

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

ADVISORY COUNCIL
MEETING

WEDNESDAY
OCTOBER 9, 2013
9:00 A.M.

7TH FLOOR BOARD ROOM
939 ELLIS STREET
SAN FRANCISCO, CA 94109

AGENDA

CALL TO ORDER

Opening Comments
Roll Call

Robert Bornstein, Ph.D., Chairperson
Clerk

PUBLIC COMMENT PERIOD

Public Comment on Non-Agenda Items, Pursuant to Government Code Section 54954.3. The public has the opportunity to speak on any agenda item. All agendas for Advisory Council meetings are posted at the District, 939 Ellis Street, San Francisco, at least 72 hours before a meeting. At the beginning of the meeting, an opportunity is also provided for the public to speak on any subject within the Council's purview. Speakers are limited to three minutes each.

CONSENT CALENDAR

1. Approval of Minutes of the July 10, 2013 and September 11, 2013 Advisory Council meetings.

DISCUSSION

2. Approval of draft report on the Advisory Council's September 11, 2013 meeting.

The Advisory Council will finalize the draft report on the September 11, 2013 meeting on Black Carbon: Health Effects of Exposure with Air District staff.

OTHER BUSINESS

3. Council Member Comments/Other Business

Council Members may make a brief announcement, provide a reference to staff about factual information, or ask questions about subsequent meetings.

4. Chairperson's Report

Robert Bornstein, Ph.D., Chairperson

5. Council Member Comments/Other Business

Council Members may make a brief announcement, provide a reference to staff about factual information, or ask questions about subsequent meetings.

6. Time and Place of Next Meeting

Wednesday, November 13, 2013 at 9:00 a.m. at 939 Ellis Street, San Francisco, CA 94109.

7. Adjournment

CONTACT THE CLERK OF THE BOARDS
939 ELLIS STREET SF, CA 94109

(415) 749-5073
FAX: (415) 928-8560
BAAQMD homepage:
www.baaqmd.gov

- To submit written comments on an agenda item in advance of the meeting.
- To request, in advance of the meeting, to be placed on the list to testify on an agenda item.
- To request special accommodations for those persons with disabilities notification to the Clerk's Office should be given in a timely manner, so that arrangements can be made accordingly.

Any writing relating to an open session item on this Agenda that is distributed to all, or a majority of all, members of the body to which this Agenda relates shall be made available at the District's offices at 939 Ellis Street, San Francisco, CA 94109, at the time such writing is made available to all, or a majority of all, members of that body.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Memorandum

To: Chairperson Robert Bornstein, Ph.D.
and Members of the Advisory Council

From: Jack P. Broadbent
Executive Officer/Air Pollution Control Officer

Date: July 17, 2013

Re: Draft Minutes of the Advisory Council Meetings of July 10, 2013, and September 11, 2013

RECOMMENDED ACTION

Approve the attached draft minutes of the Regular Meetings of the Advisory Council on July 10, 2013, and September 11, 2013.

DISCUSSION

Attached for your review and approval are the draft minutes of the Regular Meetings of the Advisory Council on July 10, 2013, and September 11, 2013.

Respectfully submitted,


Jack P. Broadbent
Executive Officer/APCO

Prepared by: Sean Gallagher
Reviewed by: Rex Sanders

Attachment

AGENDA: 1A

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
(415) 749-5073

DRAFT MINUTES

Advisory Council Regular Meeting
Wednesday, July 10, 2013

Note: An audio recording of the meeting is available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov/The-Air-District/Board-of-Directors/Advisory-Council/Agendas-and-Minutes.aspx>.

CALL TO ORDER: Chairperson Robert Bornstein called the meeting to order at 9:02 a.m.

ROLL CALL

Present: Chairperson Robert Bornstein, Ph.D., Vice-Chairperson Sam Altshuler, P.E.; Secretary Liza Lutzker, M.P.H.; and Members Benjamin Bolles, Harold Brazil, Jonathan Cherry, A.I.A., LEED A.P., Heather Forshey, Stan Hayes, John Holtzclaw, Ph.D., Kraig Kurucz, Rick Marshall, P.E., P.L.S., Timothy O'Connor, J.D., Estes Al Phillips, Jessica Range, LEED A.P. and Murray Wood.

Absent: Members Jennifer Bard, Jeffrey Bramlett, M.S., C.S.P., Gary Lucks, J.D., C.P.E.A., and Kathryn Lyddan, J.D.

Also Present: None.

OPENING COMMENTS: None.

PUBLIC COMMENT PERIOD: None.

CONSENT CALENDAR

1. Approval of the Minutes of the Advisory Council meeting of June 12, 2013

Council Comments: None.

Public Comments: None.

Council Action:

Member Altshuler made a motion to approve the minutes of June 12, 2013; Member Holtzclaw seconded; and the motion carried unanimously.

DISCUSSION

2. Discussion of draft report on the Advisory Council's meeting on May 8, 2013

Member Lutzker made introductory comments regarding the drafting of the report.

NOTED PRESENT: Member O'Connor was noted present at 9:05 a.m.

Council Comments:

The Council deliberated upon proposed revisions to the draft report on the Advisory Council's meeting on May 8, 2013.

NOTED PRESENT: Member Kurucz was noted present at 9:17 a.m.

Public Comments: None.

Council Action:

Member Hayes made a motion to approve the report of the Advisory Council's meeting on May 8, 2013, as amended; Member Holtzclaw seconded; and the motion carried unanimously.

3. Report on the Annual Air & Waste Management Association (AWMA) Meeting, June 24 – 28, 2013

Members Brazil, Hayes, Altshuler and Holtzclaw reported on their experiences at the AWMA Meeting.

Henry Hilken, Director of Planning, Rules and Research, reported on staff's experience at the AWMA Meeting.

Chairperson Bornstein reported on his experience at the AWMA Meeting.

OTHER BUSINESS

4. Chairperson's Report

The Council and staff discussed the upcoming appointment by the Board of Directors to fill the vacant Regional Park District seat on the Council.

The Council discussed potential topics for their September meeting and selected the health effects of black and brown carbon.

5. Council Member Comments/Other Business:

Member Kurucz congratulated Member Altshuler on his role at the AWMA meeting.

Member Holtzclaw distributed to the Council, on behalf of Member Bard, copies of “Susan Adams resolution on Climate Change to be presented to BAAQMD.”

6. **Time and Place of Next Meeting:** Wednesday, September 11, 2013, Bay Area Air Quality Management District Headquarters, 939 Ellis Street, San Francisco, CA 94109 at 9:00 a.m.
7. **Adjournment:** The meeting adjourned at 12:56 p.m.

Sean Gallagher
Clerk of the Boards

AGENDA: 1B

Bay Area Air Quality Management District
939 Ellis Street
San Francisco, CA 94109
(415) 749-5073

DRAFT MINUTES

Advisory Council Regular Meeting
Wednesday, September 11, 2013

Note: Audio and webcast recordings of the meeting are available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov/The-Air-District/Board-of-Directors/Advisory-Council/Agendas-and-Minutes.aspx>.

CALL TO ORDER: Vice-Chairperson Altshuler called the meeting to order at 9:04 a.m.

ROLL CALL

Present: Vice-Chairperson Sam Altshuler, P.E.; Secretary Liza Lutzker, M.P.H.; and Members Ana M. Alvarez, D.P.P.D., Jennifer Bard, M.S., C.S.P., Harold Brazil, Jonathan Cherry, A.I.A., LEED A.P., John Holtzclaw, Ph.D., Kraig Kurucz, Estes Al Phillips, Jessica Range, LEED A.P., and Murray Wood.

Absent: Chairperson Robert Bornstein, Ph.D.; and Members Benjamin Bolles, Jeffrey Bramlett, Heather Forshey, Stan Hayes, Gary Lucks, J.D., C.P.E.A., Kathryn Lyddan, J.D., Rick Marshall, P.E., P.L.S., and Timothy O'Connor, J.D.

Also Present: None.

OPENING COMMENTS:

Vice-Chairperson Altshuler welcomed new Member Alvarez who made introductory comments to the Council.

PUBLIC COMMENT PERIOD: None.

PRESENTATIONS [OUT OF ORDER]

1. Black Carbon: Health Effects of Exposure

- A. Climate Change – Health Impacts Caused by the Changing Climate
Linda Rudolph, M.D., M.P.H.
Executive Director
Center for Public Health and Climate Change

Public Health Institute
Oakland, California

Vice-Chairperson Altshuler introduced the topic of today's presentations and Linda Rudolph, M.D., M.P.H., Executive Director, Center for Public Health and Climate Change, Public Health Institute, Oakland, California. Eric Stevenson, Director of Technical Services, provided a brief description of her background.

Dr. Rudolph gave a presentation entitled, "Climate Change and Health" (*a copy of which is available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov/The-Air-District/Board-of-Directors/Advisory-Council/Agendas-and-Minutes.aspx>*), with supplemental comments from and discussion with the Council as follows:

NOTED PRESENT: Member Wood was noted present at 9:12 a.m.

Council Comments:

Member Holtzclaw asked for a more detailed description of Valley Fever, which was provided by Dr. Rudolph.

Member Bard thanked Dr. Rudolph for her presentation, commended her professional work and asked how to go about incorporating health metrics in the Sustainable Communities Strategies and similar regional agency projects, which question was answered by Dr. Rudolph.

Member Lutzker thanked Dr. Rudolph for her presentation and her leadership in the field and asked for recommendations on how to mitigate exposure for those who utilize alternative modes of transportation, which question was partially answered by Dr. Rudolph.

Member Holtzclaw said protected bike lanes are a solution to mitigate increased bicycle-related injuries that are expected to result from decreased motor vehicle use.

Member Philips thanked Dr. Rudolph for her presentation, attributed wildfires to poor land management, and suggested that climate change projections, temperature changes over the last 100 years, and deaths attributed to climate change as being inconsistent and asked how to reconcile this disparity, which question was partially answered and partially deferred by Dr. Rudolph.

Vice-Chairperson Altshuler noted the direct and indirect health impacts of extreme heat, in the forms of heat-related health complications and increased air pollution from air conditioner use, respectively.

Member Kurucz asked about the physiological effects of increased physical exertion during periods of decreased, as opposed to average, ambient air quality, which question was answered by Dr. Rudolph.

Vice-Chairperson Altshuler asked whether any health studies are being conducted during and about the Stanislaus National Forest Rim Fire, which question was answered by Dr. Rudolph.

Member Bard asked for proposed recommendations for the Council to carry forward in its report on today's presentations, which question was answered by Dr. Rudolph.

Vice-Chairperson Altshuler thanked Dr. Rudolph.

- B. Black Carbon – Health Effects of Exposure
Michael T. Kleinman, Ph.D.
Professor
Division of Occupational and Environmental Health
University of California, Irvine

Mr. Stevenson introduced Professor Michael T. Kleinman, Ph.D., Division of Occupational and Environmental Health, University of California, Irvine, and provided a brief description of his background.

Prof. Kleinman gave a presentation entitled, "Black and Brown Carbon Aerosols: Nanoparticles and Mega-Problems" (*a copy of which is available on the website of the Bay Area Air Quality Management District at <http://www.baaqmd.gov/The-Air-District/Board-of-Directors/Advisory-Council/Agendas-and-Minutes.aspx>*), with supplemental comments from and discussion with the Council as follows:

Vice-Chairperson Altshuler asked, regarding slide 26, Typical Ambient Black Carbon Nanoparticles vs. Engineered Particles, for elaboration on carbon nanotubes, which was provided by Prof. Kleinman.

Prof. Kleinman continued the presentation.

Member Lutzker asked, regarding slide 31, Objectives, what remains after a thermal denuder strips components, which question was answered by Prof. Kleinman.

Prof. Kleinman concluded the presentation.

Council Comments:

Vice-Chairperson Altshuler asked whether the research presented is current, if one could solve a number of problems by developing a way to prevent organics from attaching to BC, whether the same could be said of brown carbon, and whether organics attach to sulfates and nitrates, which questions were answered by Prof. Kleinman.

Member Lutzker asked for clarification on the particle removal process by the lymph nodes and lungs, what the eight-week time span in the mice experiments equates to for humans, and for clarification on whether the BC core or affixed organics are responsible for the attributable health effects, which information was provided and questions were answered by Prof. Kleinman.

Member Holtzclaw thanked Prof. Kleinman for his presentation and asked, regarding slide 36, Ambient Particulate Matter (PM) Exposure Causes Reduced Heart Rate Variability – Removing the Organic Constituents Blocks the Effect, for clarification on the meaning of the chart components, which was provided by Prof. Kleinman.

Member Bard asked for proposed recommendations for the Council to carry forward in its report on today's presentations relative to nanotubes and ultrafine particles emitted from refineries, which questions were answered by Prof. Kleinman.

Member Brazil asked, regarding slide 16, [untitled] regarding combustor reaction zones, whether the toxic components produced at the end of the graph are products that result from how a motor vehicle is manufactured or how it is operated, which question was answered by Prof. Kleinman.

Member Wood thanked Prof. Kleinman for his presentation and asked how to plan nanomaterial mitigation efforts when they prove so elusive in terms of determining their nature and effects, which question was answered by Prof. Kleinman.

Member Kurucz relayed a professional experience with nanoparticles and asked if nanoparticles represent a high percentage of PM and should be a special focus of the Air District as a result, which questions were answered by Prof. Kleinman.

Vice-Chairperson Altshuler asked if roadway and airport exposures are the most significant concerns for the Council to consider, about the health impact of aged air masses at greater distances from roadways and airports, and whether any studies indicate the pancreas is negatively affected by BC, which questions were answered by Prof. Kleinman.

Vice-Chairperson Altshuler thanked Prof. Kleinman.

Public Comments: None.

PANEL DISCUSSION

2. Black Carbon – Health Effects of Exposure

The Panel Discussion was waived due to the early departure of Dr. Rudolph.

CONSENT CALENDAR

3. Approval of the Minutes of the Advisory Council meeting of July 10, 2013

Council Comments: None.

Public Comments: None.

Council Action:

Approval of the Minutes of July 10, 2013, was postponed for lack of a quorum.

OTHER BUSINESS

4. Chairperson's Report: None.

5. **Council Member Comments/Other Business:** None.
6. **Time and Place of Next Meeting:** Wednesday, October 9, 2013, Bay Area Air Quality Management District Headquarters, 939 Ellis Street, San Francisco, CA 94109 at 9:00 a.m.
7. **Adjournment:** The meeting adjourned at 12:08 p.m.

Sean Gallagher
Clerk of the Boards

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Memorandum

To: Chairperson Robert Bornstein, Ph.D.,
and Members of the Advisory Council

From: Jack P. Broadbent
Executive Officer/Air Pollution Control Officer

Date: September 25, 2013

Re: Discussion of Draft Report on the Advisory Council Meeting on September 11, 2013

The attached draft report of the September 11, 2013, Advisory Council Meeting on Black Carbon: Health Effects of Exposure will be discussed with Air District staff, and the Council will finalize the recommendations at its meeting on November 13, 2013.

Respectfully submitted,


Jack P. Broadbent
Executive Officer/APCO FOR

Prepared by: Sean Gallagher
Reviewed by: Rex Sanders

Attachment

DRAFT REPORT ON THE SEPTEMBER 11, 2013 ADVISORY COUNCIL MEETING ON BLACK CARBON: HEALTH EFFECTS OF EXPOSURE

SUMMARY

The following presentations were made at the September 11, 2013 Advisory Council meeting on Black Carbon and Climate Change- Health Impacts:

1. Health Impacts Associated with Climate Change by Dr. Linda Rudolph, MD, MPH. Dr. Linda Rudolph is the co-director of the Climate Change and Public Health Project at the Public Health Institute. She is also the principal investigator on a Public Health Institute project to advance the integration of Health in All Policies in local jurisdictions around California. She holds an MD from the University of California at San Francisco and a Master's in Public Health from the University of California at Berkeley. Previously, Dr. Rudolph served as the Deputy Director of the California Department of Public Health's Center for Chronic Disease Prevention and Public Health and as the Health Officer and Public Health Director for the City of Berkeley.
2. Black Carbon- Health Effects of Exposure by Professor Michael Kleinman. Dr. Michael Kleinman is a Professor of Occupational and Environmental Medicine in the Department of Medicine at the University of California at Irvine. He is also the Co-Director of the Air Pollution Health Effects Laboratory in the Department of Medicine. He holds a Master's in Chemistry from the Polytechnic Institute of Brooklyn and a Ph.D., in Environmental Health Sciences from New York University. He has published more than 100 articles in peer-reviewed journals dealing with environmental contaminants and their effects on cardiopulmonary and immunological systems, and has directed more than 50 controlled exposure studies of human volunteers and laboratory animals to ozone, particulate matter (PM) and other pollutants.

This is Prof. Kleinman's second presentation to the Advisory Council in two years. On October 12, 2011, Prof. Kleinman discussed his research that was focused on neurological and cardiopulmonary effects of inhaled particles on humans and laboratory animals. In that presentation, Prof. Kleinman demonstrated that semi-volatile components of PM_{2.5} and Ultrafine Particles

(UFP) can promote airway allergies, accelerate the development of cardiovascular disease, and that inhaled PM_{2.5} and UFP can increase the production of inflammatory mediators, damaging brain cells. The September 11 presentation provided an update on Prof. Kleinman's research, including the unique effects of nanoparticles.

KEY POINTS

Dr. Linda Rudolph

1. Climate change is the greatest public health challenge of the 21st century. Examples of human health effects from climate change include:
 - a. During the 2006 heat wave in California there were 650 excess deaths and many more emergency room visits and hospitalizations. A large number of excess deaths were in areas that are typically cooler and lack air conditioning. About 45 percent of those who died lived alone.
 - b. Acute health care costs from just six major climate events in the United States totaled \$14 billion (heat waves, wildfires, ozone pollution, hurricanes, flooding, and infectious disease) and led to 1,699 premature deaths.
2. Climate change will continue to result in direct and indirect health impacts including: heat-related illness and death, asthma and other respiratory disease, cardiovascular disease, vector-borne disease, water- and food-borne disease, increased pollen (pollen counts are expected to triple overall by 2040), other infectious disease (e.g. valley fever has increased 13 percent annually in California), mental health disorders, malnutrition and food insecurity.
3. Climate change threatens our survival by disrupting the ecosystems upon which humans depend such as water, food, shelter, peace, and social stability. Faster and more aggressive action is needed to avert the worst effects of climate change and to avoid catastrophic impacts on our children and our grandchildren.
4. Climate change will impact vulnerable populations the greatest. Those who are already most at risk for adverse health problems (e.g. the poor, young, old, and disenfranchised) may not be as resilient at responding to climate events (e.g. due to lack of air conditioning or transportation, etc.).

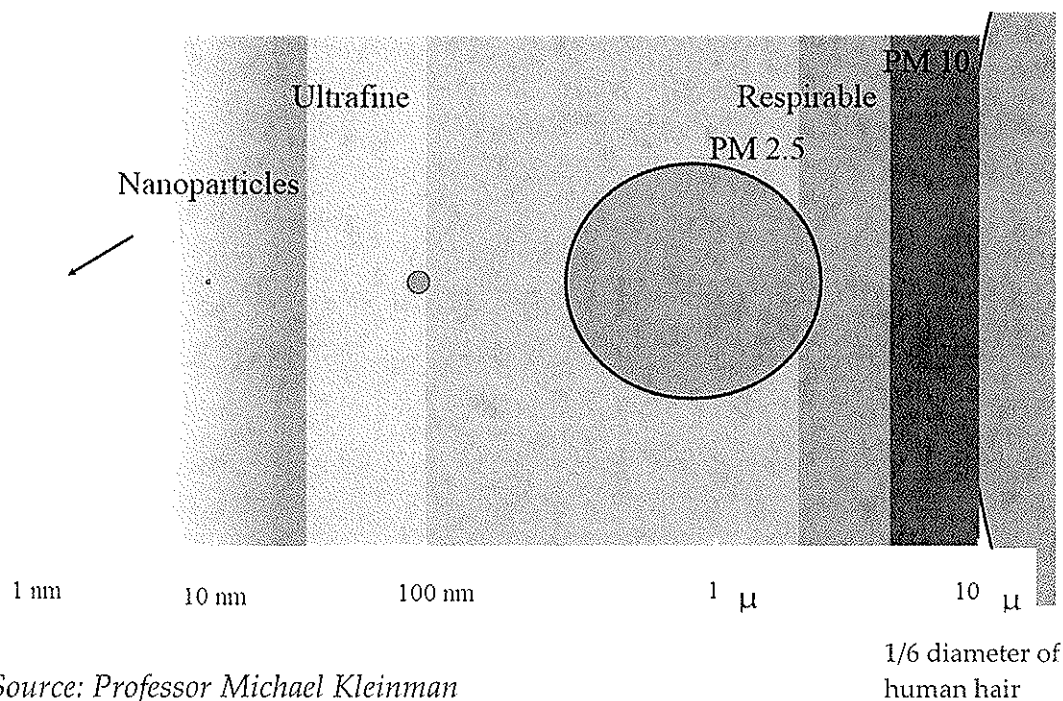
5. The impact of climate change may overwhelm ongoing air quality improvement efforts. For instance, warmer temperatures throughout California are expected to result in up to 30 more days per year of unhealthy ground-level ozone concentrations. This is known as the “climate penalty.”
6. According to Dr. Dan Cayan Director of the Climate Research Division at the Scripps Institution of Oceanography, annual average temperatures in the Bay Area are expected to increase 3.5-11 degrees by 2050 depending on the specific location within the Bay Area, with inland areas being most affected. The Bay Area may be particularly vulnerable because the population is not well-adjusted to high temperatures and existing infrastructure is not well suited for adaptation (e.g. buildings designed for coastal mild climates and lacking air conditioning systems).
7. A public health climate strategy requires a dramatic reduction in greenhouse gas (GHG) emissions, preparation, and building climate resilient communities. Strategies should include greater energy efficiency standards (especially for buildings and vehicles), greater use of pervious surfaces to decrease flood risk, use of cool roofs, urban greening, and developing plans to protect vulnerable populations from extreme heat and other weather events.
8. There are co-benefits of addressing both climate change and public health. California’s Assembly Bill 32 Scoping Plan GHG reduction measures have measurable co-benefits of reducing particulate matter (PM) and oxides of nitrogen (NOx) emissions. A recent study estimates these reductions by 2030 as one percent and 15 percent, respectively, when compared to business as usual.
 - a. Changing transportation mode shifts to active transportation not only reduces GHG emissions and other air pollutants, but provides other health benefits. For example, the California Department of Public Health study using ITHIM (an active transportation computer model) recently predicted that if active transportation in the Bay Area were to increase from the current average of four minutes a day to 15 minutes a day (from a 2 percent to 15 percent mode share), the following benefits could be expected:
 - A 14 percent reduction in heart disease, stroke, diabetes;
 - A five percent reduction in breast and colon cancer;
 - A 14 percent reduction in GHG emissions;
 - An annual health cost savings of \$1.4 to \$22 billion within the Bay Area;

The majority of these predicted health benefits are attributable to increased physical activity and equal those achieved through California's tobacco control program, averting one million excess deaths since first implemented 25 years ago.

Prof. Michael Kleinman

1. Brown Carbon (BrC) and Black Carbon (BC) aerosols are present in the nanoparticle size range. Figure 1, below, illustrates the size of nanoparticles compared to larger particles. The 10 micron particle size shown in Figure 1 is approximately one-sixth the diameter of a human hair.

Figure 1. Particle Scale



Source: Professor Michael Kleinman

2. Physically, the surface area of a nanoparticle is proportionately much greater than that of larger particles. This large surface area allows for a greater number of toxic materials to adhere to the nanoparticle surface, posing a greater health danger when inhaled.
3. Nanoparticles are believed to be responsible for the translocation of toxic materials into the body. Because of their small size, nanoparticles can be transported into the deep lung, cross cell membranes and enter into the bloodstream, altering structures within those cells, resulting in inflammation that then affects pulmonary function. While most toxic materials present on BrC

and BC aerosol particles are insoluble, over time toxic materials dissolve and translocate into other organs and the lymph nodes, and could affect the lungs, liver, brain and heart.

4. Combustion processes result in the formation of nanoparticles. Based on studies of roadways in Southern California, the majority of particles measured were found to be less than one micron in diameter and those closest to the source ranged between 70 and 80 nanometer (nm).
5. More recently nanoparticles are being manufactured for use in electronics, grinding during finishing processes and research, including medical research. Engineered nanoparticles can have a similar structure to diesel exhaust particles and can be inflammatory in the human body.
6. Both BrC and BC contain organic carbon. Prof. Kleinman conducted a study on mice that evaluated the health effects from the organic components of BrC and BC. The study exposed mice over an eight week period to particles containing organic components and particles that were stripped of any semi-volatile organics including highly toxic organic compounds such as Polycyclic Aromatic Hydrocarbons (PAHs). The following results were observed:
 - a. Mice exposed to particles without semi-volatile organic components showed an increase in cholesterol as well as cell wall thickening, which restricts air flow.
 - b. Mice exposed to particles with organic components showed an increase in cholesterol and cell wall thickening, an increase in arterial plaque, and a measurable increase in heart rate variability.
7. Prof. Kleinman 's study validates the following findings:
 - a. The semi-volatile fraction of particulates is an important contributor to the development of atherosclerosis and heart disease;
 - b. Thermal technologies that remove semi-volatile organics, such as afterburner emission controls, not only reduce PM pollution, but may reduce the toxicity of residual particles (e.g. by removing PAHs, oxygenated hydrocarbons, free radicals); and
 - c. Exposure to concentrated ambient particles (CAPs) increases inflammatory responses in the brain and is associated with damage to dopamine producing cells in the brain (same as in degenerative nerve diseases such as Parkinson's).

EMERGING ISSUES

1. Climate change is happening faster than expected and is at the upper end of the International Panel on Climate Change scenarios.
2. The recent Yosemite Rim Fire may provide an opportunity to further examine the health impacts of large wildfires, which are anticipated to only increase with climate change.
3. Preparing for the public health implications of climate change will require:
 - a. Identifying vulnerable populations and policies to protect them;
 - b. Reducing air pollution (air quality has and will continue to improve, but these improvements may be at least partially offset by the effects of climate change);
 - c. Strengthening social support networks; and
 - d. Designing green and resilient communities that:
 - i. Enhance walking, cycling and public transit,
 - ii. Improve energy efficiency, and
 - iii. Resist the impacts of heat, drought, floods and sea level rise.
4. Successful efforts by the State to control ozone may be overshadowed by the increases in ozone caused by climate change-related increases in temperature.
5. The Air District may need to initiate more efforts to control ozone (and possibly other pollutants) in order to attain air quality goals.
6. A public health climate strategy should take full advantage of both climate and health strategies that provide co-benefits. For example, increased active transportation provides both health and climate benefits. Once developed, health metrics can be used to assess the relative health benefits of climate policies.
7. While there are many co-benefits from reducing GHG emissions in terms of reductions in other air pollutants, some GHG and other air pollutant reduction strategies may be at odds with each other and difficult to reconcile. For example:
 - a. Spare the Air Days recommend that the public use alternative transportation and promote active transportation on days when air quality is poor and sensitive groups may be most affected.

- b. Some studies indicate that active transportation provides much greater health benefits than the added risks from exposure to air pollution and pedestrian/cycling injuries. These risks should be taken into account when developing climate and health policies.
 - c. Building housing near busy roadways may reduce regional air pollution and GHG emissions and may provide other local health benefits from housing in proximity to services. Strategies that reduce exposure to air pollution and provide a safe environment for walking and bicycling should be considered in these locations.
- 8. Removal of highly toxic organics, including PAHs, from particles before inhalation can reduce build-up of arterial plaque and the resulting adverse effects to the cardiovascular system. Processes for removing organic toxins are similar to engine afterburner technologies, which not only reduces pollution, but may also reduce the toxicity of residual particles.
- 9. Emissions of nanoparticles are released into the atmosphere during manufacturing and industrial processes. The use of nanoparticles in products (engineered nanomaterial) and manufacturing has increased with little safety research and regulation. The unique biological and physical properties of some engineered nanotubes pose special challenges ranging from the effects of occupational exposures to the final disposition of discarded products. The National Institute of Occupational Safety and Health is currently proposing regulations to address workplace safety from the use of carbon nanotubes. However, such regulations present challenges because:
 - a. The proposal is to regulate nanoparticles at the one microgram scale, the limit of quantification in an air sample; and
 - b. Nanoparticles, in some cases, are too small to be captured by advanced High Efficiency Particulate Air (HEPA) filters.

RECOMMENDATIONS

Dr. Linda Rudolph stressed the public health urgency of reducing the effects of climate change. The Advisory Council's October 13, 2010 report identifies strategies for aggressively reducing GHG emissions to meet California's 2050 GHG target of an 80 percent reduction in GHG emissions below 1990 levels. That report includes a number of recommendations, which are incorporated into this report by reference (see

Attachment A) and should be reviewed by the Air District for incorporation as appropriate to meet long-term GHG reduction goals.

The following additional recommendations are based on the presentations given at the September 11, 2013 meeting of the Advisory Council as well as Advisory Council input:

1. The Air District should conduct specific research and analysis of the effects of climate change in the Bay Area to identify those areas expected to be most affected by specific climate-related events, including, but not limited to: increased heat waves, flooding, atmospheric conditions, etc.
2. The Air District should consider aggressive climate strategies to reduce GHG emissions, provide guidance to protect vulnerable populations and promote the building of resilient communities. The following strategies should be considered:
 - a. The Air District's outreach program should include education to the public about the impacts of climate change on local health and air quality.
 - b. The 2014 Clean Air Plan should include performance objectives that align with California Executive Order S-3-05 to reduce GHG emissions by 80 percent below 1990 levels by 2050. The 2014 Clean Air Plan could provide the basis for a regional GHG emission reduction plan that supplements the Sustainable Communities Strategy and demonstrates how the region will attain long-term GHG reduction goals. Such a plan would require and an update of the GHG emissions inventory, and could address multiple strategies for reducing reliance on the burning of fossil fuels; these might include energy efficiency, electrification of current fossil fuel intensive uses, and decarbonization of the region's electricity supply.
 - c. Develop health metrics that can be used to evaluate the relative co-benefits of climate strategies.
 - d. Consider adding GHG standards to permits for sources regulated by the Air District.
 - e. Continue to support policies that reduce short-lived climate pollutants (BC, methane, HFCs, ozone) that also result in health benefits.
 - f. Identify climate adaptation strategies and promote policies and programs that create resilient, healthier communities. Work with applicable agencies and municipalities to incorporate those policies as part of land use planning.

3. The Air District should support all necessary strategies that promote active transportation (walking, cycling and transit). Examples include:
 - a. Supporting increased funding for transit operations and transportation choices (transit, vanpools, carpools, car sharing, bicycle sharing, and other alternatives to solo driving) as funds become available, including cap and trade funds, toll increases, high occupancy toll lane revenues, tax measures, and other sources.
 - b. Supporting increased funding and promotion of improved roadway designs for safer walking and cycling infrastructure to maximize the health co-benefits of reduced air pollution and increased physical activity (see the National Association of City Transportation Officials' Urban Bikeway Design Guide at: <http://nacto.org/cities-for-cycling/design-guide/>).
 - c. Continued and expanded funding for bicycle infrastructure with a focus on bicycle parking near transit, workplaces, and schools. Consider incentive funding for bicycle purchasing and/or subsidized bicycle sharing, especially for low income individuals and families.
 - d. Ensuring the 2016 Regional Transportation Plan maximizes health benefits.
4. The Air District should work with other agencies to prioritize indoor air quality for new development, in particular development in proximity to sources of air pollution. While tighter building envelopes in new construction will improve energy efficiency and reduce infiltration of external pollutants, pollutants generated indoors will become increasingly important and require adequate ventilation and filtration.
5. The Air District should evaluate the relative health and climate benefits of infill development and the added risk from air pollution or other risks commonly associated with high-density infill development including pedestrian/cycling injuries.
6. The Air District should further investigate the relative health risks and benefits from recommending walking and cycling on high air pollution days, particularly with respect to sensitive populations. Spare the Air recommendations may require reformulation with a goal of promoting active transportation while providing appropriately protective recommendations for sensitive populations.

7. The Air District should evaluate the ability of current pollution control programs to meet stated targets in light of potential “climate penalty” effects.
8. The Air District should monitor research on health impacts resulting from the recent Yosemite Rim Fire.
9. The Air District should monitor and support research on combustion engineering processes that reduce emissions of the semi-volatile organic fraction of UFPs generated in a wide range of combustion engines.
10. The Air District should continue to monitor and support responsible regulation at the federal level related to the use of nanoparticles in industrial or consumer products, such as, but not limited to: standardized research, toxicological testing, bio-monitoring and product labeling.

GLOSSARY AND DEFINITIONS

BC: Black Carbon

BrC: Brown Carbon

CAP: Concentrated ambient particles

Climate Penalty: Refers to increases in ground-level ozone resulting from climate change.

Complete Streets: A transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation. The focus is on separating pedestrians and cyclists from motor traffic and slowing traffic to safe speeds. Complete Streets is intended to allow for safe travel by those walking, bicycling, driving automobiles, riding public transportation, or delivering goods.

EPA: United States Environmental Protection Agency

GHG: Greenhouse Gas Emissions

HEPA: High Efficiency Particulate Air

ITHIM: Integrated Transport and Health Impact Model. For more information see: http://www.cdph.ca.gov/programs/CCDPPH/Documents/ITHIM_Technical_Report11-21-11.pdf

Micrometer (μm): One millionth of a meter (1,000 nanometers)

Nanometer (nm): One billionth of a meter

Nanoparticles: A particle having one or more dimensions of the order of 100 nanometers or less.

NO_x: Oxides of nitrogen

PAH: Polycyclic Aromatic Hydrocarbon

PM: Particulate matter

PM_{2.5}: Particles with a diameter of 2.5 micrometers or less

UFP: Ultrafine particles

Attachment A

Advisory Council Report from the October 13, 2010 Meeting
Strategies and Technologies for the Transportation Sector

REVISED DRAFT REPORT ON THE OCTOBER 13, 2010 ADVISORY COUNCIL
MEETING ON CALIFORNIA'S 2050 GHG EMISSION REDUCTION TARGET OF 80%
BELOW 1990 LEVELS – STRATEGIES AND TECHNOLOGIES FOR THE
TRANSPORTATION SECTOR FOR DISCUSSION BY THE ADVISORY COUNCIL AT
THE JANUARY 12, 2011 MEETING

SUMMARY

The following presentations were made at the October 13, 2010 Advisory Council meeting on California's 2050 Greenhouse Gas (GHG) emission reduction target of 80% below 1990 levels — strategies and technologies for the transportation sector:

1. ***Great Communities for Climate Protection*** by Stuart Cohen, co-founder and Executive Director of TransForm, an organization whose mission is to “create world-class public transportation and walkable communities in the Bay Area and beyond.” In 2005, Stuart helped conceive and launch the Great Communities Collaborative. This partnership of five non-profits, three community foundations, and 24 community partners engages communities around the Bay Area in planning for sustainable, equitable development near transit. He is also co-founder and chair of ClimatePlan, a statewide network promoting smart land use and transportation as critical components of California's climate strategy.
2. ***Regional Parking Strategies for Climate Protection*** by Jeff Tumlin, Principal for Nelson\Nygaard Consulting Associates. Jeff has extensive experience working with cities, developers, and regional governments to foster economic development, while improving quality of life through smart transportation investments. His expertise covers four key areas: Planning for Urban Infill and New Towns; Transit-Oriented Development; Regional Transit Planning; and Multimodal Planning.
3. ***Achieving California's GHG Emission Reduction Targets: Plug-in Electric Vehicles*** by Simon Mui, scientist with NRDC's Air & Energy Program. Simon focuses on advocacy and research regarding clean vehicles and fuels, with the goal of reducing impacts from transportation systems. Before Simon came to NRDC, he worked for the US Environmental Protection Agency in Washington, D.C., where he analyzed and authored studies on plug-in electric vehicles and on climate mitigation strategies for the transportation sector.

DISCUSSION MEETING

At the November 10, 2010 discussion meeting the Council discussed the presentations made and the materials received at the October 13, 2010 meeting, and how to incorporate and expand upon the recommendations from the May 13, 2009 meeting on California's GHG emission reduction target for the transportation sector.

KEY POINTS

Stuart Cohen

- Kids are indicators for climate health, by how much they walk and cycle. Vibrant, convenient communities stimulate walking, cycling, and healthy interactions. Single use, sprawling areas, with little transit and poor access (no gridded streets) to services, schools, and jobs increase vehicle miles traveled (VMT), congestion, and costs. GHG emissions are also highest in low density areas.
- Sprawl communities place the greatest burden on low income residents, who must spend a larger portion of their household income on transportation costs. According to *Windfall for All*, a report by TransForm, annual auto costs increase from under \$6,000 for families in smart growth areas to over \$14,000 in sprawling communities.
- It is widely believed that transportation investments that support walking, cycling, and transit are too expensive, but this does not account for the full costs of driving. A full economic analysis of transportation investments, which includes all the personal costs of driving, shows significant savings for individuals and families.
- California's Sustainable Communities and Climate Protection Act (SB375) is a major paradigm shift in planning, requiring Metropolitan Planning Organizations (MPOs) to conduct regional planning to meet CO₂ reduction targets from driving. In the Bay Area, GHG reduction targets are 7% by 2020 and 15% by 2035. According to the Metropolitan Transportation Commission's (MTC) model, 12% can be achieved by land use planning, 8% by road use and parking pricing, and 3% by transportation demand management (TDM). More can be done with infrastructure and transit efficiency, however, than is shown by MTC's model.
- It is more cost effective to focus transportation investments on improving transit efficiency and infrastructure to enhance connectivity for walking, cycling, and transit, than to build freeway lanes that subsidize sprawl. By improving efficiency, for example, Caltrain increased service and ridership by 70%, with only a 40% increase in costs.
- In their Regional Transportation Plan, MTC should eliminate grandfathering transportation projects that increase VMT, and should require all projects to be analyzed for effects of induced growth and induced demand, including the pro-proposed expansion of the High-Occupancy Toll (HOT) lane network. Revenues from HOT lanes should also be directed to improve transit, rather than to building traffic lanes. MTC should also consider changing funding formulas to reward operations and cost effective projects, rather than for huge capital projects.
- MTC should continue and expand successful programs that have the greatest impacts on reducing GHGs, while meeting other key economic and social goals, including: bicycle and pedestrian build-out, Transportation Climate Initiatives, Safe Routes to Schools (a regional parking program), Transit Oriented Development (including affordable housing,

planning grants), and rewarding innovative ideas. MTC should also encourage expanded use of business and residential passes for public transit (both free and deep discount types) to encourage ridership, which can also provide more dependable funding streams.

Key actions for Air District

- Educate and engage through developing a regional/city vision, and by sponsoring walking tours and other engaging educational events for residents and planners.
- Support bike/pedestrian planning, Safe Routes to School, Livable Communities, and community planning grants.
- Reward innovation, including Priority Development Areas (PDAs), money to implement Transit Oriented Development (TOD), CEQA streamlining for projects that implement the Sustainable Communities Strategy, Green TRIP certification, and indirect source review.
- Regional fit: reduce the number of transportation projects grandfathered into the sustainable community strategy. Provide local planning resources to ensure that zoning is ultimately consistent with regional housing allocations and housing elements.
- Work with MTC to calculate induced traffic on past projects and to include an analysis of induced growth and demand from new infrastructure.
- Ensure pricing is seriously considered as a regional strategy, and use the experience of the recent Bay Bridge toll increases to predict potential outcomes.

Jeff Tumlin

- Zoning. Household auto ownership depends on density, transit, and household size and income. In auto-oriented sprawl, families spend more on transportation than on housing. The cost of owning and operating each car is equal to a \$100,000 mortgage.
- Parking is the most regulated commodity in the US. Cities require huge parking lots, at \$20,000 per space. Residential parking requirements increase rents by 15-30% per place, and reduce the number of units by 15-25%. Clustering homes, offices, shopping, schools, and parks, like in downtown Palo Alto and Mill Valley, reduces land and parking areas by over 50%, VMT and arterial trips by 75% and arterial turning movements by nearly 100%. High city parking requirements and free parking cause excessive parking; lower development; lower land values; and increase sprawl, vehicle ownership, VMT, congestion, pollution, energy use, and GHGs.
- Parking policy reform can achieve the greatest reductions in VMT, congestion, and GHGs at the lowest cost and at the greatest speed. Parking reform can reduce VMT, GHG, and energy use by 50% in new development and by 20-30% in retrofitted developments. It can also generate revenue (\$2000/ton-CO₂) is pro-market, pro-smart growth, and region-wide; and promotes social equity.
- Key elements of successful implementation of parking reform:

- Address fear of parking spillover: help public understand (in partnership with the MTC) the real costs of “free” parking, and the benefits of residential parking permits and parking benefit districts.
 - Charge market rates for parking in high demand areas. Replace minimum with low maximum parking requirements (as in San Mateo and San Francisco) and increase building floor space to lot area ratios (FARs) to facilitate redeveloping parking lots.
 - Invest in good parking technology; parking meters that only accept quarters should be made illegal. Redwood City’s staff adjusts intelligent parking meter rates to keep 15% of curb spaces vacant, and motorists are called before meters expire. SFPark gives rates and availability on-line, and shows transit alternatives.
 - Workplace Parking Cash-Out (PCO) reduces parking requirements and drive-alones. Genentech got higher FARs in exchange for a \$4/day PCO, worker transit subsidies, and shuttles. The state PCO law should be enforced locally and extended to cover companies with 10-50 employees.
- CEQA reform is needed to cut regional VMT growth, but the League of Cities opposed losing Level of Service (LOS) impact fees, and homebuilders dislike the uncertainty of regional impact fees; such opposition should be addressed.
 - **Key Actions for Regional Agencies:**
 - Start with easy to implement policies and use regulatory authority to require unbundling of the costs of parking and housing, which will make housing more affordable for residents with fewer cars.
 - Coordinate local policies, support and fund FOCUS PDAs, and harmonize climate/smart growth strategies with parking and TDM.
 - Engage congestion management agencies in parking reform.
 - Include parking reform in grants, train and assist cities, develop Green Parking Certificates, and analyze parking in sustainable community strategies. The Air District should levy a region wide annual parking impact fee as part of its indirect source rule (ISR), and then it should return revenues to local governments for walk/bike/transit improvements and to address social equity.
 - MTC should condition funding parking reform (like Transit Oriented Development), and assess city/county/corridor performance and penalties. The three regional agencies (MTC, The Air District, and ABAG) should fund parking reform, especially in PDAs, and should lobby to eliminate the federal tax subsidy for employee parking.
 - Tolling existing lanes: Significant air quality, congestion, and CO₂ benefits accrue from tolling existing lanes. Recent congestion pricing at the Bay Bridge toll plaza produced dramatic shifts in driving behavior, even at a small price differential. This indicates that expanding to more locations could make significant impacts on peak travel, and help to make the case for roadway pricing in other bottleneck locations throughout the region. Pricing of existing lanes has big benefits, for congestion, air quality, and GHGs. Expanding highways with priced lanes has poor results for these issues.

- Thirty seven percent of California's GHG emissions come from transportation, with 27% of the total from light duty vehicles. Even with cleaner vehicles, the upcoming low carbon fuel standard, and reduced driving from SB 375, huge reduction shortfalls will still exist by 2030 and 2050, demonstrating the need for electric vehicles [EV: plug-in hybrids, battery electric vehicles, and hydrogen (H₂) fuel cell vehicles]. Though several EVs will come on the market, we need to push forward with next round regulations to accelerate commercialization of advanced technology vehicles. Early market success will determine how fast and far we can push. We need US and CA strategic plans to coordinate and incentivize clean cars and fuels, including refueling (Better Place, etc.) infrastructure.
- California can achieve 80% reductions in 2050 with: 80 mpg (111 g CO₂/mi) vehicles, a 25% VMT reduction (or a 32% reduction from business as usual), and a 45% reduction of carbon in fuel. When analyzing global warming emissions by electricity source, well to wheel analysis shows US plug-in hybrids (PHEV) would save one-fourth of GHG emissions from mid-sized cars using electricity derived from coal, one-third from the US average grid, and one-half from renewable energy sources, see NRDC-EPRI report: <http://my.epri.com/portal/server.pt?open=514&objID=223132&mode=2>
- The Air District's efforts have greatly aided the deployment of EVs and infra-structure, and it should continue partnering with the Bay Area EV Corridor for plug-in EVs (PEV) and should continue to analyze and promote resulting air quality benefits.

Recommendations:

BAAQMD and regional agencies should:

- Track the deployment of electric vehicles and the changing needs of communities.
- Streamline customer experiences: help disseminate best permitting and inspection practice information; promote environmental and social benefits of city engagement; and award local government activities to stimulate the market.
- Provide the public with high exposure to PEVs via car sharing programs, taxis, rentals, and vehicle purchases by private employers and cities.
- Partner with companies: continue working with the Silicon Valley Leadership Group (SVLG), the Bay Area Council (BAC) and Bay Area Climate Collaborative (BACC) on fleet purchase plans; and on tax incentives for battery R&D, manufacturing of PEV components, and charging service providers.
- Ensure new residential and commercial buildings are "PEV ready."
- Seek innovative financing of up-front costs of PEVs and their charging infrastructure.

EMERGING ISSUES

1. Need to identify what policies and transportation investments will have the greatest impact to increase walking, cycling, and transit use for the convenience of

neighborhoods. Need for more sophisticated transportation and land use models to analyze public health impacts of various policies and transportation investments on increasing mode share of walking, cycling, and transit.

2. A number of transportation and land use tools are being developed to analyze a broad range of public health impacts of various policies related to physical activity, including obesity, diabetes, heart disease, and breast cancer, in addition to traditional air quality related diseases. The San Francisco Public Health Department's (SFPHD) has developed a methodology for analyzing transportation investments to examine driving-related health impacts from air pollution, noise, injury and reduced physical activity. The tool looks at road pricing, and how revenues could be used to achieve: transit improvements, better walking and cycling environments, and mixed-use infill. This could be a model for MTC to adopt for analyzing and prioritizing transportation investments.
3. Challenge of transit funding and expansion: over the next 25 years; we face shortfalls of \$25 billion in operations and maintenance.
4. Reforming local, regional, and state planning to achieve VMT and CO₂ reductions: regional planning to reduce GHG will depend on Congestion Management Agencies (CMAs) changing their business as usual approach to approving projects. Need to reconsider committed projects in county and regional transportation plans in terms of GHG impacts and fiscal constraints.
5. California is moving forward with development of a strong, statewide, zero emission vehicles (ZEV) mandate to achieve GHG reduction goals. Proposed updates to low emission vehicle (LEV) III, Pavley 2, and ZEV regulations will be released in early 2011.
6. SB 375's mandate to reduce VMT, as a per capita metric, does not address the challenge of achieving reductions in GHGs. The latest calculations from CARB and MTC indicate that current per-capita targets will still lead to overall increases in CO₂ emissions from passenger cars (see: <http://arb.ca.gov/cc/sb375/mpo.co2.reduction.calc.pdf>). Aggressive policies to reduce GHG are needed.

RECOMMENDATIONS

The following Advisory Council recommendations to the Board are based on: the above presentations, recommendations made a year ago by the Advisory Council on transportation policies (see attachment on transportation recommendations), and subsequent discussions among Advisory Council members. The Air District should:

1. Work with MTC and ABAG to condition transportation and development investments and grants upon implementation of parking reform. The Air District should also include parking reform policies in development of an indirect source rule.

2. Work with MTC to analyze induced demand impacts from MTC's HOT Lane network expansion (study being done by MTC consultant Parsons Brinkerhoff). Modeling does not currently, but should, include a range of impacts of induced demand or increased housing at suburban fringe. The Air District should specify that net revenues from HOT lanes be used for expanded non-highway transit and transit choices, rather than expansion of the highway system.
3. Work with MTC to consider adoption of a quantification tool that evaluates a broad range of public health impacts and benefits from transportation and land use policies and decisions. The Air District should also encourage MTC to conduct a performance-based analysis of transportation projects to ensure investments are cost effective.
4. Through the Air District's role in the Joint Policy Committee, encourage MTC to evaluate all transportation projects, including projects in previous Regional Transportation Plans (RTP), for impacts on VMT and potential to induce growth. The air district should encourage MTC to only include SCS/ RTP projects that do not increase personal VMT and do not induce sprawl. Additionally, the air district should implement the relevant Transportation Control Measures and Leadership Platform* in the 2010 Clean Air Plan to address those issues.
5. Develop a social marketing campaign to increase walking, cycling, and transit, based on latest research of proven strategies that affect behavior change, including comparison-with-neighbor policies.
6. Seek state legislation requiring CMAs to expand their mission statement from primarily "congestion management" to include a major emphasis on reducing-GHG and to enable a focus on: health; increasing mode share of walking, cycling, and transit; and on reducing VMT, rather than managing congestion.
7. Develop a toolkit for planners, local agencies, and CMAs for land use and transportation policies that have the greatest public health, air quality, and GHG reduction benefits.
8. Require use of cool paving materials, such as high albedo materials, for future outdoor surfaces, such as parking lots, median barriers, and roadway improvements to reduce urban heat island effects and to save energy.
9. Use MTC's SB 375 implementation planning funds for local community planning processes.
10. Build upon SB 535 (Yee) to support development of a strong statewide ZEV mandate and incentives to help the state reach aggressive GHG reduction goals.
11. Continue to work with other agencies in regional efforts to fund and accelerate EV charging infrastructure and streamline residential charging station installation and permitting, including incentives to promote solar EV charging installations. In addition, work with cities, counties, and utility districts to assist property owners in funding

charging stations through Property Assessed Clean Energy (PACE) bonds, pursuant to SB 1340 (Kehoe)

12. Promote expansion of congestion toll pricing to all other regional bridges. Revenues raised should be used to improve public transit service in those corridors.
13. Develop and promote policies and programs, including securing necessary legislative authority, to achieve significant reductions in employer-related vehicle miles traveled, including mandating employer transportation demand management plans, such as have been adopted by Oakland (GreenTRIP) and San Francisco. Additionally, the air district should implement the relevant Transportation Control Measures and Leadership Platform in the 2010 Clean Air Plan to support these policies.
14. Support establishment of a VMT fee or gasoline tax in the Bay Area to achieve GHG, criteria pollutant, and air toxics reductions goals, and implement the relevant Transportation Control Measures and Leadership Platform* in the 2010 Clean Air Plan to support this recommendation.

* Leadership Platform: Some of the most potentially beneficial measures in the Bay Area 2010 Clean Air Plan (CAP) to improve air quality will require action by other agencies such as CARB or US EPA, or adoption of new legislation. Therefore, the CAP also includes a Leadership Platform, summarized in Volume I, Table 4-7 of the CAP, which identifies policies and actions by other entities to complement the CAP control strategy.

Glossary

ABAG – Association of Bay Area Governments
BAC – Bay Area Council
BACC – Bay Area Climate Collaborative
CEQA – California Environmental Quality Act
CMA – Congestion Management Agency
EV – Electric Vehicle
FAR – Floor Area Ratio
FOCUS – Focusing Our Vision
GHG – Greenhouse gases
HOT – High Occupancy Toll
ISR – Indirect Source Rule
LEV – Low Emission Vehicle
LOS – Level of Service
MTC – Metropolitan Transportation Commission
PCO – Parking Cash-out
PEV – Partial Electric Vehicle
PDA – Priority Development Area
RTP – Regional Transportation Plan
SVLG – Silicon Valley Leadership Group
SCS/RTP – Sustainable Community Strategy/Regional Transportation Plan
TDM – Transportation Demand Management
TOD – Transit Oriented Development
VMT – Vehicle Miles Traveled
ZEV – Zero Emission Vehicles