



## New American Contract Policy Paper

### The Pitfalls of Manufacturing a Market:

#### *Why Carbon Will Not Just Sit Down, Shut Up, and Behave Like a Proper Commodity*

By Emily Gallagher, New America Foundation  
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Advanced modern economies trend toward creating efficient markets for the exchange of any desired good, and, in Europe, the legal permission to emit carbon is now no exception. Over the years, advanced electronic exchanges have largely replaced over-the-counter trading for even complex futures contracts. In light of this trend, the European Emissions Trading Scheme (ETS) was created with the goal of establishing a liquid market, both on exchanges and over-the-counter, for European Emissions Allowances (EUAs). An allowance represents 1 metric ton of CO<sub>2</sub>.

Developed world economies (excluding the USA), dubbed Annex 1 nations, signed and ratified the United Nations' 1997 Kyoto Protocol, thereby committing them to reduce CO<sub>2</sub> emissions to 95% of 1990 levels by 2012. Annex 1 nations are attempting to achieve these reductions via cap-and-trade. Under this system, the UN assigns carbon allowance units (AAUs) to nations in accordance with the goals of the Kyoto Protocol. These nations must then reduce their emissions to equal the sum of their AAUs, or buy additional AAUs from other nations. The UN is administering the allocation of AAUs in 3 phases – meaning that AAUs become scarcer as the Kyoto deadline approaches. Phase 2 is currently in place.

There has been much debate over whether cap-and-trade is truly an efficient solution to the problem of global warming. Many argue that a tax-based system would be more efficient as the proceeds could be invested in alternative fuel technologies more directly. Additionally, it is true that under cap-and-trade brokers and banks take basis-point fees from emissions trades, leading to less direct investment in clean technology upgrades. However, cap-and-trade holds an advantage over a tax-based system in one regard: A tax-based system provides no reward for over-abatement. In contrast, Annex 1 countries that emit less than their allowable level of greenhouse gases can profit by selling their AAUs to other countries.

This potential for encouraging over-abatement is the grease under the wheels of Europe's Emissions Trading Scheme, which has been developed in parallel with the Kyoto Protocol. Under ETS, European governments directly involve European corporations (from the power generation sector and cement, metal, glass and pulp industries) in the effort to reduce CO<sub>2</sub> emissions. ETS corporations must reduce



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their emission to equal their allocated number of European Emissions Allowances (EUAs) or purchase additional EUAs from other ETS corporations in cases of under compliance.

## Traditional Commodity Price Drivers

Due to its large scale, Europe's carbon dioxide (CO<sub>2</sub>) cap-and-trade scheme, the EU Emissions Trading Scheme ([ETS](#)), presents the best example of carbon price movement. European Union Allowances ([EUA](#)), or the permission to emit one ton of CO<sub>2</sub>, are traded between designated polluting industries throughout the EU.

*Within ETS, it isn't carbon's price volatility that makes its market seem uncharacteristic of commodities markets; commodity markets are often characterized by volatility. Instead, it is the fact that carbon's price drivers are not so easily pinpointed and, therefore, its volatility seems arbitrary.*

Traditional commodity drivers are:

(a) *The Cost of Production* – Trying to apply this variable to carbon allowances is laughable. What does drawing up and distributing allowances cost the government? Who knows and who cares? It is miniscule. Instead, what influences carbon price is the cost of abatement, or the marginal cost of switching to a low-carbon fuel.

(b) *Currency Valuation* – Currency valuation will affect carbon prices if the American trading scheme attempts to team up with the European, but until then it too is meaningless.

(c) *Speculation* – In recent years, short-term speculators have been blamed for volatility in commodity prices, [especially oil](#). However, the carbon markets have seen a dearth of speculation; this makes volatility drivers in the carbon market less identifiable.

(d) *Storability* – A carbon allowance is a storable commodity, meaning it can be “banked” for use during later dates and phases. It can also be resold on the market. This feature influences supply and demand dynamics. So, during periods of high inventory levels weak demand should follow.

(e) *Supply and Demand* – Carbon does follow supply and demand to some degree, for instance carbon appears correlated with GDP and movements in the FTSE 100, which implies that demand for allowance increases when production and investment increases.

However, the scarcity needed to bring up allowance price early on, and therefore stimulate alternative energy investment, was legislated out of the European model – largely for political reasons. Thus, carbon supply, like with most commodities, is subject to political influence. But, unlike with other political commodities like oil and natural gas, which may have pipeline disruptions or sanctions to deal with, carbon is uniquely at the mercy of the political pen – where it was conceived.

As a result, according to the European Climate Exchange, carbon trading quickly embraced a derivatives market – derivatives markets tend to develop when spot markets have volatile prices. But, in contrast with traditional commodities, the forward and futures carbon markets have developed faster than the spot market (derivative trades represented approximately 95% of total volume until recent months when the spot market has grown substantially). In a new and highly unpredictable market, derivative instruments are vital to managing an emissions portfolio.

Furthermore, supply and demand game-changers, like weather, are not always observed in carbon prices. For instance the frigid 2008/2009 winter increased heating demand in Europe and, with more coal burning, should have increased demand for EUAs. This didn't appear to happen.

So what drives carbon and, according to traditional economic models, what makes carbon trading so “inefficient”?

## Mischievous Carbon

ETS market inefficiencies have produced a strange result: carbon emission allowances trade cheaply. Therefore, it is currently cheaper for polluters to buy the allowances than to cut carbon emissions.

To explain: as power-generators seem to have the largest carbon shortage within ETS, many commodity economists, such as Mark C. Lewis, Managing Director of Commodities Research at Deutsche Bank, agree that the EUA price should be based on the marginal cost of fuel switching.

In other words, the cost of burning coal to generate electricity has traditionally been far cheaper than the expense of burning natural gas. For every megawatt-hour (MWh) of energy generated, coal-fired power stations emit two times as much CO<sub>2</sub> as natural gas-fired stations. If the cap is tight (meaning allowances are scarce), coal-fired generators will have to buy more EUAs. This pushes up EUA demand and, therefore, EUA prices. A cascade of cost increases will continue until it becomes more profitable to use natural gas, instead of coal, for generation. Likewise, if coal prices were to hold constant and natural gas prices were to fall, natural gas use would run ahead of coal, thereby reducing the demand for allowances and thus EUA prices.

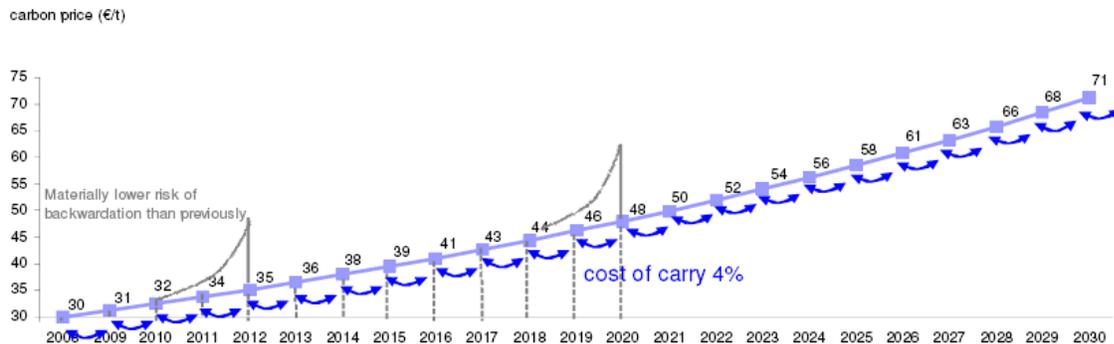
Therefore, in a CO<sub>2</sub>-constrained universe, power generators will need to buy fewer EUAs if they close down their coal burning plants and build natural gas burning plants of equal capacity. The long-term marginal cost of carbon is therefore equal to the EUA price that would ensure that a new natural gas-fired plant is built instead of a coal one. As a result, the price of an EUA must be sufficiently high to encourage power companies to switch.

Power generators with a “mixed portfolio” – meaning they have both coal and gas burning power plants – will need to buy fewer EUAs if they can optimize utilization of their natural gas plants at the expense of their coal-fired ones. As a result, the price of an EUA must be sufficiently high to encourage power companies to switch. Assuming sufficient capacity within existing natural gas burning plants, the price of EUAs would equal the short-term marginal cost of fuel switching.

Therefore, when the cap is tight, the fundamental EUA price is highly dependent on the relationship between coal and natural gas prices in addition to the cost of switching.

However this is not often the case. As the [graph](#) from Deutsche Bank illustrates below, based on the cost of fuel switching (and assuming a long-term oil price forecast of \$85 per barrel and a long-term coal-price forecast of \$125 per ton), today’s appropriate carbon price should be around €30 per ton.

### Carbon Price Given an Efficient ETS Market (2008 to 2030)



Source: Deutsche Bank

Instead, while €30 per ton was seen for a short time in 2008, EUA prices had shrunk to a third of the marginal cost of fuel switching by January 2009 (roughly €10 per ton). Likely causes were the drop in natural gas prices, coupled with negative GDP outlook in Europe. Some of this should have been offset by long-sided investors foreseeing a tightening cap in coming years; however, the numbers seem to point

to the absence of such a long-term view. Furthermore, analysts are scratching their heads to explain why between February and April EUA prices suddenly jumped 50% to €16/t – all this despite little movement in economic forecasts or natural gas prices.

*The failure of the EUA price to trend towards the marginal cost line suggests a lack of normal supply and demand dynamics – this inefficiency may only be explained when one takes into account the numerous artificial drivers pressing on carbon prices like fingers on a Ouija board.*

## **A Manufactured Commodity**

“Since the value of a permit is a direct function of the rules designed by policymakers, there is little practical benefit in attempting to quantify CO<sub>2</sub> market prices, percentage of allowances to be auctioned, or incremental reduction levels given the huge variances in baselines and market models. For example, while one would expect the price of one unit should generally be tied to the cost of removal of that one unit from the emissions of a power plant or industrial facility given today’s technology, but that’s not necessarily the case.”

-[Scott Speaker](#) – JP Morgan Chase

From its earliest days, the EU Emissions Trading Scheme had numerous implementation flaws, resulting in remarkable inefficiencies. However, while many flaws have been recognized and amended, carbon is still not behaving according to the models. Although some inefficiency may be due to the residual effects of previous errors, much is caused by the nature of the product itself and will, therefore, not self-correct with time.

### ***Carbon Leakage***

“[Carbon leakage](#)” is essentially carbon arbitrage – the fact that carbon not released in a country with a tight cap could be released in country with a loose cap, or no cap. In the absence of changing demand, many manufacturing firms may migrate abroad and, globally, carbon emissions will remain unchanged. Therefore, policymakers worry about the economic drain of carbon leakage on developed countries’ manufacturing base. The main tool used to combat the economic effects of carbon leakage under ETS is [the free allocation](#) of EUAs to at-risk manufacturing and power generation sectors.

However, free allocation has been a key driver for the strange behavior of carbon prices as it has reduced the scarcity of tradable allowances. Unlike other commodities markets, in Phase 1 most ETS corporations began with long positions. Power generators, for example, were given about 75% - 80% of their EUA needs for free. As a result, they did not need to hedge EUAs to the extent they would have hedged other commodity purchases.

Within ETS, polluters must flatten their position (possess enough EUAs to cover all carbon emitted) by the end of the several-year-long “Phase,” as opposed to annually. Therefore, shorting of EUAs was also rampant within ETS, as the usual risks associated with shorting were mitigated by the fact that corporations knew that they would receive most of their future EUA needs for free. Thus, they were not as worried about a sharp EUA price hike just before the term date (the date when the shorter must furnish the EUA) as they would under normal shorting conditions.

*The overall result has been irrationally downward pressure on carbon prices. And it looks like this market inefficiency is here to stay.*

While the EU has recognized the problems engendered by free allocation and amended some rules (utilities will have to buy 100% of their allowances from 2013 onward), the elimination of free allocation in the presence of carbon leakage is all but impossible politically. This is evidenced by looking at the new rules under ETS – industry will still receive 80 percent free allocation in 2013, with free allocations dropping to 30 percent in 2020, and to 0 in 2027. Furthermore, sectors exposed to the risk of carbon leakage are dealt with separately, some receiving 100 percent of their carbon needs for free.

This issue is not going away anytime soon, as the American cap-and-trade provisions of Waxman-Markey demonstrate. The bill [contains free allocations](#) slated to phase out over 10 years.

### ***Unpredictable Government Intervention***

With a government-manufactured market, the rules of the game are constantly changing. This is due to the fact that there are so many polluters with such diverse needs that governments tend to establish very complicated allocation systems that are often unpredictable from one year to the next – a perfect [Rube Goldberg machine](#), really. As a result, analyst reports on carbon prices are stuffed to the brim with caveats and recognition of just how little is known about these systems.

The New Entrants Reserve (NER) is an example of an ETS policy that prompts significant speculation. To avoid discouraging entrepreneurs, ETS regulators set aside an allowance reserve for new emitters. Already established players must therefore grapple with the chance that, if regulators determine that the reserve is over-stocked, they may take these excess allowances out of the reserve and release them into the market. Likewise, new entrants, such as the massively polluting aviation sector, can suddenly be legislated into the next phase of the scheme – changing the future dynamics dramatically.

Furthermore, with a “normal” commodity like corn, suppliers leak product into the market appropriately to support the price. In contrast, with carbon allowances, polluters and analysts alike are in the dark as to when the auctions of future phases’ EUAs will be held, and this uncertainty influences EUA derivative prices.

Lastly, there is dramatic political risk, such as the government scrapping cap-and-trade entirely in favor of a tax-based system, or even the possibility that a US cap-and-trade scheme will link up with the ETS. The fact that the post-2020 (post-Kyoto) outlook has not yet been fully legislated also carries risk.

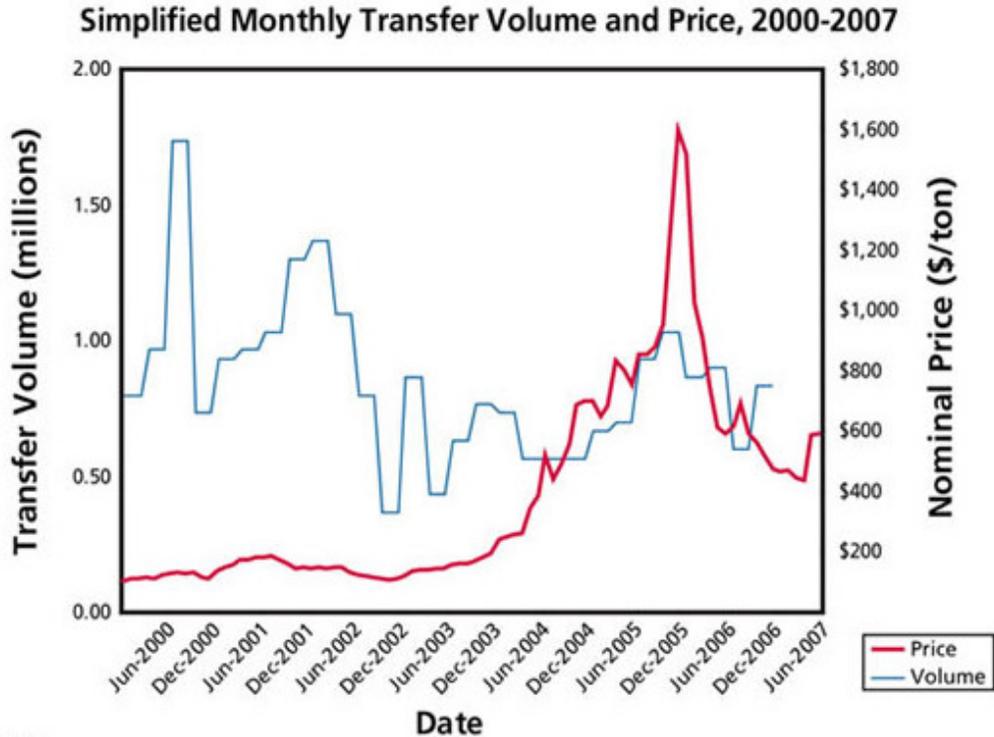
*Although other commodities carry a good deal of uncertainty, carbon players confront a particularly unpredictable market because there is only one regulator and one supplier – the government, which can act arbitrarily and politically.*

### ***Comparison with the Sulfur Dioxide Market***

Carbon is not the first negative externality to be commoditized. In response to acid rain issues generated by emissions of sulfur dioxide (SO<sub>2</sub>), the U.S. mandated [a cap-and-trade scheme in 1990](#). Thus, carbon cap-and-trade is but an expansion of a prior pollution reduction scheme, which is almost universally considered a success in significantly and cost-effectively reducing emissions.

However, comparing the SO<sub>2</sub> market with that of carbon is a bit like comparing baseball with online poker. Carbon is a much larger externality produced by more industries than SO<sub>2</sub>, which is primarily emitted in large quantities by coal-fired power plants. A key difference in the two markets is the fact that, to reduce SO<sub>2</sub> emissions, many power generators simply had to switch to low-sulfur coal and/or add more high-tech scrubbing technology. They did not have to change fuel sources altogether or trust in technology that has not been developed or fully commercialized. Because the technology was largely pre-existing, many large power generators decided very early on to invest in reducing emissions. In contrast, in a carbon-constrained environment, power generators will face a Solomon’s Choice: hold out for a large-scale technology, such as carbon sequestration, to come on-line or pursue a new fuel source, most likely natural gas.

Yet, despite these dissimilarities, SO<sub>2</sub> prices, like carbon, have shown vulnerability to government legislation. The price spike in the [graph](#) below was caused partly by a market rule change and partly by the removal of a government requirement on building new coal-fired plants – both caused a sharp increase in demand for permits.



Source: EPA, 2007

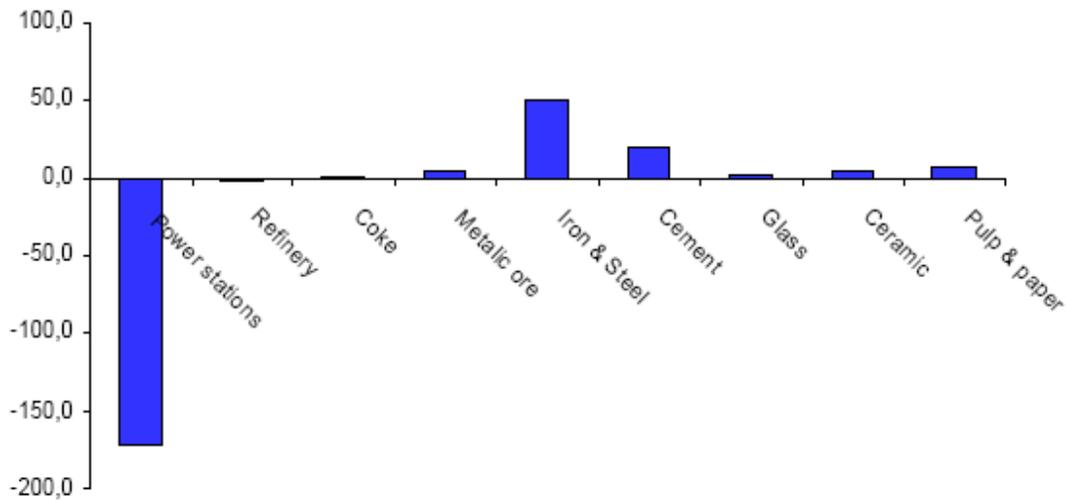
*If the impetus behind construction of a large scale carbon cap-and-trade market is the triumph of the much simpler SO<sub>2</sub> market, then it is necessary to look at what made the SO<sub>2</sub> market triumphant – trouble-free access to technology. It is also beneficial to observe the omnipotent and destabilizing hand of the government in a fabricated market.*

**Psychology of Market Players**

Shouldn't carbon behave like the energy commodities that release it? In reality carbon is a sort of reverse commodity, and therefore it is managed differently by each industry sector. For several reasons, the trading behavior of carbon emitters differs from that of other commodity traders.

To understand their psyche of this market, one must first look at the long and short positions of the participants:

**Distribution of EUA Deficits and Surpluses by Sector (Mt)**

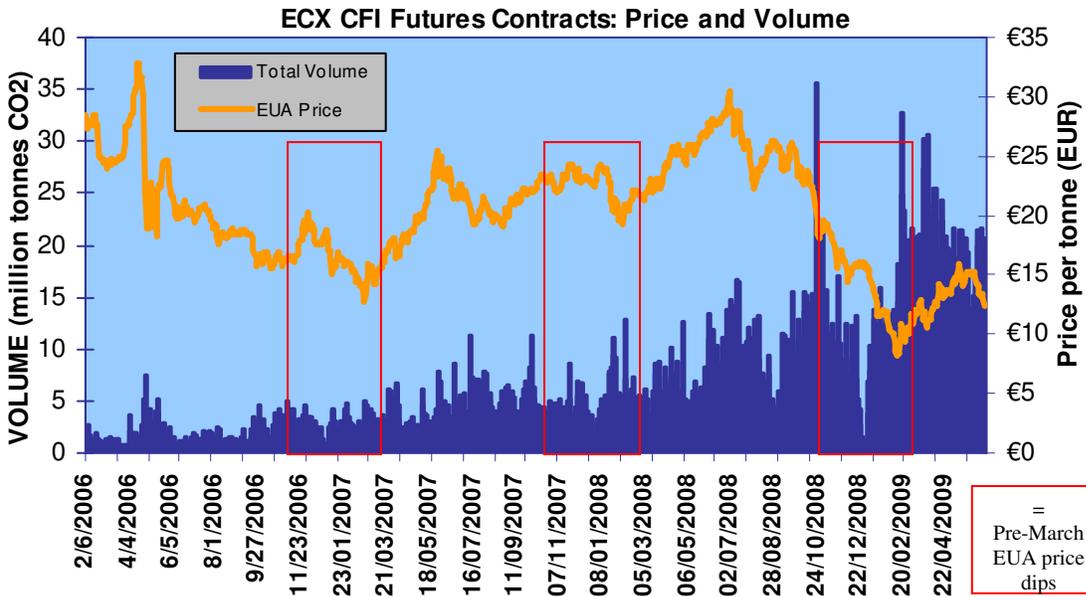


Source: European Commission, Member State NAPs, Deutsche Bank; Based on data of installations that released their 2008 verified emissions and for which we have allocation data

Chiefly there is a juxtaposition of trading interests within the carbon market, which generates a bizarre form of seasonality. According to Barclays Bank analysts, industrial polluters tend to access their carbon emissions inventory toward the end of the year, before the March deadline for reporting emissions. Long industrials take this opportunity to sell their excess allowances, which can have the added benefit of profit-smoothing.

Meanwhile, short electric utilities are frequently in the market, usually on the demand side, throughout the year. *Regulated* utilities are in the habit of hedging their commodities when future electricity is sold, often years in advance.

Thus, there is a constant demand for allowances, but a supply that only floods the market between November and March. This may explain some of the winter dips observed in EUA prices since 2004:



Secondly, the irrationality of EUA prices may be partly caused by the fact that some electric utilities are averse to the risks of fuel switching. This is because the low-carbon alternative fuels present long-term risks that may not be reflected in the short-term marginal cost of switching (STMC). For instance, natural gas and oil supplies are both much more politically influenced (Russia, Venezuela and Kuwait holding the lion's share) than coal prices, and new natural gas supplies may not meet projected demand. Therefore, even if EUAs were at a price higher than the projected STMC, emitters would still resist switching to a lower carbon fuel because of the long-term risks of doing so. Luckily for polluters, EUA price is currently far below switching cost.

Lastly, in an efficient market, speculators would bring short-term prices closer in line with long-term forecasts. That is because fuel-switching and technological investments become more expensive as cap-and-trade progresses to later phases and the caps on allowed emissions get tighter. Foreseeing the future supply crunch, speculators, like hedge funds, could jump in the market now and express a long-term view. This would bring the current price more in-line with where the market is headed. Yet, there has been a dearth of speculation. A trader at Deutsche Bank-London, Chloe Desmonet, posits that this may be due to the volatility and political instability of the market. Therefore, the lack of speculation is logical, considering individual investors tend to be risk-averse and hedge funds tend to be short-term focused.

*As carbon cap-and-trade makes its way across the pond to the U.S., regulators have much to learn from the mistakes of the ETS. However, it isn't Europe's implementation flaws that have caused precariousness in carbon prices as much as it is the political nature of the financial product itself. Therefore, while the U.S. could see a reduction in greenhouse gas emissions due to cap-and-trade, the carbon market will never behave much like those of the commodities that release CO<sub>2</sub>.*