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Preparing Supply Chains for the Green Future

Understanding Cap and Trade and Carbon Taxes

On almost a daily basis, we hear reference to the potential for “cap and trade” legislation with regard to carbon emissions. Less prominent but also common is the topic of a “carbon tax.”

Most of us understand that either of these regulatory changes would have a profound impact on energy policy and consumption, and dramatically impact the economics of current and future supply chain decisions.

But does anyone well understand what these two largely competing approaches to carbon emissions really mean, and how they will likely work?

Two Paths on Reducing Carbon Emissions

While there is still much debate on the real dangers of global warming and the role of fossil fuel consumption in potential climate change, there is certainly a strong likelihood that the US and maybe other countries will join Europe in its regulatory efforts to reduce carbon emissions (which to date have met with at best mixed results in Europe).

Below, we summarize the two main approaches being proposed. Because a cap and trade system is by far the more complex and difficult to understand, it will be explained in more detail.

Cap and Trade Approach

This is the system currently in place in the European Union – and a bill to enact a similar system has been passed by the House in the US, though its fate in the Senate is uncertain at best.

With a cap and trade system, the government sets a cap on carbon emissions that will be released into the atmosphere over a certain period (e.g., annually).

That “cap” is then divided into individual permits to release a specified amount of CO₂.

That, of course, is where the challenges start.

Permits can be freely given away to affected participants (e.g., utilities, manufacturers, transportation companies), auctioned off, or some combination of the two. As the US government seems very anxious to raise revenues, the notion that the permits would be distributed freely is highly unlikely. If sold, a key question then becomes what to do with the revenues, as discussed later in this article.

However the permits are distributed, because the total CO₂ emissions are capped they begin to take on financial value. That’s where the “trade” part comes in. After the permits have been created, companies can sell excess credits if they will not need all of the emission permits they own, while other companies that will exceed the threshold need to buy credits from those willing to sell. So, the market quite directly sets a price for the right to emit a ton of CO₂ into the environment, and companies can weight the costs of permits versus the cost of internal CO₂ abatement.

The theory goes that over time, the emissions cap will be tightened, requiring companies to further reduce emissions.

Example Illustrates how Program Might Work

Here, we look at an example of how a cap and trade program might work in practice, based on materials from **Dr. Stephen Polasky** of the University of Minnesota.

Consider two companies, A and B, each of which now emits four “units” (however that is defined) of CO₂, or eight units between them.

Requiring the two companies to reduce emissions by 50% would result in four units being eliminated, and four remaining. That could be “enforced” by allocating only two units to each firm.

Let’s further say that it is three times as costly for company B to reduce its emissions than it is for company A, based on each company’s current technology or other factors – and that the costs rise per unit the more units you attempt to reduce, as shown in the chart below (i.e., the “marginal cost” for each unit of decrease goes up – as almost always would be true in practice).

Firm A			Firm B		
Emissions	Total Cost	Marginal Cost	Emissions	Total Cost	Marginal Cost
4 (BAU)	0	0	4 (BAU)	0	0
3	1	1	3	3	3
2	3	2	2	9	6
1	6	3	1	18	9
0	10	4	0	30	12

Source: Dr. Stephen Polasky of the University of Minnesota

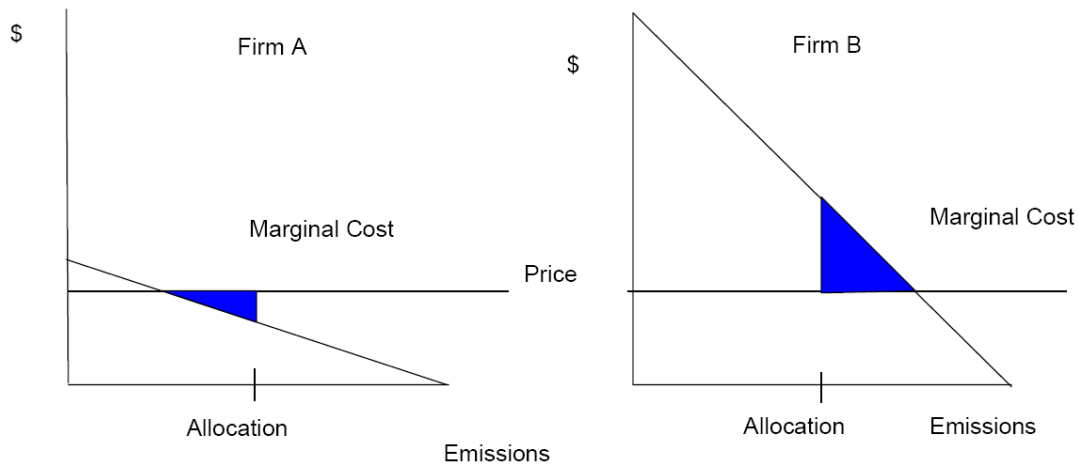
As shown above, if no trading were allowed, it would cost firm A \$3.00 to meet the cap, and firm B \$9.00 – meaning it costs \$12.00 between them.

However, trading is by definition allowed under a cap and trade system. So, because Firm A can sell one of its “permits” at a higher price than the cost it would incur to reduce the emissions internally, it will sell one permit to B for say \$5.00 - \$1.00 less than the marginal cost (\$6.00) for firm B to reduce its emissions internally.

Now, the total cost for both firms, rather than the \$12.00 without trading, is just \$9.00:

- \$1.00 for firm A to reduce its emissions 1 unit; it uses its remaining permit for the other unit
- \$3.00 for firm B to reduce its internal emissions 1 unit
- \$5.00 for firm B to buy the permit from firm A

Over time, emission sources will trade to a point at which the marginal costs of reducing emission are equalized between internal options and buying permits on the market. That is because companies will pursue the lowest cost means of obtaining the cap.



Source: Dr. Stephen Polasky of the University of Minnesota

It is critical to understand, however, that firm A has also pocketed \$4.00 in revenue from this deal (absent any cost to begin with for acquiring the permits) – in effect giving it a profit of \$3.00 on the whole deal. This potential for perhaps “windfall” profits is one of the many concerns over cap and trade.

Concerns over Cap and Trade

A cap and trade program could tremendously benefit companies that can significantly reduce their carbon emissions, as the excess permits could be sold and the proceeds in effect driven straight to the bottom line. In fact, some critics complain, especially in a free distribution model, that the result could be windfall profits for many corporations.

As you might imagine, in addition to whether permits are freely distributed or auctioned off, there are a number of other policy issues and decisions with cap and trade:

- **Where will the Caps be Implemented?:** For example, is it “upstream,” where carbon enters the supply chain (such as oil importers, for example), or downstream, where CO₂ is emitted (e.g., manufacturers)? Or some hybrid combination of both? An upstream program is generally thought to be more effective and easier to administer – but also gives legislators and regulators less freedom to change the rules over time, especially to give breaks to specific industries.
- **Managing Volatility:** In periods of heavy demand, such as an extremely cold winter, permits could be in such high demand that the price skyrockets and becomes simply unaffordable to business. The result could theoretically be utilities and factories shutting down over a lack of permits, though it is unlikely in practice this would be allowed to happen. So, under some proposed plans businesses would be able to “bank” unused permits from previous years, or “borrow” from future allocations – though some doubt such “loans” would ever be paid back.

- **Creating Exceptions:** Related to the above, many recognize that price gyrations to the high side could bring a cap and trade program to its knees. So, there are often proposals in which if permits reached a certain market price level, new permits would be sold at a “ceiling price.” Or, firms could be given additional permits if carbon reducing technology does not advance as expected. These so-called “circuit breaker” mechanisms might, for example, freeze a gradually declining emissions cap if the permit price rose above a predetermined level. It would offer firms some protection from high compliance costs if the development of new technologies lagged behind the pace of the cap's decline. Such a feature, however, could undercut incentives to invest in low-carbon technologies and delay achievement of environmental goals.
- **Are Offsets Permitted?** Some approaches would let a company emit more CO₂ directly if it created offsets, such as planting trees, somewhere else.
- **How will Actual Emissions be Calculated and be Monitored Against Permits?:** There are very few clear answers to this question.
- **Political Manipulation:** How permit levels are decided, what industries are favored versus others, and a host of other political considerations have the potential to hinder the effectiveness of cap and trade programs and distort the market-based theories underlying the concept. Here come the lobbyists!

Carbon Tax Approach

Direct taxes on sources of carbon emissions (i.e., fossil fuels) are actually preferred by most subject matter experts, but the “tax” language in the approach makes it often less accepted by politicians than the more innocuous sounding “cap and trade.”

With a carbon tax, a tax is placed on fossil fuel producers or importers at a rate that reflects the amount of carbon that will be emitted when the fuel is burned or used.

That tax would likely be levied at the first point of transaction from producer/importers to users (utilities, manufacturers, carriers), increasing the fuel price. So, market mechanisms in theory should drive users away from more carbon-intensive fuels to more carbon-efficient ones, or to find ways to reduce their costs by using less of a given fuel.

The tax would be based on carbon emissions per BTU, which are precisely known. As such, coal would likely have by far the highest tax, followed by oil in the middle and finally natural gas, which has a very favorable BTU to emissions ratio. Provisions would be made to exempt fossil fuels that are used in non-carbon emitting applications (e.g., oil used in making plastics).

Many believe a carbon tax would be simpler, more transparent, and less subject to political manipulation than a cap and trade program. However, the key question of course is at what levels the taxes would be set. Proposals range wildly, from a few dollars per metric ton of emissions to \$200 or more – not only incredible differences in percentage terms, but also in the impact on business. One study of different program proposals found an average recommendation of \$12 per metric ton of emissions, but

what would actually wind up in legislation is a total unknown. Most believe the tax level would need to be significantly ratcheted up over time.

It is also not clear how a carbon tax would be handled if technology was developed to abate carbon emissions from a given fuel type (e.g., “clean coal” technology), while such developments would be well handled under cap and trade.

Comparing the Two Approaches

On the next page, we compare at a high level key differences between a cap and trade program and a carbon tax.

Of course, the devil is in the details, so the comparisons might change depending on the specifics of any legislation enacted and how it is enforced in practice.

At the core though is one important difference between the two approaches. A cap and trade system in the end is focused on the quantity of CO₂ emissions, and would ultimately fix that level and in theory ratchet that level down over time.

A carbon tax, on the hand, is a price-based approach that seeks to reduce carbon emissions through market-based mechanisms. But, there is no guarantee that higher prices for energy will actually lead to reduced emissions. Business and consumers may simply decide in many cases to pay the price.

That difference, as well as others between the two approaches, are summarized in the table on the next page.

In general, it appears most experts prefer a carbon tax approach for its simplicity and ultimate effectiveness.

Summing that view up, the Los Angeles Time recently editorialized that “For all its benefits, cap-and-trade still isn’t the most effective or efficient approach [for reducing carbon emissions]. That distinction goes to ... a carbon tax. While cap-and-trade creates opportunities for cheating, leads to unpredictable fluctuations in energy prices and does nothing to offset high power costs for consumers, carbon taxes can be structured to sidestep all those problems while providing a more reliable market incentive to produce clean-energy technology.”

On the other hand, **Nathaniel Keohane**, director of economic policy and analysis for the advocacy group Environmental Defense, says that “You have to set the reductions in stone...Bottom line, cap-and-trade is the most environmentally sound approach and it’s the only politically viable approach.”

Currently, the fundamental problem with both approaches is that there are wildly differing views of where costs to business and/or consumers need to go to make a meaningful impact on reducing carbon emissions. The experience thus far in Europe is not encouraging – unless you are a global warming skeptic. There, two versions of cap and trade have done nothing to reduce CO₂ emissions to date.

	Cap and Trade	Carbon Tax
Emissions Certainty	Can set firm limit on emissions – though politicians may continually back off	Not directly mandated, but taxes could be set at levels expected to deliver a given reduction in CO2 over time. In good economic times, for example, an industry as a whole or specific companies may simply decide to pay the tax and meet market demand for products.
Price Predictability	Prices for emissions permits fluctuate in an open market, which can cause some real planning challenges for business and lead to emergency “changes” in the rules	The tax level is fixed, absent legislative changes. Businesses will know exactly how much energy purchase/consumption will cost.
Incentives for Investment	Because the cost of emissions is more volatile, investments in new technologies to reduce emissions would likely be constrained by lack of clarity about ROI.	As the cost of the tax is fixed, this would enable business to make more informed and confident investments to reduce CO2 emissions – but the ROI will depend on the level of the tax.
Overall Effectiveness	Is highly dependent on the details of how aggressively the caps are phased in, how permits are created and distributed, and other factors.	Probably less subject to political manipulation, but the level of tax needed to make an impact is not well understood, and it is not clear if politicians would be willing to go that far anyways.
Simplicity and Transparency	Requires new administrative structures, new “Wall Street” market mechanisms to trade the permits, and some way to actually measure and monitor emissions. Also likely more susceptible to political forces over time.	Would be an add-on to existing tax structures and collection procedures. Most believe a carbon tax is much simpler for consumers and business to understand.
Time to Results	The inherent complexity likely means it will take fairly long to set up all the mechanisms and achieve results – as Europe’s experience attests.	Could in theory be implemented much faster – but would impact behavior only at levels where the government may fear to go.
“Profiteering”	An army of lawyers, consultants and financial middlemen could make a killing; some companies could also reap vast profits themselves, depending on how the permits are designed and distributed.	Very few concerns
Source: SCDigest and TheGreenSupplyChain.com		

What to Do with the Revenues?

With either an auction-based cap and trade program, or a carbon tax regime, the government could end up collecting a huge level of taxes – perhaps hundreds of billions of dollars per year.

Not only could this place a huge burden on the economy, many also say that it could be a highly regressive tax, as costs are ultimately passed on to consumers, and lower income consumers pay a higher percentage of their incomes on such things as utility bills and gasoline whose prices would be driven higher by the programs.

Many therefore recommend “revenue neutral” plans, in which almost all taxes collected from carbon-related tax revenue changes are rebated to citizens based on any of several formulas (such as “dividend” payments or a reduction in other taxes).

Others, however, want to see the revenues used for research and development on such things as alternative energies – or to fund other government programs.

Summing it Up

With each proposal, the devil is in the details, meaning the impact on companies, their supply chains, a country’s global competitiveness and more can be dramatically impacted not only by which path is pursued, but the level and timing of the programs.

As just one example, how “offshoring” will be handled is one huge source of uncertainty. Some are calling for imposition of “carbon tariffs” on imported goods if low cost countries do not implement CO2 programs that give their manufacturers additional price advantages over Western companies that in some way bear the cost of either cap and trade or a carbon tax.

Regardless, if either type of program is implemented to any significant degree, it totally changes the rules and impact of current Green supply chain strategies, as the change puts a direct financial impact on those strategies – and perhaps even the opportunity for profit from managing those changes effectively, especially under cap and trade.

What is clear is that companies need to well understand what each of these programs can mean for them – and begin to model various scenarios in their supply chain network planning, just as many started to do in 2007-08 using various levels of oil prices out into the future.

Decisions made today may drive total supply chain costs for many years.

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