SP Sustainable Prosperity

Policy Brief August 2011

FOR A LOW CARBON ECONOMY

A Carbon Bank:

Managing Volatility in a Cap-and-Trade System[1]

Key messages

- While an emissions trading system is regarded as an economically efficient mechanism to facilitate the transition to a low-carbon economy, price volatility can undermine the system's ability to meet its economic and environmental goals.
- Experience - such as that of the European Union Emissions Trading Scheme (EU ETS) - has shown that emissions trading systems face a number of challenges related to the perceived stability of the system, particularly price volatility.
- To maintain confidence in the system and ensure manageable compliance costs, price volatility in a cap-and-trade system must be minimized and managed. This policy brief explores the role of a potential "carbon bank," to be established by government as part of its cap-and-trade policy, which can intervene in the carbon market to ensure price stability, minimize manipulation and speculation, and provide market oversight.

Sustainable Prosperity is a national research and policy network, based at the University of Ottawa. SP focuses on market-based approaches to build a stronger, greener, more competitive economy. It brings together business, policy and academic leaders to help innovative ideas inform policy development.

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The Issue

A cap-and-trade system can be effective in spurring the transition to a low-carbon economy, if the challenges associated with it, mainly price volatility, are addressed. Many jurisdictions, including Australia and the United States, have explored the possibility of using a carbon bank as a potential tool to manage the volatility of carbon allowance pricing, in support of the overall policy objectives of the government. A carbon bank is an independent body, separate from political influence, responsible for oversight and management of the carbon market.

The Knowledge Base

Policy-makers looking to reduce a country's carbon emissions can utilize market-based instruments to achieve this goal, namely, a carbon tax or a cap-and-trade system.[2] Policy research and experience have clearly demonstrated the advantages – in terms of both effectiveness and efficiency – of market-based policy instruments. At the same time, research and experience have identified a number of issues associated with the use of a cap-and-trade system, including its administrative and management requirements, lack of transparency, and price uncertainty.

A carbon bank is an independent body, separate from political influence, responsible for oversight and management of the carbon market.

This Policy Brief examines the challenges presented by a cap-and-trade system, with a particular focus on the issue of price volatility, and how they can be addressed using a carbon bank. It draws lessons learned from the European Union's Emissions Trading Scheme (ETS), the world's largest and most advanced cap-and-trade system, and it proposes solutions to cap-and-trade's challenges, with a focus on the notion of a carbon bank.[3]

Case Study: An examination of the European Union's Emissions Trading Scheme (EU ETS)

Indirect carbon pricing can be established via a cap-and-trade scheme, by setting a fixed limit (cap) on total emissions for the economy, thereby creating market scarcity, and enabling the government to control quantity. The government either auctions or gives away free allowances, which are then traded among firms. The best example is the European Union Emissions Trading Scheme (EU ETS).

2 Sustainable Prosperity remains neutral on the best policy choice for pricing carbon. As noted in *Managing Carbon Revenue: Institutional Needs and Models* (available at: http://sustainableprosperity.ca/article1345), Sustainable Prosperity believes that a well-designed instrument is more important. For expert dialogue from business, non-profits and academia on essential principles for good design see *Principles for Pricing Carbon* (available at: " (available at: http://sustainableprosperity.ca/article11).

3 In this Brief, the term "carbon bank" is used. Others have advocated for a carbon "board," which essentially performs the same functions.

The EU ETS is the world's first, most advanced and largest cap-and-trade system – not only in terms of the amount traded, which reached €88.7 billion (US$118.5 billion) as of 2010;[4] but also in terms of size, as a multinational, mandatory scheme with 30 participating countries. The absolute cap on CO_2 emissions applies to industries (e.g. electricity generation, oil refining, steel, cement, glass, bricks, ceramics and paper) for a total of almost 12,000 plants representing about half of the European Union's emissions.[5]

The initial phase (2005 to 2007) was a trial period to allow for the development of the system's infrastructure, and enable lessons learned for improvements in its design and functioning. The current phase (2008 to 2012) aims for an overall cap of 6.5 per cent below 2005 emissions levels, which then tightens to 21 per cent below 2005 levels for 2020.[6, 7] Since its inception, the EU ETS has produced a decrease in CO_2 emissions and induced a downward emissions trajectory.[8]

The six years of experience in establishing a functioning emission trading market has resulted in an extensive body of knowledge on which other governments and policy-makers may draw. Of particular relevance to the consideration of a carbon bank are issues related to market design and management, which include:

1. **Interest groups influencing the design of the EU ETS:** Industries perceiving that the EU ETS would put them at a competitive disadvantage vis-à-vis their competitors outside the system intensely lobby the European Commission for exemptions and favourable treatment.[9] A recent study compared the initial Green Paper on the EU ETS from 2000 with the final Directive in 2003, and found that industry interest groups were successful in influencing the final design of the EU ETS.[10] For example, the plan was originally supposed to cover six greenhouse gases (GHGs), though the final Directive is limited to CO_2 emissions. Also, corporate interests were found to have had an influence on decisions about which sectors would be covered by the system, and the initial allocation of allowances at no charge (grandfathering).

Since its inception, the EU ETS has produced a decrease in CO_2 emissions and induced a downward emissions trajectory.

4 Kossoy, Alexandre and Philippe Ambrosi, *State and Trends of the Carbon Market 2010,* World Bank, http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_of_the_Carbon_Market_2010_low_res.pdf, (May 2010).

5 Ellerman, A.D., and P.L. Joskow, *The European Union's Emissions Trading System in Perspective,* Pew Center on Global Climate Change, http://www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf (2008).

6 Hood, Christina, *Reviewing Existing and Proposed Emissions Trading Systems,* International Energy Agency, http://www.iea.org/papers/2010/ets_paper2010.pdf (2010).

7 For more detailed information on how the EU ETS functions and how the third phase will differ from the first and second, please visit "European Commission: Climate Action – Emissions Trading System FAQ" at: http://ec.europa.eu/clima/faq/ets/index_en.htm.

8 Ellerman, Denny, Frank Convery and Christian De Perthuis. *Pricing Carbon.* (Cambridge University Press, 2010).

9 Grubb, M., and K. Neuhoff, *Allocation and competitiveness in the EU emissions trading scheme: policy overview,* Electricity Policy Research Group (Cambridge University), http://www.eprg.group.cam.ac.uk/wp-content/uploads/2008/11/eprg0622.pdf (2006).

10 Markussen, P., and G.T. Svendsen. "Industry lobbying and the political economy of GHG trade in the European Union," *Energy Policy* 33:2, January 2005: 245-255.

2. **Fraud and theft:** According to a recent survey by Point Carbon, 15 per cent of individuals engaged with the EU ETS in some capacity have witnessed fraud, embezzlement or corruption.[11] In February 2010, the European Commission had to revise the registries that audit emissions allowances to enhance internet security, after a number of fraudulent transactions took place.[12]

   In addition, the EU ETS experienced theft of over three million allowances valued at about €45 million (USD$65 million) in January 2011. And while *The Economist* reported this story as a 'backhanded compliment,' demonstrating that the trading of carbon emissions is taken seriously as a commodity market (by thieves at least), it is a clear indication of some of the problems with theft facing the system.[13]

3. **Price volatility:** Perhaps the most significant issue facing the system is price volatility, as shown in Figures 1 and 2. For example, allowance prices spiked at almost €30 in April 2006, but by December of the same year had fallen to only €6. While some price fluctuations are natural as a market adjusts to new information, a great deal of volatility will destabilize the system's ability to meet its long-term goal of reducing GHG emissions. The uncertainty created by price volatility undermines investment in low-carbon technology, because investors are lacking the market conditions needed for investment, which can be categorized as 'TLC' – transparency, longevity and certainty. Price volatility makes it difficult to predict the price trajectory of allowances, resulting in delayed or cancelled investment decisions. Reliable pricing would enable more efficient trading strategies and risk management.[14] Price volatility benefits speculators aiming solely to make money out of the system's price swings, at the expense of its long-term objectives.[15]

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11 Tvinnereim, E., and K. Røine, eds., *Carbon 2010: Return of the Sovereign.* Point Carbon. http://www.pointcarbon.com/polopoly_fs/1.1420234!Carbon%202010.pdf (2010).

12 Europa Press Releases RAPID, *New EU ETS registry rules win approval from Member States,* http://europa.eu/rapid/pressReleasesAction.do?reference=MEX/10/0218&type=HTML and Emissions trading: Commission takes action over cyber attacks on EU ETS account holders, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/125 (2010).

13 The Economist. "Carbon Trading: Green fleeces, red faces. A theft of carbon credits embarrasses an entire market," http://www.economist.com/node/18063834 (February 3, 2011).

14 Grubb, M., and K. Neuhoff, *Allocation and competitiveness in the EU emissions trading scheme: policy overview,* Electricity Policy Research Group (Cambridge University), http://www.eprg.group.cam.ac.uk/wp-content/uploads/2008/11/eprg0622.pdf (2006).

15 McKibbin, Warwick J. , *A New Climate Strategy Beyond 2012: Lessons from Monetary History.* The Brookings Institution and The Lowy Institute for International Policy, 2009.

Drivers of this price volatility can be categorized as:

Policy and regulatory issues:[16]

- Announcements regarding the National Allocation Plans (NAPs), or the use of regulatory measures.

Market fundamentals that affect the production of CO_2, and thus the demand and supply of CO_2 allowances:[17]

- Weather conditions are highly correlated to electricity generation (e.g. cold snaps), and raise energy demand and thus increase CO_2 emissions.
- Fuel prices are correlated to fuel consumption, and therefore CO_2 production.
- Economic growth tends to result in higher emissions, or vice-versa, where economic stagnation as seen during the credit crisis of 2008 had the effect of decreasing emissions, as shown in Figure 2.
- Shifting expectations will contribute to the fluctuation in allowance demand and supply. These include changes in expectations about the demand for allowances, higher- or lower-than-anticipated abatement costs, and longer- or shorter-than-expected mitigation project timelines.[18]

Investor activity:[19]

- This includes speculation and other attempts to deliberately manipulate prices, as well as the influence of the trading activity of institutional and other large investors, whose buying or selling of large amounts of allowances can have an effect on the market.

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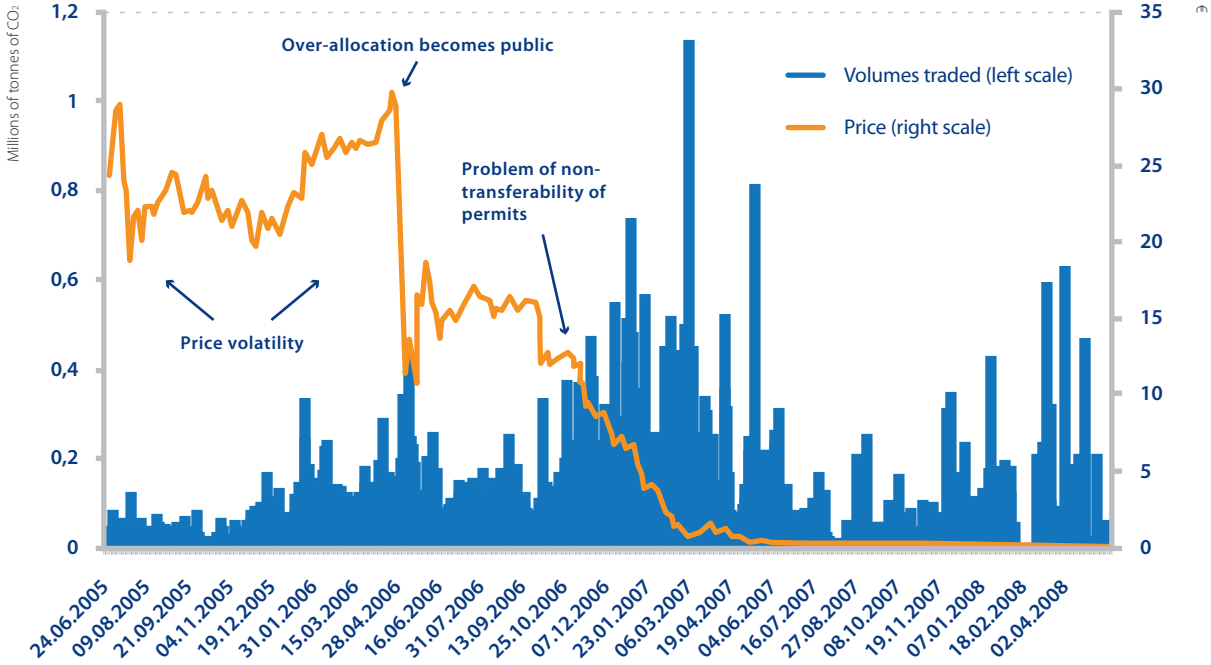
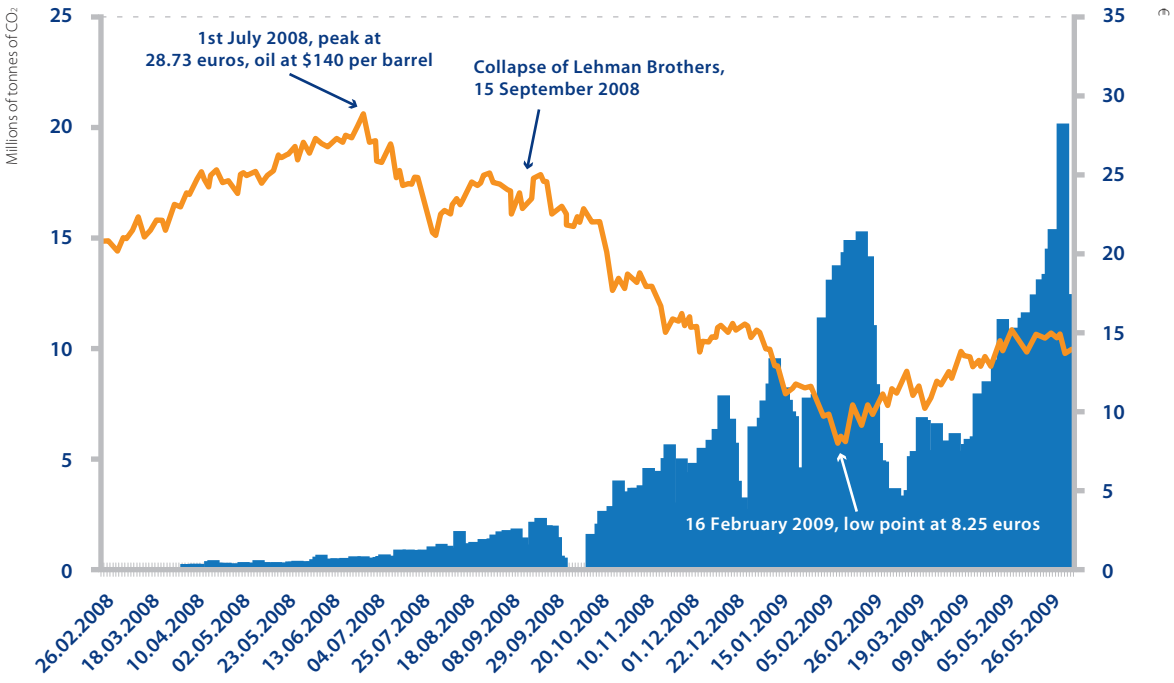
16 Benz, Eva and Stefan Trück. "Modeling the Price Dynamics of CO2 Emission Allowances," *Energy Economics* 31:1, January 2009: 4-15.
17 Benz, 4-15.
18 Whitesell, William and Stacey Davis. *Cost-Containment in Cap-and-Trade Systems: A Review of the Options,* The Center for Clean Air Policy (2008), 7.
19 Whitesell, 6-7.

Figure 1: Volumes traded and cash prices for the European carbon market between 2005 and 2008 (Blue Next Spot EUA 05-07)



Source: Laurent, E., and J. Le Cacheux, *An ever less carbonated Union? Towards a better European taxation against climate change,* Notre Europe, http://www.notre-europe.eu/uploads/tx_publication/Etud74-Laurent-LeCacheux-en_01.pdf (2009).

Figure 2: Volumes traded and cash prices for the European carbon market between February 2008 and May 2009 (Blue Next Spot EUA 08-12)



Source: Laurent, E., and J. Le Cacheux, *An ever less carbonated Union? Towards a better European taxation against climate change,* Notre Europe, http://www.notre-europe.eu/uploads/tx_publication/Etud74-Laurent-LeCacheux-en_01.pdf (2009).

Addressing Price Volatility

Of the main challenges facing cap-and-trade systems, as shown in the EU ETS case study, price volatility is the most essential to manage to ensure the system's ability to meet its long-term objectives. Volatility makes it difficult for firms to manage their compliance costs and undermines investor confidence in the system.[20] In addition to the risk of price swings, there are also dangers associated with carbon prices that are either too high or too low. Although companies covered by the cap-and-trade system tend to favour a low carbon price, low prices do not encourage much carbon abatement. On the other hand, sustained high prices, while encouraging large reductions in the production and consumption of carbon-intensive goods, are challenging for carbon-intensive industries to cope with, at least in the short-term.

Possible benefits of volatility

The majority of the literature concludes that price volatility is a weakness of cap-and-trade systems; as such, a rich body of literature exists on various cost-containment mechanisms that can be deployed to increase price certainty.

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At the same time, some research has suggested that price volatility could be beneficial in meeting the overall aim of reducing carbon emissions. Recent analysis suggests that suppressing price volatility through offsetting and other price-control mechanisms may delay clean technology investments. A recent study found that a cap-and-trade system could trigger the adoption of clean technology investments at a considerably lower carbon price ($30) than a tax policy ($80).[21] This is because the volatility itself acts as an incentive to carbon abatement investments for companies who assume that volatility is an ongoing feature of the system.

Volatility of other commodities

Price volatility is not restricted to carbon markets such as the EU ETS; it is common in most commodity markets due to supply constraints, speculation and other factors. Certain commodities demonstrate more price volatility than others; for example, oil and gas prices are particularly volatile.[22] There is not enough experience with long-term price patterns in cap-and-trade systems to conduct a comparison with other commodities of the relative degrees of price volatility.

20 Whitesell, 7.

21 Chen, Y., and CL Tseng. "Inducing Clean Technology in the Electricity Sector: Tradable Allowances or Carbon Tax Policies?" *The Energy Journal* 32:3. http://research.economics.unsw.edu.au/ctseng/CO2.pdf (2011).

22 Regnier, E. "Oil and energy price volatility." *Energy Economics* 29, 2007: 405-427.

Cost-containment mechanisms

As already explained, price volatility can result from unanticipated changes in economic activity, weather, fuel prices or technology development.[23] Researchers have suggested potential cost-containment approaches as a solution to reduce risk and price volatility in emissions trading markets. Cost-containment measures can help control abatement costs for regulated entities, or represent a more direct market intervention. Though studied in varying degrees of depth, many different cost-containment mechanisms have been explored:[24]

- **Price ceiling or 'cap':** sets a maximum allowance price, thereby providing greater cost certainty to emitters. Governments can either guarantee to sell unlimited quantities of allowances at the fixed price (termed a 'hard' cap) or, at a trigger price, to make available an extra reserve of allowances (termed 'soft' cap). The former guarantees price certainty, the latter provides emissions or 'benefit' certainty.[25]
- **Price floor:** the mirror instrument of a price ceiling, a price floor ensures a minimum price on carbon, providing greater price confidence for investors.
- **Price collar:** a symmetric safety valve; the combination of both a price floor and a price ceiling to create a 'corridor' of fluctuation.[26]
- **Managed price:** the government sets a yearly target price (similar to government interest rate targets), which allows emissions to be higher or lower than the cap in a given year in order to control the price.[27]
- **Allowance expiration date:** when allowance prices are low, there is an incentive for companies to buy large quantities and then sell them at higher prices in the future.[28] Allowance expiration dates would remedy this issue.
- **Allowance splits:** if allowance prices rose too high, allowances could be split (like a stock split), where holders would get a larger number of allowances at a lower per-unit value.[29]
- **Safety valve:** a price ceiling at which an additional unlimited supply of allowances can be purchased at a predetermined price in excess of the limit. This provides certainty to

Cost-containment measures can help control abatement costs for regulated entities, or represent a more direct market intervention.

23 Fell, Harrison and R.D. Morgenstern, *Alternative Approaches to Cost Containment in a Cap-and-Trade System,* Resources for the Future, http://www.rff.org/RFF/Documents/RFF-DP-09-14.pdf (2009).

24 Wood, P.J. and Frank Jotzo. "Price floors for emissions trading." *Energy Policy* 39, 2011: 1746-1753.

25 Hood, Christina. *Reviewing Existing and Proposed Emissions Trading Systems,* International Energy Agency, http://www.iea.org/papers/2010/ets_paper2010.pdf (2010).

26 Fell, Harrison and R.D. Morgenstern, *Alternative Approaches to Cost Containment in a Cap-and-Trade System,* Resources for the Future (2009); termed by McKibbin, W.J., Adele Morris and P.J. Wilcoxen, *Achieving Comparable Effort through Carbon Price Agreement.* Harvard Kennedy School: The Harvard Project on International Climate Agreements. Available at: http://belfercenter.ksg.harvard.edu/files/MorrisViewpointFinal_2.pdf (2009).

27 Whitesell, W.C. *Climate Policy Foundations: Science and Economics with Lessons from Monetary Regulation.* (New York: Cambridge University Press, 2011).

28 Pizer, William, *Choosing Price or Quantity Controls for Greenhouse Gases,* Resources for the Future, http://www.rff.org/rff/Documents/RFF-CCIB-17.pdf (1999).

29 Newell, Richard, William Pizer, Jianghfeng Zhang. "Managing Allowance Markets to Stabilize Prices." *Environmental and Resource Economics* 31, 2005: 133-157.

firms about the limits on future abatement costs, yet undermines the environmental objectives of the system. If the safety valve price was set high, it would have little effect as allowance prices could fluctuate over a wide range. On the other hand, if a safety valve price was set low, allowance prices may stay stuck at that ceiling level, thus becoming equivalent to an emissions tax.[30, 31]

- **Allowance reserve:** extra 'reserve' allowances; unlike safety valves, where the number of allowances available are unlimited, the amount of extra allowances is limited to a maximum number issued, and thus the ceiling is no longer strict.[32]
- **Offsets:** in order to reduce the cost of complying with emissions targets, in some schemes domestic and international offsetting is permitted, whereby credits are generated for emissions reductions made in sectors or regions not covered by the cap. These credits are used to 'offset' emissions within the capped region. However, extensive offsetting should be discouraged as it can lock investment in high-emissions infrastructure domestically, making the eventual transition to a low-carbon economy more difficult and expensive.[33] Unsurprisingly, the quality of offsets is crucial, as they allow regulated firms to meet emissions requirements by paying unregulated sources to abate (cut emissions).
- **Banking and borrowing:** Banking allows companies to hold allowances and use them in subsequent compliance periods. Borrowing allows companies to use allowances from a future compliance period to meet obligations in a current period. This feature, which can be unlimited or restricted, helps firms smooth their abatement costs over time[34] and helps control allowance prices.[35]
- **Allowance loans:** companies could borrow allowances, with specified limits and payback to include interest payments.[36]
- **Market manager:** A government agency (e.g. a carbon bank) can intervene in the market, to buy allowances when prices are low, and sell them when prices are high.[37] It can also perform other market supervision functions as discussed in subsequent sections.

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The outlined cost containment approaches attempt to truncate the possible range of allowance prices in the emissions trading market, therefore reducing price volatility. These approaches aim to ensure the economically optimal amount of emissions reductions is achieved, though they can undermine the system's environmental objective. Above all, the instruments have their

30 Whitesell, 17.

31 Metcalf, G.E., *Cost Containment in Climate Change Policy: Alternative Approaches to Mitigating Price Volatility,* University of Virginia Tax Law Review, http://works.bepress.com/gilbert_metcalf/84 (2009).

32 Murray, B.C., R.G. Newell and W.A. Pizer. "Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade." *Review of Environmental Economics and Policy* 3, 2009: 84-103.

33 Hood, http://www.iea.org/papers/2010/ets_paper2010.pdf.

34 Fell, http://www.rff.org/RFF/Documents/RFF-DP-09-14.pdf.

35 Whitesell, 2011.

36 Fell, http://www.rff.org/RFF/Documents/RFF-DP-09-14.pdf.

37 Whitesell, 2008: 4.

own strengths and weaknesses, and have been tested in reality to a limited degree. Some experts have discouraged the use of price ceilings and floors, saying that they have damaging effects on the operation of the scheme, and also create a barrier to international linking.[38] Table 1 shows which price control measures are being used in current and proposed trading schemes.

Table 1: Measures to address price uncertainty and volatility in current and proposed trading schemes[39]

REGION	Schemes	Summary of measures
EU	EU ETS	• Unlimited banking. • One-year compliance period, no borrowing (but the deadline for submission is after the issue of following year's units, so there is effectively year-ahead borrowing within trading periods but not in the final year).
Australia	New South Wales	• Unlimited banking. • Penalty AUD 12/tCO_2-e for not supplying abatement certificates, effectively capping the allowance price. • Participants may carry forward a 10 per cent shortfall to the next year without penalty.
Australia	Carbon Tax	• The recently unveiled carbon pricing package (July 2011) contains a price ceiling and floor for the first three years of the ETS period. Specifically, the price ceiling will be set at AUD 20 above the expected international price, increasing by five per cent in real terms each year; in contrast, the price floor will be AUD 15 rising by four per cent per year in real terms.[40]
USA	Regional Greenhouse Gas Initiative	• Quarterly reporting (linked to existing EPA reporting) provides good market information. • Three-year compliance period, extendible to four years in the event of a stage-two trigger event. • Unlimited banking. • Price thresholds allow more offsets to enter scheme. • Auction reserve price of the greater of USD 1.86/tCO_2 or 80 per cent of the current market price.
USA & Canada	Western Climate Initiative	• Three-year compliance periods. • Unlimited banking. • Other measures to mitigate high prices are still under consideration: a reserve set-aside, or allowing use of future years' allowances above certain price triggers. • Auction floor price (level yet to be specified), to support low-carbon investment and help correct inadvertent oversupply of allowances.
USA	Waxman Markey (H.R.2425)	• Quarterly reporting cycle provides good information to market. • Unlimited banking. • Borrowing without interest one year ahead, with interest up to five years, for up to 15 per cent of obligation. • Strategic reserve set aside as safety valve, offered at auction with reserve price. Reserve is USD 28/t CO_2-e in 2012, rising five per cent in 2013-14, then set at 60 per cent above three-year rolling average price. Proceeds used to purchase REDD units to replenish reserve. • Auction floor price starting at USD 10/tCO_2-e then rising at five per cent per year above inflation.
USA	California	• Three-year compliance period. • Unlimited banking. • USD 10/tCO_2-e auction price floor. Allowances unsold at auction are added to the price containment reserve. • Allowance price containment reserve (approximately five per cent of total allowances), offered at fixed price at quarterly sales. Reserve will not be replenished. Reserve allowances will be offered in three tiers: USD 40/tCO_2-e, USD 45/tCO_2-e and USD 50/tCO_2-e in 2012. These prices will escalate by five per cent plus inflation each year, reaching USD 60/tCO_2-e, USD 67/tCO_2-e and USD 75/tCO_2-e in 2020.
CND	Alberta	• Unlimited banking. • Option of paying CAD 15/tCO_2-e into technology fund, effectively capping allowance price.

Source: Various; see footnotes.

38 Garnaut, Ross. *The Garnaut Climate Change Review* (Melbourne: Cambridge University Press, 2008), 335.

39 Adapted from: Hood, Christina. Reviewing Existing and Proposed Emissions Trading Systems, International Energy Agency, http://www.iea.org/papers/2010/ets_paper2010.pdf (2010), 53-54.

40 The Government of Australia. *Securing a clean energy future: The Australian Government's climate change plan,* http://www.cleanenergyfuture.gov.au/wp-content/uploads/2011/07/Consolidated-Final.pdf (July 2011).

A Carbon Bank

The weaknesses of cap-and-trade systems, as highlighted above and in the case study on the EU ETS, can be addressed to some extent by various cost-containment mechanisms and policy design features, as discussed above. When attempting to introduce these mechanisms, governance issues arise, as they cut across traditional institutional boundaries with regards to authority and knowledge acquisition.[41] This could point to the need for an independent governing body, in the form of a carbon bank, which would principally be charged with price management, thereby increasing the confidence in the system of both investors and covered entities.[42] A carbon bank would choose how to manage the price, using some of the cost-containment mechanisms described above. A carbon bank could help tackle some of the underlying drivers of price volatility, such as market expectations and investor activity, though it would only be able to react to volatility driven by exogenous factors such as weather conditions, fuel prices and the general level of economic activity. At the same time, to the degree that an independent carbon bank would play a role – either directly or indirectly – in shaping market design issues that are within the purview of the policy and political realm (such as allocation or auctioning levels), it would provide a greater degree of stability in the overall policy direction.

A carbon bank would choose how to manage the price, using some of the cost-containment mechanisms described above.

Functions

A carbon bank would not just be charged with price management, but would perform a variety of market oversight and management functions, including:[43]

- **Professional forecasting:** judgements about probabilities, assessments about the consequences of different outcomes with regards to emissions and carbon prices, etc.;
- **Allowance management:** allocating allowances, tracking allowance and offset ownership, and conducting auctions;
- **Monitoring emissions:** ensuring compliance, assessing progress towards emissions reductions, etc.;
- **Cost containment:** managing cost-containment mechanisms, buying and selling allowances, approving offset projects, etc.; and,
- **Coordination** with various government bodies.

41 Newell, 2005: 133-157.
42 Whitesell, 2008: 17.
43 Whitesell, 2011.

The main decisions that need to be made with regards to a carbon bank are its governing mandate, the tools available to it, and the degree to which it operates based on legislative rules versus management discretion.[44]

Strengths and weaknesses

The sheer complexity of administration of a cap-and-trade system suggests there is a need for third-party, independent oversight and management. Government can set the policy and direction, but day-to-day management necessitates an independent body. Independence is also important to insulate the emissions trading system from the influence of external interests, and to maintain the focus on the overall climate policy objective. The private sector requires long-term policy certainty to make investment decisions, so it's best to have an independent body managing the system, with government oversight.[45]

There are also downsides to implementing a carbon bank, the main one being that the bank could end up undermining the carbon pricing system if it intervenes too much and too often.[46] The actions of the carbon bank can to some degree be controlled through its operating mandate and rules, and through government oversight, but day-to-day management decisions are also influenced by the bank's managers, adding an element of unpredictability.

The main decisions that need to be made with regards to a carbon bank are its governing mandate, the tools available to it, and the degree to which it operates based on legislative rules versus management discretion.

Some argue that a carbon market has certain features that will make it inherently difficult for an institution like a carbon bank to manage. It is difficult to project CO_2 production levels, because they are linked with economic growth, energy prices and many other factors, which adds to the unpredictability of demand for allowances.[47] There is an incentive for firms to hold on to allowances until the end of a compliance period to ensure it can meet its targets, which can lead to an illiquid market.[48] The other unique feature of the carbon market is the fact that its long-term goal is to decrease the supply of allowances, which makes it harder to manage the price, since it places a constraint on allowance supply management.[49] The carbon bank's goals are so long-term that it will be difficult to evaluate its effectiveness over shorter time periods.[50]

44 Mason, Joseph R. *The Economic Policy Risks of Cap and Trade Markets for Carbon Emissions: A Monetary Economist's View of Cap and Trade Market and Carbon Market Efficiency Board Designs,* The U.S. Climate Task Force (2009).

45 McKibbin, Warwick J., *A New Climate Strategy Beyond 2012: Lessons from Monetary History.* The Brookings Institution and The Lowy Institute for International Policy (2009).

46 Mason, 2009.

47 Mason, 2009.

48 Mason, 2009.

49 Mason, 2009.

50 Mason, 2009.

International proposals

The idea of a carbon bank has been considered in several jurisdictions that have seriously explored carbon pricing. The proposals of various countries with regards to a carbon bank are explored in more detail in the following section, though Table 2 shows how these countries have defined the functions of the carbon bank.

Table 2: Global References of Carbon Banks and their Function

COUNTRY	Termed	Referencing Carbon Bank	Function
Australia	Carbon Bank	McKibbin-Wilcoxen Hybrid[51]	• Modeled on the Reserve Bank of Australia. • The central bank of carbon would print annual allowances to maintain a pre-announced price of carbon. • The annual price will apply five years at a time where it is then reset based on observed emissions reductions or as a part of a global agreement on carbon price ('safety valve'). • Independent body to avoid rent-seeking.
Australia	Carbon Bank	Garnaut Climate Change Review (2008 and 2011)[52]	• Long-term maintenance of stability of Australian ETS. • Given necessary powers and sufficient discretion. • Five-year firm cap. • Advise government on rules and application. • Monitor, report and verification of ETS.
Australia	Climate Change Authority; and, Clean Energy Regulator;	The Australian Government's climate change plan: Clean Energy Future (July 2011)	• Advise on pollution caps and progress towards meeting targets and undertaking reviews of the carbon pricing mechanism. • Administer the carbon pricing mechanism.
U.K.	Carbon Bank	News Conference by PM Gordon Brown[53]	• Remove influence of political pressures on allowance allocation decisions. • Support of other member states and the European Commission unlikely.
United States	Carbon Market Efficiency Board	Lieberman-Warner Bill[54]	• Modeled on the Federal Reserve. • Collect and analyze relevant market information. • Assume authority to implement the cost-relief measures. • Implement cost-containment measures.

Source: Various, see footnotes

51 McKibbin, W.J., and P.J. Wilcoxen, *A better way to slow global climate change,* Brookings Institution (1997); McKibbin, W.J., and P.J. Wilcoxen, "The Role of Economics in Climate Change Policy," *Journal of Economic Perspectives* 16:2, 2002: 107-129; McKibbin, W.J., and P.J. Wilcoxen, *Climate Change policy after Kyoto: Blueprint for a realistic approach,* Brookings Institution (2002).

52 Garnaut, 2008; Garnaut, Ross. *The Garnaut Review 2011: Australia in the Global Response to Climate Change* (Cambridge University Press, 2011). http://www.garnautreview.org.au/update-2011/garnaut-review-2011/garnaut-review-2011.pdf.

53 Taylor, Paul. "UK's Brown calls for EU carbon bank." http://www.reuters.com/article/2008/02/21/environment-climate-eu-brown-dc-idUSBRU00633120080221 (February 21, 2008).

54 The Library of Congress. "Bill Summary & Status: 110th Congress (2007-2008) S.2191," http://thomas.loc.gov/cgi-bin/bdquery/z?d110:SN02191:@@@L&summ2=m& (2008).

Analogous to a Central Bank

The need for, and functions of, a carbon bank have been compared to that of a central bank. The main points of similarity are highlighted in Table 3. The government is responsible for setting the policy goals and framework, whereas the carbon bank has independence in deciding how to meet the targets, just as the central bank does for its fiscal targets; this is known as "instrument independence."[55] The carbon bank's two instruments are the allowance price and supply. There are trade-offs between the use of the two instruments, because neither a carbon bank, nor a central bank, can use both instruments at the same time.

Table 3: Comparing a central bank and a carbon bank

	Central bank	Carbon bank
Policy goals (short- [ST] and long-term [LT])	**ST:** Maximum production and employment **LT:** Price stability (inflation)	**ST:** Control the market price of allowances **LT:** Reduce GHG emissions
Instruments[56]	**Price:** Interest Rate **Supply:** Monetary	**Price:** Allowances **Supply:** Emissions Target
Government promise[57]	Maintain currency purchasing power	Hit an emissions target

Source: Various, see footnotes

Roles of Government and a Carbon Bank

The governance of a cap-and-trade system has a large impact on its efficiency, stability, credibility and simplicity.[58] When considering the system's governance with the inclusion of an independent body, the government is still responsible for setting the framing policies and rules, while the carbon bank is responsible for implementation and ongoing market supervision. An independent body, in the form of a carbon bank, can perform the following functions, as shown in Table 4.

55 Whitesell, 2011.
56 Whitesell, 2011.
57 McKibbin, 2009.
58 Garnaut, 2008.

Table 4: Governance of a cap-and-trade system

FUNCTIONS OF A GOVERNANCE SCHEME	Government Responsibilities: Policy-making	Independent Carbon Bank: Administration and Regulation
Emissions scheme trading rules	• All, including coverage, point of obligation, acquittal, offset rules and standards (domestic and foreign), accounting rules, compliance regime. • Undertake reviews of scheme rules.	• Advise government on rules and their application. • Manage monitoring, reporting and verification systems. • Enforce compliance.
Setting emissions limit	• Decide/announce: › Initial target and trajectory (and conditions for changing); and, › Nature, extent and timing (including advanced notice) of changes to the target and trajectory.	• Administer movement from one trajectory to another.
Allowance issuance	• Determine manner of allowance issuance and setting fixed prices for auction.	• Sell allowances in line with fixed prices.
Use of revenue from allowance sales	• Receive revenue, and decide on its use.	
Market supervision	• Set policy on banking, lending and market participation.	• Make decisions on banking and carbon price targets. • Monitor integrity of the market and supervise transactions. • Monitor the creditworthiness of borrowers. • Monitor the stability of the market, and undertake interventions when required.
Trade rules (international linking)	• Establish international trade agreements and rules for international linking.	• Certify that conditions have been met for linking. • Monitor international trade by market participants. • Undertake stabilization interventions when required.

Source: Garnaut, Ross. *The Garnaut Climate Change Review.* (Melbourne: Cambridge University Press, 2008), 352-353.

The International Knowledge Base

Australia

The notion of a carbon bank has been best developed and most discussed in Australia. Economist Warwick McKibbin from Australian National University introduced the concept jointly with Professor Peter Wilcoxen from Syracuse University in 1997, expanding on the notion in 2002.[59] *The McKibbin Wilcoxen Hybrid,* which details a hybrid cap-and-trade and carbon tax approach to climate policy, also details the institutional structure of a carbon pricing scheme.

An essential component of the *McKibbin Wilcoxen Hybrid* is the proposal to build an independent institution in the form of a carbon bank to print annual allowances to maintain a pre-announced price of carbon. This particular model specifies that the annual price will apply for five years at a time, and then reset as required. This approach is an attempt to provide both price certainty and risk management.

59 McKibbin, W.J., and P.J. Wilcoxen, *A better way to slow global climate change,* Brookings Institution (1997); McKibbin, W.J., and P.J. Wilcoxen, "The Role of Economics in Climate Change Policy," *Journal of Economic Perspectives* 16:2, 2002: 107-129; McKibbin, W.J., and P.J. Wilcoxen, *Climate Change policy after Kyoto: Blueprint for a realistic approach,* Brookings Institution (2002).

In addition, *The Garnaut Climate Change Review* (2008) recommended an executive independent carbon bank to manage the emissions trading scheme. The carbon bank would act similarly to the Reserve Bank of Australia, providing long-term stability, and assisting emissions-intensive and trade-exposed industries, among other tasks.

The need for an independent agency was most recently reiterated by Professor Ross Garnaut in his updated 2011 Review.[60] Also, the carbon bank concept has been endorsed by the Clean Energy Council[61] where according to the chief executive Matthew Warren: "There is potential merit in some of these jobs being done at arm's length from government so they are away from political interference, they are away from being lobbied, they can make difficult decisions."[62]

Moreover, a group of senior economists in Australia wrote an open letter in May 2011 supporting the need for a carbon price, and outlining five elements in designing such a mechanism. Specifically, the fourth element advocates for an independent authority, again, similar to the Reserve Bank of Australia, with responsibility for: selling/auctioning allowances, collecting revenue, and allocating revenue in accordance with guidelines defined by legislation and by agreement with government. The benefit of such an institution would be to increase the system's fairness, transparency and accountability, and ensure a stable market price.[63, 64]

"We should run climate policy like we run monetary policy... The Reserve Bank of Australia is a credible system with the goal to bring inflation down within a target band within a period of time... With climate policy, you need to do the same thing and have an independent institution which sets the short-term price of carbon... If we get more information about climate change we can tighten the target or loosen the target in a way that is transparent and credible."

Professor Warwick McKibbin, ANU

The European Union

Responsibility for governance of the EU ETS is held by the European Commission which, while not entirely independent of political influence, *is* removed from national interests as a body representing all 27 EU countries and having to approve National Allocation Plans.

60 Garnaut, 2011.

61 Clean Energy Council, *Institutional arrangements for a carbon price,* www.cleanenergycouncil.org.au (May 2011).

62 Monk, David. "Carbon bank proposed to manage tax revenue," *ABC News,* May 2, 2011. http://www.abc.net.au/news/stories/2011/05/02/3204980.htm?section=justin

63 The list of senior economists include: Paul Brennan, Head of Economics, Citigroup Global Markets, Australia; Chris Caton, Chief Economist, BT Financial Group; Besa Deda, Chief Economist, St George; Saul Eslake, Director of the Productivity Growth Program, Grattan Institute, and former Chief Economist ANZ from 1995 to 2009; Bill Evans, Chief Economist, Westpac; Joshua Gans, Professor of Management, Melbourne Business School; Richard Gibbs, Global Head of Economics and Chief Economist, Macquarie Bank Limited; Stephen Grenville, visiting fellow, Lowy Institute for International Policy; Stephen Halmarick, Chairman Australian Business Economists; John Hewson, Economist and Former Leader of the Liberal party and the Federal Opposition; Raja Junankar, Professorial Visiting Fellow, School of Economics University of New South Wales and Emeritus Professor University of Western Sydney; Geoff Weir, Director, Financial Sector Services; and Glenn Withers, Chief Executive, Universities Australia.

64 *Economists' Open Letter Supporting A Price on Carbon Pollution 2011,* http://wwf.org.au/publications/economists-open-letter/ (2011).

The United Kingdom

In 2008, then British Prime Minister Gordon Brown called for the creation of an independent European carbon bank to strengthen the EU ETS, as well as provide transparency and predictability, though the idea was abandoned.[65] Instead, the recent focus has been on the concept of a Green Investment Bank (GIB), whose aim is to accelerate private-sector investment in the UK's transition to a green economy. The GIB is commercially independent and therefore not accountable to ministers or to Parliament for individual investment and lending decisions.[66]

An independent governance body does exist in the U.K. under the *Climate Change Act* (2008); however, its functions are to monitor, research and analyze carbon markets in order to provide independent advice to the Government, rather than acting as a central bank to minimize fluctuations in carbon prices.

The United States

Recent proposed U.S. climate change legislation has called for the establishment of an independent *board*[67] modeled on the Federal Reserve.[68] However, none of the pieces of legislation that mention the independent board have been passed, for example, *America's Climate Security Act* of 2007 and 2008, also known as the Lieberman-Warner Bill (S.2191 and S.3036), was killed in the U.S. Senate in June 2008. Subsequent U.S. climate change bills had differing oversight models; for example, Waxman-Markey (H.R. 2454) assigned market oversight to the Commodity Futures Trading Commission (CFTC), while Dingell-Boucher (2008) gave the Federal Energy Regulatory Commission (FERC) jurisdiction over the carbon market.[69]

Recent proposed U.S. climate change legislation has called for the establishment of an independent *board* modeled on the Federal Reserve.

Since then, various climate change policy advocacy groups have picked up on the idea, such as the United States Climate Action Partnership (USCAP)'s call for a 'Carbon Market Board (CMB),' which would have the authority to set annual limits on offsets.[70] In particular, USCAP calls for a market with cost-containment measures to limit price spikes, as well as an independent CMB to implement these measures in a manner that prevents 'market gaming and price manipulation.'[71]

65 Taylor, Paul. "UK's Brown calls for EU carbon bank," *Reuters,* February 21, 2008. http://www.reuters.com/article/2008/02/21/environment-climate-eu-brown-dc-idUSBRU00633120080221.

66 Green Investment Bank Commission. *Unlocking investment to deliver Britain's low carbon future* (2010).

67 This is simply a difference in terminology. The tasks of a carbon 'board' would be strikingly similar to that of a carbon 'bank.'

68 The Library of Congress. "Bill Summary & Status: 110th Congress (2007-2008) S.2191," http://thomas.loc.gov/cgi-bin/bdquery/z?d110:SN02191:@@@L&summ2=m& (2008).

69 Pew Center on Global Climate Change. *Carbon market design and oversight: A short overview,* http://www.pewclimate.org/docUploads/carbon-market-design-oversight-brief.pdf (February 2010).

70 United States Climate Action Partnership. *A Blueprint For Legislative Action: Consensus Recommendations for U.S. Climate Protection Legislation,* http://www.us-cap.org/PHPages/wp-content/uploads/2010/05/USCAP_Blueprint.pdf (2009).

71 United States Climate Action Partnership. Issue Overview: Carbon Market Oversight, http://www.pewclimate.org/docUploads/FINAL-USCAP-Issue-Brief-Carbon-Market-Oversight.pdf (2009).

The Knowledge Base in Canada

Canada has no national-level carbon pricing policy in place, and the federal government has stated that its intention is to regulate carbon-intensive sectors instead of implementing a carbon price. However, at the provincial level, several provinces are considering a cap-and-trade system. Four Canadian provinces (British Columbia, Manitoba, Ontario and Quebec) have committed to participate in the Western Climate Initiative (WCI), which is a regional cap-and-trade system. The WCI program design recommendations suggest the use of the following cost-containment tools: offsets, unlimited banking, an auction floor price, and as needed, an allowance reserve and allowance borrowing.[72] It recommends that market oversight is managed by existing authorities, though their responsibilities may need to be altered to accommodate for the needs of the emissions trading system.[73]

Canadian researchers have explored the concept of a carbon bank in a limited way. The National Round Table on the Environment and the Economy (NRTEE) articulates a concern about rent seeking in carbon pricing systems, and how it compromises the objectivity and independent oversight of regulators, thereby reducing confidence in the system.[74] In addition, the NRTEE refers to an 'independent external regulator,' which would make periodic price adjustments, advise on interim targets for each compliance period, provide ongoing evaluation, and advise on adjustments to carbon pricing policy.[75] A separate institution called the 'Carbon Pricing and Revenue Authority' would be empowered with regulatory and operational decisions including the monitoring and enforcement of compliance, with the ability to trigger relief mechanisms among other actions.[76]

More research is needed to examine how such an institution should be designed in the Canadian context.

More research is needed to examine how such an institution should be designed in the Canadian context. Given the stated position of the federal government to align with the United States' climate policy and the participation of Canadian provinces in the WCI, how the institution can operate in conjunction with the United States is a key consideration.

72 Western Climate Initiative. *Design for the WCI Regional Program*, http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program/program-design (July 2010), 12-13.

73 Western Climate Initiative. *Design for the WCI Regional Program*, http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program/program-design (July 2010), 20-21.

74 National Round Table on the Environment and the Economy. *Technical Report: Achieving 2050: A Carbon Pricing Policy for Canada*, http://www.nrtee-trnee.com/eng/publications/carbon-pricing/carbon-pricing-tech/carbon-pricing-tech-backgrounder-eng.pdf (2009).

75 NRTEE, 2009.

76 NRTEE, 2009.

Implications for Policy-Makers

This brief is meant as an overview of the theory and experience on the concept of a carbon bank. Based on the overview, Sustainable Prosperity believes that the following conclusions are of direct relevance to policy-makers engaged in the development of carbon pricing policies in Canada:

1. Experience to date with emission trading schemes (most notably the EU ETS) has shown that price volatility is a real concern in the operations of a cap-and-trade system, inasmuch as it can create a disincentive to emission abatement investments. At the same time, research suggests that the condition of volatility can, in fact, act as an incentive to such investments if price volatility in the scheme is seen as a risk that can only be mitigated by abatement.

2. There are a number of instruments that can be used in a cap-and-trade system to address price volatility. The development and implementation of these instruments might best be left to an independent "carbon bank." This body would provide oversight of a cap-and-trade system, and manage price volatility using the cost-containment instruments described above. It would also, indirectly, through the experience of its ongoing management of carbon markets, provide advice to governments on the nature and evolution of the market itself, thereby indirectly improving policy certainty and effectiveness.

3. The roles of the government and the carbon bank need to be clearly defined to ensure the most effective functioning of the cap-and-trade system.