MEMO

To: **All Global Warming Technologies Contributors**

From: **Kimberly Nunlist, Staff Editor**

Date: **December 21, 2015**

RE: **Looking for feedback on suggested revisions**

Attachments: Proposed outline (see "Distinguishing Technological and Economic Issues"); proposed revision example (see "Using Multi-Level Headings); proposed style sheet (see "Mechanics")

Hi everyone,

I hope to have had the opportunity to introduce myself to all of you before you receive this, but that might be tough with everyone's busy schedules. If we haven't met yet, I'm the person ETAAC added to the staff as an in-house editor, and my purpose here is to help deliver clear written communications that promote our agency's recommendations on how California can make the most of technological research and development opportunities.

With this goal in mind, I had some thoughts about possible revisions to the new Global Warming Technologies document that I wanted to run by everyone. I have grouped these thoughts under the headings of "Making Policy Recommendations," "Using Multi-Level Headings," "Policy Recommendations," "Graphics," and "Mechanics," which I hope will make this memo easier for everyone to read. I would really appreciate any feedback on the topics below—your perspective as ETAAC authors helps me understand our agency's strategy for fulfilling its directive.

Making Policy Recommendations

My first thought on this document is that it could more explicitly state this agency's policy recommendations in each of the subject categories. As currently written, the document identifies areas of need, both technological and economic, and suggests strategies that could be used to approach these needs. To make sure we are doing our due diligence in providing advice on these issues, we could rephrase the suggestions as recommendations, using more assertive language to clarify the actions this agency has identified as necessary to the development of these technologies.

To implement this suggested revision consistently, we may need to develop more specific recommendations for the energy efficiency sector. If this is the case, I would be happy to collaborate with our subject matter experts to develop the relevant content.

Distinguishing Technological and Economic Issues

This is tough to do because of ETAAC's purpose to advise the ARB from both technological and economic perspectives, and because many of the challenges limiting technology development are largely economic.

Nonetheless, the current Executive Summary presents technological opportunities and challenges under separate headings from economic ones. As I understand it, the full-length document will also distinguish the two perspectives in different chapters, with each of three chapters devoted to one of the energy technology sectors and two subsequent chapters devoted to economic development and innovative financing.

If my understanding is correct, the primary headings in the Executive Summary could be reordered to reflect the full-length structure, with the technology headings presented first, followed by the economic headings. Presenting the technology subjects first allows us to identify key challenges that originate in the material limitations of current technology, with corresponding recommendations. The subsequent economic sections can then reference those material limitations and recommendations as the basis for presenting the economic opportunities and challenges.

I have attached a proposed outline for the Executive Summary to clarify this recommendation. The outline reorders the primary headings of the Executive Summary and also adds secondary and tertiary headings, based on my next suggestion.

Using Multi-Level Headings

This formatting topic may seem pretty trivial, but headings are actually a great way to direct readers' attention and aide them in quickly comprehending the message we want them to receive.

Multi-level headings could be especially useful in highlighting policy recommendations, if we decide to implement that revision. My thought was that we would use primary headings to distinguish between technological and economic issues (Introduction, Technology Issues, Economic Issues, and Conclusion), and then use secondary headings for each of the key energy sectors under the technology section. Within this structure, we could institute tertiary headings for "Opportunities," "Challenges," and "Recommendations" under each of the key energy sector headings. In the economic section, the information currently presented under the primary headings "Economic Development" and "Innovative Financing" could be reorganized under the "Opportunities," "Challenges," and "Policy Recommendations" headings; in

this section, these headings would be one level higher than they are in the technology section, drawing further attention to the economic factors under consideration.

To clarify this suggested structure, I have attached an annotated outline and a proposed revision of the "Energy Efficiency" section. In addition to aiding our readers, multi-level headings could help us organize the tremendous amount of information we will be presenting in the full-length document, so setting this structure up in the Executive Summary could make our work significantly easier as we continue with the rest of the text.

Graphics

As with subject headings, appropriate graphics are a great way to attract readers' attention and quickly communicate a large amount of information—a picture really is worth a thousand words.

One example of a graphic that could be helpful to our readers is a bar graph representing the levels of GHG emissions reductions that are mandated by S-03-5. This graph, which would follow the first paragraph of the Introduction, would show 1990 levels, current levels, and then the levels mandated for the years 2020 and 2050. Visualizing the mandate in this way would clarify the mandated reductions without requiring readers to do their own calculations; the graph would also be an impactful way to show readers how much work needs to be done to achieve the mandate.

Other examples of graphics that would aide readers abound. There are opportunities to illustrate quantitative information with graphs, such as the size of the market for clean energy technologies and the percentage of the current energy demand supplied by each of the renewable energy fields. In addition, drawings or photographs that show different types of emerging technologies, such as geothermal and biomass, could help readers visualize their corresponding opportunities and challenges. Illustrations could be used to show the difference between PHEVs, BEVs, and FCEVs.

On this subject, we should remember to identify and describe the relevance of any graphic we include in the main text of the document. It would also be nice to implement a document format that identifies ETAAC as the source of the document, perhaps in the header or footer. I am working on finding out if we have a logo (or if we can have one designed). In the meantime, we might want to plan on leaving an inch and a half at the top or bottom of each page of the document for this identifying graphic.

Mechanics

There are a few minor mechanical inconsistencies that I would like to correct to enhance the professionalism of the document. These include the representation of units (whether we use abbreviations or spell out units in full), the punctuation of calendar dates, and

the capitalization of "Report" and "Program" in the titles "Advanced Technology Development Report" and "Public Interest Energy Research Program," respectively.

Regarding the use of quotation marks to set off words that are either new terminology or colloquialisms, many of these are not necessary because the word is introduced in the text (microearthquakes), has been fully integrated in the general vocabulary (smart grid and pull), or can be replaced to improve clarity (as with "'green'," which can be replaced with "energy-efficiency" or "energy-efficient," to distinguish the energy sector from other sectors that impact the environment, such as waste management). In particular, the phrase "'valley of death'," applied to the development of renewable energy technologies, may offend people who maintain a reverent relationship with Biblical text.

Limiting the use of hyphenated words would also improve clarity and readability. Some hyphenated words could be avoided by finding a more suitable word choice, such as "apathetic" for "wait-and-see" and "increase" for "ramp-up." Other hyphenated words, including "business-based," "home-based," and "smart grid-related," could be avoided with simple rearrangements of the sentences.

As these mechanical decisions are matters of choice rather than prescribed by language rules, I have created the attached Style Sheet, where we can identify the approach we would like to take with each word or phrase, and which we can all reference as we continue to develop this document.

Next Steps

I have tentatively reserved the conference room for next Wednesday afternoon, from 2–3 pm, so that we could all have the opportunity to meet as a group and discuss these potential revisions, or other suggestions that anyone might have. Please let me know as soon as possible if this meeting time does not work for you, and I will try to accommodate everyone's schedules. Management would like to have a revised draft of the Executive Summary ready one week from the proposed meeting date, and first drafts of each chapter are due three weeks after that, so I suggest we use Wednesday's meeting to reach consensus on the structure and decide how to implement any changes.

I want to thank everyone for their hard work thus far. There is a lot of great information in the Executive Summary alone, and I am particularly impressed with its optimistic tone. Our state and agency face considerable challenges to fulfilling S-03-5, and the scope of the problem can be intimidating. The tone throughout this document is truly encouraging, and I congratulate all of our authors on this achievement.

Please let me know if you have any questions or concerns about anything I have presented here. I look forward to our continued collaboration on this and other projects.

PROPOSED OUTLINE:

HEADINGS IN BOLD AND/OR ITALIC FONT ARE INTENDED FOR USE IN THE DOCUMENT; BULLETED POINTS ARE INTENDED AS SUBJECT MATTER GUIDANCE

I. Introduction

A. Purpose and Scope

- State the carbon emission reduction requirements stipulated by the relevant legislative and executive actions
- Introduce the role required of advanced technology development toward fulfilling those carbon reductions
- Draw attention to the economic opportunities associated with advanced technology development, in addition to the environmental opportunities

B. Document Outline

- "Section II of this summary identifies opportunities and challenges associated with technology developments in three key sectors—renewable energy, energy efficiency, and transportation—that would represent significant progress toward the goal of reduced carbon emissions."
- "Section III identifies economic opportunities and challenges associated with the advanced technology developments discussed in Section II."
- "Each section contains the ETAAC's recommendations on policies that could be implemented in support of these objectives."

II. Desirable Technology Developments in Three Key Sectors

A. Shifting to Renewable Energy Technologies

1. Opportunities Associated with Renewable Energy Technologies

- Expected contribution of this sector toward carbon reduction goal
- Current and expected contributions of each renewable energy field toward carbon reduction goal (can be graphically represented)
- Recent advances in specific renewable energy fields (thin-film photovoltaic cells, increasing economic advantages of geothermal power)

2. Challenges to Advancing Renewable Energy Technologies

- Required improvements in energy transmission infrastructure

- Limited energy storage capacity and challenges associated with new energy storage technologies (including rate-setting, rate recovery, and compensation for owners of storage assets)
- Challenges in specific renewable energy fields (land use for solar, wind, and geothermal; credit challenges, relatively high development costs, and concerns over low-magnitude seismic events for geothermal; siting, permitting, and feedstock availability and transportation for biomass)

3. Policy Recommendations

a. General recommendations to improve grid expansion and energy storage

- Update the standard policy framework governing interstate transmission financing and cost recovery
- Implement smart grid technologies

b. Specific to renewable energy sources

- Solar: Support efficient inverters, solar concentrators, tracking devices, mounting systems that are easier to install, feed-in tariffs and net metering
- Wind: Support research on bird and bat behaviors
- Biomass: Convert woody feedstocks to pellets and/or biogas to facilitate transportation and avoid siting and permitting concerns

B. Improving Energy Efficiency of Energy Technologies Currently in Use

1. Opportunities for Improving Energy Efficiency

- Success of existing programs
- Promising new energy efficiency technologies: solid-state lighting, home area networks, improvements in heating and air conditioning
- Energy efficiency can reduce energy bills and enhance California's ability to compete economically

2. Challenges to Improving Energy Efficiency

- Higher upfront costs associated with adopting efficient technologies
- Lack of familiarity and risk aversion on the part of consumers
- Split incentives, such as those associated with owner-tenant relationships

3. Policy Recommendations

a. Continue to support the development and deployment of energy efficient technologies with existing programs
b. Apply innovative financing strategies to defray upfront costs

C. Reducing Transportation-Related Carbon Emissions

1. *Opportunities for Reducing Transportation-Related Carbon Emissions*

- Significant federal, state, and international funding available
- Current pilot-scale deployments expected to broaden into early commercialization
- California's expected job loss in conventional vehicle manufacturing fields will be mitigated by electric-drive manufacturing job creation

2. *Challenges to Reducing Transportation-Related Carbon Emissions*

- PHEVs and BEVs: Reducing battery cost and size
- FCEVs: Reducing fuel cell cost and increasing output
- Continued black carbon contribution from medium and heavy duty vehicles

3. *Policy Recommendations*

- Support more efficient internal combustion and non-plug-in hybrids to meet 2020 goals
- Support electric-drive development to meet long-term goals
- Assume a leadership role in addressing black carbon emissions by using incentive programs to support medium duty hybrid vehicles and investigating in-state feedstock availability to support biofuel technology

III. Economic Dimensions of Technology Development

A. Economic Opportunities Associated with Technology Development

- Size of the market (include information on dollar amounts of federal and private investments in clean technology as well as sales revenue generated from clean technology; this data can be further broken down by technology sector, and perhaps illustrated graphically)
- Employment opportunities and estimated contribution to economic growth
- California's competitive advantages: Well-developed technology industries, highly educated work force

B. Economic Challenges Associated with Technology Development

- High initial costs associated with technology development
- California's competitive disadvantages: Cost of labor and high taxes

C. Policy Recommendations: Adopt Innovative Financial Strategies to Advance Desirable Technology Developments

- Helping California consumers: Upfront capital repaid with downstream savings
- Helping California businesses: Leveraging greenhouse gas allowances to help businesses transition to apply technologies to reduce their costs and GHG footprint simultaneously
- Advancing renewable technology development: Devise innovative financing strategies to bridge the financing gap between the pilot-plant phase and the post-demonstration phase

IV. Conclusion

- Pursuing advanced technology development will enable California to meet its carbon emission reduction goals while simultaneously promoting the state's economic growth and enhancing its competitive edge in a market sector that will continue to expand globally.

PROPOSED REVISION: TRANSPORTATION

C. Reducing Transportation-Related Carbon Emissions

Within the transportation sector, significant advances have been made to reduce carbon emissions associated with personal and commercial vehicles. The remaining challenges to the development and broad deployment of these advanced transportation technologies can be achieved by implementing standards and incentives.

1. Opportunities for Reducing Transportation-Related Carbon Emissions

Federal and state funding sources are scheduled to deliver over $10 billion to develop electric-drive vehicles (EVs), and the industry can expect significant public and private investment internationally as well. In California, state investment in EV technology is considered especially important because despite aggressive efforts to retain conventional vehicle manufacturing jobs, California is expected to lose those jobs and gain jobs in EV manufacturing and related infrastructure. Rather than assuming a negative perspective on the job losses in conventional vehicle manufacturing, the state will be better served by supporting the growth of the EV industry and assisting workers with transitions to jobs in this emerging and expanding market.

Regarding personal vehicles, current pilot-scale deployments of plug-in hybrid EVs (PHEVs) and battery EVs (BEVs) are expected to broaden rapidly into preliminary commercialization over the next few years. Preliminary commercialization of fuel cell EVs (FCEVs) is expected to follow in 2015, if current FCEV technology and infrastructure developments remain on schedule. Recently, substantial reductions in the costs of fuel cells have been particularly encouraging.

2. Challenges to Reducing Transportation-Related Carbon Emissions

Nonetheless, significant technology challenges remain to achieve the dramatic carbon reductions demanded by the relevant mandates. Current challenges to the broad commercial deployment of PHEVs and BEVs are the large size and cost of the batteries they require; likewise, current challenges facing FCEV development are the need to further reduce the cost of the fuel cell and increase its output.

For California, EV technology is critical for both economic and environmental reasons, and the black carbon emissions produced by medium and heavy duty vehicles are of particular concern environmentally. With no immediate solutions to this larger transportation problem, California will be best served by a comprehensive long-term vision.

3. Policy Recommendations

Achieving the 2020 goals will require relying primarily on more efficient internal combustion engines and non-plug-in hybrids, whereas promoting EV technologies will be essential for achieving the 2050 objectives and over the longer term. The state can play an important role in supporting the success of upcoming commercial EV deployments through infrastructure policies and investments, which will require effective decision-making and coordination among various actors.

Regarding the black carbon concerns associated with heavier duty vehicles, in the short-term, state leadership on black carbon can inspire international efforts to reduce this climate change producing pollutant while improving public health. California can also use incentive programs to demonstrate new technologies, such as medium duty hybrid vehicles, and future heavy duty technologies that may emerge from federally funded research and development (R&D).

Advanced biofuel technologies are another potential solution to mitigating the black carbon concern. Federal standards and R&D are promoting advanced biofuel technologies, but only with state leadership on biofuel production will the technology become viable in California. Therefore, further study on in-state feedstock availability and production capability is recommended to help inform both public and private decision-making and investments in this sector.

PROPOSED STYLE SHEET

A

Abbreviations, spell out in full at first mention
advanced renewable energy technology development (words to be applied in that order, whether or not all words are represented)
and (in text, and to replace "/" at all instances)
& (once defined as part of an abbreviation)

B

business-based

C

California Solar Initiative
clean technology (referring to any technology developed to improve the input-output efficiency ratio)
CleanTech™ Alliance (referring to this particular organization; other organizations in this field should also be represented by their legal names)
climate change producing pollutant
Climate Levy
cross-cutting
cross-sector

D

dates: month, year, … *or* month day, year, …
decision-making
dollars (in text not referencing a specific number of dollars)
$ (in text referencing a specific number of dollars, an in tables, graphs, and figures)
downstream

E

electric-drive vehicle (appears only once and is thereafter referred to by its abbreviation "EV"; "electric drive" does not appear without "vehicle")
energy-efficiency *or* energy-efficient (not "green")

F , G

federal (when referring to the US government at the national level, not "national")
fractions: any fraction with a denominator of four or less should be spelled out and not hyphenated (as in "two thirds"); any fraction with a denominator greater than 4 should be represented as a decimal (in numerals), with "approximately" if necessary

H

high-volume
home-based
hydroelectric

I , J, K

in-state

L

long-term (compound adjective modifying another noun)
longer term (adjective modifying the noun "term")
low-carbon
low-cost
low-GHG
low-magnitude
low-margin

M

N

net-zero-energy home
non-plug-in
numbers (excluding fractions, see "fractions"), less than 10: spelled out in full unless appearing with higher place values; 10 to 9999: numerals with no commas; 10,000-999,999: numerals with commas; millions, billions, trillions: represented with numerals and decimals from 1 to 999

O

off-bill
off-peak
on-bill

P

per-capita
percent (in text)
% (in tables, graphs, or figures)
pilot-scale
plug-in
pull

Q, R

ramp-up
rate setting (not rate-making)
real-time

S

serial comma (use at all instances)
short-term (not near term)
site-specific
smart grid
smart grid-related
smart inverters
solid-state
spill-over
Stern School of Business (no "the")

T

technology-specific
the United Kingdom (the UK)
the US Department of Energy (USDOE)

U, V, W

units: SI, spelled out in full unless appearing with a given value, and then abbreviated
upfront
"valley of death"
wait-and-see
western United States

X, Y, Z

year-round
zero-carbon
zero-GHG