

December 16, 2016

Ms. Rajinder Sahota
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Comments on 2030 Target Scoping Plan Update Discussion Draft

Dear Ms. Sahota,

On behalf of our 78,000 supporters in the Golden State, including 2,700 scientific experts, the Union of Concerned Scientists (UCS) is pleased to provide our comments on the 2030 Target Scoping Plan Discussion Draft (Discussion Draft) document for the 2030 Scoping Plan Update.

We thank you for the hard work and commitment of you and your staff to help design an effective, far-sighted approach to the critical task of reducing greenhouse gas emissions in California, which we hope will prove to be a model for other states and beyond. We hope that our comments on the draft will be helpful as you move toward successfully finalizing the Scoping Plan.

Earlier this year, California reaffirmed its commitment to a low carbon economy with the passage of SB 32 and AB 197. Together, these bills codified the state's 2030 greenhouse gas (GHG) emissions reduction goal of 40 percent below 1990 levels, increased legislative involvement in implementation of climate change programs, and strengthened the state's commitment to ensuring climate policies help communities most impacted by air pollution. The 2030 Target Scoping Plan Update (or Scoping Plan Update) will provide the roadmap for how California will achieve this important milestone.

The 2030 target marks an important milestone on the emissions reduction pathway to limit global average temperature increases to "well below 2 degrees Celsius," a goal enshrined in the Under 2 MOU between 135 jurisdictions and adopted by more than 190 global leaders in the Paris Climate Agreement last December, including California. The Paris Agreement further committed the parties to pursuing efforts to limit the temperature increase to 1.5 degrees Celsius and achieving net-zero global warming emissions in the second half of this century.

The state is currently on track to meet its 2020 GHG reduction target under AB 32. Through its Scoping Plan Update, the Air Resources Board (ARB) has the opportunity and responsibility to build upon the success of AB 32, and present a compelling vision and plan for decarbonizing the economy in a way that supports economic growth, improves Californians' quality of life, and minimizes negative impacts on disadvantaged communities.

Review of Climate Science

We appreciate the Discussion Draft's review of the current state of climate science. It underscores the need for deep reductions in GHGs over the coming decades to avoid catastrophic climate change, and the need for serious action to increase the state's resilience to a changing climate future. However, **this section of the document could be strengthened in several ways.**

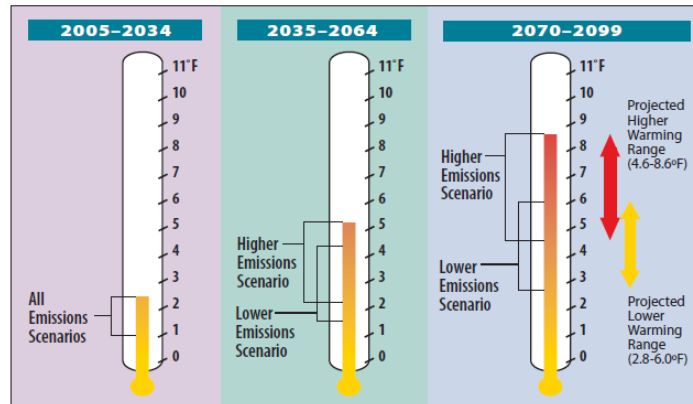
- The draft includes a discussion of some new climate science developments, including the faster-than-projected rate of sea level rise. The unprecedented warming in the Arctic, which is driving this change, should also be included.
- There is a strong focus on the state's drought, which we believe is appropriate. However, it is important to accurately reflect the drought's impacts. The Discussion Draft refers to a report that estimated statewide economic costs and job losses using the SWAP model, which has been found to vastly over-estimate losses in the agricultural sector. The author retracted earlier estimates of drought impacts produced by this model and published an article with revised numbers.¹ We recommend that ARB instead cite county crop reports on actual agricultural losses during the current drought.² Finally, this section should note the profound impact of drought on the state's natural capital and ecosystems, as well communities like those in the Central Valley who lost access to drinking water supplies.
- The synthesis of the more recent literature on drought should be updated to include the conclusions of the recent Pagan et al 2016 article in *Environmental Research Letters*, which found that extreme hydrological changes are likely to lead to significant reductions in Southern California's water supply by mid-century. The lack of surface water supplies has led to increased pressure on groundwater resources, with unprecedented amounts of pumping and associated negative impacts, such as land subsidence.³ It might also be useful to add a sentence explaining that, in summary, **all of these studies indicate that drought is widening the gap between water supply and water demand in California and that drought conditions are worsening.**
- **There are already climate change impacts affecting California that we will have to adapt to and cope with, but California and the rest of the world do have choice about how serious the impacts will be by the end of this century, as demonstrated by the graphic below.** The lower emissions scenario projects a lower warming range with fewer associated impacts. This key point should be emphasized in the section of the document.

¹ Michael, Jeffrey, Richard Howitt, Josué Medellín-Azuara, and Duncan MacEwan. 2010. A Retrospective Estimate of the Economic Impacts of Reduced Water Supplies to the San Joaquin Valley in 2009. Online at: http://www.pacific.edu/Documents/school-business/BFC/SJV_Rev_Jobs_2009_092810.pdf

² For example, Cooley, Heather, Kristina Donnelly, Rapichan Phurisamban, and Madyama Subramanian. 2015. Impacts of California's Ongoing Drought: Agriculture. Online at: <http://pacinst.org/app/uploads/2015/08/ImpactsOnCaliforniaDrought-Ag.pdf>

³ Union of Concerned Scientists. 2015. The Big Water Supply Shift. Online at: www.ucsusa.org/watersupplyshift

Projected Average Temperatures in California



This “thermometer” graphic from the Third Assessment of the California Climate Change Center shows projected increases for three different time periods: the next several decades (2005-2034), mid-century (2035-2064), and late century (2065-2099). By mid-century, today’s emissions become apparent, with differences in the higher and lower emissions scenarios occurring. By late century, projected temperatures under the higher emissions future (of up to 8.6°F above historic levels) are greater than those under the low emissions future (up to 6°F above historic levels).

Overview of the Scenarios

The Discussion Draft describes the need for significant and rapid reductions to meet the 2030 goal while also placing California on a trajectory to meet its 2050 goal of 80 percent below the 1990 emissions level. In order to achieve both goals, California will need to consider all the available emission reduction tools, including carbon pricing and specific sector-based policies, like the Renewable Portfolio Standard, Low Carbon Fuel Standard, energy efficiency standards, Zero Emission Vehicle program, and the Sustainable Freight Action Plan, among others.

UCS analysis and California’s own experience show the importance of integrating sector-specific policies and a carbon price in bringing down emissions more effectively and at a lower cost. A robust price on carbon can help ensure that the costs of climate impacts and the opportunities for low-carbon energy choices are better reflected in our production and consumption choices, driving innovation in clean technologies. The revenues from a carbon pricing program can also be used for the public benefit and to amplify and accelerate climate action, as has been the case in California. Here in California, sector-specific policies in the energy and transportation sectors have been critical to overcoming market barriers and driving deployment of clean technologies and energy efficiency. In fact, we’ve seen sector-specific policies drive down emissions, and a price on carbon serve as a cost-effective backstop to ensure that the state reaches its GHG goals.

For the 2030 Target Scoping Plan Update, ARB is evaluating three different scenarios, each of which rely on a common core set of strategies, or “known commitments,” but vary in fundamental ways. We offer some high level comments on each scenario below, with more detailed comments on specific strategies later in this letter.

Overall, UCS supports strong emission reduction measures in energy, transportation, and water among other sectors, as well as well-designed carbon pricing approaches. We look forward to additional information in the January 2030 Target Scoping Plan Update that will further describe the design details of both pricing approaches under consideration (cap-and-trade and carbon tax), as well as how effective they will be in reducing emissions and meeting other key criteria (such as addressing equity concerns and the needs of disadvantaged communities), and how they’ll work in concert with complementary policies.

Draft Scoping Plan Scenario

The “Draft Scoping Plan Scenario” (Draft Scenario) relies on the known commitments plus an extension of cap-and-trade and a new refinery efficiency measure that results in 20 percent reduction in emissions at refineries by 2030. In ARB’s “ideal scenario,” where the known commitments and the refinery measure achieve the estimated emissions reductions, cap-and-trade would be responsible for closing the emissions gap of about 40 MMTCO₂e in 2030. However, the amount of emissions reductions that cap-and-trade would need to backfill could be significantly larger if these strategies underperform. ARB’s own uncertainty analysis demonstrates this possibility from a cumulative perspective in Figure III-2; cumulative GHG reductions from cap-and-trade increase from 98 MMTCO₂e in the ideal scenario to 270 MMTCO₂e in the uncertain scenario, or 40 percent of the reductions. (We appreciate that ARB included a discussion of uncertainty in its evaluation of the scenarios.)

UCS therefore recommends that the Draft Scoping Plan Scenario increase the amount of emission reductions attributed to sector-specific strategies beyond the levels of several known commitments and include additional sector-specific policies. They include: a stronger Low Carbon Fuel Standard and freight efficiency target, a much more ambitious target for zero emissions freight vehicles and equipment, higher levels of renewable energy investments,⁴ and a requirement for electric heat pumps in new commercial and residential buildings, among others. Including these feasible and achievable sector-specific policies will help serve as a hedge against uncertainty.

In addition, ARB should examine ways to modify the cap-and-trade program to improve outcomes in communities that are burdened by pollution and most vulnerable to its effects, in line with the direction of AB 197. Any carbon pricing program should be designed in a way that minimizes the disproportionate impacts felt by these communities. Moreover, the 2030 Target Scoping Plan Update should reduce emissions in a way that also improves public health, so we look forward to a robust analysis of the public health benefits of the January Proposed 2030 Target Scoping Plan alongside the assessment of the economic costs. We believe the proposed direct refinery reductions could be an important step in this direction.

Alternative 1

The “Alternative 1” scenario does not include carbon pricing, but rather relies on enhanced measures for the energy, transportation, and industrial sectors in addition to the known commitments. **While UCS supports a robust set of sector-specific policies for achieving a significant portion of the emission reductions, we believe that a price on carbon is an important tool for the reasons described above and therefore should be considered as well.**

Alternative 2

The final scenario, “Alternative 2,” is a combination of known commitments, a carbon tax, and the refinery efficiency measure. **As with the Draft Scenario, UCS recommends ARB increase the ambition of reductions expected from non-pricing mechanisms in this scenario by exceeding known commitments with additional sector-specific policies.** These updates would help reduce the scenario’s reliance on the carbon tax for emissions reductions, which could potentially be quite large as a result of the uncertainties for the sector-specific policies as shown in Figure III-2. The January Proposed 2030 Target Scoping Plan will need to discuss the specific price for a carbon tax to be evaluated properly alongside the other scenarios. We also recommend that ARB’s evaluation of Alternative 2 include more detail about how a carbon tax could be designed to address some of the concerns raised in the Discussion

⁴ This does not necessarily mean increasing the RPS across the board, which would apply to all load serving entities.

Draft. For instance, ARB could explore whether a carbon tax could be designed to address concerns about emissions reduction certainty.

More detailed discussion of assumptions

In order to more fully understand staff conclusions in the Discussion Draft, UCS would also appreciate a more detailed discussion of several sets of assumptions in the January Proposed 2030 Target Scoping Plan. They include: the assumptions underlying the Reference Scenario, or business as usual, and how the models employed by ARB for the Scoping Plan development account for interactions among the sectors and specific strategies. They are important components of the Scoping Plan development and this information will enable stakeholders to more readily engage in a meaningful discussion about them. We also support an evaluation of the interactions, both synergies and trade-offs, between strategies and recommend that ARB clearly delineate what it believes would constitute a ‘win-win’ strategy or policy.

Known Commitments and Other Measures

The Discussion Draft includes a common set of strategies, or known commitments, across all three scenarios. They include measures from the energy and transportation sectors, as well as implementation of the Short Lived Climate Pollutant Strategy. Because the transportation, industrial, and electric power sectors combined accounted for more than three-quarters of the state’s heat-trapping emissions in 2014, their share should be reflected in the selection of policies for the Scoping Plan Update. Below we provide comments on the specific known commitments described in the Discussion Draft, and highlight opportunities to strengthen specific strategies to secure additional reductions moving forward.

Energy Sector

The energy sector, which includes the state’s electricity and natural gas infrastructure, represents nearly 30 percent of statewide greenhouse gas emissions in 2014. The Discussion Draft describes several existing policies and some new strategies that are critical to decarbonizing the state’s energy system and meeting the 2030 goal. Below, we highlight several areas that could be strengthened or further clarified for the January Proposed 2030 Target Scoping Plan Update.

In addition, ARB should identify when in the Scoping Plan development process it will provide a range of emissions for 2030 that are associated with each sector of the economy. This information will be an important benchmark to measure emission reduction progress throughout the economy between now and 2030. It is especially important for the electricity sector, because this range of emissions forms the basis of what the IRP will plan for.

Renewable Electricity

California has made tremendous strides in renewable energy generation largely due to the successful implementation of the Renewables Portfolio Standard (RPS), which has positioned the state as a global leader in renewable energy investments. This policy has helped the state reach the GHG reductions required by AB 32 through investments in cleaner generation resources that, as an added benefit, make the electricity grid more diverse and resilient. Currently, the RPS requires all retail electricity sellers to source 33 percent of retail sales with renewables by 2020 and 50 percent by 2030. **Many of the state’s major electricity suppliers are well on their way to meeting these requirements.** For example, Pacific Gas and Electric Company (PG&E) reports in their 2016 RPS Procurement Plan that “PG&E projects that under the 33 percent RPS by 2020 target, and an assumed ‘straight-line’ trajectory implementing the Senate Bill (“SB”) 350 target of 50 percent RPS by 2030, it is well-positioned to meet its RPS

compliance requirements for the second (2014-2016), third (2017-2020), and fourth (2021-2024) compliance periods and will not have incremental RPS physical need until at least 2026.”⁵

In fact, over the last four years, in-state generation capacity of renewable energy has more than doubled.⁶ Given the state’s success to date in bringing new sources of renewable electricity online to displace generation by fossil fuels, **UCS believes that the ARB should be open to considering additional renewable procurement beyond what’s required by the current RPS.** An increase in renewable electricity beyond the 50 percent identified in the draft scoping plan scenario could be possible, but would not have to be realized through an increase in the RPS, which would apply to all load-serving entities (LSEs) in the state. This is because for some LSEs, relying on renewables beyond the 50 percent RPS requirement to provide safe, reliable and cost-effective electric service while also meeting SB 32 emission reduction goals may be the best option. The integrated resource plans (IRPs) provide an opportunity to have these discussions.

Renewable energy procurement will be a key strategy to ensure that future load growth is met with carbon-free generation sources instead of natural gas. This benefit will be especially important as electricity load grows to accommodate electric vehicles. **Meeting the 50 percent RPS – and even exceeding it – is achievable and feasible and will be important for maximizing the emission-reducing potential of switching from gasoline-powered vehicles to electric as more EVs are brought onto the grid.**

Modeling Assumptions

We are concerned that the PATHWAYS model assumptions for expected generation from large hydropower facilities are based on historical generation data that does not reflect the impacts of climate change on the future availability of hydropower generation in California.⁷ Climate studies show that climate change will reduce California’s snowpack, which will likely mean that on average, California will have less hydropower generation capacity in the spring and the summer.⁸ By failing to take this dynamic into account, the model could be overestimating the available supply of resources to meet future electricity needs.

PATHWAYS also makes certain assumptions in the Draft Scenario and alternative scenarios that allow for a greater use of GHG-free resources to integrate renewables, such as energy storage, additional participation of flexible loads including EVs, and conventional demand response.⁹ While the procurement of these resources will help reduce renewable energy curtailment, lower production costs and costs of reaching the 50 percent RPS, and reduce emissions, they have not yet been deployed aggressively enough to reduce reliance on natural gas. In addition, UCS is unsure at this point of the extent to which the CPUC’s IRP process will offer an opportunity to address this issue by influencing decisions about renewable energy integration that could change how resources on the grid are dispatched. Since the utilization of these flexible, GHG-free resources is extremely important for maximizing the GHG reduction potential of the RPS and other renewable energy programs, **UCS believes the 2030 Target Scoping Plan Update should emphasize the importance of making investments in energy storage**

⁵ Pacific Gas and Electric Company. August 8, 2016 Draft Renewable Energy Procurement Plan (U 39 E). Online at: <https://pgera.azurewebsites.net/Regulation/NewSearchResults>.

⁶ California Energy Commission. California’s 2030 Climate Commitment: Renewable Resources for Half of the State’s Electricity by 2030. Online at: https://www.arb.ca.gov/html/fact_sheets/2030_renewables.pdf

⁷ Draft Scoping Plan Scenario & Alternatives Modeling Description, p.29

⁸ Moser, S., J. Ekstrom, and G. Franco. 2012. Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California. Sacramento, CA. Page 3. Online at: <http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>

⁹ *Id.* pp.11-12.

and flexible load programs, enhancing coordination with neighboring balancing area authorities, and enabling renewables to provide grid services as critical to the electricity sector delivering on its emission reductions.

Building Electrification

In a 2014 analysis commissioned by ARB, CEC, CPUC, and CAISO, the consulting firm E3 evaluated the feasibility and cost of a range of 2030 targets consistent with the state's goal of reducing GHG emissions to 80 percent below 1990 levels by 2050. They employed the PATHWAYS model, which ARB is also using for the Scoping Plan Update, and found that aggressively reducing the use of natural gas in buildings by switching to electricity was an important investment. Specifically, all of the E3 scenarios in that study assumed that over 50 percent of new sales of residential water heaters and HVAC systems for buildings were high efficiency electric heat pumps by 2030 or over 50 percent of natural gas demand was supplied with biogas by 2030.¹⁰ For reasons that are explained in more detail in the section below on renewable natural gas, UCS believes that to the extent the state will be able to increase the supply of renewable natural gas, while also adequately addressing methane leakage concerns, that gas should be reserved for use in the industrial sector, where efforts to dramatically reduce emissions may be more challenging than efforts to fuel-switch in commercial and residential buildings.

Given the importance of building electrification as a necessary emission reduction strategy, UCS would like ARB to provide more information on why the Draft Scenario does not include fuel-switching of natural gas or diesel end-uses to electricity either for new buildings or early retirement. ARB's Alternative 1 scenario assumes that between 2025 and 2030, residential and commercial natural gas, distillate, and LPG space heaters and air conditioners from 2013 or older are replaced with electric heat pumps at a rate of 6 percent per year. In addition, Alternative 1 assumes that between 2020 and 2035, the proportion of new residential and commercial water heater, space heater, and air conditioner sales that are electric heat pumps increases from either 0 to 75 percent or 0 to 100 percent.¹¹

In contrast, the ARB's Draft Scenario assumes no early retirement of natural gas HVAC systems, water heaters, and air conditioners and the transition to heat pumps, and that no new buildings contain electric heat pumps instead of natural gas HVAC, water heaters, and air conditioners by 2030. ARB may be assuming that some of this transition would happen as a result of the cap-and-trade program, but UCS does not believe that cap-and-trade would send an adequate incentive for building owners to switch from one technology to another. **At minimum, we believe that the Draft Scenario should assume that the state enacts a requirement to encourage some new buildings (commercial and residential) to contain electric heat pumps by 2030, as it does in Alternative 1.**

Renewable Natural Gas

UCS generally supports the state's efforts to displace fossil natural gas with renewable natural gas, as long as doing so contributes to an overall decrease in natural gas use statewide, and the necessary precautions are taken to address potential methane leakage issues. However, unless ARB provides some direction on where this renewable natural gas might be best used, we risk several sectors depending on the same supplies of renewable natural gas to achieve emission reductions. At this point, we believe that the most advantageous use of renewable natural gas may be in the industrial sector, where there could be fewer cost-effective alternative strategies for achieving deep cuts in emissions. UCS believes that even the state's best efforts to develop additional sources of renewable natural gas will result in a limited

¹⁰ E3 Summary of scenarios, p.2: https://ethree.com/documents/E3_Project_Overview_20150406.pdf

¹¹ See page 10 of the Draft Scoping Plan and Alternatives Modeling Description

supply.¹² For this reason, **we believe that directing a large portion of renewable natural gas towards residential and commercial buildings or in heavy-duty vehicle applications such as transit buses and delivery trucks, when clean electricity alternatives exist, is not the best use of what will likely be a limited supply.**

Transportation Sector

As the largest sector of emissions, reducing pollution from the transportation sector is critical to addressing air quality, climate, and oil reduction goals in California. The draft scoping plan outlines several necessary steps and policies to put California on the path towards its 2030 climate targets. The following comments emphasize the importance of some of these key policies and where additional emphasis and attention is needed in order to finalize a robust Scoping Plan in 2017.

Greenhouse Gas and Zero Emission Vehicle Standards

The GHG standards for light duty vehicles play an essential role in ensuring that gasoline and diesel-powered vehicles are as efficient as possible. **Because the Discussion Draft assumes that the majority of vehicles sold in 2030 will still use petroleum-based fuels, it will be critical to maintain the current fleet GHG standards through 2025.** Furthermore, the evaluation of US EPA, US Department of Transportation, and CARB in the draft Technical Assessment Report¹³ supports continued efficiency improvements through 2030. The state should take actions to ensure that these technically achievable and cost-saving measures are taken.

As the Discussion Draft notes, Zero Emission Vehicle (ZEV) policies are critical to achieving the state's 2030 target. The Mobile Source Strategy calls for 1.7 million ZEV and transitional ZEVs (plug-in hybrids) in service by 2025 and 4.2 million by 2030 to meet the targets, which will require increased adoption of ZEVs. The ZEV regulation has been an important component of the state's policies to reduce air pollution, petroleum use, and GHG emissions, and the regulation serves as a floor for the minimum ZEV deployment in California. The structure of the ZEV regulation has resulted in California leading the nation in both the number of ZEVs deployed (currently more than 250,000 vehicles in California alone) and the number of ZEV models available (30 models as of December 2016).¹⁴¹⁵

UCS supports the goals for the ZEV program as outlined in the Draft Scenario, including 4.2 million zero emission and plug-in hybrid light-duty electric vehicles by 2030, but the state must take additional actions beyond current policies to achieve them. While the ZEV regulation has been successful in accelerating the development and deployment of ZEVs in California, the current regulation will not result in the anticipated effect of 15.4 percent new car sales by model year 2025. In fact, estimates of likely compliance scenarios show automakers could sell as few as 6 percent ZEVs in 2025 to meet the ZEV regulation.¹⁶ The Discussion Draft assumes 18 percent ZEV sales in 2025 and requires 40 percent sales by 2030 with an ultimate goal of 100 percent sales – targets which UCS supports. However, more will need

¹² National Renewable Energy Laboratory. 2013. Biogas potential in the United States. NREL/FS-6A20-6017. Golden, CO: U.S. Department of Energy. Online at: <http://www.nrel.gov/docs/fy14osti/60178.pdf>

¹³ US EPA, US DOT, and CARB. 2016. Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025

¹⁴ http://www.pevcollaborative.org/sites/all/themes/pev/files/161110_PEVC_PEV_250KSales_Milestone_Release%5B4%5D.pdf

¹⁵ Reichmuth, David and Don Anair. 2016. Electrifying the Vehicle Market. Online at: <http://www.ucsusa.org/clean-vehicles/electric-vehicles/ev-availability#.WFOXQneZOgQ>

¹⁶ Shulock, Chuck. 2016. Manufacturer Sales Under the Zero Emission Vehicle Regulation 2012 Expectations and Governors' Commitments Versus Today's Likely Outcomes. Online at: https://www.nrdc.org/sites/default/files/media-uploads/nrdc_commissioned_zev_report_july_2016_0.pdf

to be done to provide greater certainty that light duty ZEVs are on a trajectory in the near term to meet the state's climate goals. **Prior to 2025, the state should implement additional policies and measures to achieve at least 15% ZEV by 2025** since this will very likely require vehicle manufacturers to substantially over-comply with the ZEV regulation. These policies should include a sustainable, reliable, and equitable incentive program, as well as increased refueling infrastructure and programs to increase consumer awareness of clean vehicle options.

Implementing ZEV requirements for model year 2026 and later vehicles is a critical policy to build on current success. But it is important that the stringency of these standards is consistent with the volume of ZEV vehicles needed by 2030 and not rely on over compliance by manufacturers to meet California's climate goals. Incentives and infrastructure investments will be important policies to complement vehicle standards, but are not a replacement for them. Setting an aggressive, yet achievable, post-2025 trajectory for ZEV requirements could also help increase ZEV sales prior to 2026 helping alleviate the disconnect between the current ZEV program requirements and the 18 percent ZEV sales fraction assumed in 2025. Setting a strong target could compel automakers to ramp up research and development prior to implementation of the 2026 standards. There is precedence for this over-compliance as large-volume manufacturers in California are currently producing many more ZEV credits than the regulation requires.

Autonomous Vehicle Technologies

The Discussion Draft, recognizing that Autonomous Vehicle (AV) technology will impact mobility options in the future, calls for action to promote the use of EVs and shared-ride services for the deployment of AV technology. It however does not commit to taking the actions that are necessary to prevent potential emission increases resulting from the deployment of AVs.

Existing literature examining the potential climate impacts of AVs shows a wide range of possible futures, from more than a doubling of emissions to a reduction of emissions on the order of 90 percent.¹⁷ The high-end emissions scenarios assume a large increase in VMT resulting from low-cost AV technology coupled with internal combustion engine vehicles. The ability to disengage from driving changes the value of time spent in a vehicle, which could lead to effects such as increased commute distances as housing choices change, more frequent long-distance car travel, or reduced transit use if parking and congestion are no longer a concern. AVs could also allow vehicle travel without any occupants (e.g. sending a vehicle on an errand, looking for parking, sending a vehicle back home or circling the block while waiting for its owner), adding convenience for the owner but with the potential societal cost of increased congestion and emissions.

The low emissions scenarios in the literature envision a future of shared, electric, and highly efficient (i.e. reduced weight, right-sizing, reduced congestion, platooning, etc.) AVs allowing rapid vehicle turnover and new technology dissemination in the vehicle fleet. Car ownership may decrease with the availability of ride-hailing services, car-sharing, and other transportation options enabled by AV technology, which has historically resulted in lower individual VMT as a result of paying the price for every trip rather than having the sunk cost of vehicle ownership. However, a future of electric self-driving cars operating most of the time as multi-occupant vehicles and driving down personal vehicle ownership is not a certainty.

¹⁷ Greenblatt, Jeffrey and Samveg Saxena. 2015. "Autonomous taxis could greatly reduce greenhouse-gas emissions of US light-duty vehicles," *Nature Climate Change* 5, 860–863. Online at: <http://www.nature.com/nclimate/journal/v5/n9/full/nclimate2685.html>
Wadud, Zia and Don Mackenzie and Paul Leiby. "Help or Hindrance? The travel, energy and carbon impacts of highly automated vehicles," February 2016. Online at: <http://www.census.gov/prod/ec02/ec02tv-ca.pdf>
Brown, Austin and Jeffrey Gonder and Brittany Repac. *An Analysis of Possible Energy Impacts of Automated Vehicle*. June 2014. Online at: http://link.springer.com/chapter/10.1007%2F978-3-319-05990-7_13

ARB should consider multiple possible policy levers for inclusion in the 2030 Target Scoping Plan Update that could make a low emission outcome from AV deployment more likely. These policy levers include using the extension of vehicle standards beyond 2025 to ensure that the vehicles themselves are low emissions and developing new policies designed to directly impact the use of AVs. **In addition to promoting potential efficiency gains and electrification of self-driving cars, the Scoping Plan should also include a commitment to develop and implement policies that ensure that AVs do not increase climate emissions.** For example, should personally owned autonomous vehicles become common, zero-occupant trips could become commonplace as noted in the example above but could be prevented with forward-looking policy.

Low Carbon Fuels

The Low Carbon Fuel Standard (LCFS) is a core strategy for increasing the consumption of low-carbon, clean fuels in California's transportation sector. It is succeeding in lowering the carbon content of the state's transportation fuels.

UCS believes that the Draft Scenario's target of an 18 percent reduction for 2030 is too low. Based on the Biofuel Supply Module that ARB developed in September 2016, a target at this level would be expected to reduce credit prices from current levels and undermine investment in clean fuels.

The 2030 target should at a minimum support the continuation of the level of investment in the first phase of the LCFS. A nominally steady progression of 1% a year from 10% in 2020 to 20% in 2030 would already represent a lower level of ambition, given ongoing improvements in vehicle efficiency, expansion of alternative fuel vehicles and infrastructure, and progress in clean fuel commercialization. **Thus, we believe that the LCFS target should increase to more than 20% in 2030, perhaps 22%.** The final target and the schedule will require additional analysis, with a goal of supporting steady investment in progressively cleaner fuels to meet the evolving needs of the California transportation sector. We agree that absent cap-and-trade, more stringent targets for the LCFS, as well as more aggressive policies in other areas, would be required to meet the targets.

Cleaner Freight and Heavy-Duty Vehicles

UCS believes that the state can achieve stronger targets for electrifying heavy-duty vehicles than the ones described in the Discussion Draft. Battery and fuel cell technology can meet the needs of a significant fraction of heavy-duty vehicles today, particularly ones operating over short distances in cities. In California, more than 50 percent of heavy-duty vehicles have an operating range (maximum trip distance) of less than 50 miles, which is well within the range of existing heavy-duty electric vehicles on a single charge or tank of hydrogen.¹⁸ **Greater electrification and GHG reductions can be pursued under the last mile delivery rule and around drayage trucks.** The latter have not been identified in the Scoping Plan as an area for achieving GHG reductions but should be included due to their suitability for electrification and existing demonstration projects within the state. The greatest reductions in emissions from heavy-duty vehicles will come from electrification. Electric transit buses powered by today's grid in California, for example, have nearly 70% lower lifecycle GHG emissions than the newest diesel and CNG

¹⁸ US Census Bureau. 2004. California 2002 economic census: Vehicle inventory and use survey. EC02TV-CA. Washington, DC. Online at; <http://www.census.gov/prod/ec02/ec02tv-ca.pdf>

buses. Natural gas from fossil fuel sources has limited climate benefits, having only 10% lower emissions than diesel.¹⁹

Freight equipment in particular is a critical component of the Scoping Plan because heat trapping emissions from freight are currently increasing. Likewise, as the Sustainable Freight Action Plan notes, freight equipment accounts for nearly half of statewide emissions of diesel particulate matter and nitrogen oxides, and freight hubs are a significant source of air toxics that can cause localized cancer hot spots. We believe that the included target of deploying 100,000 zero emissions freight vehicles and equipment by 2030 underestimates reasonable and necessary deployment levels. A recent ICF analysis commissioned by the California Electric Transportation Coalition found that California already has 100,000 pieces of freight equipment capable of zero emission operation and, that even under its least aggressive assumptions, the population of electric freight equipment will approach 300,000 by 2030. ARB's own Mobile Source Strategy suggests that over half of the 100,000 target would be achieved by electric forklifts. Consequently, **an ambitious yet achievable target would be roughly 500,000 freight vehicles and equipment capable of zero emission operation by 2030.**²⁰

The proposed freight efficiency target of 25 percent underestimates the reasonable potential for improvements in freight efficiency. In our joint comments with the California Cleaner Freight Coalition (CCFC), we previously noted that "there is no connection between this target and the GHG Reduction path that needs to be achieved by freight in order for the state to meet its 2030 and 2050 GHG reductions goals." In fact, it would result in the state increasing its GHG emissions by 10 percent between 2014 and 2030, whereas maintenance of 2014 GHG levels in 2030 would translate to a 37 percent efficiency target, according to the state's estimate of GDP growth.²¹

Finally, as noted in comments we submitted with members of the CCFC on the State Implementation Plan (SIP), many emission reductions committed to in that plan rely on "further deployment" of clean technologies. How the deployment of these technologies will occur is unclear. While incentives clearly have a role to play in meeting both the state's air quality and climate goals, coupling incentives with regulatory measures provides the best assurances that the necessary outcomes will be achieved. Because the Scoping Plan relies on many of the same actions as the SIP, the Scoping Plan must also clarify specific actions for reducing emissions beyond "further deployment."

Natural Gas and Biomethane

Biomethane (or renewable natural gas) is limited in supply with many competing demands for this resource in California. This includes businesses in the industrial sector that rely on natural gas and have few low carbon options other than biomethane. California currently uses 16,000 million diesel gallon equivalents (dge) per year of natural gas across all sectors including residential, commercial, power generation, and industrial applications,²² yet there is an estimated biomethane potential of just 380 million diesel gallon equivalents (dge) per year in California and 2,700 million dge/year nationally.²³ The

¹⁹ Chandler, Sara, Joel Espino, and Jimmy O'Dea. 2016. Delivering Opportunity: How Electric Buses and Trucks Can Create Jobs and Improve Public Health in California. Online at: <http://www.ucusa.org/sites/default/files/attach/2016/10/UCS-Electric-Buses-Report.pdf>

²⁰ ICF International. 2014. California Transportation Electrification Assessment – Phase 1. These numbers include Class 1, 2, and 3 forklifts; transportation refrigeration units; yard tractors, cranes, and forklifts at ports; airport ground support equipment; and medium- and heavy-duty vehicles.

²¹ California Department of Transportation, California Air Resources Board, California Energy Commission, and the Governor's Office of Business and Economic Development. 2016. *California Sustainable Freight Action Plan*. Sacramento, CA.

²² Energy Information Administration (EIA). 2016. California Natural Gas Consumption by End Use. Online at: https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm

²³ National Renewable Energy Laboratory (NREL). 2013. Biogas potential in the United States. NREL/FS-6A20-6017. Golden, CO: U.S. Department of Energy. Online at: <http://www.nrel.gov/docs/fy14osti/60178.pdf>

biomethane available in California would satisfy less than 15 percent of heavy-duty vehicle's demand for diesel in California today (3,000 million gallons per year),²⁴ so **its use in heavy-duty vehicles should be reserved only for vehicle applications that are not able to electrify. However, given the higher efficiency of electric vehicles, the highest value use of biomethane in the transportation sector from a carbon perspective would be to generate electricity for electric vehicles rather than using it directly in a compressed natural gas.**²⁵ Biomethane is also not immune to the climate and public health risks of methane leaks that occur throughout every stage of natural gas and biomethane transmission, storage, and distribution.

Vehicle Miles Traveled

The Discussion Draft acknowledges the important role that reducing vehicle miles traveled (VMT) growth will have in meeting California's 2030 climate target. However, despite identifying various strategies that could be explored, no commitments are made to implement specific strategies or stringency levels. SB375 in particular—the existing policy which requires regional emission reductions—is central to achieving VMT reductions at the regional level. **The January 2030 Target Scoping Plan Update should contain a stronger commitment to increasing SB375 targets that is consistent with the necessary reductions in emissions and VMT to achieve the 2030 goal,** as well as delivering direct benefits to disadvantaged communities. In addition to greater SB375 targets and the targets identified for biking and walking trips, targets for transit trips should also be included.

Water Sector

UCS appreciates the inclusion of the water sector in the Discussion Draft. Much of the information that is provided for this sector is, however, over a decade old. ARB should consider including newer, updated information from the California Climate Change Assessments in the January Proposed 2030 Target Scoping Plan. In particular, there is little information about the energy intensity of groundwater pumping, despite current state-funded research on the topic. For example, Lawrence Berkeley National Laboratory is currently conducting research to estimate the energy intensity of increased amounts of groundwater pumping during this drought. Our 2015 UCS report, “Clean Energy Opportunities in California's Water Sector,” provides a deeper discussion of these issues.²⁶

We recommend inserting a statewide, or hydrologic region, water budget graphic into the discussion that clearly identifies data sources and gaps in our understanding of surface and groundwater water use for both urban and agricultural uses. For example, it should explain each water budget component and describe whether it is measured empirically or based on an estimate that is derived from a hydrological model. Lastly, the sentence: “agriculture uses about 40 percent of the State's managed water supply” should be removed, along with the associated footnote that defines *applied water*, which is not the same hydrological concept as *managed supply*. Managed supply is a separate term, which is not commonly-used. Rather, the typical definition, used in the California Water Action Plan, is to describe the amount of

²⁴ California Air Resources Board (CARB). 2014. EMFAC Web Database version 1.0.7. Online at: <https://www.arb.ca.gov/emfac/2014/>

²⁵ Chandler, Sara, Joel Espino, and Jimmy O'Dea. 2016. Delivering Opportunity: How Electric Buses and Trucks Can Create Jobs and Improve Public Health in California. Online at: <http://www.ucsusa.org/sites/default/files/attach/2016/10/UCS-Electric-Buses-Report.pdf>

²⁶ Christian-Smith, Juliet, Laura Wisland. 2015. Clean Energy Opportunities in California's Water Sector. Available online at <http://www.ucsusa.org/sites/default/files/attach/2015/04/clean-energy-opportunities-in-california-water-sector.pdf>

“developed water supply” that is consumed by different sectors (agriculture consumes 80% in California).²⁷

Incorporating Climate Impacts into Key Assumptions and Strategies

Climate change will impact key sectors in the Scoping Plan Update, such as energy, transportation, and forestry, affecting their ability to deliver services and placing our safety, quality of life, and economy at risk.²⁸ It could also affect a sector’s ability to help achieve the 2030 and 2050 goals, especially as we look towards mid-century and beyond. For example, rising temperatures over the coming decades will increase electricity demand for cooling needs on extreme heat days while potentially decreasing the efficiency of power plants to meet that demand. It will also cause more precipitation to fall as rain versus snow, shrinking our snowpack and reducing the amount of hydropower available, especially in the warm summer months when electricity demand is higher.²⁹ Drier conditions combined with hotter temperatures could also affect the intensity and frequency of forest fires, influencing the Natural and Working Lands sector.³⁰

The Discussion Draft acknowledges these effects by recommending a potential new measure for the transportation sector to “take into account the current and future impacts of climate change when planning, designing, operating, maintaining and investing in State infrastructure.” We enthusiastically support inclusion of this measure and recommend similar strategies for other sectors in the Scoping Plan Update, as appropriate. Implementing this approach for the energy sector, for instance, will help ensure that the state is prepared to meet its energy needs over the coming decades in a manner that reduces emissions while improving the resilience of the energy system to climate impacts. Similarly, for the water sector, energy intensity of delivering water could grow if reliance on ever-deeper groundwater pumping continues unchecked.

In addition, the Scoping Plan Update should describe how modeling assumptions, such as demand or supply for the energy sector, incorporate key climate impacts that could affect the ability of these sector specific strategies to achieve their stated emission reduction goals, like extreme heat or reduced hydropower.

We also recommend that ARB list all six climate change pillars, including Safeguarding California, in the document’s introduction rather than just the five GHG mitigation-related ones. The description of EO-B-30-15 in the Scoping Plan Update should be expanded to include the relevant climate adaptation provisions as well, especially the requirement for all state agency planning and investments to incorporate climate impacts.

²⁷ California Natural Resources Agency, California Department of Food and Agriculture, and Cal/EPA. 2014. California Water Action Plan. Sacramento, CA. Online at:

http://resources.ca.gov/docs/california_water_action_plan/2014_California_Water_Action_Plan.pdf

²⁸ California Natural Resources Agency. 2014. Safeguarding California: Reducing Climate Risk. Sacramento, CA. Online at:

http://resources.ca.gov/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf

²⁹ Moser, S., J. Ekstrom, and G. Franco. 2012. Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California. Sacramento, CA. Online at: <http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>

³⁰ Cleetus, Rachel and Kranti Mulik. 2014. Playing with Fire: How Climate Change and Development Patterns Are Contributing to the Soaring Coasts of Western Wildfires. Online at:

http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/playing-with-fire-report.pdf

Conclusion

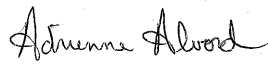
California is a leader when it comes to addressing climate change, having made tremendous progress towards meeting its 2020 target. While the 2030 target is ambitious, the 2030 Target Scoping Plan Update presents an opportunity for the state to develop a compelling roadmap for a low carbon economy that supports economic growth, improves our quality of life, and minimizes negative impacts on disadvantaged communities. UCS supports a suite of strong emission reduction measures in energy, transportation, and water, among other sectors, and well-designed carbon pricing approaches to get us there, so long as they also address equity concerns and the needs of disadvantaged communities.

UCS recommends that the Draft Scoping Plan Scenario increase the level of emission reductions attributed to sector-specific strategies beyond the levels of several known commitments and include additional sector-specific policies, which we've outlined in this letter. We also suggest that the January draft of the Scoping Plan include additional detail concerning the design of both pricing approaches, as well as their costs and benefits, so that the public may better evaluate the most effective path forward to achieve California's goals of a thriving low-carbon economy, healthy and vibrant communities, and a clean environment.

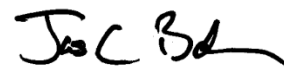
Sincerely,



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