

How Climate Change is Driving a New Wave of Energy Efficiency Review and Investment

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INTRODUCTION

In the past, efforts to regulate air pollutants were focused on reducing emission of criteria pollutants and hazardous air pollutants and their precursors. One way to do this was to promulgate rules that would generally result in the need to install abatement controls such as thermal oxidizers, baghouses, selective catalytic reduction scrubbers, and diesel particulate filters to name a few. Now that greenhouse gases (GHG) are considered regulated air pollutants under the federal Clean Air Act, and carbon dioxide, a key GHG, is a natural product of complete combustion, regulators are moving toward different approaches to reduce these new regulated air pollutants. In particular, one primary method of reducing GHG is to improve energy efficiency.

This presentation will discuss how efforts to mitigate and adapt to climate change at the federal, state, and local level have resulted in a new wave of regulations designed specifically to evaluate and implement energy efficiency measures for stationary sources. The discussion will focus on the energy efficiency elements of new and proposed regulations.

The provisions in these rules can be as basic as conducting low-costs tune-ups, to conducting more detailed studies of new capital projects that can improve energy efficiency but at potential significant cost to a facility. While beneficial in many ways, energy efficiency improvements will involve some actions that may well be “low hanging fruit”, yet some actions may be more complicated than they may appear on the surface.

This presentation will focus on the more recent regulations that have been promulgated as a result of climate change concerns that are driving energy efficiency review and investment. However, there are other regulations and initiatives that promote energy efficiency but were not set in place because of climate change. In fact, some of these regulations have been around before climate change was a widely accepted phenomenon. Examples include appliance and building efficiency programs. While not the initial intent, these other regulations and initiatives contribute to mitigate climate change. However, they will not be covered in this presentation.

DISCUSSION

With climate change as a key driver, the following are examples of regulations (or regulations being developed) that require the consideration of energy efficiency.

Federal Level

With GHG having been classified as a regulated pollutant under the Clean Air Act, the United States Environmental Protection Agency (US EPA) has been moving forward to control GHG

emissions. These measures will take advantage of energy efficiency to reduce GHG. At the same time, some energy efficiency requirements are being imposed to address more than just climate change.

GHG BACT

Under the federal Tailoring Rule, as of January 2, 2011, Prevention of Significant Deterioration (PSD) for GHG must be considered under either of the following for any **new construction**:

- Potential to emit (PTE) of at least 100,000 tons per year of CO₂e and total mass emission of GHG, without consideration of global warming potential, is equal or greater than 100/250 tons per year, depending on the source category OR
- Otherwise subject to PSD (due to non-GHG emissions) and that has a PTE of at least 75,000 tons per year of CO₂e

As of July 1, 2011, PSD for GHG must be considered for any **modification** if:

- Existing source has PTE of at least 100,000 tons per year of CO₂e and at least 100/250 tons per year on a mass basis (depending on source category) and the modification results in a net increase of at least 75,000 tons per year of CO₂e;
- Existing source was a minor source for PSD but the modification increased PTE to at least 100,000 tons per year of CO₂e and at least 100/250 tons per year on a mass basis; OR
- Modification is otherwise subject to PSD (due to non-GHG) and has PTE of at least 75,000 tons per year of CO₂e.

If PSD is triggered for GHG, a source must conduct a detailed top-down best available control technology (BACT) analysis for GHG. The PSD and Title V Permitting Guidance for Greenhouse Gases¹ specifies the need to, at a minimum., look at energy efficiency and carbon capture and storage (CCS) as part of a BACT analysis for GHG,. In fact, energy efficiency is acknowledged as a means to not only reduce GHG but other NSR pollutants. Though, it should be noted that EPA specifically states that energy efficiency options that only reduce GHG from offsite sources should not be considered as BACT (e.g., do not consider a option if it only increases efficiency of electricity usage generated by an offsite power plant). In the end, the Tailoring Rule will result in large facilities needing to evaluate and potentially implement energy efficiency projects to minimize a facility's impact on climate change.

NESHAP for Industrial, Commercial, Institutional Boilers at Major and Area Sources

Another federal regulation requires at least identifying potential energy efficiency projects for both large and small facilities. On March 21, 2011, the EPA issued the final National Emission Standard for Hazardous Air Pollutants (NESHAP) for Industrial, Commercial, Institutional Boilers at major and area sources (though on May 18, 2011, the effective date for the major source rule was delayed). The regulations limit HAPs emissions by imposing limits on certain HAPs and other pollutants serving as surrogates for HAPs (e.g., mercury, particulate matter, carbon monoxide, hydrogen chloride, dioxins/furans). Not only are limits imposed on these HAPs but the regulation incorporates work practice standards to reduce HAPs emissions by requiring the examination of energy efficiency. While these work practice standards were not directly imposed to control GHG, they have the effect of either reducing GHG or providing the information to explore GHG further GHG reduction.

In particular, the area and major source rule require either an annual or biennial tune-up depending on the type and size of unit. Tune-ups are a cost effective way to ensure a unit is operating efficiently.

In addition, a one-time energy assessment performed by a qualified energy assessor is also required of certain existing subject sources at both area and major sources of HAPs. For both area and major sources, some of the required elements of the energy assessment include:

- Visual inspection of the affected unit
- Inventory of major consuming systems
- Evaluation of operating characteristics, specifications of energy consuming systems, operating and maintenance procedures, architectural/engineering plans, and fuel usage for the entire facility
- Report identifying potential energy efficiency projects and associated costs, benefits, and time frame to recoup investments

In addition, the rule for major sources requires that a facility's energy management program be reviewed and recommendations be provided for improvements to the program that would be consistent with the U.S. Department of Energy and U.S. EPA's Energy Star or similar program. However, the rule does not require the actual implementation of any of the identified energy efficiency measure. While requiring an energy audit is the first of its kind in the NESHAP world, the expectation is that the EPA will incorporate similar energy efficiency measures in other rules where they have the authority.

California Level

California is the fifteenth largest emitter of greenhouse gases on the planet and represents two percent of the worldwide emissions². Under California's Climate Change Law, AB32, the state is required to achieve 1990 GHG emission levels by 2020. CARB has estimated that business as usual (BAU) emissions in 2020 will be 507 MMTCO₂e. To achieve 1990 GHG emission levels, the state must reduce emission to 427 MMTCO₂e (a reduction of about 80 MMTCO₂e or a 16 percent reduction from business as usual)³. CARB has been and is currently developing regulations to achieve this goal and which will rely, in part, on energy efficiency to achieve those goals.

Proposed Cap and Trade

On October 28, 2010, CARB formally issued the proposed Cap and Trade regulations. While the compliance obligation portion of the regulation is going to be delayed by one year, CARB is planning to move forward with making the regulation effective the start of 2012. This regulation would generally apply to (1) facilities or suppliers that effectively emit 25,000 MT CO₂e or more and (2) all electricity importers. Such entities would have to acquire allowances, which are tradable authorizations to emit one metric ton of CO₂e, and/or purchase offsets in quantities equivalent the actual direct CO₂e emissions from the entity. Depending on the cost comparison, an entity will either spend money to purchase allowances or offsets, or spend money on projects to reduce CO₂e emissions. A facility can reduce their compliance obligation by reducing fuel

combusted on site which can be achieved by upgrading their equipment and process to be more energy efficient. Another class of energy efficiency projects are those that result in less electricity consumed. However, such electricity reduction projects won't directly help a facility reduce their compliance obligations. These Emissions from electricity consumption are considered Scope 2 emissions and are the responsibility of the power generator. However, because the Cap and Trade program is expected to result in higher electricity prices, a facility may have incentives to implement energy efficiency projects that reduce electricity consumption to control such costs. Each facility will need to weigh the cost and benefits to determine the most cost effective approach.

Energy Efficiency and Co-Benefits Rule

Similar to the provisions in the boiler NESHAP, CARB also developed a rule that became effective on July 16, 2011 that directly addresses the need to consider energy efficiency to mitigate climate change impacts. In particular, the rule requires that, in general, a facility that emits 0.5 MMTCO₂e or more from stationary sources in calendar year 2009 must conduct an energy audit to identify and assess energy efficiency projects and then evaluate co-benefits of such projects. Cement plants and petroleum refineries that produce transportation fuels and emitting 0.25 MMTCO₂e or more are also subject to the rule. Acknowledging the inherent efficiency of certain power plants, combined-cycled electric generating units built after 1995 are exempt from this rule. Potential energy projects must be evaluated for processes and equipment that account for 95 percent of the facilities GHG emissions OR energy consumption. While this rule does not currently require the implementation of the energy efficiency projects, CARB is evaluating how to require facilities to implement the most cost effective measures.

Local Air District Level

Even at the local air district level, efforts to address climate change have also focused on energy efficiency. Two examples are presented below.

Bay Area Air Quality Management District Boiler Regulation

For example, in 2008, the Bay Area Air Quality Management District (BAAQMD) revised their Regulation 9, Rule 7 that generally applies to boilers, steam generators, and process heaters rated greater than 1 MMBtu/hr (2 MMBtu/hr if burn only natural gas or LPG) and control NO_x and CO emission levels. Among the changes made, BAAQMD incorporated energy efficiency measures to reduce GHG emissions. In some cases, measures to reduce NO_x emission may result in reduced energy efficiency (e.g., additional fans for exhaust gas recirculation), and so BAAQMD wanted to incorporate energy efficiency measures to counter some of the potential negative impacts to energy efficiency. The measure included in the final version of the rule (which was again updated and made effective in May of 2011) included

- Specifying insulation requirements
- Requiring annual tune-ups for certain heaters
- Limiting stack gas temperature.

The 2008 BAAQMD staff report⁴, BAAQMD noted that insulation can result in an energy efficiency increase of 5 to 10 percent and that tune-up, whereby air-fuel ratios are optimized, can increase efficiency by 10 to 20 percent. Also, BAAQMD indicated that a 40F drop in exhaust

gas temperature correlates to an increase in energy efficiency of 1 percent. In 2011, BAAQMD again updated the regulation, allowing, among other things, to allow equipment certified to the Air-Conditioning, Heating and Refrigeration Institute (AHRI) as having a thermal efficiency of 80 percent or more in lieu of meeting the stack gas temperature. In their staff report, BAAQMD estimated, using the most conservative estimates, that for boilers in the 20 to 75 MMBtu/hr range subject to the regulation, the increase in efficiency from the tune-ups and insulation requirements and the potential decrease in efficiency as a result of trying to achieve the NOx limits would still result in a net CO2 reduction of 194 tons per day.

BAAQMD Guidelines for California Environmental Quality Act

Amendments to the state California Environmental Quality Act (CEQA) Guidelines were made effective in March of 2010 and required that the impacts from GHG emissions be evaluated when state and local agencies identify environmental impacts and ways to mitigate significant impacts associated with their actions as required under CEQA law. To help state and local agencies in the San Francisco Bay Area, BAAQMD updated their own CEQA Guidelines to provide assistance to lead agencies in evaluating GHG impacts. In particular, the BAAQMD CEQA Guidelines provide recommended thresholds over which a project may have significant impacts from GHG emissions and suggest mitigation measures to reduce those significant impacts. Suggested mitigation measures include energy efficiency considerations such as shading to reduce building energy consumption, installing tankless water heaters, and other measures to increase building efficiency.

SUMMARY

The recent efforts to mitigate climate change have led to increase regulations that use energy efficiency as a key means of reducing climate change. This can be seen to occur at all government levels (federal, state, and local). In some cases, the requirement only takes the first step by requiring examination of energy efficiency projects without requiring the implementation of the project. In other cases, the goal of a regulation to reduce GHG will inevitably result in the need to implement energy efficiency projects. As governments look at additional ways to address climate change, we will likely see stronger and more direct regulations requiring the examination and implementation of energy efficiency projects.

REFERENCES

1. EPA, PSD and Title V Permitting Guidance for Greenhouse Gases, March 2011
2. CARB, Climate Change Scoping Plan, December 2008
3. CARB, Proposed Regulation to Implement the California Cap and Trade Program, Part I, Volume I, Staff Report: Initial Statement of Reasons
4. BAAQMD, Proposed Amendments to BAAQMD Regulation 9, Rule 7 Staff Report:, June 2008

KEY WORDS

Energy Efficiency, Greenhouse Gas, NESHAP, BACT, Climate Change, Boilers, Cap and Trade