BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

# ADVISORY COUNCIL MEETING

**WEDNESDAY**
**MARCH 12, 2014**
**9:00 A.M.**

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

# AGENDA

## CALL TO ORDER

Opening Comments — Sam Altshuler, Chairperson
Roll Call — 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 February 13, 2014 Advisory Council meeting.

## DISCUSSION

2. Discussion of draft report on the Advisory Council's February 13, 2014 meeting.

   *The Advisory Council will discuss the draft report on the February 13, 2014 meeting on The Path Forward for the Energy Sector to Move Towards the 2050 Green House Gas Goals 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. Report of the Executive Officer/APCO

5. Time and Place of Next Meeting
   *Wednesday, April, 9 2014, at 9:00 a.m. at 939 Ellis Street, San Francisco, CA 94109.*

6. Adjournment

**CONTACT 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. Such writing(s) may also be posted on the District's website (www.baaqmd.gov) at that time.

# BAY AREA AIR QUALITY MANAGEMENT DISTRICT
## 939 ELLIS STREET, SAN FRANCISCO, CALIFORNIA 94109
## FOR QUESTIONS PLEASE CALL (415) 749-5016 or (415) 749-4941

## EXECUTIVE OFFICE:
## MONTHLY CALENDAR OF AIR DISTRICT MEETINGS

# MARCH 2014

| TYPE OF MEETING | DAY | DATE | TIME | ROOM |
|---|---|---|---|---|
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* **-CANCELLED** | **Wednesday** | **5** | **9:45 a.m.** | **Board Room** |
| **Advisory Council Regular Meeting** *(Meets on the 2nd Wednesday of each Month)* | **Wednesday** | **12** | **9:00 a.m.** | **Board Room** |
| **Board of Directors Executive Committee** *(Meets on the 3rd Monday of each Month)* | **Monday** | **17** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* | **Wednesday** | **19** | **9:45 a.m.** | **Board Room** |
| **Board of Directors Climate Protection Committee** *(Meets on the 3rd Thursday of Every Other Month)* | **Thursday** | **20** | **9:30 a.m.** | **Board Room** |
| **Board of Directors Personnel Committee** *(At the Call of the Chair)* | **Monday** | **24** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Budget & Finance Committee** *(Meets on the 4th Wednesday of each Month)* | **Wednesday** | **26** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Mobile Source Committee** *(Meets on the 4th Thursday of each Month)* - **CANCELLED** | **Thursday** | **27** | **9:30 a.m.** | **Board Room** |

# APRIL 2014

| TYPE OF MEETING | DAY | DATE | TIME | ROOM |
|---|---|---|---|---|
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* | **Wednesday** | **2** | **9:45 a.m.** | **Board Room** |
| **Board of Directors Legislative Committee** *(At the Call of the Chair)* | **Thursday** | **3** | **10:00 a.m.** | **4th Floor Conf. Room** |
| **Advisory Council Regular Meeting** *(Meets on the 2nd Wednesday of each Month)* | **Wednesday** | **9** | **9:00 a.m.** | **Board Room** |
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* | **Wednesday** | **16** | **9:45 a.m.** | **Board Room** |
| **Board of Directors Executive Committee** *(Meets on the 3rd Monday of each Month)* | **Monday** | **21** | **9:30 a.m.** | **4th Floor Conf. Room** |

# APRIL 2014

| TYPE OF MEETING | DAY | DATE | TIME | ROOM |
|---|---|---|---|---|
| **Board of Directors Budget & Finance Committee** *(Meets on the 4th Wednesday of each Month)* | **Wednesday** | **23** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Mobile Source Committee** *(Meets on the 4th Thursday of each Month)* | **Thursday** | **24** | **9:30 a.m.** | **Board Room** |

# MAY 2014

| TYPE OF MEETING | DAY | DATE | TIME | ROOM |
|---|---|---|---|---|
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* | **Wednesday** | **7** | **9:45 a.m.** | **Board Room** |
| **Advisory Council Regular Meeting** *(Meets on the 2nd Wednesday of each Month)* | **Wednesday** | **14** | **9:00 a.m.** | **Board Room** |
| **Board of Directors Climate Protection Committee** *(Meets 3rd Thursday of every other month at 9:30 a.m.)* | **Thursday** | **15** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Executive Committee** *(Meets on the 3rd Monday of each Month)* | **Monday** | **19** | **9:30 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Stationary Source Committee** *(Meets Quarterly at the Call of the Chair)* | **Monday** | **19** | **10:00 a.m.** | **4th Floor Conf. Room** |
| **Board of Directors Regular Meeting** *(Meets on the 1st & 3rd Wednesday of each Month)* | **Wednesday** | **21** | **9:45 a.m.** | **Board Room** |
| **Board of Directors Mobile Source Committee** *(Meets on the 4th Thursday of each Month)* | **Thursday** | **22** | **9:30 a.m.** | **Board Room** |
| **Board of Directors Budget & Finance Committee** *(Meets on the 4th Wednesday of each Month)* | **Wednesday** | **28** | **9:30 a.m.** | **4th Floor Conf. Room** |

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**
Memorandum

To: Chairperson Sam Altshuler and Members of the Advisory Council

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

Date: February 25, 2014

Re: Approval of Minutes of the Advisory Council Regular Meeting on February 13, 2014

RECOMMENDED ACTION

Approve the attached draft minutes of the Regular Meeting of the Advisory Council on February 13, 2014.

DISCUSSION

Attached for your review and approval are the draft minutes of the Regular Meeting of the Advisory Council on February 13, 2014.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Sean Gallagher
Reviewed by: Rex Sanders

Attachment

AGENDA: 1

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

**DRAFT MINUTES**

Advisory Council Regular Meeting
Thursday, February 13, 2014

*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:** Chairperson Sam Altshuler called the meeting to order at 9:06 a.m.

**Roll Call:**

Present: Chairperson Sam Altshuler, P.E.; Vice-Chairperson Liza Lutzker, M.P.H.; Secretary Jessica Range, LEED A.P.; and Members Benjamin Bolles, Robert Bornstein, Ph.D., Harold Brazil, Jonathan Cherry, A.I.A., Stan Hayes, Kraig Kurucz, Rick Marshall, P.E., P.L.S., Bruce Mast, Timothy O'Connor, J.D., and Laura E. Tam.

Absent: Members Ana M. Alvarez, D.P.P.D., Jeffrey Bramlett, M.S., C.S.P., Heather Forshey, John Holtzclaw, Ph.D., Kathryn Lyddan, J.D., SaraT L. Mayer, M.P.P., and Estes Al Phillips.

Also Present: None.

**Opening Comments:**

Chairperson Altshuler welcomed the Advisory Council (Council) and announced that the Council Secretary will compile and share the action items generated in Council meetings to assist with tracking their completion over time.

Secretary Range listed the outstanding action items from the January meeting as Council member feedback on the report writing guidelines provided by staff, delivery of the Council reports from 2009 – 10 to the Council, and an updated Air District organizational chart.

**CONSENT CALENDAR**

**1. Approval of the Minutes of the Council meeting of January 8, 2014**

Council Comments:

Chairperson Altshuler revised the minutes at page 1, last paragraph, "Opening Comments (continued), to request the inclusion of a detailed list of the 2014 Goals.

Public Comments: None.

Council Action:

Member Bornstein made a motion to approve the minutes of January 8, 2014, as amended; Member Marshall seconded; and the motion carried by the following vote of the Council:

AYES: Altshuler, Bolles, Bornstein, Brazil, Cherry, Hayes, Lutzker, Marshall, O'Connor, and Range.

NOES: None.

ABSTAIN: Mast and Tam.

ABSENT: Alvarez, Bramlett, Forshey, Holtzclaw, Kurucz, Lyddan, Mayer and Phillips.

## RECOGNITION

### 2. Recognition of New Council Members

Chairperson Altshuler introduced newly appointed Members Laura E. Tam (*Conservation Organization*) and Bruce Mast (*Conservation Organization*) and welcomed them to the Council. Members Mast and Tam made introductory remarks.

Council Comments: None.

Public Comments: None.

Council Action: None.

## PRESENTATIONS

### 3. The Path Forward for the Energy Sector to Move Towards the 2050 Greenhouse Gas (GHG) Goals

Jean Roggenkamp, Deputy Air Pollution Control Officer, introduced Professor Mark Jacobson, Ph.D., and provided a brief description of his background.

**A. Roadmaps for Transitioning California and the Other 49 States to Wind, Water and Solar Power for All Purposes**
Professor Mark Jacobson, Ph.D.
Professor of Civil and Environmental Engineering
Director, Atmosphere/Energy Program

Senior Fellow, Woods Institute for the Environment, Precourt Institute for Energy
Stanford University

Prof. Jacobson gave a presentation entitled *Roadmaps for Transitioning California and the Other 49 States to Wind Water and Solar Power for All Purposes* (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).

NOTED PRESENT: Member Kurucz was noted present at 9:28 a.m.

Council Comments: None.

Public Comments: None.

Council Action: None.

**B. California's Transition to a Low Carbon Economy: Infrastructure, Regulation, and Local Action**
Dr. Jim Williams
Chief Scientist
Energy and Environmental Economics (E3)
Former Associate Professor, International Environmental Policy
Monterey Institute of International Studies

Ms. Roggenkamp introduced Jim Williams, Ph.D., and provided a brief description of his background.

Dr. Williams gave a presentation entitled *California's Transition to a Low Carbon Economy* (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).

Council Comments: None.

Public Comments: None.

Council Action: None.

## PANEL DISCUSSION

### 4. GHG and the Path Forward to Move Toward 2050 Goals

Council Comments:

The Council and speakers discussed the funding sources for the studies summarized in each presentation; the identity of critics of each presentation and the nature of the criticism received; the wind farm in Hawaii that has fallen into disrepair; the difference in the approach of the presentations; the scope of public health effects calculations; the impact of mining operations to

obtain the materials necessary to develop the 100% sustainable energy model; the recommended role of the Air District and proposed Council recommendations to the Board of Directors (Board); power generation, including current levels and sources, expected fall off in California sources over the next ten years, and the reliability of the current infrastructure to accommodate renewably-sourced replacements; what the speakers believe the Air District should do in the face of the ongoing submission of applications for permits to operate fossil-fuel burning operations in the Bay Area; the issue of and methods for valuing externalities; the scalability of wind-water-sun (WWS) and the accuracy of claims regarding WWS as a threat to grid stabilization; the accuracy of claims regarding the negative impact of the life-cycle costs of electric vehicles; the impact of various energy scenarios on water supplies; clarification of Dr. Williams's slide #17 and Prof. Jacobson's slide #33; the similarities and dissimilarities between funding programs for renewable energy in China and California's cap-and-trade system; the speakers' proposed recommendations for the Council to deliver to the Board; and the emissions footprint of hydroelectric facilities, by some measures, and the resulting exclusion of hydroelectric as a sustainable resource by some.

Public Comments: None.

Council Action: None.

**PUBLIC COMMENT PERIOD:**

Taylor Hawke, 350 Bay Area, addressed the Council to suggest the development of a Bay Area plan by Prof. Jacobson, similar to that prepared for the State of California, and the implementation of the same by the Air District.

Lawrence Danos, 350 San Francisco and San Francisco 99% Coalition, addressed the Council to encourage ongoing efforts by the Air District to keep the Bay Area at the forefront of clean air technology and planning and to discourage the refinement of tar sands and hydrofracked-sourced materials in the Bay Area.

Natalie Shuttleworth addressed the Council in support of the findings of Prof. Jacobson's study and his proposed recommendations for the Council to deliver to the Board and to urge for an increase in residential incentivization programs by the Air District.

**OTHER BUSINESS**

**5. Chairperson's Report:**

Chairperson Altshuler thanked the Council members for their support and involvement, reminded them to complete the survey provided by staff, and requested that staff agendize the survey results for the next Council meeting.

Member Hayes distributed copies of the Report Feedback Template to increase the ease and efficiency of providing and gathering member input.

Chairperson Altshuler asked staff to arrange two open conference calls, one for the Council officers and one for the report drafting work group and that discussion of the 2009 – 2010 Council reports be agendized for discussion at the next Council meeting.

Secretary Range summarized the action items from today's meeting as Member survey completion, report input submitted to staff by Members no later than close of business on Tuesday, February 18, 2014, set up of two conference call lines by staff, and the agendizing of both the survey results and a discussion of the 2009 – 2010 Council reports.

**6. Council Member Comments/Other Business:**

Member Hayes referenced the publication, "California's Energy Future - The View to 2050," issued by the California Council on Science and Technology.

Chairperson Altshuler mentioned Laurie Wayburn, Pacific Forest Trust, for Council consideration as a possible future presenter on the topic of carbon sequestration as it relates to forestation planning.

**7. Time and Place of Next Meeting:**

Wednesday, March 12, 2014, Bay Area Air Quality Management District Headquarters, 939 Ellis Street, San Francisco, CA 94109 at 9:00 a.m.

**8. Adjournment:** The meeting adjourned at 12:23 p.m.

Sean Gallagher
Clerk of the Boards

AGENDA: 2

**BAY AREA AIR QUALITY MANAGEMENT DISTRICT**
Memorandum

To: Chairperson Sam Altshuler and Members of the Advisory Council

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

Date: February 25, 2014

Re: Discussion of Draft Report on the Advisory Council Meeting on February 13, 2014

The attached draft report of the February 13, 2014, Advisory Council Meeting on The Path Forward for the Energy Sector to Move Towards the 2050 Greenhouse Gas Goals will be discussed with Air District staff, and the Council will finalize the recommendations at its meeting on April 9, 2014.

Respectfully submitted,

Jack P. Broadbent
Executive Officer/APCO

Prepared by: Sean Gallagher
Reviewed by: Rex Sanders

Attachment

# DRAFT REPORT
# FEBRUARY 13, 2014 ADVISORY COUNCIL MEETING
# THE PATH FORWARD FOR THE ENERGY SECTOR
# TOWARD CALIFORNIA'S 2050 GREENHOUSE GAS (GHG) GOAL

## SUMMARY

The following presentations were made at the February 13, 2014 Advisory Council meeting on **The Path Forward for the Energy Sector Toward California's 2050 Greenhouse Gas (GHG) Goal**:

1. *Roadmaps for Transitioning California and the Other 49 States to Wind, Water and Solar Power for All Purposes* by Professor Mark Jacobson. [BIO TO BE ADDED BY STAFF]

2. *California's Transition to a Low Carbon Economy: Infrastructure, Regulation, and Local Action* by Dr. Jim Williams. [BIO TO BE ADDED BY STAFF]

## BACKGROUND

### Professor Mark Jacobson

1. Professor Jacobson has developed a 50-state roadmap for transforming the U.S. from dependence on fossil fuels to 100 percent renewable energy by 2050. Each state in the U.S. (including California) has the opportunity to transition to renewable wind, water, and solar (WWS) power for all purposes.[1]

2. There are different approaches to dealing with energy issues. The focus can be primarily on carbon reduction, or it can be expanded to a more comprehensive approach that considers all aspects of climate change, air pollution, public health impacts, and resource availability. A 100 percent WWS strategy is distinguished from one based primarily on carbon reduction in that, while both reduce carbon emissions, the 100 percent WWS strategy also minimizes the negative impacts of important externalities (e.g., air pollution, health impacts).

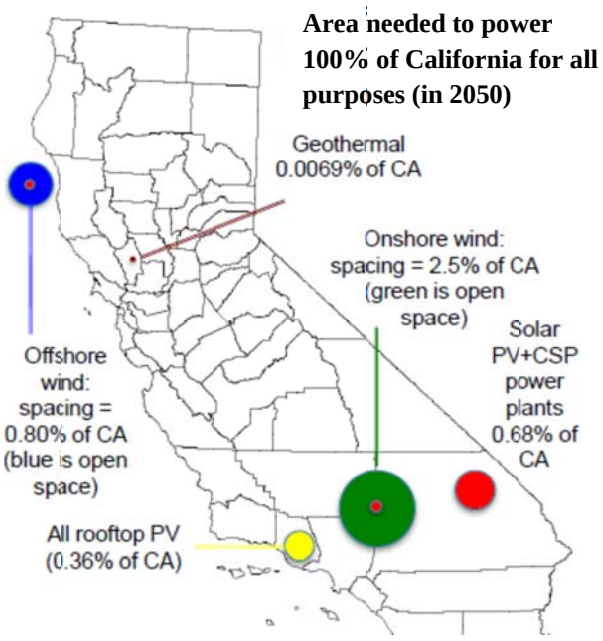
3. Given their large scale and complexity, actions required to transition our energy supplies need to begin soon. Reasons for needing this transition include the impacts of climate change, the health effects of air pollution (which kills 2.5 to 4 million people worldwide each year), and the possibility that rising fossil fuel energy prices will lead to economic, social, and political instability.

[1] "All purposes" as used here refers to electricity, transportation, building heating and cooling, and industry. For more details and the plans developed by Professor Jacobson and his collaborators for California and other states, see www.thesolutionsproject.org.

4. The benefits of such a transition in California would be 16,000 fewer air pollution deaths per year, tens of billions of dollars in reduced global climate costs, tens of thousands of new jobs, and reduced future energy costs.

5. While often considered to be cleaner than current fossil fuel energy technologies, some non-WWS energy technologies may present significant adverse climate, environmental, and/or health effects, as compared to WWS sources. These "not recommended" fuel sources include natural gas, "clean coal" with carbon capture, nuclear, soy/algae biodiesel, and ethanol (corn, cellulosic, sugarcane).

6. Professor Jacobson illustrated the land use impacts of a 100% WWS scenario for California. In this scenario, existing WWS sources are retained, with improved efficiency. New WWS sources to replace existing non-WWS sources would be a mix of 35% from wind, 55% from solar, and 10% from other sources (geothermal, hydro,[2] tidal, wave). The footprint of the total energy supply portfolio in this scenario would be less than 1% of the state's land area (or ~2.7% including the open space between turbines). New supplies in this scenario would include tens of thousands of on- and offshore wind turbines, millions of residential roof photovoltaic (PV) systems, several thousand large-scale solar plants, and a number of geothermal, hydro, tidal, and wave plants and devices.




7. While the intermittent nature of renewable resources is sometimes cited as a barrier to high levels of renewable electricity integration, Professor Jacobson explained that it is possible to obtain over 99% of California's energy needs from WWS (without over-sizing) using real-time demand-response or energy storage to match power generation to day-of-year and time-of-day.

8. In many cases, WWS energy technologies are cost-competitive with conventional sources today when life-cycle costs are considered. Taking into account a conservative estimate of fossil fuels' negative externalities makes WWS sources even more cost effective. By 2020-2030, WWS sources will be less expensive than conventional supplies, even without taking into account externalities.

[2] The scenarios assume that existing large hydro supplies would remain in place.

**Dr. Jim Williams**

1. California's climate goals include the AB 32 requirement to reduce statewide GHGs to 1990 levels by 2020, along with the goal of reducing GHGs to 80% below 1990 levels by 2050 (Executive Order S-3-05).

2. Looking beyond 2020, the policy approach is likely to follow a similar framework to AB 32, but a transformation of the energy system is required to achieve the 2050 goal. There are three primary strategies related to energy:
    a. Reduce energy use through efficiency (in buildings and vehicles) as well as smart growth. Examples include achieving "zero net energy" in new homes beginning in 2020, and over the next 20 years from now the retrofit of the majority of existing homes.
    b. Decarbonize both the production of electricity (from natural gas) and transportation fuels. The state's loading order[3] may need to be modified to integrate greater concentrations of renewables. However, Dr. Williams stated that some low carbon electricity resources will still be needed to maintain electric grid reliability.
    c. Electrification of transportation, building heating/cooling and industrial processes. Over the next 20 years, examples include the replacement of 70% of gasoline and diesel light-duty vehicles with EVs or PHEVs, as well as the replacement of 75% of existing gas water heaters with electric heat pump water heaters.

3. The scale of up-front investment needed statewide by 2050 is quite large,[4] but variability in fossil fuel costs also presents a cost risk for inaction. Decarbonization and electrification will shift the energy economy to be dominated by fixed (capital) costs rather than variable (fuel) costs. In addition, there will be co-benefits (climate, health, etc.) that come with this shift.

4. The extent of the transformation requires solutions to a variety of technical and planning challenges. In addition, achieving these goals will require better coordination across state and regional agencies and sectors that have typically operated in silos, as well as the establishment of clear GHG mandates to guide the actions of each agency.

5. Of particular note for the District, as transportation is electrified, emissions from the transportation sector (regulated by the State) will shift more and more toward stationary sources (regulated by the District).

[3] The loading order defines the priority that utilities must assign to different types of electric supply, with efficiency and demand response coming first, followed by renewables and then other supplies.
[4] There is a large uncertainty in both technology costs and fuel costs, but the net cost increase could be on the order of ~$500 billion by 2050. The cost estimates presented did not provide a value for the co-benefits (reduced externalities) of shifting away from polluting fuels.

KEY EMERGING ISSUES

1. Further definition of the Bay Area's role. Further investigation is needed to identify, evaluate, and prioritize policies and measures that the District and other regional agencies can implement to support and advance attainment of California's 2050 GHG reduction goal. Policies and measures need to be developed that are effective, efficient, and feasible, and they need to be coordinated across agencies, accounting for each agency's mission and authorities.

2. Further evaluation of the District's role. To achieve 2050 climate goals, a fundamental transition in energy sources and usage will need to be made across California and thus the Bay Area. This transition affects a number of areas that are within the District's ability to regulate, as well as other areas that are outside the District's current authority. Further evaluation of the District's evolving role is needed, including its authority and capacity to regulate and/or permit stationary GHG sources, influence indirect GHG emissions associated with energy consumed within the District, and coordinate with other agencies or expand its role in areas that the District has not traditionally pursued, including:
    a. Energy efficiency (e.g., codes, financing)
    b. Energy use (e.g., retrofits, rates, reliability)
    c. Energy generation (e.g., distributed energy, on-site renewable, CCS)
    d. In-home uses of energy (e.g., water heaters, furnaces)
    e. Planning (e.g., zoning, density, infill)
    f. Transit (e.g., mode shifting, biking, walkable cities)
    g. Vehicles and goods movement (e.g., infrastructure, consumer choices, technology development)
    h. Non-energy/non-$CO_2$ GHGs (e.g., methane, HFCs, SF6)
    i. Waste (e.g., waste management, landfill gases)
    j. Agriculture (e.g., animal feedlots, agricultural tillage, forestry)
    k. Tailpipe emissions from vehicles
    l. Upstream/life-cycle impacts (e.g., emissions over life cycle, not just in the District)
    m. Water (e.g., use, pumping, efficiency)
    n. Climate change adaptation.

3. Reduction in energy consumption. For the Bay Area to achieve long-term climate goals, a fundamental transition must be made from the current dynamic of relatively high energy use per capita to low energy use per capita. Further investigation is needed to develop and deploy major improvements in energy efficiency in all sectors, including transportation.

4. Decarbonization of energy. Attainment of California's 2050 goal will require more than just energy efficiency and decarbonizing the energy supply. Energy demand also will need to be decarbonized. How this will be done -- what policy choices, regulatory approaches, technology developments, and implementation measures will be needed – is a major and critically important emerging issue. Further investigation is needed to identify, develop, and deploy measures to

reduce the carbon intensity of energy (imported and produced within the Bay Area) used in residential, commercial, and industrial applications, as well as in the transportation sector.

5. Resiliency. Further investigation is needed to better understand how the shift to low-carbon energy supply and demand might help insulate California from the worst impacts of climate change, including drought, reduced snow pack, sea level rise, heat waves, and energy price volatility.

6. Grid reliability. Further investigation is needed to identify means by which grid reliability can be ensured by providing for balanced supply and demand. Particular focus is needed on the transition from fossil fuels to renewable energy sources. Zero (or minimum) emission energy source dispatching strategies and tools for implementing those strategies need to be developed, demonstrated, and deployed.

7. Water supply and quality. While water supply and quality are outside of the District's purview, water imposes practical constraints on the feasibility and cost effectiveness of various energy supply options. Further investigation of water-related issues and how those affect Bay Area energy source options and usage is needed.

8. Financing availability. Further investigation is needed to identify, evaluate, and demonstrate the availability and feasibility of mechanisms necessary to finance the measures required to achieve California's 2050 goal, including additional innovative financing measures that may be needed.

## RECOMMENDATIONS

Based on information presented at the February 13, 2014 meeting of the Advisory Council, as well as member input, the Advisory Council offers the following recommendations:

1. Planning. The District should work with other regional agencies to develop and adopt a ***Bay Area Energy Futures Plan*** to guide, facilitate, and coordinate energy-related regional actions to achieve California's target of 80 percent reduction in GHG emissions by 2050.
    a. This Plan should adopt policy recommendations for prioritizing Bay Area energy supply options, based on a combination of climate, air quality, public health, water, and economic factors.
    b. The Plan should incorporate core principles to guide prioritization that recognize the following:
        i. Electrification of energy use across all sectors will be necessary.
        ii. Decarbonization of electricity generation will have to occur, resulting in a fundamental shift from reliance on fossil fuels to renewable sources.
        iii. Diversification of energy sources, biological resources, and economic investments is necessary, and will lead to strength, sustainability, and stability in each area.

iv. All key externalities (e.g., climate, air quality, health, water) should be included, not just dollar cost.

c. The Plan should integrate high-priority energy supply actions into:
   i. Other District air quality and climate planning efforts, including the District's multi-pollutant planning approach.
   ii. The District's permitting program, including such aspects as the following:
      1. Evaluation of new energy facilities for their potential to meet such goals as reduced health impacts, low carbon fuel, and energy availability and stability.
      2. Review of the licensing and permitting of back-up generators with the long-range goal of reduced carbon fuels.
      3. Streamlining of the permit approval process for wind, water, and solar (WWS) power generation projects, including small-scale solar and wind installations.
      4. Continued encouragement of infill development, mode shift, and public transit.
   iii. The District's CEQA guidelines.

2. Coordination. The District should:
   a. Encourage and support legislative and other efforts that transition to progressively greater electrification of energy sectors, accompanied by increasing de-carbonization of electricity generation.
   b. Collaborate with the Public Utilities Commission and other responsible agencies to investigate:
      i. Policy options for pursuing decarbonized electricity generation.
      ii. Substation-level grid reliability requirements.
   c. Coordinate energy supply policies with statewide and regional agencies, including water districts and the Regional Water Quality Control Board, to account for water supply and water quality constraints.
   d. Support establishment of new-residence standards for energy efficiency and electrification to ensure that housing inventory turnover works for clean air the way fleet turnover has for vehicles.
   e. Support incentives for homeowner installation of solar infrastructure.

3. Grants. The District should further incorporate into its grant programs criteria that further incentivize:
   a. Development of infrastructure to support electrification (e.g., EV charging stations, solar PV, electrical heating and cooling), including enhancement of incentives for residents and building owners.
   b. Assistance with home energy retrofits and electric vehicle infrastructure.

c. Clean-energy backup emergency power systems, rather than diesel/gasoline generators, at both household and community levels.
d. Promotion, through municipal financing, incentives, and rebates, of energy efficiency measures in buildings, appliances, and processes, considering building performance, potential unintended adverse health consequences, and measures to minimize such consequences.

4. Education. The District should:
   a. Integrate into its public education programs further recognition of energy use reduction options and their public health, air quality, and climate benefits.
   b. Develop outreach strategies that further stress economic, health, and resiliency co-benefits of a shift to a low-carbon economy, and that use bottom-line metrics that best appeal to issues about which people care most (e.g., personal and family health and cost).

5. Operations. The District should consider conversion of its entire fleet to electric vehicles (EVs).

## GLOSSARY

Carbon intensity – The average emission rate of grams of carbon dioxide released per unit of energy produced.

CCS (Carbon Capture and Sequestration) – The process of trapping carbon dioxide at its emission source, transporting it to a usually underground storage location, and isolating it there.

Cellulosic ethanol – Ethanol produced from biomass of various kinds, including waste from urban, agricultural, and forestry sources.

Clean coal with carbon capture – see CCS, above.

Decarbonization – The declining average carbon intensity of primary energy over time.

Electrification – ~~to~~ To supply (a region, community, etc.) with electric power.

EV – Electric Vehicle

Externalities – External effects, often unforeseen or unintended, accompanying a process or activity.

GHG (Greenhouse Gases) – A gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide,

methane, nitrous oxide, and ozone. Other greenhouse gases include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$).

HFC (Hydrofluorocarbon) – A suggested replacement for the chlorofluorocarbon (CFC) coolant gas used in chillers and air conditioners.

Low-carbon – Minimal output of greenhouse gas (GHG) emissions.

PHEV (Plug-in Hybrid Electric Vehicle) – A hybrid vehicle which utilizes rechargeable batteries, or another energy storage device, that can be restored to full charge by connecting a plug to an external electric power source (usually a normal electric wall socket).

PV (Photovoltaic) – Producing electric current or voltage caused by electromagnetic radiation, esp visible light from the sun.

$SF_6$ (Sulfur hexafluoride) – An inorganic, colorless, odorless, non-flammable, extremely potent greenhouse gas which is an excellent electrical insulator.

Soy/algae biodiesel – Biodiesel refers to a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters. Biodiesel is typically made by chemically reacting lipids (e.g., vegetable oil, animal fat) with an alcohol producing fatty acid esters. Biodiesel is meant to be used in standard diesel engines and is thus distinct from the vegetable and waste oils used to fuel converted diesel engines. Biodiesel can be used alone, or blended with petrodiesel in any proportions. Biodiesel can also be used as a low carbon alternative to heating oil. A variety of oils can be used to produce biodiesel. These include algae, which can be grown using waste materials such as sewage and without displacing land currently used for food production.

Zero-carbon – Zero output of greenhouse gas (GHG) emissions.