BAY AREA AIR QUALITY MANAGEMENT DISTRICT ADVISORY COUNCIL EFFICACY OF GREENHOUSE GAS CAPS ON BAY AREA REFINERIES

KEY QUESTION BEFORE THE COUNCIL

Air District staff asked the Advisory Council to consider the following question:

"What is the efficacy of imposing greenhouse gas caps on Bay Area refineries?"

PREAMBLE

While the key question focuses on refinery greenhouse gas (GHG) emissions and global climate change, the Council recognizes that there are also community concerns about the effects of refinery toxics and criteria pollutant emissions on health risk, particularly near refineries. We view both climate and health risk considerations as crucially important, and the Council's opinions are meant to address both.

With respect to climate, we conclude that refinery GHG caps are unlikely to be effective in mitigating global climate change. That conclusion, however, is not an endorsement of inaction. The Council strongly supports coordinated climate protection efforts by the Air District, CARB, USEPA, and others, and the Council views as urgent further efforts by all to take effective steps toward climate protection.

With respect to health risk, we conclude that toxics and criteria pollutant health risk are most effectively addressed directly, through established health-based programs and measures such as draft rule 11-18, rather than indirectly as co-benefits of GHG reduction policies.

CONCLUSIONS

Based on the material that it has considered, its deliberations, and its collective expertise and experience, the Council has reached the following conclusions:

- Conclusion on Key Question: The Council concludes that facility-level caps on Bay Area refinery GHG emissions are unlikely to be effective in mitigating global climate change. GHG reduction policies are effective in providing climate protection only if total global GHG emissions are reduced, and if leakage occurs (that is, GHG emissions are shifted outside of the Bay Area to other locations instead of being reduced), which is likely with refinery GHG caps, such caps would not provide such protection.
- Policy Recommendation: The Council recommends that the Air District identify, systematically evaluate, prioritize, and adopt Bay Area GHG reduction policies and measures, including ones directed at refineries as appropriate, that are effective in reducing total global GHG emissions, minimize leakage risk, and complement and reinforce GHG reduction measures adopted by CARB (e.g., GHG cap-and-trade and methane reduction programs), USEPA, and others.
- Policy Recommendation: The Council recommends that the Air District address community concerns about toxics and criteria pollutants directly, through established programs, rather than indirectly as co-benefits of GHG reduction policies. The approach embodied in proposed rule 11-18 is consistent with this recommendation.

GUIDING PRINCIPLES

The Council has developed the following guiding principles that it regards as useful when evaluating the efficacy of Refinery GHG caps:

1. Clear goals: The Air District should state its goals clearly. If the goal of a proposed GHG reduction measure, such as a Refinery GHG cap, is climate protection, then that goal should be explicitly stated. If toxics reduction is the goal, that should be stated. If, instead, the goal is to limit or reduce the amount or nature of crude throughput at Bay Area refineries, that is a different goal, and should be clearly stated.

2. Systematic evaluation of policies to ensure that they support the goals: The Air District should align its policies, including refinery-related GHG measures, with its goals and ground them in plausible and workable pathways specific to those goals, and careful of unintended consequences.

3. Evaluation and prioritization of GHG reduction options: The Air District should systematically evaluate and prioritize the effectiveness of Bay Area GHG reduction options. Criteria should include the following:

    i) Total global GHG emissions must actually be reduced. To ensure effective climate protection benefits, the Air District should adopt policies that truly reduce total global GHG emissions, and not simply displace Bay Area GHG emission elsewhere outside the Bay Area through leakage.

    ii) GHG regulations should be complementary and non-conflicting. The climate change regulatory landscape is complex. To be most effective, Air District policies should be complementary and non-conflicting with those established by CARB, USEPA, and others. Coordination should include enhanced measurements of GHG emissions.

    iii) Interactions of GHG and other programs and policies should be evaluated. While GHG reduction policies and toxics and criteria pollutant control programs are often synergistic, they are not always so. It is important that interactions among such programs and policies be evaluated and addressed to maximize health and climate benefits and minimize unintended consequences.

DISCUSSION

It is the mission of the Air District to "create a healthy breathing environment for every Bay Area resident while protecting and improving public health, air quality, and the global climate."

Toward that end, the Air District has regulated toxics and criteria pollutants for over 60 years. During this time, there has been continuous improvement in Bay Area air quality due to Air District efforts, along with those of CARB, USEPA, and others. This process of continuous improvement has incorporated evolving understanding of atmospheric science, toxics and criteria pollutant health effects, and improving emissions control technology. The Air District has acted within a framework of State, Federal and local regulations, while also enacting its own rules.

Over a period of decades, the Air District has implemented a number of effective and proven regulatory programs and adopted rules to ensure that clean air health and other environmental standards are met.

Programs specifically directed at toxics include New Source Review of Toxic Air Contaminants, emission and/or performance standards for hazardous air pollutants, the Community Air Risk Evaluation (CARE) Program, and the California Air Toxics "Hot Spots" Program. Programs directed at criteria pollutants include the Multi-Pollutant Clean Air Plan (which also includes GHGs), New Source Performance Standards for new sources, and emission and/or performance standards for existing sources.

The Air District has enacted a number of rules directed specifically at reducing toxics and criteria pollutant emissions from refineries, with additional such rules the subject of currently on-going rulemaking. A significant expansion of community risk-based protection would be provided by draft "Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities". This rule would improve air quality and reduce toxic emissions from facilities ranging in size from large-scale plants like factories and refineries to smaller operations like back-up generators and gas stations. The Air District estimates that hundreds of facilities throughout the Bay Area may be subject to the proposed rule, which would incorporate recently adopted risk management guidelines and health risk values from the California Office of Environmental Health Hazard Assessment.

Under draft Rule 11-18, Air District staff would conduct site-specific health risk screening analyses for all facilities that report toxic air contaminant emissions, and calculate health prioritization scores based on the amount of toxic air pollution emitted, the degree of toxicity of these pollutants, and the proximity of these facilities to local communities. The Air District would conduct health risk assessments for facilities found to have priority scores above a threshold value.

All facilities found to have a cancer risk in excess of 10 in a million or an acute hazard index greater than 1.0 would be required to reduce their risk below 10 in a million and their hazard index below 1.0, or install Best Available Retrofit Control Technology for Toxic Pollutants on all significant sources of toxic emissions.

Because their effectiveness and focus have been amply demonstrated, the Council concludes that toxics and criteria pollutants should be regulated directly through such established programs, rather than indirectly as co-benefits of GHG reduction policies. The most effective place for Bay Area GHG emissions policy is within a comprehensive multi-pollutant strategy that accounts for the realities of conflicting effects, where present, including both co-benefits and dis-benefits.

Climate change is one of the most serious and urgent challenges confronting not just the Bay Area, but the world. That is why, for more than a decade, since 2005, the Air District Board, Staff, and Advisory Council have worked together in efforts that today place the Air District at the leading-edge of climate protection efforts by local agencies in California and throughout the U.S. Programs directed at global climate change include the Climate Protection Program, Regional Climate Protection Strategy, GHG emission inventories, and Plan Bay Area (with the Metropolitan Transportation Commission and others).

In determining the most effective path forward for its climate protection efforts, the Air District works within a framework of existing climate regulations enacted by the State of California, the Federal government, and others. Unlike toxics and criteria pollutants, for which effects of concern typically occur adjacent to emitting sources (tens of meters) or near-downwind (hundreds of meters to several kilometers), the relevant effects of climate change (and the GHGs that cause it) are global. In the Bay Area, such effects will include flooding from sea level rise, and increases in airborne pollutants from wild fires.

Climate change is one-world in scope, driven not just by GHG emissions from a single facility, localized area, or even a large geographical region, but by the world-wide total of all GHG emissions. While a ton of GHGs emitted anywhere in the world has the same effect on global climate as a ton of GHG emitted in the Bay Area, this is not a rationale for inaction but rather a call for leadership.

> ***The Council strongly supports climate protection efforts by the Air District, State and Federal authorities, and others, and the Council views as urgent further efforts by all to take <u>effective</u> steps to address global climate change.***

To be effective, efforts directed at global climate change must reduce total global GHG emissions. It is not sufficient to reduce GHG emissions in one location if those emissions are simply moved elsewhere to another part of the world, an effect called "leakage." Avoiding leakage, or at least minimizing its risk, is key to ensuring the climate protection effectiveness of adopted policies and measures.

The Council is concerned about the potential for such GHG leakage with refineries. In permitting, refineries, like other stationary sources, are required to install emission controls sufficient to ensure that operations meet clean air toxics and criteria pollutant health standards, even if the refinery were to be operated at its theoretical maximum emission rate. The effect of a GHG cap, especially if set at actual throughput levels that are below permitted maximums, may be to prevent a refinery from processing the volume of crude it would otherwise have processed within its permit. If so, the Council is concerned that leakage will be triggered. Because the petroleum industry is globally integrated, the Council considers it likely that such excess crude over the cap (and the GHGs associated with that production) will be displaced from the Bay Area and relocated to refineries elsewhere, out from underneath the caps and negating their intended climate benefit.

The ready mobility of global refinery production and gasoline shipment re-equilibration, and thus the strong potential for GHG leakage, is illustrated by a recent example in Southern California. In February 2015, an explosion and fire at a large refinery in Torrance shut down the refinery for more than a year. Almost immediately, the loss of gasoline production was made up by large outside shipments.

According to the U.S. Energy Information Administration (October 13, 2015), "Over a five-month period following an explosion at a California oil refinery in February 2015, imports of gasoline into California increased to more than 10 times their typical level, drawing from sources that include India, the United Kingdom, and Russia."

The Council is concerned that merely shifting Bay Area refinery GHG emissions to other locations outside the Bay Area will not truly reduce total global GHG emissions, and as a result, will not provide the climate protection expected and needed. In fact, should such a shift result in additional transport of displaced refinery products, as happened in the Torrance example, the carbon footprint of those products would actually increase.

Concern for leakage is not an excuse for inaction, however. There is much that can and must be done in the Bay Area and elsewhere to reduce total global GHG emissions, including those from petroleum-based sources, and there exist important opportunities for the Air District to provide leadership. The question is not <u>whether</u> to reduce global GHG emissions, but <u>how</u> to do it in a manner that will be effective in mitigating global climate change.

For example, emissions of high global warming potential (GWP) pollutants such as methane are not covered under cap-and-trade when emitted as fugitives, meaning emissions that are unintentional and

do not pass through a stack, or other equivalent opening. However, the GWP of methane is up to 25 times greater than that of carbon dioxide. The Air District can play a significant role in addressing fugitive emissions of methane in the Bay Area, whether by accidental discharges or from routine fugitive emissions at facilities.

More generally, the Air District should coordinate with CARB on its Short Lived Climate Pollutant (SLCP) strategy. The strategy addresses emissions of other high-GWP pollutants such as soot (black carbon), fluorinated gases and hydrofluorocarbons. In addition, at the federal level, there is already a Prevention of Significant Deterioration requirement for GHG.

Points of opportunity for Air District refinery focus include:

- Enhanced monitoring of high-GWP emissions such as methane
- Enhanced regulation of fugitive emissions of high-GWP emissions such as methane
- Enhanced energy efficiency reviews
- Increased focus on energy efficiency in the definition of GHG best practices and best available control technology

The Air District can also influence Bay Area GHG emissions in other ways:

> ***The Council strongly encourages Air District efforts to identify, systematically evaluate and prioritize, and adopt Bay Area GHG reduction policies and measures, including ones directed at refineries as appropriate, that are effective in reducing total global GHG emissions, minimizing leakage risk, and complementing and reinforcing GHG reduction measures adopted by CARB (e.g., GHG cap-and-trade and methane reduction programs), USEPA, and others.***

To maximize climate protection afforded by policies directed at petroleum-based GHGs, it is important to target both stationary and mobile sources. For example, in the Bay Area, as elsewhere in California, petroleum-fuelled mobile sources collectively are the largest emitters of GHGs. Approximately 80% of the GHGs emitted over the life-cycle of a barrel of petroleum used to produce gasoline are produced when that gasoline is burned as fuel in motor vehicles, that is, from "tank-to-wheels." By comparison, refining accounts for about 12% of those petroleum life-cycle GHGs.

Relevant refinery GHG emissions information includes the following:

- Refineries emit approximately 16% of Bay Area GHG emissions, compared to transportation sources, which emit about 38%, two-thirds of which is from passenger cars/trucks.
- Refineries are five of the six largest emitters of GHGs among Bay Area stationary sources.
- Refining accounts for approximately 12% of the well-to-wheels GHG emissions from internal combustion engine transportation.
- Burning of fuel in vehicle engines (tank-to-wheels) accounts for approximately 80% of the well-to-wheels GHG emissions for internal combustion engine transportation.
- Refinery GHG emissions are primarily from process heaters and boilers, and from fluid catalytic cracking units, which together emit more than 90% of refinery GHGs. Global emissions of petroleum-based GHGs can be reduced most directly by reducing demand for petroleum-based fuels. Past experience suggests that gasoline demand is inelastic, that is, it is relatively insensitive to gasoline price over a broad range. This implies that GHG-reduction policies that reduce gasoline demand may be more effective in reducing gasoline usage (and resulting GHG emissions) than policies that rely on increased price.

Petroleum fuel demand can be reduced by lowering vehicle miles travelled (VMT) through a variety of local Bay Area policies, including, for example, ones that encourage more efficient and transportation-integrated land use (e.g., Plan Bay Area, Smart Growth) and increased availability and use of public transit (e.g., increased transit funding, bike and car share programs, expanded public education). Many of these policies are already key elements in plans to reduce toxics and criteria pollutant air pollution, and will be compatible with efforts to reduce GHG emissions.

In addition to petroleum fuel demand reduction, complementary measures are being adopted that reduce per-vehicle-mile GHG emissions. Such measures include a requirement for lower carbon fuel intensity (e.g., Low Carbon Fuel Standard), more stringent mileage standards for petroleum-fuelled vehicles, and replacement of petroleum-fuelled vehicles with cleaner, non-petroleum-fuelled alternatives (e.g., electric vehicles, ideally powered by renewable-generated electricity). Current paths to reduce carbon emissions in the Bay Area will not attain the stated 2050 goals without significant additional policies aimed at decarbonizing power sources. Therefore, the Air District should support policy efforts at the state and federal level to encourage development and deployment of carbon capture and sequestration (CCS), especially of natural gas power plants.

Certain individual sources of GHGs and/or other pollutants are known to release atypically large emissions, disproportionately larger than other similar sources and materially higher than estimated using standard bottom-up GHG emission estimation methods. The Air District should consider a find-and-fix program to identify and repair GHG "super-emitters," if and where present, reducing non-inventory "hidden" (but real) GHG emissions from such sources.

ATTACHMENT A
Advisory Council Members

Pursuant to California Health and Safety Code § 40260-40268, the Advisory Council consists of seven members "skilled and experienced in the fields of air pollution, climate change, or the health impacts of air pollution," and the Air District Board Chair (or their representative) as an ex-officio member. Council members are appointed by the Air District Board and are "selected to include a diversity of perspectives, expertise, and backgrounds." Members of the Advisory Council include:

Member	Background	Air Pollution	Health	Climate
Stan Hayes	Member, Advisory Council (1995-2007, 2009-) and former chair; emeritus Principal, Ramboll Environ; air-related research consulting	X	X	X
Severin Borenstein	Professor of Business Administration and Public Policy, Haas School of Business, University of California, Berkeley			X
Tam Doduc	Member and former chair, State Water Resources Control Board; served as Deputy Secretary, Cal/EPA, directed environmental justice	X	X	
Robert Harley	Professor and Department Chair, Civil and Environmental Engineering, University of California, Berkeley	X		X
Michael Kleinman	Professor, Environmental Toxicology, Co-Director, Air Pollution Health Effects Laboratory, Adjunct Professor, College of Medicine, University of California, Irvine	X	X	
Tim Lipman	Co-Director, Transportation Sustainability Research Center, energy and environmental technology, economics, and policy researcher and lecturer; University of California, Berkeley	X		X
Jane CS Long	Chair, California's Energy Future Committee, California Council on Science and Technology			X

ATTACHMENT B
Process and Speakers

DELIBERATIVE PROCESS

Presentations to the Council were made by more than a dozen speakers from the Air District, CARB, the California Energy Commission (CEC), and various interested stakeholders. A full list of speakers is provided below.

Speakers included Richard Corey, Executive Officer, CARB; Jack P. Broadbent, Executive Officer/APCO and other senior management and staff of the Air District; and senior representatives of Communities for a Better Environment, 350 Bay Area (by letter), the California Council for Environmental and Economic Balance, and the Western States Petroleum Association.

Council deliberation was conducted in five full-day meetings on December 3, 2015, and February 3, April 25, July 19, and October 3, 2016.

SPEAKERS

- Bay Area Air Quality Management District
  - Jack P. Broadbent, Executive Officer/APCO
  - Brian Bunger, General Counsel
  - Jeff McKay, Deputy APCO
  - Jim Karas, Director of Engineering
  - Henry Hilken, Director of Planning and Climate Protection

- California Air Resources Board
  - Richard Corey, Executive Officer
  - Sam Wade, Chief, Transportation and Fuels Branch
  - Jason Gray, Manager, Climate Change Market Monitoring Section

- California Energy Commission
  - Gordon Schremp, Senior Fuels Specialist

- Stakeholders
  - Communities for a Better Environment (CBE) – Greg Karras
  - 350 Bay Area – Letter
  - California Council for Environmental and Economic Balance (CCEEB) and Western States Petroleum Association (WSPA) – Bill Quinn and Berman Olbaldia; Gary Rubenstein, Sierra Research on behalf of CCEEB and WSPA