



CONSIGNMENT AUCTIONING OF CARBON ALLOWANCES IN CAP-AND-TRADE PROGRAM DESIGN

A hybrid method used in California's emission trading system combines elements of auctioning and free allocation

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Carbon pricing is increasingly used as a mechanism to reduce carbon emissions. Carbon taxes and cap-and-trade programs, or emission trading systems (ETS), are two ways to directly introduce a carbon price. The most important new development in carbon pricing is the [implementation of China's national ETS](#), and the issue of how to distribute allowances, or the tradable permits at the core of compliance for every ETS, is fundamental to program design. Allowances can be sold by the government – “auctioned” – or given away – “freely allocated.”

This research note discusses the “consignment auctioning” approach that California has developed, which offers a hybrid of auctioning and free allocation. It provides an option for Chinese policymakers to introduce auctioning while at the same time prioritizing the cushioning of economic effects on entities covered initially under China's ETS through free allocation. Consignment auctions also are a way to overcome existing legal and institutional hurdles to auctioning, as it allows for auction revenue to be kept separate from government accounts.

AUCTIONING VERSUS FREE ALLOCATION

The benefits of auctioning are immense. It offers the fastest, most efficient way for the market to discover an efficient carbon price, quickly sorting through the signal provided by auction participants to determine a market clearing price. Auctioning provides the best way to introduce price floors and price ceilings into an ETS, introducing price management and reducing cost uncertainty, which is another priority for policymakers. Auctioning generates the most efficient economic outcomes by avoiding subsidies for carbon emission production.

Auctioning also helps avoid unfair impacts on consumers. Many common markets (although not the Chinese power market, as currently structured) enable the industries whose emissions are covered by the ETS to pass along the cost of carbon to consumers. This occurred in the European Union (EU) ETS, where power companies enjoyed windfall profits from free allocation,

and is one reason why the EU ETS has increasingly auctioned allowances and have 100 percent allowances auctioned for power sector. Given the Chinese power sector's current structure, power producers covered under phase one of the national ETS will be inhibited from passing along costs to downstream consumers.

Political resistance to an ETS inevitably arises from legacy fossil-fuel intensive emitters, and free allocation is often a strategy for overcoming this. In China, where a major transition away from coal-fired generation to lower-emitting resources and steps to correct coal sector overcapacity are already causing major social dislocations, policymakers are understandably cautious about introducing new shocks.

Political acceptability is a real world hurdle that must be addressed, but from the economic perspective, only one condition justifies free allocation: concerns about international competitiveness. In most cases, the consumption of electricity or transportation fuel has strong domestic roots.¹ Electricity is often supplied exclusively or nearly so. However, every ETS program thus far has provided some free allowances through output-based allocation to counter these concerns for "energy-intensive, trade-exposed" firms.

OUTPUT-BASED FREE ALLOCATION

Energy-intensive, trade-exposed sectors are those for which energy costs are a large share of overall production costs (i.e. energy-intensive) and domestic producers must take into account whether foreign competitors will face a similar carbon price (i.e. trade-exposed). Trade exposure can occur if a domestic market involves significant foreign imports or if domestic producers largely export to places without carbon pricing. In such cases, domestic producers are not likely to be able to pass costs along to consumers, providing a rationale for free allocation.

The preferred approach to free allocation to counter competitiveness concerns is known as output-based free allocation (OBA). This approach rewards producers with carbon allowances based on the amount of economic output and not the level of emissions. This provides an extra incentive for domestic production to continue undiminished.² OBA is a big improvement over free allocation based on past emission levels. The worst form of free allocation is one that rewards producers with more allowances if they emit more carbon.

¹ Transportation fuels are not among the initial sectors Chinese policymakers have targeted for coverage.

² The Economic and Allocation Advisory Committee to the California EPA describes the advantages of the approach as follows: "A particular form of free allocation—output-based updated free allocation—has the potential to mitigate emissions leakage by helping keep prices low for firms within the implementing jurisdiction and thereby helping those firms maintain a share of the larger market. Output-based updated allocation offers firms free allowances as a function of their levels of production in the current or in a recent time period. As discussed below, it is in effect a subsidy to production. As a result, it can help in-state firms maintain their output levels and thereby retain market share," p. 13. *Allocating Emissions Allowances Under a California Cap-and-Trade Program: Recommendations.*

http://www.climatechange.ca.gov/eaac/documents/eaac_reports/2010-03-22_EAAC_Allocation_Report_Final.pdf

It is worth pointing out that even free allocation through OBA induces some distortion from the theoretical optimum, but it does not fundamentally undercut the existence of an allowance price. The reason for this is that the method by which allowances enter into circulation does not change supply and demand market fundamentals, which determine the price of an allowance. Therefore, a carbon price can still be effective even with free allocation. Even if producers receive free allowances, they still have an incentive to reduce emissions because doing so would allow them to sell extra allowances they might not need.

Experience with ETS impacts over the last decade have found that covered industries generally overestimate the impact a carbon price will have and “international competitiveness impacts are limited to a small number of industry sectors,” i.e. the sectors that are most energy-intensive and trade-exposed.³ Chinese policymakers concerns are understandable because China’s export-oriented industrial sectors are such important parts of the nation’s economy, even as it undertakes a transition to new economic models.

BACKGROUND ON CALIFORNIA ELECTRICITY MARKET

California’s consignment auctions apply to the state’s “investor-owned” electricity providers, which serve most of California’s electricity demand. They are privately-operated companies, but are strongly regulated by the state’s Public Utilities Commission, which must approve investments, procurement plans, and rates customers will be charged. Investor-owned utilities (IOUs) are different than publicly-owned electricity providers, which are not required to consign allowances they received. The publicly-owned electricity providers receive free allocation with a requirement that they use them to benefit their electricity customers.

HOW CONSIGNMENT AUCTIONS WORK

The consignment approach can be thought of as consisting of three steps.

1. Free allocation to companies
2. Government auctioning of allowances on behalf of the companies
3. Distribution of auction revenue to companies

In the California context, it works as follows. First, the government gives IOUs free allowances. They are required to be returned to the California state government (“consigned”), and are later offered for sale at quarterly auctions. After the sale, revenue is returned to the IOUs in an amount that reflects their contribution to the amount of allowances sold at auction. Also, the electric utilities must report on how the revenue is used and explain consistency with the requirements of the regulation.

³ See page 9 of: Michael Grubb, Thomas L. Brewer, Misato Sato, Robert Heilmayr, Dora Fazekas. 2009. Climate Policy and Industrial Competitiveness: Ten Insights from Europe on the EUETS. German Marshall Fund Climate and Energy Papers Series 09.

Some equations may help explain this process for the mathematically inclined. California's free allocation approach to electricity providers is not based on a single benchmark, but for simplicity, the following equation presents such a simplified case.⁴ Further, it should be emphasized that California's approach to OBA for industries which are deemed "energy-intensive, trade exposed" uses a more complicated formula that includes a leakage risk factor based on the level of energy intensity and trade exposure.

Two equations illustrate the consignment auction approach, but the following equations should be viewed as simplified and generic rather than representative of the approach taken in California:

ALLOCATION

Equation one develops a simplistic example of free allocation to covered power producers by OBA using a single benchmark.

- Define production X , kilowatt-hours (kWh)
- Define benchmark Y , allowances per kWh sold

A firm producing X units of output receives allowances according to this formula:

$$(Equation 1) \text{ Allowances received} = X * Y$$

This first equation reveals the amount of free allowances received. Next, allowances are returned to the state government (consigned), for auctioning. Then, electricity providers receive revenue back according to the amount of allowances they provided for the auction.

RETURN OF REVENUE TO FIRMS

A firm producing X in output and contributing a quantity of A allowances to the consignment auction would receive allowances back according to the following formula.

- Define A as the amount of allowances initially received based on equation (1).
- Define P as the price of allowances determined at auction.

$$(Equation 2) \text{ Revenue returned to firm} = A * P$$

California's approach includes a further step regarding how revenue returned to companies is to be used. IOUs are required to use revenue generated from consignment according to rules set

⁴ California's approach recognizes current emissions but also aims to reward electricity providers that made significant investments in low carbon generation sources in the past. Additional discussion of the considerations and specific design choices are discussed in the California Air Resources Board Staff's Proposal for Allocating Allowances to the Electric Sector. (<http://www.arb.ca.gov/regact/2010/capandtrade10/candtappa2.pdf>)

by California's government. This last aspect of the California approach helps to achieve the state's policy goals, but is not strictly required by consignment auctioning. China's policymakers could return revenue to covered companies with no strings attached.

ADVANTAGES OF THE CONSIGNMENT APPROACH

Consignment auctioning offers at least four benefits for China's policymakers to consider.⁵

ALIGNMENT WITH OBA AND BEST WAY TO ACHIEVE A PRICE COLLAR

Consignment auctioning is a promising way to promote auctioning that aligns with initial proposals under the Chinese national ETS for OBA to covered emitters as the main distribution mechanism. Price floors and ceilings at auction are the most direct and proven way to manage price fluctuation. Therefore, by enabling auctioning from the start, price regulation will be easier.

OVERCOMES LEGAL AND INSTITUTIONAL BARRIERS

One hurdle to the introduction of auctioning in China's national ETS has been the fact that the implementing agency (formerly the National Democratic and Reform Commission and now the Ministry of Ecology and Environment) does not have authority to handle revenue from auctions. Proceeds from a conventional auction would be taken as "government revenue" and would be required to flow through the "general budget" account handled by Ministry of Finance. Consignment auctioning offers a solution, as allowances are owned by entities and the auction proceeds are collected on behalf of them. Thus the proceeds do not have to go to "general budget." A private firm or non-government institution could be established to manage the auction and disperse funds to covered entities.

California has adopted such an approach though for a different reason. The state wanted to establish a new authority to jointly coordinate auctioning among the partners in the linked carbon market established under the Western Climate Initiative, which include the Canadian provinces of Ontario and Quebec. To do this, a nonprofit corporation was established called the Western Climate Initiative, Inc.,⁶ which manages auctions, including collecting revenue, which is dispersed directly to the companies which consigned allowances. The funds never enter government controlled accounts, but rather are directly wired to participant bank accounts.⁷

⁵ Burtraw and McCormack reach similar conclusions in recent work, concluding consignment auctioning can help overcome, "thin markets, weak prices, and poor recognition of opportunity cost," that may result from exclusive reliance on conventional free allocation. See: Dallas Burtraw and Kristen McCormack, "Consignment auctions of free emissions allowances," August 2017, Volume 107, pages 337-344. <https://doi.org/10.1016/j.enpol.2017.04.041>

⁶ From the home page, <http://www.wci-inc.org/>, "Western Climate Initiative, Inc. (WCI, Inc.) is a non-profit corporation formed to provide administrative and technical services to support the implementation of state and provincial greenhouse gas emissions trading programs."

⁷ This is implicitly demonstrated in CARB's guidance for consignment auctions, which instructs participants: "Every consigning entity is required to provide wiring instructions or confirm existing wiring instructions in CITSS for the payment of auction proceeds every time allowances are consigned to auction."

INCREASES AUCTIONED SHARE OVER “PURE” AUCTION APPROACH

By increasing the fraction of allowances available at auction, auction effectiveness is improved. A larger market makes it more difficult for price manipulation to happen and a larger quantity of allowances for sale with more participants increases the quality of the price signal.

California’s initial ETS design covered the electricity sector plus other large industries, including many producers deemed energy-intensive, and trade-exposed, meaning they receive free allowances under OBA while also purchasing some at auctions (“the primary market”) or from secondary market (bilateral or commodity exchange mediated transactions). Only later did California and the Western Climate Initiative program expand to cover natural gas and transportation fuels. Hence, consignment auctioning was needed to have a meaningful share of auctioning from the start.

In its second ETS compliance period, California expanded the program to cover natural gas and transportation fuels. Transportation fuel demand is not judged at risk of leakage, and therefore allowances needed to account for transportation fuel distribution are entirely auctioned. However, in the program’s first compliance period, consignment auctioning was necessary to have a significant amount of allowances auctioned.

MORE TARGETED USE OF ALLOWANCE VALUE BEYOND WHAT CAN BE ACHIEVED WITH PURE AUCTIONING OR FREE DISTRIBUTION

Consignment auctioning allows for a more targeted use of the value created by allowances needed for compliance under an ETS, because it allows policymakers to go beyond the choice of no or very little carbon price for consumers versus a carbon price that fully hits consumers.

The approach California developed creates a powerful combination of economic efficiency and consumer protection by allowing for the return of allowance value to consumers in a very specific, efficient way that enhances environmental effectiveness. Essentially, the carbon price signal remains in force and retail electricity prices are allowed to rise to reflect embedded carbon. At the same time, electricity customers are largely insulated from overall effects through a customer rebate (i.e. the “Climate Credit,” a fixed payment per customer that does not change with the amount of electricity consumed).

Figure 1 shows how electric utilities have used money raised through consignment auctions so far.⁸ The Residential and Small Business Climate Credits, the largest category at 70 percent of overall funds, represents funds going to the fixed customer rebate that does not change with amount of electricity consumed. It helps keep overall bills low even as price per kilowatt-hour

See, https://www.arb.ca.gov/cc/capandtrade/auction/consignment_guidance.pdf

⁸ California Air Resources Board. 2018. Cap-and-Trade Program Summary of Vintage 2014–2016 Electrical Distribution Utility Allocated Allowance Value Usage,

<https://www.arb.ca.gov/cc/capandtrade/allowanceallocation/edu-v2014-2016-allowance-value-report.pdf>
(accessed 1 June 2018)

increases. Residential Volumetric Rate Reduction refers to the use of some value to tamp down the price effect for households. 2016 was the last year that any of the money could go to rate reduction, and so the full cost of carbon was integrated into electricity use decision making starting in 2017. Seven percent of funds supported energy efficiency efforts at large industrial plants.

Cumulative total: \$3.16 billion

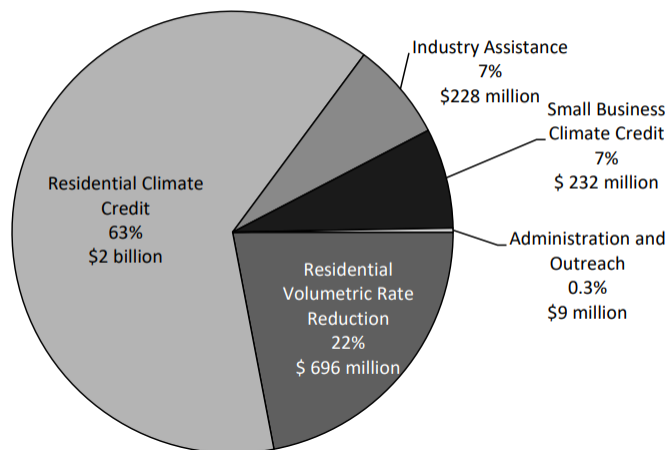


Figure 1. Revenue use for revenue earned from consignment auctioning, 2014-2016 (California Air Resources Board)³

California developed the consignment auctioning approach for a more creative solution that went beyond pure auction or free allocation. It allowed for major auctioning from the start of the program and allowed a more effective policy that reduced emissions by a larger amount while protecting consumers.

Without consignment auctions, the choice for California policymakers would have been, either (1) auction, in which case electricity providers would have passed along the cost in higher prices, (2) or freely allocate, which would have suppressed the price signal for consumers, reducing the effectiveness of the policy.

With free allocation, the carbon price would not have been visible to the consumer, due to the structure of the California electricity market. Under state regulation, investor-owned utilities would not have been able to increase electricity prices for consumers if they received allowances for free, which would have suppressed the price signal for consumers and reduced the policy's effectiveness. A market signal for carbon price would have still existed, in terms of the wholesale power generation procurement, but the customer-side incentive for conservation would be reduced. The alternative and preferable outcome was achieved thanks to consignment auctioning. Conservation of energy was encouraged while overall effects on consumers have been minimized.

CONCLUSION

As in most programs, it appears that China’s program designers are balancing a number of goals, including avoiding additional economic impacts on a power sector already under pressure from air pollution regulation and overcapacity corrections. Indications are that China’s initial program design will rely significantly on output-based free allocation to covered firms.⁹ We understand that there are important political, social, and economic reasons for this. The consignment auctioning approach offers a way to introduce auctioning in China’s national ETS without contradicting plans for initial free distribution.

⁹ See the paper “China’s New National Carbon Market” by William Pizer and Xiliang Zhang for an overview with allocation discussion starting at page 6. Included version dated December 31, 2017 and presented at the American Economic Association meeting and accessed March 22, 2018. Look for an updated journal article version soon.

Working paper version: <https://www.aeaweb.org/conference/2018/preliminary/paper/Tbf4SdTS>