

Energy Economist

Oil spill costs and legacies 3

"Complacency is one of the greatest threats to oil spill prevention and response." Words written on the 20th anniversary of the *Exxon Valdez* disaster. Toxic crude from that spill can still be found in Alaska's Prince William Sound. The *Exxon Valdez* legacy will be an important guide to understanding the damage wrought by the Gulf of Mexico oil disaster. Those ultimately responsible face potentially company breaking lawsuits.

Storage: changing the nature of electricity 5

If the electric car has the capacity to turn the oil market on its head, efficient electricity storage will be no less revolutionary for power markets. It would change the very nature of electricity as a commodity and thus the way it trades. It would reduce the amount of required new generation capacity, and challenge the notion that gas-fired power plant is the best fit with intermittent renewables. **Ross McCracken**

Turkey first: gas transit options 8

Turkey's location, centered between the gas reserves of the Middle East and the Caspian and the markets of Europe, finally looks set to pay dividends. But whether that is good news for European energy security remains an open question. The country's developing role as a regional power indicates a Turkey first foreign policy that suggests EU ambivalence towards its eastern neighbor may prove misplaced. **David O'Byrne**

The piecemeal march to cap-and-trade 11

Although, in principle, there to correct distortions arising from market failure, cap-and-trade programs may, in practice, create more distortions than they fix. This certainly appears true of the piecemeal approach of regional US cap-and-trade schemes, which threaten to create balkanized carbon markets with high transaction costs, limited liquidity and inefficient pricing. **Sam Van Vactor**

LNG prospects to improve 16

The LNG market is oversupplied, but the rash of new liquefaction plant completions is coming to an end. By contrast, regasification facilities continue to multiply, creating a wider and more solid base to the market. Lower gas prices and construction costs should revive delayed LNG terminal plans as demand recovers. Australia, alone, has big plans to develop more LNG plant over the next eight years. **Ross McCracken**

Chinese oil stocks and product balances 21

China's oil demand is racing back towards levels of growth seen before the financial crisis and the country's economic slowdown. Part of this is stock building, both commercial and strategic, a process planned to continue over the next 10-15 years. Increases in refinery capacity mean that China will remain a net exporter of diesel and jet kerosene, but this will be balanced by a growing deficit in gasoline.

UCG moves towards commercial scale 24

Trials of pilot power plants using syngas produced by Underground Coal Gasification could, over the next couple of years, pave the way towards the construction of commercial scale plants. If it is safe, and if it can prove its environmental claims, UCG would materially alter the world's energy resource map by expanding the recoverable coal resource. Australia is leading the way, but Chile might just be first past the post.

through the Turkish section of the Black Sea are far advanced. Turkey earlier this year granted permission for a feasibility study and the recent slate of agreements between the two countries is believed to include a further joint commitment to the project. However, with a planned capacity of 63 Bcm/yr, South Stream is more than double the size of Nabucco and nearly eight times the size of ITGI. It would, if built, soak up future demand growth in Europe for some time, raising questions over the viability and timing of Nabucco.

Questions still remain over the necessity of South Stream, given that the project was initially proposed in response to Russian problems transiting gas through Ukraine. With the new government in Kiev having made peace with Moscow,

South stream may yet be abandoned in favor of a far cheaper expansion of the existing transit line through Ukraine, but this too would be competition for Nabucco.

While few analysts believe both Nabucco and South Stream can be built and operate economically given current demand growth, publicly at least Ankara remains equally committed to both. But as one official commented recently, both offer roughly the same benefits to Turkey itself and there is no reason for Ankara to pick sides. EU supply security, he explained, is a matter for the EU to resolve. Not so much a cynical observation as a realistic one. Turkey has its own energy needs, its own regional issues and its own regional position to consider. And, after all, it is not an EU member.

The piecemeal march to cap-and-trade

Although, in principle, there to correct distortions arising from market failure, cap and trade programs may, in practice, create more distortions than they fix. This certainly appears true of the piecemeal approach of regional US cap-and-trade schemes, which threaten to create balkanized carbon markets with high transaction costs, limited liquidity and inefficient pricing. Similarly complex regulatory programs in the 1970s ultimately collapsed. **Sam Van Vactor**

So far, the principal measure used to address climate change has been the cap-and-trade system, based on an approach first developed by the US government in the 1990s to curtail sulfur emissions and reduce acid rain. The basic idea is to cap pollutants at a given level and allow polluters to buy and sell the rights to emit as they see fit. There are only a few greenhouse gas cap-and-trade programs around the globe and they cover only a small portion of emissions. Moreover, important details vary.

This piecemeal development has both advantages and disadvantages. It allows for the diversity of opinion about the risk of climate change arising from GHG emissions and, consequently, how vigorously action should be taken. It also provides a series of test models on how best to reduce GHG emissions and implement carbon trading. There are, however, major drawbacks, and the most obvious are uneven results and market distortions associated with fragmented development.

The EU implemented a cap-and-trade system in 2005, and it is, by far, the most developed. Australia and New Zealand have programs in various stages of development. Japan and a number of other nations are studying these schemes and are likely to adopt the approach. A nationwide cap-and-trade program in the US has been proposed for years, but remains entombed in Congress. In the event Congress does not act, the Environmental Protection Agency will begin a series of regulatory actions in 2011 aimed at constraining GHG emissions.

However, even without a federal plan there are three regional programs in North America that are either

trading carbon or intend to do so in the near future. If fully implemented, these plans would cover 22 states and 4 Canadian provinces. Importantly, they do not include Alberta in Canada, nor many mid-continent states heavily dependent on coal-fired power generation. This piecemeal approach threatens their success.

Command and control, taxes, or markets?

The EPA was established in 1971, one year after Congress passed the landmark Clean Air Act. The EPA's initial task was to implement the various programs mandated under the Act, which included regulation of both stationary and mobile emissions. The fundamentals of the approach, now referred to as one of "command and control," dominated environmental regulation for two decades. Broadly, the regulations were successful. Anyone who choked on Los Angeles smog in the early 1970s would have to acknowledge substantial improvements. Complaints were not levied so much at the result, as the cost.

Economists argue that similar environmental benefits could have been achieved at less cost by taxing polluting emissions, rather than mandating specific technological changes. Such an approach allows firms and individuals to decide the cheapest course of action – install pollution abating equipment, shut down, or pay the tax. Similar results could be achieved by capping emission levels and allowing firms to trade the right to emit pollutants. One approach fixes the marginal cost of reducing emissions, and the other fixes the desired emission level.

The big change came under the Bush Administration in 1990, when an unusual coalition of environmentalists

and free-market advocates joined forces to solve the acid rain problem. The Clean Air Act of 1990 (an amendment of the earlier Act) established an emissions trading scheme that successfully reduced acid rain with minimum impact on the economy because it was straightforward, simple, and had clear accountability. Before the amended Clean Air Act, the EPA had experimented with emissions trading, but without much success because the complexity of the systems required frequent regulatory intervention.

Successful emissions trading depends very much on how a program is implemented. In principle, cap and trade programs are there to correct distortions arising from market failure, but in practice they may create more distortions than they fix. Moreover, CO₂ is not the only GHG, even if it has by far the greatest impact due to rampant fossil fuel burning. In addition, there is a natural process of emission and extraction associated with a variety of human activities: on the one hand, burning fossil fuels and, on the other, planting and nurturing vegetation. This is in contrast to most other pollutants, which need to be extracted at the emission source to prevent environmental harm.

Reducing CO₂ emissions need not be as complex as curtailing those of sulfur and other pollutants. That is because the carbon content of a fuel can be calculated before it is burned; it is not necessary to meter carbon at the point of emission. For example, taxes based on carbon content would penalize coal burning approximately three times more than natural gas. There would be no penalty for wind, solar, hydro, and nuclear energy. Such taxes would cause emitters to gravitate to energy sources low in carbon, automatically reducing the risk of climate change. This approach has another advantage in that it captures all emitters, large and small. The focus on cap-and-trade, rather than a taxation scheme, however, has little to do with relative efficiency and a lot to do with politics.

Something like a carbon tax was tried by US President Bill Clinton in 1993, when his administration proposed a 'Btu tax' on a variety of fossil fuels. The proposal raised a furor with the public and Congress defeated it mercilessly. In 2008, Clinton commented: "I tried [a fuel tax] once. It didn't work for me," which is why he supports a cap-and-trade approach.

The EU had a similar epiphany as it devised its cap-and-trade scheme in order to reduce GHG emissions. Emissions trading conceals the tax-like impact by adjusting costs and prices at the wholesale level. Consumers may not like higher retail prices, but it is not altogether clear whom to blame, and the familiar 'tax' epithet is absent from the political debate. Likewise, the cap-and-trade approach allows authorities to distribute allowances to existing firms, raising marginal costs but not necessarily average costs. The prospect of higher profit margins unavailable to new firms entering an industry usually cements existing firms' support.

Distortion potential

Broadly, there are five types of difficulties arising from the regional US cap-and-trade schemes so far planned or implemented which are likely to lead to market distortions. First, the process violates fundamental principals of good governance by creating conflicts of interest. That is, those setting allowance levels frequently directly or indirectly benefit from the revenue. Programs to study the impact of GHGs or encourage energy conservation and renewable development may be worthy endeavors, but good governance depends on separating the task of collecting operating revenue from the decision as to how it is to be spent. All too often at the state level these tasks are combined.

Second, the programs are pointedly selective. Some firms are required to purchase allowances while other emitters are not. Likewise, some firms are permitted to sell offsets, while others are left out. Indeed, existing plans so far implemented cover less than half carbon-emitting activity, concentrating on large industries and power generation.

Third, revenue is earmarked to support specific projects and technologies, rather than letting the market determine the optimum path to minimize GHG emissions. The US Council of Economic Advisors in their annual report to the president neatly summarized this point in their chapter on energy and climate change: "A policy that broadly incentivizes R&D is more likely to maximize social returns than a narrow one targeted at a specific technology because it allows the market, rather than the government, to pick winners."

Fourth, there is a serious problem of leakages in a patchwork system that will grow over time. In theory, some industries can be protected. Generally, however, selective taxes or mandated allowances raise trade issues in that they are akin to an import tariff, since they do not fall evenly over all products sold. Paul Krugman points out that "carbon tariffs" could be accommodated through existing trade agreements. However, such an arrangement may not work for states and provinces and raises all sorts of local issues for the regional cap-and-trade zones in North America.

Fifth, balkanized markets, particularly in North America, inhibit participants from choosing the least cost option and raise market transaction costs. The patchwork system results in different trading rules, different product specifications, and smaller volume trading. This reduces liquidity and raises information and brokering costs, so the carbon market is less efficient and more prone to the exercise of market power.

REGGI

The first such plan, the Northeast Regional Greenhouse Gas Initiative, known by its supporters and critics as "Reggie", began trading in late 2008 after a five-year planning period. Ten contiguous states along the Atlantic Coast participate, stretching from Maine to Maryland.

The program is limited in scope and modest in outcome, but it was the first on the continent and, so far, operates without serious problems.

Emission constraints in the RGGI are limited to power generation, which provided a variety of advantages. First, policies for the ten states could be coordinated using existing regulatory agencies and authorities. Second, data on generating unit heat rates and fuel use were readily available, so GHG emissions could be calculated without controversy.

Regulatory procedures and state laws vary among the ten participants. In order to harmonize the methodology the Signatory States agreed to implement programs reflecting a common 'Model Rule'. The Model Rule, in turn, was adapted from the EPA's trading programs for sulfur and other emissions, where the EPA designed the program and various state agencies implemented it.

The RGGI plan covers fossil fuel generators of 25 MW and greater and certain mixed biomass/fossil fuel operations. In other jurisdictions, notably the EU, the bulk of emissions allowances are allocated to existing emitters. RGGI took a different and more sensible approach. A "significant portion" of the allowances are sold through an auction, with sufficient volume to keep carbon prices modest. This minimizes the disruption of implementing the program and moderates the impact on electricity consumers.

The memorandum of understanding between participating states mandates that at least 25% of the revenue be spent on "consumer benefit" programs and, so far, this has been the case. Although such earmarking has a political logic, as noted, it can distort the efficient allocation of resources and exacerbates lobbying by special interests.

Electricity demand varies enormously depending on weather, season, and time of day. Likewise generation costs can change radically depending on fossil fuel prices and the number and types of unit outages. Generators require flexibility in meeting their GHG emission targets. The RGGI provides several mechanisms to resolve these problems. Emitters are allowed to bank unused allowances for future use. The model rule also allows for a three-year compliance period. In the end, of course, the greatest flexibility arises from the right to buy or sell allowances as needed, which is the crux of all cap-and-trade programs.

The Western Climate Initiative

Names don't always do an organization justice, and the WCI is a prime example. The initiative originally included eleven partners – the seven western states of Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington, as well as four Canadian provinces – British Columbia, Manitoba, Ontario, and Quebec. In early 2010, Arizona withdrew due to concern about the impact on the economy. The WCI might seem like an unlikely alliance,

but it is bound together by public concern over the environment and, in Canada, a mild distaste for the Sheiks of Alberta.

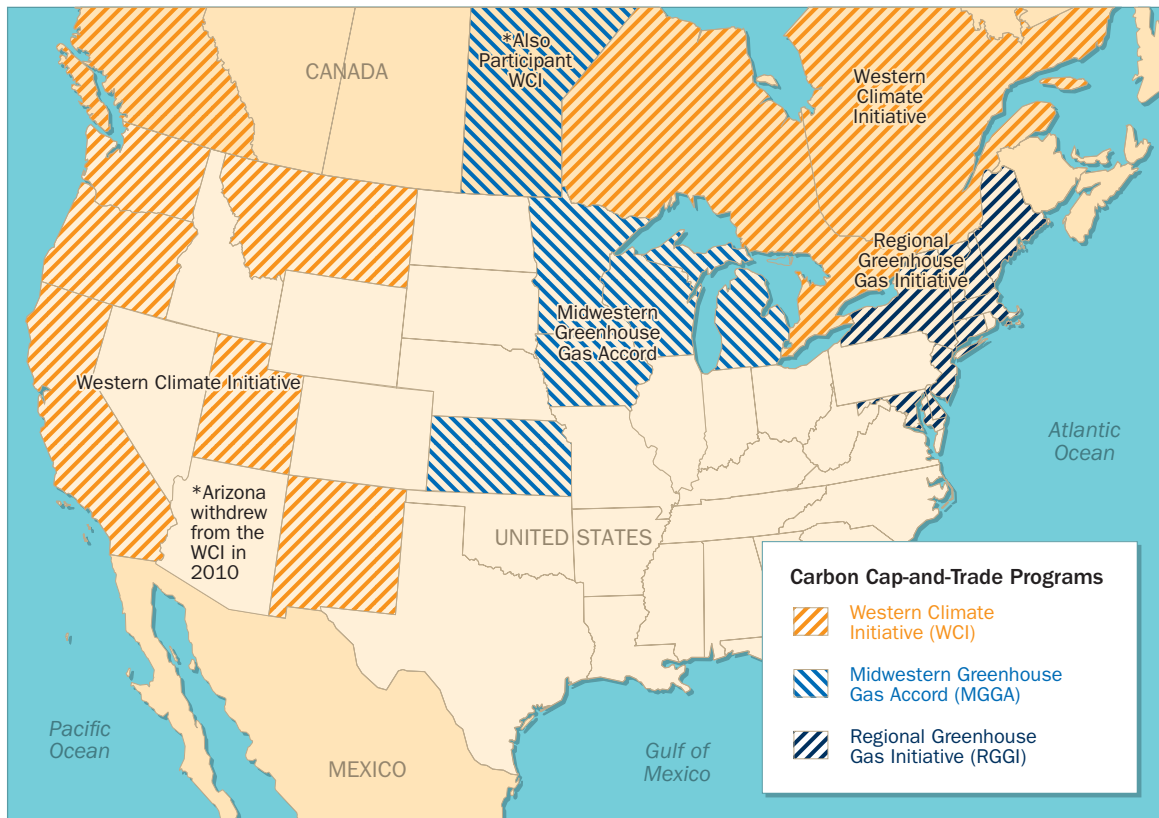
California has been the prime mover behind this initiative. California is unique among the states in that its large population centers are a long distance from other state lines. That, plus its size, allows the state to craft environmental regulations different from everyone else. A prime example is CARB gasoline, which meets stricter emission standards than those imposed in other states. California also prohibits the burning of heavy fuel oil and launched a zero-emissions initiative for vehicles which, although scaled back, is still a cutting-edge policy. States and provinces north of California are equally enthusiastic about the environment. Importantly, the various states and provinces do not typically depend on low-cost coal generation and many have large hydroelectric facilities. Such natural endowments make carbon reduction more palatable.

Unlike the RGGI or EU programs, the WCI will be broadly based across all fossil fuel use and once fully implemented will cover 90% of all CO₂ emissions, including those from individual residences and vehicles. The goal is to be achieved in two steps. First, participants will implement a cap-and-trade scheme for larger emitters – power generators and "industrial process emission sources," such as refineries, steel mills, etc. These are large location-specific facilities where adequate data has been collected to measure GHG emissions. California plans to implement the first stage by January 1, 2012, although there is a ballot initiative that seeks to block it. The idea is to move ahead with as many of the WCI participants as possible. In a recent stakeholders' conference call officials from three provinces, BC, Quebec, and Ontario, volunteered that they had the authority to start in 2012. All the other participants plan to join once authority is granted.

In 2014, the WCI is set to implement cap-and-trade across virtually all fossil fuel emissions. However, such a trading scheme will be difficult to implement for individual residences and vehicles. To resolve this dilemma WCI partners intend to levy an allowance requirement "where the fuels enter commerce in the WCI Partner Jurisdictions, generally at a distributor." In other words, fuel distributors would be required to purchase allowances for the carbon inherent in the fuel sold. This would have the same mechanics as a carbon tax, except that the per-unit amount of the tax would vary with carbon trading prices.

Although an allowance budget will be set for the WCI as a whole, each partner's budget will be based on its own state or provincial goals. The intent seems to be to have the WCI administer a region-wide program, but allow the stringency of the restrictions to vary. At this juncture it is unclear how this would work. For example, assume California seeks to cut CO₂ emission allowances by 50% and everyone else chooses 5%. Either there will be variation in each partner's carbon prices or California's

North American cap-and-trade scheme participants



Source: Platts

industry would be able to buy cheaper allowances from other members of the group. This could create a perverse set of incentives, since there will be a net flow of revenue to those partners that choose less stringent goals than the average. Will states compete to see who can garner the most net revenue by setting the lowest goals?

As in the RGGI, revenue from the auctioning of allowances will be allocated to specific purposes, such as energy conservation, renewables, research, adaption to climate change impacts, etc. Part of the revenue may also be used for broader purposes and the last item cited was “promoting economic efficiency.” The WCI’s compliance period is three years. Banking of allowances is allowed, but borrowing from future compliance periods is not.

Midwestern Greenhouse Gas Reduction Accord

The MGA is the least developed of the three North American cap-and-trade programs although it is the most interesting, because the region is heavily dependent on coal-fired generation. Six US states – Illinois, Iowa, Kansas, Michigan, Minnesota, and Wisconsin – and one Canadian province – Manitoba – agreed to the GHG reduction accord in late 2007. Two distinct features stand out. First, the region houses the Chicago Climate Exchange, which is intended to serve all of North America’s carbon markets. Second, the Great Plains project in North Dakota has been producing coal gas and sequestering waste CO₂ in

Canadian gas fields for some time. This gives the region an advantage in developing and marketing a technology that could be widely replicated elsewhere.

The MGA’s advisory group is studying emission targets for 2020 that range from 15-25% below 2005 levels and recommends a 60-80% reduction by 2050. The program is intended to cover 85-95% of the emissions in each of four sectors – electricity generation and imports, industrial combustion, industrial process heat, and buildings. A determination to include or exclude transportation fuels will be made at a later time.

The MGA’s points of regulation are similar to that of the other regions. The allowance obligation rests with the first deliverer of electricity, either generation within the group’s territory or at the point of import: “The first deliverer is the entity that first delivers the electricity into a participating jurisdiction for consumption.” For industrial activities, the allowance obligation lies with the emitter. Fuels for buildings or transportation (when included) will have an allowance obligation with the “final blender or distributor.” The principal problem will be tagging the sources of imported electricity, since different types of generation emit different levels of GHGs. It may also be easy for an importing utility to shift around sources outside the region and import only green energy, with no net impact on GHG emissions.

The distribution of allowances is an especially thorny problem for the MGA. The Advisor Group notes: "Allowance value should be put toward climate-related purposes, not for other purposes, with a focus on the Midwest's special challenges as a coal-dependent region with a significant energy-intensive industrial base faced with global competition." This could not be more different from California, where 72% of electricity sales are in the residential and commercial sectors and industrial use is only 13%.

Although the MGA will attempt to mitigate the impact to consumers, its primary concern is likely to be the impact on industry: "Allowance value should be used to mitigate cap-and-trade program cost impacts (including energy price impacts) to industrial entities in the region, particularly for those industries that are energy-intensive and have a limited ability to pass costs on to consumers of their products." This, of course, is the heart of the matter when piecemeal cap-and-trade programs are put in place: regions which take the lead in cutting emissions are acting altruistically if other regions do not follow suit and must decide which groups within bear the cost of the altruism.

States participating in the MGA explicitly recognize the activities of other regional cap-and-trade programs or the possibility of a federal program. The intent is to link the Accord with these activities and the EU Emissions Trading System. This, for example, could permit a broader opportunity for purchasing offsets.

Federal developments

Senators John Kerry and Joe Lieberman released a complex cap-and-trade bill on May 12, 2010, designed to parallel the one passed in the House of Representatives a year ago. Significantly, the bill's other major sponsor, Republican Lindsey Graham, dropped his sponsorship, owing mainly to the ongoing conflict between political parties. Most analysts believe that a Senate climate bill will not pass this year. It is too close to the November elections and the bill is too complex to placate all special and regional interests. Even if a bill passes the Senate it will have to be reconciled with the House bill, which has a number of important differences.

The structure of the Senate bill follows the preset pattern – the pain of higher energy prices will be offset by a variety of subsidies and benefits to consumers and industry. Just about everyone gets something, which is what makes it possible to pass this sort of legislation. Significantly the Kerry-Lieberman Bill pre-empts the state cap-and-trade programs. It would also require that all allowance and offset trading be conducted through registered clearing houses, in order to prevent Enron-style abuses.

Treading water

In the US, the debate over climate change has centered mainly on the reliability of scientific forecasts and the cost to do something about it, particularly in a weak economy. Skeptics typically argue that the cost of

reducing carbon emissions far exceeds any benefits. They believe that global warming due to human activity may not happen, and, even if it does, the consequences are likely exaggerated.

This misplaced focus is myopic; much more attention should be paid to the specifics of the plans for reducing GHG emissions. There is a clear consensus among economists that pricing carbon using a cap and-trade scheme is superior to regulation. That conclusion, however, depends on the straightforward use of markets and frictionless trading. Those assumptions do not reflect the piecemeal set of programs that are emerging in North America or the extensive earmarking of auction revenue.

The primary problem with a regional approach is that decisions lie in the hands of local regulators, whose primary experience is in utility and environmental regulation. Their natural instinct will be to balance a plethora of special interests, rather than aim for efficient markets. One analyst likened the RGGI plan to "synchronized swimming," but stepping back and looking at the regional programs in total, they look more like treading water.

Advocates of the programs suggest that it is the process that is important; the EU, Northeastern states, California, etc. are taking leadership roles. These leaders may offer to cut emissions further if other regions follow suit, after which crafting a unified market would be simpler than creating it from scratch today.

However, if the piecemeal approach stays in place, least cost alternative energy options may not win the special-interest battle for subsidies and support; incremental offset projects will likely reward cronies and political cronies, and emission-intensive industries will shift to states and provinces that fail to implement similar plans or where the penalty for GHG emissions is low. Likewise the different approaches create balkanized carbon markets with high transaction costs, limited liquidity, inefficient pricing, and uncertainty. The more complex and splintered the programs, the greater the market distortions and unintended consequences.

It is worth noting that similarly complex regulatory programs in the 1970s – oil allocation and natural gas regulation – ultimately collapsed due to their complexity and obvious inefficiencies. The regional cap-and-trade programs are not as inefficient, but from an economic perspective there are better choices. Likewise, the bills in the House and Senate and the EPA's backstop regulatory plan are chock full of inefficiencies. With red ink spreading from the Potomac to the Thames, it is hard to overlook the revenue potential from carbon taxation. Perhaps Congress will ultimately come to that conclusion.

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