therefore, take into account the policies that WCI states might enact to reduce emissions. States could implement policies such as efficiency standards that might make an emission reduction target less costly to achieve, reduce pressure on covered entities to achieve emission reductions, and thereby lower allowance prices. Indeed, WCI modeling of its region's "complementary policies" does find this outcome would occur. If such policies enabled WCI jurisdictions to achieve more ambitious emission reductions goals, and these policies were only pursued in conjunction with federal allowance cancellation, then the overall allowance prices might not rise as the NCEP analysis projects. Instead, the "cancelling effect" referred to above, and invoked by Bianco and Litz (2009) might occur.

[27] The following states and provinces are members of the WCI: Arizona, California, Montana, New Mexico, Oregon, Utah, Washington, and the Canadian provinces Ontario, Quebec, British Columbia and Manitoba.

5. Discussion

The market impacts of allowance cancellations varies with the conditions under which they occur. Table 3 summarizes the potential ETS responses to allowance cancellation and summarizes the conditions under which such a response is most likely. It furthermore indicates the impact on allowance prices and on global GHG emissions.

Table 3. ETS Responses to Allowance Cancellation

Response by ETS covered entities	Conditions	Effect on Allowance Prices	Effect on global GHG emissions
Situation 1: **Allowance cancellation <u>without</u> corresponding (added) emissions reductions by individual/state/entity**			
No response in current or future periods	• Market over-supplied in current and future periods	None	None
No response in current compliance period More internal reductions in later periods	• Allowances are bankable • Oversupply in current period • No oversupply in future period Market over-supplied	Limited, if any (based on value in future periods)	None in the current compliance period Later decrease (subject to uncertainty regarding future policies)
More internal reductions in current period	• No oversupply in current period • Internal reductions cost competitive with offsets (if not offsets not limited)	Potential rise in price	Decrease
More offsets used for compliance	• Offset limit not yet reached • Offset limit increases as a result of price trigger • Offsets cost-competitive with internal emission reductions	Difficult to predict	Decrease to extent offsets are additional/real
Difficult to predict	• Cost containment mechanisms that effectively loosen target are triggered (e.g. price ceiling) • Targets loosened due to political response to (potential for) increased prices	Difficult to predict; see box to right	None if targets increased by same amount as allowances cancelled; potential increase in emissions if cap is loosened beyond voluntary actions.
Situation 2: **Allowance cancellation <u>with</u> corresponding (added) emissions reductions by individual/state/entity**			
No response	• Reductions only occur if it is possible to cancel allowances	None, to first order	Decrease

After giving an overview of the potentials and drawbacks of allowance cancellation two questions remain to be explored:

Is the cancellation of allowances a better option than the purchase of offsets for voluntary buyers? And what role can allowance cancellation have in climate mitigation?

Offsets have been criticized because of the difficulty of establishing additionality. On the other hand offset projects offer the possibility of bringing new technology and capacity building to poorer countries and sectors that are not capped. Offset projects can also potentially deliver significant co-benefits such as employment creation and the reduction of air pollution. Allowances do not deliver development benefits to poorer nations and the potential co-benefits of mitigation actions due to the cap can only be assessed in aggregate but in most cases not pin-pointed to the cancellation of a specific allowance.

The PR value of purchasing offsets might be larger than if allowances are cancelled: If the voluntary buyer purchases offsets from 'charismatic' project with high likelihood of being additional and with significant co-benefits such mitigation actions can easily be 'sold to the public' (for example Dell investing in protecting large areas of rain forest in Madagascar). The principle of allowance cancellation, on the other hand, is abstract and cannot as easily be delivered with as a nice story and pictures.

Yet it is important to put the comparison of offset purchases versus allowance cancellations in a larger context. The science unequivocally states that global GHG emissions have to be reduced by 80-95% in the next few decades if we are to avoid the more dire consequences of human-induced climate change[28]

Such dramatic reductions can only be achieved if emissions are reduced significantly in all countries according to their capacity and responsibility. This means that offsets are an important short-term strategy to facilitate capacity building and technology transfer. In the medium and long term, all actors will have to dramatically reduce emissions to keep GHG concentrations at safe levels, and offsets could help facilitate the payment for those reductions by countries with more financial resources. As cap-and-trade markets mature and over-supply becomes less of an issue, cancelling allowances might therefore become a more important tool to achieve additional emissions reductions.

Given the small size of the voluntary market for offsets and allowances it seems unlikely that voluntary efforts in the near term could achieve significant emissions reductions. In the medium and long-term this might change if large numbers of sub-national actors came into play and chose to cancel allowances, as is explained above.

In summary, purchasing and cancelling allowances could be an attractive option for individuals, businesses, and government entities that seek either to compensate for leakage that might occur due to their internal emissions reductions that go beyond the cap or to spur additional reductions by covered sources. This option will be most effective if markets are not over-supplied and the overall magnitude of such voluntary cancellations is not at a scale that would trigger a loosening of targets.

[28] For a overview paper on this topic, see Baer P., Athanasiou T, Kartha S. (2009). A 350 ppm Emergency Pathway, November 2009. EcoEquity and Stockholm Environment Institute.

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