Coming Climate Change Policy and the Effect on Energy Efficiency

Frank Stern, Nicole Wobus, and Jane Pater, Summit Blue Consulting

ABSTRACT

Mandatory federal climate change policy in the U.S. is virtually inevitable at this point. The questions remaining are how stringent will the policy be, what sectors will it cover, and when will it take place? And, in terms of energy efficiency (EE), what will be the effect on that industry? Climate change policy is likely to make EE more cost-effective, but the nature and magnitude of the impact are subject to more uncertainty. It appears likely that the coming federal legislation will take the form of a cap-and-trade program. The critical concept to realize when estimating the impact on EE is that if the EE program is reducing electricity use within a capped system, then it should not be eligible for offsets since system-wide emissions are not being reduced. With any stringent cap, emissions will be at the capped level whether or not the EE programs exist. However, while the EE programs may not be eligible for direct benefits, those who invest in EE will indirectly benefit, quite possibly significantly, due to allowance prices that are passed through in the avoided generation costs. The effect will vary regionally due to the differing makeup of the generation portfolio.

Introduction

Mandatory federal climate change policy in the U.S. is virtually inevitable at this point. The question is not if it will occur, but how stringent will the policy be, what sectors will it cover, and when will it take place? And, in terms of EE, what will be the effect on that industry? This paper describes current and proposed policies, and the types of effect on EE.

With the ratification of the Kyoto Protocol by Australia in 2007, the U.S. remained the only developed country not committed to binding reductions in greenhouse gas (GHG) emissions. In the absence of federal commitment, states, corporations, and individuals have taken it upon themselves. Federal legislation has been introduced, and passage appears likely within the first two years of the next Administration.

At the state and regional levels, the Regional Greenhouse Gas Initiative (RGGI) in the Northeast and the California Global Warming Solutions Act of 2006 are the leading efforts, with additional regional efforts underway in the West and Midwest. RGGI is a cooperative effort by Northeast and Mid-Atlantic states to reduce carbon dioxide emissions from power plants in the region, established by seven states in 2005 and expanded to nine in 2007. The approach will cap emissions at 2002 to 2004 levels by 2015, followed by a 10% reduction by 2020. The California Global Warming Solutions Act requires the state's GHG emissions be reduced to 1990 levels by 2020. This represents a reduction of approximately 25% relative to projected business-as-usual emissions. The Secretary for Environmental Protection has appointed a market advisory committee to make recommendations about the design of the cap-and-trade program (California Environmental Protection Agency 2007).

At the federal level, the 110th Congress has seen seven economy-wide bills introduced with provisions for a cap-and-trade GHG program (Pew Center for Global Climate Change 2008). The Senate Environment and Public Works Committee passed one of these, the Lieberman-

Warner bill, in December 2007. The bill's sponsors believe it would reduce overall U.S. GHG emissions roughly 63% by 2050.

In the voluntary markets, the Chicago Climate Exchange represents 400 corporations who have made legally binding commitments to meet annual GHG emission reduction targets. Those who reduce below the targets have surplus allowances to sell or bank; those who emit above the targets comply by purchasing CCX Carbon Financial Instrument ™ contracts.

It appears likely that the coming federal legislation will take the form of a cap-and-trade program. The critical concept to realize when estimating the impact on EE is that if the EE program is reducing emissions within a capped system, then it should not be eligible for offsets since system-wide emissions are not being reduced. With any stringent cap, emissions will be at the capped level whether or not the EE programs exist. However, while the EE programs may not be eligible for direct benefits, those who invest in EE measures will indirectly benefit, quite possibly significantly, due to allowance prices that are passed through in the avoided generation costs. The effect will vary regionally due to the differing makeup of the generation portfolio. The effect will also depend on the type of measures. EE will also benefit if revenues generated from the auctioning of allowances are directed to EE.

Generally speaking, climate change policy is likely to make EE more cost-effective, but the nature and magnitude of the impact are subject to more uncertainty. EE measures can be counted as Verified Emissions Reductions by the Chicago Climate Exchange and the Gold Standard, but may not necessarily be counted under new policies. Current and developing regulation in Europe, the Eastern U.S. (Regional Greenhouse Gas Initiative), in California and in bills introduced in the 110th Congress provide indications that offsets must meet, among other criteria, an 'additionality' requirement and that if electricity and onsite fuel emissions are capped, EE cannot meet this requirement.

The next section describes key concepts in GHG policy, including cap-and-trade, carbon tax, offsets, allocations, and white certificates. The third section describes current and proposed GHG regulation, with discussion of treatment of offsets for EE. The fourth section explains how the benefits to EE of GHG regulation, which will largely be indirect benefits, will vary depending on the type of market, the generation mix in the market, and the type of measure.

Key Concepts in GHG Policy

To begin the conversation about the effect of GHG policy on EE, it is critical to understand the types of GHG policies available and a few of the fundamental components of those regulations. This section will explain the foundations of GHG policy.

Types of Policies

Current and proposed GHG regulations include cap-and-trade systems, carbon taxes, and emission performance standards.

Cap-and-Trade. Cap-and-trade systems rest on the foundations of the free market. Regulators establish a "cap" – a limit below which future emissions must remain – and design a market in which regulated entities can operate in order to meet their targets. The cap is typically set at the level of the market, rather than at the level of each regulated entity, thereby creating the opportunity for market players to trade emissions allowances (the currency of the market). The

cap-and-trade approach is used in the U.S. to control SO2 and NOx and is currently the most widely discussed model for GHG regulation. Other critical aspects include whether or not there are "safety valves" for prices, selection of the regulated entities, point of compliance, developing rules pertaining to offsets and allocations, monitoring and verification mechanisms, penalties for non-compliance, and policies for dealing with facilities that are closed or opened after trading begins.

Carbon tax. The carbon tax takes a different approach to using the market to achieve GHG reductions. Instead of regulators defining the reduction amount and the market determining the price, with a carbon tax, regulators determine the price, and the market determines what the emission reduction will be. The carbon tax is a static approach, while the cap-and-trade approach allows for flexibility in meeting the emissions reduction targets. The carbon tax provides price certainty for all regulated entities, but the cap-and-trade mechanism provides emission reduction volume certainty from the regulated sector and allows regulated entities to select the most economically efficient approach to meeting the reduction target by allowing them to make decisions about whether to invest in technology to reduce emissions or in emissions allowances. The carbon tax approach generates revenue that can be used to fund policies and programs aimed at reducing carbon emissions. Under a cap and trade system, such revenues are only generated if allocations are auctioned. The most significant drawbacks of the approach are that it is politically unpalatable to introduce a new tax and it is uncertain how much reduction will be achieved.

Emission performance standards. Emission performance standards require that facilities emit GHGs at or below a specified rate (e.g., pounds of CO2 per MWh of electric generation). Such standards have been implemented in California. This approach can be combined with trading whereby over-compliance by one entity can be traded to another facility that has under-complied.

Offsets

GHGs are pollutants with global effects and can be both emitted into and re-absorbed from the atmosphere. The geographical location of emission (or absorption) is irrelevant--only the amount of net emissions is important in accounting for GHGs. As a result, GHG policies can allow a regulated entity to achieve its emissions targets by creating emissions reductions elsewhere that offset its own emissions. These offsets can be subtracted from the entity's total emissions in order to determine its net emissions, which can then be used for compliance purposes:

Total Emissions by Regulated Entity – Emissions Offsets = Net Emissions

Offsets have created some controversy as the GHG reduction debate has evolved, in large part due to the difficulty in quantifying and verifying their effects. One of the most difficult aspects to prove is the additionality of the offset—i.e., that the project would not have happened in the absence of the funding that purchased the offset. Accordingly, some regulatory frameworks allow a broad range of offsets – including renewable energy, EE, forest/biomass sequestration of carbon, and landfill gas combustion – while others allow only a subset of these offsets. If emissions from electricity generation and on-site fuel use are capped, EE will not be able to meet additionality requirements.

Allowance Distribution

The allocation of allowances is one of the most contentious issues in GHG cap-and-trade policy design. An allowance is a right to emit one ton of GHG during a specified compliance period (e.g., a given year). The cap defines the amount of allowances that will be made available. Allowances may be given away or auctioned off.

If they are given away, the question is to whom and on what basis? Policy makers can decide to include all existing generators (including renewable sources), only existing emitters (excluding the renewable sources), potential future emitters, traders, private parties (e.g., non-governmental organizations), and others. Policy makers may decide to allocate allowances based on historic or projected emissions levels, historic or projected energy output, historic or projected installed capacity, or other metrics. Using the historic levels, a baseline year must be established, which may or may not give credit to "early movers" – those entities that took action to reduce emissions in anticipation of future regulation. Each option can create incentives and disincentives for reducing emissions in the future. Decisions about the recipients and the level of allocations have ramifications for the equity of the system created. Those who are "grandfathered in" are given assets (allowances) that can be sold in the marketplace at minimal cost, while those who must purchase the allowances increase their costs accordingly.

The alternative to free allocation of allowances is an auction. Auction formats can vary, but the essence is that bidders name the price they are willing to pay for the allowances and that payment is exchanged for allowances by the winning bidders. Proceeds from emissions auctions can be used to fund EE and renewable energy projects.

White Certificates

"White certificate," also referred to as "white tag" or "energy savings certificate," is a term used both in Europe and the U.S. as a unit of measure and trading instrument for energy savings resulting from end-use EE projects (i.e., one MWh saved equals one certificate). White certificates are primarily used as a trading and compliance verification instrument in markets with EE portfolio standards (quotas). EE portfolio standards are being implemented in Europe and in several U.S. states to establish a minimum threshold of demand for EE resources (Hamrin, Vine & Sharik 2007). White certificates play the same role in markets with EE portfolio standards that Renewable Energy Credits (RECs) do in markets with renewable energy portfolio standards (RPSs). A notable difference, however, is that the measurement of renewable generation is quite straightforward. This is not the case with EE.

Internationally, EE portfolio standards are in place in Italy, the U.K, France, and Australia (New South Wales). However, few active white certificate markets currently exist. Italy has the most experience, having launched a white certificate trading program in 2005 to facilitate compliance with energy saving targets. In the U.S., Connecticut is the only state that has currently implemented a white certificate market. Connecticut's RPS includes a Class III compliance category that sets targets for energy savings from end-use efficiency measures. Hawaii, Nevada and Pennsylvania also have RPS-related policies that include EE targets, and California, Colorado, New York, Texas, and Vermont have all set some form of EE target as well. These states will likely look to the experience of Europe and Connecticut to determine whether a white certificate trading system is an appropriate mechanism to apply.

White certificates are also used, to a limited extent, in voluntary markets for EE savings. Sterling Planet has developed software to measure and verify energy savings for potential use in both compliance and voluntary white certificate markets, and the company has promoted the white certificate or "white tag" concept broadly across the U.S. The term "white certificates" could also be used to describe credits associated with EE offset projects used for compliance by participants in the Chicago Climate Exchange.

Interaction of white certificate and carbon markets is the subject of debate, sharing issues similar to those that have come up in a similar debate related to the interaction between carbon and REC markets. Europe has begun to address some of these issues. Following a 2005 report which introduced the potential for a European Union (EU)-wide white certificate trading scheme, the European Commission (EC) is scheduled to consider the issue again in 2008 (European Commission 2005). An EC-sponsored initiative, the EuroWhiteCert Project, has examined issues of interaction between a potential EU-wide white certificate scheme and the EU GHG Emission Trading Scheme (ETS). The group has found little potential for direct interaction between the two systems, stating that the EU-ETS target applies only to emissions from energy producers and energy-intensive industries while an EE-portfolio would only apply to energy distributors (EuroWhiteCert Project 2007).

While this seems an appropriate assessment if the white certificates system only covers EE measures related to on-site reduction in fossil fuel use where only electricity-related emissions are capped (as is the case with EE offset projects eligible under the Northeast states' RGGI system, as discussed below), there does appear to be some problematic overlap between the two systems to the extent that electricity saving EE measures are considered. Despite any reduction in electricity use due to EE measures, GHG emissions will remain at the capped level from the capped sector as a whole. The boundaries of white certificate markets are vague and may vary depending on the jurisdiction, and the interaction between different environmental attribute markets is complex. Policy makers should take care in defining attributes and avoiding duplication with other environmental attribute markets.

Current and Proposed GHG Regulation and Treatment of Offsets for EE

GHG regulation exists in varying stages of development. Europe has had regulation functioning since 2005. In the U.S., the RGGI and California markets are under development, while federal legislation appears to be imminent.

Europe

The EU established the first multi-national GHG trading system in 2005 with the creation of the EU ETS. The first phase, from 2005 through 2007, served as a testing ground for the market design, monitoring and verification approaches, trading platforms, corporate strategies, and other aspects of the regulations. Phase II began January 1, 2008, and will end on December 31, 2012; it represents the first regulatory reduction in GHG emissions for the EU ETS and applies to the electric industry as well as several other heavy industries. Each Member-State determined its own allocation scheme in its National Action Plan (NAP), which had to be approved by the European Commission. The approved NAPs, in aggregate, will reduce emissions in the EU to 5% below 2005 levels by the end of Phase II through the cap-and-trade system.

Neither Phase I nor Phase II of the EU ETS granted any allowances for EE. The NAPs provided nearly all allowances for free to regulated entities based on either historic or projected emissions; the specifics varied by Member-State. As of February 2008, allowance prices were around €22 ($33). Since the Phase II rules allow banking of allowances into the post-2012 trading period, these prices are not expected to crash like prices did at the end of Phase I, during which banking was not allowed. These forces, combined with an EU-wide goal of increasing EE by 20%, are creating higher prices of electricity for consumers, which are translating to more favorable project economics for EE.

Although domestic EE projects do not receive allowances, international EE projects can receive tradable offsets, provided that they meet requirements developed by the ETS. If a "developed" country from the EU funds (or co-funds) an EE project in a "developing" country (through the Clean Development Mechanism) or in an "emerging" economy (through Joint Implementation),[1] any energy savings can be translated into Certified Emissions Reductions (CER) or Emissions Reduction Units (ERU), respectively. These can then be used by EU-based entities to offset some of their emissions.

While these mechanisms create opportunities for EE projects to participate in the cap-and-trade system, the EE projects face challenges. First, the EU ETS limits the share of a regulated entity's emissions that can be offset using these mechanisms, which limits the potential market for the CERs and ERUs. Further, it can be difficult to prove additionality – that the EE projects would not go through except for the funding provided by the EU ETS regulated entity – because of short payback times for some candidate projects. Finally, these transactions can carry higher levels of risk and transaction costs because of the certification process. Overall, EE projects made up a small share of the CERs and ERUs sold during Phase I, but this could change in the future.

RGGI

RGGI focuses only on emissions from power plants with a generating capacity of 25 MW or greater. Detailed policies for a region-wide CO_2 Budget Trading Program are set forth in RGGI's Model Rule, which regulatory agencies in each participating state codify through their own rulemaking process. Participating states commit to the state-specific targets set collaboratively by members of RGGI, based primarily on historical emissions of the participating states. States will distribute emissions allowances to generating units within their state borders, a significant portion of which will likely be auctioned. The Program's first compliance year is 2009.

The majority of the CO_2 emissions reductions and trading activity that will occur under RGGI's CO_2 Budget Trading Program is intended to take place within the capped power sector. However, a generating unit can use offsets, documented emissions reductions from outside the capped system, for 3.3% of its compliance obligation.[2] The Model Rule specifies five categories of eligible offset projects, one of which pertains to EE measures in buildings. Qualifying EE measures include those that reduce "on-site combustion of natural gas, oil or propane for end-use in an existing or new commercial or residential building by improving EE or fuel usage and/or

[1] The Kyoto Protocol defines the "developed" countries as those listed in Annex I of the Protocol; "developing countries" as the non-Annex I countries; and "emerging" economies as those listed in Annex 2.
[2] This limit is increase to 5% or 10% if certain price triggers occur (Model Rule Section XX-6.5(a)(3)).

the energy efficient delivery of energy services." Electrical EE measures are not included as eligible measures.

While a variety of HVAC and building envelope-related measures could potentially qualify as offset projects and receive revenue under the RGGI system, RGGI will not directly affect the many projects occurring through ratepayer-funded EE programs, or in response to EE portfolio standards in states like Connecticut. Offset projects must pass both regulatory and financial "additionality" tests to demonstrate that they would not have occurred in the absence of RGGI's offset provisions. The Model Rule specifically prohibits projects that receive funding or incentives from any system benefit fund-related program, and projects completed under state or federal mandate. Strict monitoring and verification practices are also required of prospective offset projects.

In addition to the offset provisions of RGGI, the EE industry can benefit from increased support for end-use EE programs that will result from RGGI implementation. Each state that signs the RGGI Memorandum of Understanding agrees to set aside at least 25% of its total allowances to be sold or distributed to provide funds to support consumer benefit programs such as those that promote EE, renewable energy, or other non-carbon-emitting energy technologies (RGGI 2005). States that choose to auction more than 25% of their allowances could produce an even larger revenue base to support EE programs. While RGGI allows each state to develop its own allowance allocation plan, several states support the concept of auctioning a significant portion of allocations in order to maximize revenues for use in supporting end-use efficiency programs that can minimize the cost impact to electricity consumers (RGGI 2007). New York, Vermont, Maine, and Connecticut have announced that they will auction 100% of their RGGI permits (Environmental Entrepreneurs 2007). As discussed elsewhere in this paper, EE investments will also benefit more broadly from the increased energy cost savings resulting from generators' cost of compliance under the cap-and-trade Program.

Since EE projects cannot participate as an offset project if they receive funding from an EE financial incentive program, project developers will need to determine whether offset credits or EE program incentives provide a more favorable return on investment for prospective projects. This will depend on how market dynamics evolve under the cap-and-trade program. Given the limited extent to which offsets can be used for RGGI compliance and the range of other eligible offset projects and given the potentially high transaction costs associated with offset project participation (i.e., demonstration of additionality, adherence to M&V protocols and third-party verification of savings), EE projects are likely to benefit more from increased cost-effectiveness resulting from the cap-and-trade program and from increased financial support from expanded EE programs than they are from potential offset credit revenues.

California

California is introducing its direct statewide GHG regulation using a phased approach. The first phase began in 2007, when the California Public Utilities Commission and Energy Commission passed harmonized emissions performance standards for investor owned and publicly owned utilities, respectively, in response to Senate Bill 1368, enacted in 2006. These standards require that any long-term commitments to baseload generation whose output will be sold in California meet a maximum emissions standard of 1,100 lbs CO_2/MWh.

The second phase entails implementing Assembly Bill (AB) 32, which requires that statewide GHG emissions be reduced to 1990 levels by 2020. This process is currently in the

rulemaking stage, and the details are not yet clear (Peevey 2008). The California Air Resources Board is responsible for promulgating the regulations, which will be done at the statewide level, including several industries besides the electric industry. The CPUC has provided its input into the statewide scheme from its seat as the regulator of the electric industry in a proposed decision. At the time of this writing, the CPUC recommended establishing a statewide cap-and-trade program, of which the electric industry is only a part, to take effect in 2012. Regulations would affect the "deliverer" of electricity to the grid, the same point at which the emission performance standard regulations currently apply. At a high level, the recommendations include auctioning at least part of the allowances available through the regulatory framework and considering the distribution of at least part of the proceeds from that auction to "benefit electric consumers in California;" such benefits could be derived from funding EE and renewable energy programs.

Since the AB 32 regulations are only in the planning stages, a comprehensive analysis of how they might affect EE is premature. More detail must be developed around the portion of the allowances that will be auctioned, how those proceeds will be spent, the rules around offsets and banking, and any regulatory intervention to establish price floors or ceilings. Under the existing SB 1368 regulations, EE will see indirect benefits as the price of electricity increases because resources that meet the emissions performance standard are more expensive than those that would have been acquired in its absence.

At a higher level, California considers its EE and renewable energy requirements as critical components of its emission reduction activities. The proposed decision sees these resources as a source of "a large portion of the emissions reductions in the electricity sector" and anticipates maintaining those programs in a cap-and-trade world. It does not appear that the CPUC is currently advocating granting allowances to renewables or EE, but EE remains first in the state's loading order of resources. As a result, IOUs must obtain all cost-effective EE resources, and cost-effectiveness is determined, in part, by the cost of electricity.[3] If electricity prices increase as a result of the AB 32 regulation, as is expected, more EE resources would be cost-effective, increasing demand for them. This holistic approach bodes well for efficiency in California, regardless of what form the GHG regulation takes in the future.

Proposed Federal Legislation

Over 165 climate-related bills were introduced in the 110th Congress as of December 2007, nearly 20 of which would set greenhouse gas emission limits and nine of which propose some form of cap and trade system, with only two bills proposing a carbon tax. A strong consensus has formed around the need for a cap and trade program (Pew Center on Global Climate Change).

The Lieberman-Warner Climate Security Act (S. 2191) has come closer to passage than any other bill proposing a mandatory cap and trade system, having been voted out of the Senate Environment and Public Works Committee in December 2007. The bill proposes limits on emissions from all major sectors of the economy, and would reduce the nation's total greenhouse gas emissions by roughly 63% by 2050. The legislation would strengthen appliance efficiency standards and would require updates to state building EE codes (THOMAS 2007). An amendment from the Senate Environment and Public Works Committee would build on the bill's existing incentives for states to promote EE investments, rewarding states with increased

[3] In the Proposed Decision, Commissioner Peevey recommends that the California Energy Commission (CEC) seek to extend this requirement to all publicly-owned utilities, which are under the CEC's jurisdiction.

allowance allocations if they decouple utility cost recovery from electricity sales (Pew Center on Global Climate Change 2007). The Act would allow 15% of compliance to be achieved through the use of offset projects, though the legislation emphasizes agricultural and land-use related offset projects. Given the economy-wide nature of the cap and trade system, EE measures would not likely qualify as offset projects since very few measures would pass additionality tests given the scope of the capped system. The bill sets a schedule for the portion of allowances to be auctioned annually, starting at around 20% in 2012 and increasing to over 70% in 2036. Revenues from these auctions would be spent on a variety of climate-related public benefit initiatives. The bill directs 9% and 2% of auction proceeds to electric and gas load serving entities, respectively, to promote energy efficiency and otherwise mitigate economic impacts for low and middle income customers. The EPA estimates these shares of the proceeds to be $17 billion to $24 billion by 2015 (U.S. Environmental Protection Agency 2008).

Another economy-wide cap and trade bill with strong support, including co-sponsorship by leading presidential candidates, is the Climate Stewardship and Innovation Act of 2007. However, this bill had not moved beyond the Committee on Environment and Public Works' Subcommittee on Private Sector and Consumer Solutions to Global Warming and Wildlife Protection as of early 2008.

Given the structure of bills that have garnered the greatest support to date, as well as the legislative records of the leading presidential candidates, it is likely that mandatory federal climate change legislation will take the form of an economy-wide cap and trade system in which a substantial portion of allowances are auctioned.

Benefits for EE from GHG Policy Will Vary

EE may receive substantial benefits if allowance auction proceeds are directed to promoting EE, as provided for in the Lieberman-Warner bill. The other benefits for EE from GHG policies are likely to be primarily indirect, by making EE more cost-effective by increasing avoided costs and/or bill reduction. However, how this benefit will manifest will vary, based on the status of deregulation and allowance allocation, the marginal generation technology, and the nature of the of the EE technology.

How GHG Costs are Reflected in Electricity Prices Depends on the Status of Regulation and Allowance Allocation

When a generator has to pay to emit a pollutant, the generator will consider that cost in deciding whether to dispatch a unit. This cost then becomes reflected in the marginal price of electricity. This has been the case with SO2 and NOx emissions in the U.S., and with CO_2 emissions under the European Trading Scheme. In deregulated markets, such as those found in the Northeast, Mid-Atlantic, and Texas, the emission costs will be largely passed through to customers. In Europe, under Phase 1 of the ETS, generators were allocated 100% of baseline emissions, passed through 60 to 100% of the emission costs in prices, and as a result received windfall profits (Sijm, Neuhoff & Chen 2006). In states with cost-of-service regulation, if utilities receive allowances, as many policies propose, the allowances would offset the emission costs, mitigating the price increases, although avoided costs are likely to increase unless allowances are awarded on an updating basis. Under policies with allowance auctions, as

opposed to freely given, emission costs would be passed through in prices and avoided costs in regulated markets.

How GHG Costs are Reflected in Electricity Prices Depends on the Generation Technology

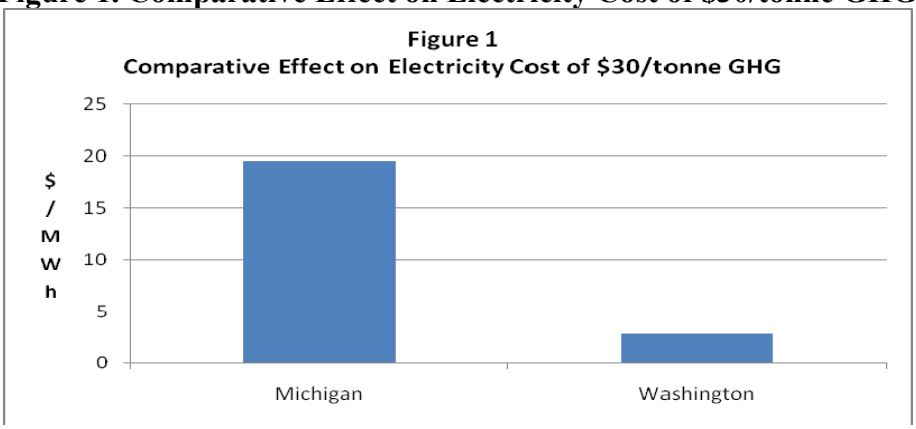
The cost of GHG emissions per MWh varies significantly depending on the type of technology. This variation in emission rates effects how GHG allowance costs will translate into price impacts. The emission rate for natural gas power plants is approximately 0.5 metric tonnes of CO_2/MWh, while the emission rate for coal-fired power plants is about double, at 1.0 metric tonnes CO_2/MWh (U.S. EPA 2000). A cost of $30/tonne translates to $15/MWh cost increase for a gas plant, or $30/MWh for a coal plant. Hydro and nuclear generation has no CO_2 emissions.

In regions with significant coal generation, the effects of stringent GHG policy will be more substantial than those with relatively low emission rates. Figure 1 shows an example of effects on average electricity prices in Michigan and Washington states. Michigan's generation is approximately 60% from coal and 10% from gas, with the remaining being mostly nuclear. Washington's generation is 87% hydro and nuclear, with 7% gas and 6% coal (Energy Information Agency. 2007). As a result of this difference in mix, the effect on electricity prices of a GHG cap-and-trade policy are almost 7 times as great in Michigan as Washington. As a result, the effect on EE will be greater in Michigan.

Exactly how the allowance cost translates into price impacts also depends on the combination of status of regulation. In deregulated markets, prices reflect marginal costs, while in markets with cost of service regulation, prices reflect average costs. To the extent the time-on-the-margin distribution differs from the generation mix, the effect on prices can be quite different. This could be the case in markets with a fairly equal mix of gas and coal generation. In such markets, the gas generation is likely to be on the margin most of the time, while coal plants run all the time and are infra-marginal (i.e., do not set the price). For example, in a market with half coal and half gas generation, but where gas generation sets the price 100% of the time, the average cost impact of a $30/tonne cost would be $22.50/MWh, but the marginal price impact would be only $15.00/MWh.[4]

[4] This assumes no change in the dispatch order. If coal becomes more expensive than gas generation, the marginal cost price effect would be higher.

Figure 1. Comparative Effect on Electricity Cost of $30/tonne GHG



Benefits Will Depend on the Type of Measure

The timing of the savings from the EE measure will have an affect on avoided cost and/or bill reductions. The generation mix must be taken into account when evaluating the effect. To the extent marginal costs are passed through in prices, in a market with significant on-peak natural gas generation and significant off-peak coal generation, a measure that primarily reduces on-peak energy, such as commercial lighting, will not benefit as much from GHG regulation as a measure that reduces off-peak usage, such as street light efficiency.

Demand-response measures will see little or possibly negative benefits from GHG regulation. Demand response typically saves little or no energy and may shift energy use from on-peak to off-peak periods. Commercial lighting dimming during critical peak periods, for example, saves only small amounts of energy. Air conditioning load control reduces use during peak periods which may be offset by increases during off-peak periods. To the extent that the offsetting use is met by generation with higher emission rates, the measures could increase GHG emissions.

Conclusion

The EE industry is likely to benefit from current and coming GHG regulation. The nature and extent of the benefit will be determined in coming months and years. The concept of additionality is likely to limit the ability for EE to participate in cap-and-trade markets. It appears likely that most of the benefits will derive from more favorable project economics resulting from increased avoided energy costs and from potential increased spending on EE incentive programs resulting from incentives for state-level EE program activity as well as increased funding from allowance auction proceeds. The nature of the avoided cost benefit will depend on the policy, the electricity market and the type of EE measures.

References

California Environmental Protection Agency. 2007. “Expert Advisors Release Final Cap-and-Trade Report: Recommendations Intended to Complement California’s Ongoing Efforts to Reduce Emissions”

Energy Information Agency. 2007. "State Electricity Profiles."

European Commission. 2005. Green Paper on EE: Doing More with Less.

EuroWhiteCert Project. 2007. "Interaction and integration of White Certificates with other policy instruments: Recommendations and guidelines for decision makers." www.eurowhitecert.org.

Hamrin, Jan, Edward Vine and Amber Sharik. 2007. "The Potential for Energy Savings Certificates as a Major Tool in Greenhouse Gas Reduction Programs." Center for Resource Solutions.

Peevey, M. 2008. "Proposed Decision on Rulemaking 06-04-009: Order Instituting Rulemaking to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emissions Standards into Procurement Policies." California Public Utilities Commission.

Pew Center for Global Climate Change. 2007. "Status of Senate Bill 2191, the Lieberman-Warner Climate Security Act."

----------2008. "Economy-wide Cap-and-Trade Proposals in the 110th Congress."

----------"Legislation in the 110th Congress Related to Global Climate Change." http://www.pewclimate.org/what_s_being_done/in_the_congress/110thcongress.cfm.

RGGI. 2005. *Memorandum of Understanding*, Section G (1); and RGGI Model Rule, Section 1.2 (ae).

RGGI. 2007. *Overview of RGGI CO2 Budget Trading Program*.

Environmental Entrepreneurs. 2007. Testimony. Massachusetts Department of Energy Resources.

Sijm, J., Neuhoff, K., Chen, Y., 2006. "CO2 cost pass through and windfall profits in the power sector." Electricity Policy.

THOMAS. 2007. Summary of America's Climate Security Act of 2007 (S. 2191). http://thomas.loc.gov/cgi-bin/bdquery/D?d110:1:./temp/~bd4wLk:@@@D&summ2=m&|/bss/d110query.html|

U.S. Environmental Protection Agency. 2000. eGRID.

----------2008. "EPA Analysis of the Lieberman-Warner Climate Security Act of 2008".