

# Comments on the California Air Resources Board's January 2017 Draft Scoping Plan for the State of California Climate Change Program

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## Introduction

California has led the way on climate policy by setting targets for reductions in greenhouse gas emissions, implementing a wide array of strategies, and achieving reductions. The Legislature provided that climate policy also maximize environmental and economic benefits to the people of the state, protect disadvantaged communities, reduce air pollution, and improve public health.

“Scoping” Plans developed by the ARB lay out possible actions across sectors at a conceptual level, allowing for comparison of approaches and consideration of the provisions of the statutes. The process allows for public engagement in consideration of choices available and their implications. The ARB adopted the initial Scoping Plan in 2008, endorsed it again in 2011 and modified it in 2013. As the climate program develops, it becomes a bigger task to describe the available options and analyze them.

The 2017 Scoping Plan responds to actions by Governor Jerry Brown and the Legislature adopting targets for 2030 and 2050 that requiring more extensive reductions in greenhouse gas emissions. The transition to the new targets is a very important step forward in the program, and the consideration of a new scoping plan brings that into focus.

While the plan has many strengths and is an important step forward, recommendations would be to:

- Ensure that other scenarios including “Cap-and-Trade”and alternatives are considered according to criteria from the statutes;
- Incorporate equity and public health as core elements;
- Seek opportunities to achieve air quality gains in nonattainment areas and disadvantaged communities in the near term and develop the data and metrics to support this;
- Support actions by people and communities to reduce climate impacts and improve health;
- Discuss options and actions in light of the end game for 2050 to avoid regrettable investments and maximize benefits.
- Clearly define a path to a carbon free economy and a just transition away from fossil fuels
- Continue working with the EJAC beyond the scoping plan phase
- Increase communication and collaboration to ensure CARB moves beyond the current regulatory silos to insure more effective regulatory development

The overall structure and content of the plan and related documents should be redesigned to better support public understanding of the climate program, and additional suggestions to achieve this are included as an appendix for consideration for the future.

## 1. Analyze Scenarios including “Cap-and-Trade” According to the Statutes

One reason that the Scoping Plan is so important is because it represents the one place where different options and approaches can be assessed and considered in a comparative way. At later steps, individual options are analyzed individually. The comparative approach is where we can analyze options with regard to the criteria set out in the statutes, as well as other criteria that may be relevant.

In passing AB 32 in 2006 and SB 32 in 2016, the Legislature recognized that meeting greenhouse gas reduction targets requires transformation of the energy system of the State of California and saw this as an necessary step and an opportunity to lead. The Legislature wanted the transformation to provide as many benefits to the people of the State as feasible while achieving emission reduction goals. Statutes refer to maximizing overall environmental and economic benefits, reducing air pollution, protecting and investing in disadvantaged communities, and advancing public health. These criteria are to be considered in the selection of the elements of the program as a whole.

The 2017 plan does not do this. The alternatives should be fairly assessed according to the criteria of AB 32 and SB 32. These include maximizing economic and environmental benefits to the people of the state, protecting disadvantaged communities, and reducing air pollution.

One particular concern that arose with the passage of AB 32 and the first scoping plan is that “cap-and-trade” is likely to push emissions toward disadvantaged areas because it does not provide any limits on individual facilities or areas. In general, polluting facilities and adverse conditions are distributed toward communities of color and communities of lower income as a result of long standing social, economic and institutional forces. Facilities that emit greenhouse gases usually emit other air pollutants that impact the health and air quality at the local and regional level. The so-called “disadvantaged” communities were and are rightly concerned that a cap and trade program could allow for increases in toxic emissions to be disproportionately distributed toward already disproportionately impacted communities.

Recent analyses suggest that these concerns have merit. Findings from a respected academic research group <sup>1</sup> and the Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency <sup>2</sup> suggest that there may be greater emissions

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<sup>1</sup> Lara J. Cushing, Madeline Wander, Rachel Morello-Frosch, Manuel Pastor, Allen Zhu, and James Sadd. A Preliminary Environmental Equity Assessment Of California’s Cap-and-Trade Program. September 14, 2016. [http://dornsife.usc.edu/PERE/enviro\\_equity\\_CA\\_cap\\_trade](http://dornsife.usc.edu/PERE/enviro_equity_CA_cap_trade) (accessed March 17, 2017).

<sup>2</sup> OEHHA. 2017. Tracking and Evaluation of Benefits and Impacts of Greenhouse Gas Limits in Disadvantaged Communities: Initial Report. Office of Environmental Health Hazard Assessment California, Environmental Protection Agency. February 2017. <https://oehha.ca.gov/media/downloads/environmental-justice/report/oehhaab32report020217.pdf> (Accessed March 17, 2017).

from stationary sources in disadvantaged communities than in other communities during the implementation of cap-and-trade. These reports are an important early warning sign and merit immediate corrections in the measures used to meet our climate targets.

Moreover, the plan takes the view that improving conditions for disadvantaged communities is important only with regard to distribution of revenues from the cap-and-trade program. This is not sufficient. It is very important to invest revenues for disadvantaged communities. Revenues from cap-and-trade have supported outstanding projects and created benefits to communities. (The two members of the Environmental Justice Advisory Committee (EJAC) who represent groups and communities funded by such projects provide great testimonials to how important these projects can be.) But this is not sufficient. Protection for disadvantaged communities needs to be considered to the selection of elements for the program as a whole.

## **2. Incorporate Equity and Public Health as Core Elements**

Consideration of equity and public health are written into the statutes for the climate program and reflect a core concern of environmental justice groups. The 2013 Scoping Plan indicated that the ARB would carefully assess health and environmental justice implications of the climate program. However, the Scoping Plan does not appear to show progress on public health and equity analysis or results. Some research projects are mentioned, but otherwise this is a gap that must be addressed.

The Scoping Plan continues to include significant economic analysis and modeling. Economic impacts are extensively studied and modeled. Such efforts have served the ARB well and allowed it to determine that actions are cost effective and not unduly disruptive to the economy.

Analogous progress has not been made for health and equity concerns. Virtually no attention is given to equity. The foreseeable result of this is that implementation of the plan will reinforce rather than remedy existing inequities. This squanders a valuable opportunity. It is incumbent on ARB to adopt methods to systematically consider health and equity, as it has always done for economic impacts, in ways that can inform decisions about policy options.

### **Track any accumulation of allowances**

For policies that reduce emissions, such as cap-and-trade, it is important to determine whether emissions are increasing in some areas or for some populations. One specific action needed is to track the distribution of allowances to see if they are accumulating in particular areas, particularly in disadvantaged communities or areas that are at risk to become disadvantaged communities. Early warnings could be used to take actions to avoid any increased or unacceptable emissions. A broader and more aggressive early action system is needed to ensure that the impacts of the climate program as a whole can avoid further degradation in disadvantaged communities and ensure that more communities do not fall into the category of disadvantaged communities. This will require more robust and timely data than is now available. Tracking accumulations of allowances would be a first step.

## Analyze equity impacts

Consideration of impacts of the mitigation policies themselves, rather than climate change or in adaptation is an important innovation in the California climate program. Much has been written about how to provide for equity in mitigation strategies among jurisdictions, understanding inequity in impacts of climate change itself, and promoting equity in adaptation strategies.

However, this is something different. It is important for the State to devise and implement ways to understand equity impacts of different potential strategies and to track these over time. This is an area that will require additional research and should be added to the Cal EPA and ARB research portfolio. A general comment is that it is typically true that actions that produce economic benefits may still produce inequitable distribution of such benefits.

Use of approaches beyond CalEnviroScreen may be needed to adequately characterize disadvantaged communities or populations facing inequities.

A few issues seem to stand out, though others may emerge as we consider this further. One concern is the distribution of financial costs of mitigation strategies. For policies that promote or require technologies for reductions in energy demand or emissions, important considerations include access and cost. Who will have access? Who will be able to pay costs? Is it equitable?

The climate program includes development of cleaner energy sources and technologies. No doubt these have great benefits. But there could be issues with regard to distribution of cost and benefits especially for technologies for vehicles and buildings to be adopted by the public. If the benefits are achieved only by those who can pay the cost of the new technology, then this will limit the distribution of benefits in ways that may not be equitable. Lower energy costs will accrue over time to those who can pay for the better technologies. What about those who cannot?

The Scoping Plan does not address how CARB and other implementing agencies will ensure that investments and the introduction of new technologies do not further imbed inequality. The distribution of benefit of innovations in the energy system as a whole may vary by strategy. Different groups may attain greater benefits from different strategies. Communities with low rates of ownership of private vehicles may benefit more from strategies that make communities more walkable and bikeable and that improve public transportation. To communities where economic circumstances preclude many or most individuals from purchasing energy efficient appliances or purchasing an zero emission vehicle we must ask how do we create programs that minimize unintended consequences and maximize benefits.

The strategies of the State climate program can incentivize investment in private vehicles and better fuels and they can incentivize investment in public transit. How do these processes lead to maximizing net benefits for the people of the state and to providing benefits to disadvantaged communities? Much can be found in the recommendations of the Environmental Justice Advisory Committee that point to how to balance these often conflicting needs.

Equity analysis could elucidate the implications of different approaches including for more decentralized strategies that could re-make and rebuild communities to produce better quality of life and better health while reducing demand for energy and thus emissions.

In some cases, known causes of inequity are more than likely already being addressed through community building and policy development and offer a great learning laboratory on how to invest in communities without displacement and what are key principles for equitable investment and development. The ARB could begin by performing at least rudimentary analyses of equity implications of its current measures and proposed future measures.

### **Consider health benefits in selecting strategies**

The Scoping Plan should more specifically analyze options with regard to public health benefits. Another key choice is what investment will be made to improve community environments in ways that provide health benefits over the long term while also reducing greenhouse emissions. Considerable health benefits accrue from reducing air pollution and from increasing activity and social connection. They are discussed in the plan but not integrated into a strategy. This is a critical point in time to consider what has been learned from work on Sustainable Communities Strategies and in other contexts and how such strategies compared to others included in the 2017 Scoping Plan.

## **3. Seek Air Quality Gains in Nonattainment Areas and Disadvantaged Communities in Near Term**

Transformation of the energy system and economy to address climate change could provide an opportunity to reduce air pollution throughout the State, as the ARB is of course aware. The draft scoping plan has proposed a plan for refineries to reduce emissions. This is an important initiative for an important pollution source. The question is what other targeting strategies can reduce air pollution. Despite its robust air pollution control and climate policies, California still has the worst air quality in the nation.

It would seem important to specifically address how strategies related to the climate program could improve air quality in disadvantaged communities and area that are not in attainment with the National Ambient Air Quality Standards and the California standards. Perhaps these areas should be exempted from cap-and-trade and go through mandated emissions reductions, for example. Perhaps non attainment areas would receive priority phase out of combustion sources. Other possibilities may be available and worthwhile to explore.

### **Make improvements to Air Toxics Programs**

California has made significant reduction in some regulated hazardous air pollutants or air toxics.

The Legislature and ARB recognize that reduction in emissions of air toxics could be a benefit of the climate program. The Scoping Plan should discuss in some detail how this could occur.

It would also be important to improve the air toxics program, which has been in operation for

many years and would benefit from review and updating. The overall data system seems to reflect practices that may be able to be updated and upgraded to be more modern and timely. Recent efforts by the ARB to consolidate data through the visualization tool are valuable but do not improve the underlying data quality or timeliness.

The air toxics program is decentralized to the local air districts. That may be beneficial, but seems to lead to inconsistency in methods used to assess and manage risks of air toxics. This should be addressed to ensure that differences are substantiated for good reasons.

Data available about air toxics emissions is outdated and updated only every few years.

It is difficult to match air toxics data to greenhouse gas emissions data and criteria pollutant emissions data for the same facilities during the same timeframe. Moreover, attention to accuracy and quality control would be as important for air toxics data as it is for greenhouse gas emissions data. Perhaps similar provisions to ensure the reliability of data provided would be appropriate.

It is important that OEHHA has updated the methods for risk assessment to reflect consideration of children's environmental health, but other areas need updating as well.

It is unlikely that that current list of chemicals considered for regulation as air toxics is complete as it was developed more than two decades ago and not substantially updated since. This would be appropriate for an audit.

Moreover, the data used to characterize toxicity is incomplete and should be audited so that deficiencies can be rectified.

It would seem to be time for the State of California to develop some form of registry for regulated or managed entities to allow cross-referencing between programs.

Better data allows better analysis to avoid creating any new problems and to resolve excessive emissions that may be occurring now and to fulfill the mandates of the statutes.

The Appendix on data and metrics includes recommendations to improve data sources and develop metrics to inform climate policy and improve air quality. This was previously submitted to the ARB at the March meeting of the Environmental Justice Advisory Committee

#### **4. Support Actions by People and Communities to Reduce Climate Emissions**

The Scoping Plan focuses primarily on top-down actions to reduce greenhouse gas emissions. This is understandable since the ARB is a centralized technical agency with expertise in such strategies.

The Scoping Plan has less to say about actions by the people and communities to reduce greenhouse gas emissions and improve health. Over the long term, supporting actions by individuals is essential to the success of the overall program.

The ARB has had the foresight to work with the Environmental Justice Advisory Committee (EJAC), to conduct workshops around the State to discuss climate change and obtain community suggestions for strategies within the Scoping Plan. This brings different voices, perspectives, and capabilities into the discussion, and ARB is to be commended for supporting it.

The EJAC has provided an extensive set of recommendations to the ARB about actions informed by individuals and communities. These cover topics not specifically addressed in the Scoping Plan and provide an important complement to the ARB work.

The ARB has developed a “crosslink table” to communicate its responses to these recommendations. However, the Scoping Plan does not focus on many of the types of issues raised by the EJAC and this approach does not appear to be highly productive.

The EJAC recommendations have been developed through a process of consultation with community groups and among the EJAC members themselves. It has not been supported by the type of technical analysis and assessment that support the recommendations from the ARB staff. This creates some discordance between the products of the EJAC and the ARB.

It would be valuable to capture the rationale for the EJAC recommendations and record the substantiation as developed at the community meetings and the EJAC discussions. This could be done by the process facilitators. This would provide a more complete background to the recommendations and might allow for the common themes and points of connection to be better described.

It may be that the EJAC recommendations would best be considered along with the Scoping Plan rather than simply be added as an appendix. The EJAC perspective is in many ways more relevant to communities. The Scoping Plan is more concerned with top-down solutions. Both can play important roles, but they are not the same. Perhaps a new chapter could be added for community-oriented strategies that would bring the EJAC recommendations into the plan and build on them. The Scoping Plan needs a way to consider the value of community based investments alongside technology investments and standards.

## **5. Discuss Current Options and Actions in Light of the End Game for 2050 and Avoid Regrettable Investments**

The 2013 revision to the Scoping Plan (published in May 2014) set out an agenda for the climate program as a whole to meet targets for 2050. These included

- (a) conversion to electricity as the principal energy source for buildings and passenger vehicles;
- (b) use of “renewable biofuels” for non passenger vehicles;
- (c) mass deployment of distributed generation of electricity;
- (d) development of vastly increased storage capacity for the electricity grid, including both distributed and centralized elements and creation of capacity to shift load at times of peak demand;



- (e) changes in activity to reduce demand for travel;
- (f) increased efficiency of appliances, electronics and buildings to reduce energy demand;
- (f) widespread conversion to zero energy demand buildings.

This is a serious agenda with serious implications. It would seem important to bring this into the 2017 Scoping Plan.

### **Avoid sinking investment into facilities that must be superseded**

The implications of a long term shift toward electrification using clean renewable energy seems to be missing from this report. 2050 is only 33 years away.

Given a shift of electricity generation toward clean renewable sources, what are the implications for construction of power plants? Is further investment in combustion based power plants misplaced at this time, given a 50 year expected lifetime for power plants. Ratepayers pay the costs of unneeded power plants. The LA Times has recently reported that Californians' electricity rates are elevated in part due to construction of too much excess capacity in generation of power from natural gas.<sup>3</sup>

It would be best to avoid investing in actions that will need to be superseded later. For example, the State has invested in a transition to natural gas for electricity generation and other purposes. Yet, to meet the 2050 goals, burning of any fossil fuels including natural gas will need to be minimized. ARB must be bolder in its efforts to reduce the need for burning natural gas as a so called bridge fuel and ensure that it is investing the development of effective zero emission technologies. How does the ARB determine the correct pace for investment to avoid over-investing in solutions that are not sufficient in the long run and will increase pollution in the short run?

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<sup>3</sup> Ivan Penn and Ryan Menezes. Californians are paying billions for power they don't need. Los Angeles Times. February 5, 2017. <http://www.latimes.com/projects/la-fi-electricity-capacity/> (accessed March 17, 2017)

## Appendix 1. Data and Metrics for Climate Change Policy, Health and Equity

Note: metrics are to be designed to be comparable across areas and over time

### I. Unified Source Inventory Matched to CalEnviroScreen

- Develop a registry or unified set of sources of air pollution and/or greenhouse gases for the State of California that draws on the existing inventories and sources but provides a single identifier and characteristics information for each source. This may use a “registry” type of data structure that allows the underlying systems to remain intact as long as all information may be accessed through the registry or other meta data system.
- Provide accurate and usable geocodes for all sources.
- Provide overlays of CalEnviroScreen and the inventory sources that can be used together.

### II. Unified Reporting Timeframes

Create a unified reporting timeframe for all greenhouse gas and air pollution sources so that monitoring and other data can be viewed for consistent time periods.

### III. Climate Change Emissions

#### A, Each Greenhouse Gas (each gas separately)

- California statewide, county, census tract, and facility totals for emissions of each greenhouse gas by month and year
- Totals for disadvantaged communities and other communities of each greenhouse gas by month and year
- Equity analysis: metric for intensity of emissions by race/ethnicity and by income by year

#### Total adjusted greenhouse gases (in MMTCO<sub>2</sub>E) by month and year

- California statewide, county, census tract, and facility totals for emissions of total adjusted greenhouse gases by month and year
- Totals for disadvantaged communities as identified by CalEnviroScreen and other communities of total adjusted greenhouse gases by month and year
- Totals for total adjusted greenhouse gases for areas that are in nonattainment for criteria pollutants and for those that are in attainment by year

- Equity analysis: metric for intensity of total adjusted greenhouse gases emissions by race/ethnicity and by income by year
- Equity analysis: metric for intensity of emissions by income by year
- Health analysis: identify areas with health impacts or susceptible population for special analysis

### Allowances

- California statewide, county, census tract, and facility totals for allowances by year
- Totals for disadvantaged communities as identified by CalEnviroScreen and other communities of allowances by month and year
- Totals for allowances gases for areas that are in nonattainment for criteria pollutants and for those that are in attainment by year
- Equity analysis: metric for intensity of emissions by race/ethnicity by year
- Equity analysis: metric for intensity of emissions by income by year
- Health analysis: identify areas with health impacts for special analysis or by susceptible population?

### Assessment Issues:

- What can be tracked in real time? How could we see greenhouse gas emissions in real time?
- What other types of sources should be tracked beyond those that have allowances, particularly those related to transportation?
- Can we identify the areas of origin for impacts on disadvantaged communities (such as upwind sources that affect them)?
- Can we identify areas that are at risk of becoming “disadvantaged”?

## IV. Air Pollution: Air Toxics and Hazardous Air Pollutants

### Assessment Issues:

- How can we get the emissions numbers into real time?
- How good is the list of toxics that are included in the reporting system? Are there any cases where an identified air toxic has been managed and reduced by replaced by something else that has not been tested or is not in the system?

- Which air toxics are monitored and which are estimated? How good are these methods?
- What is the range of methods that local air districts use to prepare emission inventories? Do these result in differences in characterization between district? Is there any scientific justification for any differences? What would be involved in standardizing these methods?
- Methods for emission inventories: Develop analysis and documentation of changes in emissions inventory methods (statewide and by district). Determine how these changes are likely to affect emissions estimates and what would be needed to provide estimates that could be comparable from year to year.
- Background:

Facility emissions are reported first from facilities to the air district, then from air districts to the ARB. There are opportunities or revision to emissions estimates at the district and the ARB. ARB estimates do not always match the district estimates. It is not clear which estimates are used to prepare hot spots risk assessments (to inform notification levels or risk reduction measures). The adequacy of the current lists of toxic air contaminants and hazardous air pollutants needs to be audited as these lists are many years old and not likely to reflect all pollutants of concern.

#### **Air Toxics Emissions:**

##### **Each Toxic Air Contaminant of Hazardous Air Pollutant**

- California statewide, county, census tract and facility level totals for emissions of individual toxic air contaminants and hazardous air pollutants by month and year
- Totals for disadvantaged communities and for other communities by month and year
- Equity analysis: metric for intensity of emissions by race/ethnicity and by income by year
- Health analysis: identify areas with health impacts or susceptible populations for special analysis?

##### **Total adjusted air toxics and hazardous air pollutants combined**

- Develop metric for total air toxics and hazardous air pollutants combined
- California statewide, county, census tract and facility level totals for emissions of total toxic air contaminants and hazardous air pollutants by month and year
- Totals for disadvantaged communities and for other communities by month and

year

- Equity analysis: metric for intensity of emissions by race/ethnicity and by income by year
- Health analysis: identify areas with health impacts or susceptible populations for special analysis?

## Criteria Pollutants

### Each Criteria Pollutant

- California statewide, county, census tract and facility level totals for emissions of individual criteria air pollutant by month and year
- Totals for disadvantaged communities and for other communities by month and year
- Totals for areas that are in nonattainment for criteria pollutants and for those that are in attainment by year
- Equity analysis: metric for intensity of emissions by race/ethnicity and by income by year
- Health analysis: identify areas with health impacts or susceptible populations for special analysis?

### Total adjusted criteria air pollutants combined

- Develop metric for criteria air pollutants combined
- California statewide, county, census tract and facility level totals for emissions of total criteria air pollutants combined by month and year
- Totals for disadvantaged communities and for other communities by month and year
- Totals for areas that are in nonattainment for criteria pollutants and for those that are in attainment by year
- Equity analysis: metric for intensity of emissions by race/ethnicity and by income by year
- Health analysis: identify areas with health impacts or susceptible populations for special analysis?

Note: This equity analysis should be completed by OEHHA

Note: These metrics are relevant to AB 197 as well.

## **Appendix 2: Information Design for the Scoping Plan**

The climate policy program of the State of California is a model for the nation and the world. The robust program includes many elements that are being developed through many processes by many parties. This is exciting and productive. It is also a challenge for the people of the state to follow and understand. It would be beneficial to establish an information design framework to consistently collect and present data and information about the program as a whole and the choices being made at each step. This could be done in a way that allows different levels of engagement and different levels of interest in understanding details.

Some initial suggestions for the scoping plan document are included here, but this should be seen as part of a coordinated effort. Certain elements of the Report Card for the climate program, for example, would be relevant to include, as well as certain elements from the interagency documents.

### **Design Scoping Plans to Better Explain the Current Program and Options for Future Action**

The Scoping Plan draft is a complex document. These are suggestions to make the document more understandable to the public and more helpful in understanding the overall trajectory of the California climate program.

#### **a. Explain where are we now**

It would be helpful to orient readers by showing readers what has been accomplished so far. The 2013 Scoping Plan update (released in 2014) provides a model. It explained policies that were adopted, whether they were successfully implemented, and how the Air Resources Board (ARB) viewed their future prospects. This would be appropriate for each scoping plan. Explaining the starting point helps the reader assess the options ahead.

#### **b. Present information in a consistent order**

The plan would benefit from a stronger structure. The text jumps around between material that provides introduction, background, scientific findings proposed actions, and general explication. The reader would benefit if it had from a stronger narrative structure.

#### **c. Develop and use consistent metrics and graphics**

Consistent information allows people to easily compare where we are now with where we were before. The ARB has developed informative presentations of information in some contexts, but they seem to be lacking in this draft. As yet, a consistent design for information is not apparent.

The public would benefit from an intentional information design for the Scoping Plan and related presentations. Such an information design would include important metrics and understandable graphics presented in a consistent way that is easy to understand. There may

be some material from the climate report card project that could be adapted for this purpose.

There is broad recognition of the value of metrics to track program progress and understand impacts of the climate program. It seems somewhat surprising that metrics are very limited in the Scoping Plan. As noted previously, this makes it harder to understand what was expected and what was achieved.

As a general comment, to provide valuable insights to the public, it would be very helpful for the ARB to adopt and use metrics that can show key elements and progress. They should be related to the design of the program as a whole.

#### **d. Identify Action Items clearly**

Possible or proposed action items appear in many places in the document, including “Scenarios,” “Sectors,” and “Achieving Success.” It is difficult to find them, and to understand the logic behind this organization. Perhaps an index of action items and a summary table of recommended actions and associated reductions as included in the 2008 scoping plan could be added. It is baffling why some items are included in sectors and scenarios and others in achieving success, as there is overlap between scenarios and sectors. One would hope that all of the actions would contribute toward success, not just some of them.

#### **Details on Metrics and Graphics**

##### **Showing the numbers on the targets**

The first data provided is graph 1-1 at page 13 of the full text. It is entitled “California GHG Inventory Trend” but what it shows is the changes in total greenhouse gas emissions from 2000 to 2014 on a graph with a scale that goes to 2020. It is intended to show progress toward the 2020 target. This graph is helpful and illustrates how far we have come. It would seem to belong earlier in the text as part of the introduction. You could add a second version that extends out to 2050 and then shows how far we have to go. The graph is now placed in a rather puzzling explanation about the methodology of the reporting into the GHG emissions inventory. This graph is helpful but could be made more understandable. Suggestions are

included in the endnotes. <sup>4</sup>

### Showing the numbers on the emissions

The next data are presented as two very small pie charts that show “Emissions by GHG” and Emissions by Sector. These graphs show 2014 emissions, now three years ago. These are the only illustrations of emissions included in the Scoping Plan.

One thing that would be interesting would be to see whether these have changed since the outset of the program in absolute or relative terms. Have they? Could that be added here?

These graphs would benefit from some additional attention. For one thing, perhaps they

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<sup>4</sup> First, the graph could show the “2020 Target” explicitly. This is now shown by a horizontal line that starts in 2000 and continues to 2020 labeled as “2020 limit = 431.” I am sure this makes sense to those steeped in this work but to the casual reader it may be hard to make sense of it. First, the document consistently uses the word “target” not “limit.” When you use a different word, it suggest that you mean something different. So the reader has to puzzle out whether the “limit” is the same thing as the target. Moreover, the line starts in 2000, while the target it intended to be reached only by 2020. So it doesn’t make sense. In addition, there is another entry that says 2020 limit = 260 using a line color and thickness that is identical to those that denote the value for the left axis. This is baffling because this graph, despite its title, is about progress toward the 2020 target, and the 2030 targets are not under discussion here.

One small additional point of needless complexity is the use of two decimal places for the left hand axis. Why would you write out the numbers as if there are five significant figures?

As a general matter, it is easier to understand data if presented across a consistent time line in a consistent way. Recall that the targets are expressed in terms of 1990 emissions. Yet the graphs generally do not show 1990. Why not? It will be easier to visualize what a reduction to 1990 emissions would be if you show the emissions of 1990. Then anyone can see that the 1990 emissions level is the same as the 2020 target (or “limit). It is easier for people to compare the various targets and numbers if the range of years included is consistent.

It would make sense for the ARB to develop a format to consistently show the current target period, now from 1990 to 2030. You can always use a second detailed graph if there were some detail in the pattern that could not be illustrated at that scale.



could be a bit larger and thereby easier to read. Additional suggestions are at the endnote.<sup>5</sup>

The black carbon data are shown entirely separately. It is not entirely clear why. helpful to the reader. This text does not put the black carbon numbers into perspective as related to the other numbers presented here and is baffling. There is better information in the 2013 Plan that might be appropriate to add here.

Then the transition to the next paragraph after table 1-1 would seem to deserve some kind of new heading, as it moves on into a discussion of the fact that the state hasn't done anything on natural and working lands as yet. That might merit some subtitle at least, as it now appears to be part of a section on black carbon.

The ordering of this text seems random , as the draft discusses some of the arcane points about what is and isn't in the inventory and refers to multiple other sources before it gets around to describing the 2030 target that is the point of the entire document finally at page 16. The paragraph 2 on page 16 also refers back to the Paris agreement. This bouncing around through the document is difficult for any reader to follow. Later at page 16, the document returns again to the subject of tracking emissions, which had been discussed starting at page 13. The paragraphs seem to lack a clear order. Page 13 starts with tracking emissions, talks about methods, shows the pivotal table 1-1 (discussed above) about progress in reaching targets, briefly discusses that transportation is the largest sources, then talks about how methane is the second most important greenhouse gas.

On page 26, in a section called Setting the Path to 2050, which is Part 7 of this chapter, a graph shows the emissions trends from 2000 to 2014 with a projection to the 2020 target. This is positive because it shows the 2020 target as a target and not an ambiguous line starting from 2000. Moreover, it shows the 2030 and the 2050 targets as targets (not limits). This graph is valuable because it shows the magnitude of the reductions that would be needed to achieve these later targets. It would be improved by adding 1990 so that people could visualize the targets as they relate to the 1990 baseline.

Unfortunately, this graph also tries to introduce some partially developed ideas about a path

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<sup>5</sup> For Figure 1-2 Emissions by GHG, the use of the term "GHG" here is not consistent with how it is used elsewhere. More typically, "GHG" is used to refer to the total greenhouse gases as weighted into MMTCO<sub>2</sub>e. The point of this graph, however, is exactly the opposite, to point out the emissions of the individual gases that are included in the combined metric. This use of the same acronym to mean something almost opposite can be very confusing to people who are not already well versed in the data. Some more informative title like: "Emissions of Individual Gases that Contribute to Global Warming in California in 2014" might be more understandable. It would also be helpful to include a legend to the graph that defines all of the abbreviations. These are defined in the text but it is hard to pick them out, and including these in the legend directly on the graph makes it clear which of the many acronyms on the page are pertinent to the graph. Moreover, the use of the legend or secondary title under this graph that says: "2014 Total CA Emissions: 441.5 MMTCO<sub>2</sub>e" seems particularly unfortunate since the whole point of this graph is to separate out the different gases that contribute to that combined metric.

toward zero emissions. This would possibly not be confusing to people who already are familiar with everything else on the graph. But to those who are trying to understand the Scoping Plan and the new targets and where we have gotten to from the baseline, adding this additional complexity is baffling. Where did the numbers come from? What is “constant progress?” The idea of “constant progress” does not seem to fit with the data even if you just look at the shape of the trend line from 2000 to 2014, which is neither straight nor on the slope of the constant progress line. But whether the notion of “constant progress” has merit or not, it is confusing to introduce it on the first graphic in this report that provides a visual representation of what is trying to be accomplished.

In addition, this graph should have a more specific title and then notes that remind the reader what the targets were and where they came from. <sup>6</sup>

Another version of this graph is given as Figure II-1 at page 33. This version is good in that it finally includes the 1990 baseline level. It shows the target levels fairly clearly. The graph would benefit from a larger vertical size because this squished version makes the distance from 0 to 600 look small, and it is not. However, this graph unfortunately has added something called the Reference Scenario (BAU), which will be obscure to many not well versed in the jargon of the international discussions. (For many Americans, the acronym BAU will be understood as the Behavioral Analysis Unit on a TV crime show.) This is not defined anywhere on the graph. Again this graph lacks an explanatory legend.

Figure II-2 at page 41 introduces the concept of Cumulative Greenhouse Gas Emissions Reductions. This is in the context of trying to justify the expansion of cap-and-trade. However, the ARB should decide whether it is important to express emissions in both annual and cumulative terms. If it is, then a section should be added to the document that more fully explains the relevance of these two approaches, both in the State and in the international discussions. The explanation given here makes no sense, and the use of the two ways of reporting results and two types of numbers is very confusing.

It may be worthwhile to use both types of metrics. If so then the design of the graphics should consistently make the two types of graphs look different to help the reader recall that the two types of metrics have different contexts and purposes.

It would be helpful to include a list of tables and figure with the contents.

Table II-3 (at page 43) shows estimates changed in GHG emissions by sector in MMTCO<sub>2e</sub> from 1990. However, none of these numbers match any given in the introductory chapters. Why go back to 1990 here when the numbers in the previous chart are from 2014? It may very well be appropriate to show changes from 1990, but from this we cannot determine how much of that was already achieved by either 2014 or 2020 and it seems like a very odd way to show this.

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<sup>6</sup> In publications, it is a basic principle that each graph should be understandable on its own without having to skim the accompanying text. That is because many people skim the graphs and figures first to try to get a sense of the content. Moreover, the graphics could stand alone and used to help in other contexts.

These numbers appear to be in annual emissions rather than cumulative emissions.

It is also odd that the cap-and-trade reductions are not allocated by sector in this table, though that is not specifically a data issue.

The text says:

*To understand how the Proposed Plan affects the main economic sectors, Table II-3 provides estimate GHG emissions by sector compared to 1990 levels, and the range of GHG emissions for each sector estimated for 2030. The comparison helps to illustrate which sectors are reducing emissions more than others and where to focus additional actions to reduce GHGs across the entire economy.*

However, this does not appear to be true since the cap-and-trade reductions are not allocated.