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November 26, 2008

Chairperson Nichols and Members of the Board
California Air Resources Board
1001 I St., P.O. Box 2815
Sacramento, CA 95812

RE: AB 32 Proposed Scoping Plan

Dear Chairperson Nichols and Members of the Board:

The Union of Concerned Scientists (UCS) congratulates the CARB staff for their hard work in developing the nation's most comprehensive plan to date for reducing the pollution that causes global warming. The proposed scoping plan (the Plan) represents the furthest step forward any state has taken in the fight against global warming. Many of the plan's policies will save consumers money and yield economic benefits. California is showing the rest of the country and the world how to build a clean energy economy—creating jobs and using energy more efficiently, while at the same time protecting the environment and public health. We appreciate the open and public process CARB has conducted for all stakeholders to provide input as staff worked to develop the Plan for your adoption by the end of the year, and we thank you for considering input from UCS throughout the process. We are honored to be part of such an historic moment of California leadership in the movement toward a sustainable future.

Below, we offer a summary of our comments and specific requests for changes to language in the Plan. More detailed comments on the Plan are included below the summary.

SUMMARY

Electricity Sector (p.5)
UCS is pleased that CARB recommends increasing the state's renewable electricity standard. A higher RPS mandate is essential to drive the changes in regulation, utility practices, and capital-intensive investments that are necessary to overcome the transmission, siting, and other market barriers to further development of renewable energy in the state and to reach our 2050 climate goal.

Setting the price of a feed-in tariff is critical to designing a successful RPS policy. UCS believes that a feed-in tariff set at the Market Price Referent (MPR) may not be robust or stable enough to attract meaningful new investment into the California renewable energy market. We disagree with this statement in the Plan (C-129): "A tariff set initially at the ["market price referent"] MPR could immediately benefit small-scale facilities."

In order to meet the 33 percent RPS target, utility resource planning should evaluate and plan for long-range investments like transmission and energy storage technologies. Long-term planning for higher levels of renewables will also put utilities on the right path for the post-2020 period, when even higher levels of renewables will likely be required to mitigate climate change. **CARB should include a recommendation in the Plan that retail electricity providers coordinate with state energy agencies to ensure that long-term utility resource plans are designed to incorporate significantly higher levels of renewable energy.**

Policymakers in the Northeast (RGGI) have recognized the importance of accounting for emissions reductions provided by the voluntary renewables market; California should do the same. **The Plan should include language indicating that accounting for the emissions reductions from voluntary renewable energy sales that occur once the cap is in place is an important and necessary step that should be taken to encourage additional renewable energy development in the voluntary market.**

Vehicles/Fuels (p. 8)

UCS supports CARB's adoption of a low-carbon fuel standard with appropriate safeguards for public health and the environment. The low carbon fuel standard is groundbreaking policy that will, for the first time, hold the fuels industry responsible for global warming pollution in the fuels it sells. The LCFS standard must include emissions from indirect land use. As the state moves forward with the LCFS, it must ensure that California's air quality is protected with strict prohibitions against air quality backsliding and toxic and criteria pollution hot spots. In addition, the state will need safeguards in place to promote sustainable fuel production.

UCS supports CARB's steps to analyze the benefits of a feebates program for reducing global warming emissions from passenger cars and trucks. We encourage CARB to look at the benefits of feebates both as a replacement and as a complement to existing vehicle regulations program. Feebates can also be used to reduce emissions on medium-duty trucks.

Medium and heavy-duty trucks account for a full 20 percent of transportation related global warming emissions. Reductions from this sector will help us meet our 2020 targets and will be absolutely critical to meeting our 2050 goals. **The heavy-duty engine efficiency measure that was included in previous versions of the draft scoping plan should be reinstated. A commitment should be added to the Plan or the Board resolution to evaluate the full technical and regulatory potential to reduce emissions from medium and heavy-duty trucks beyond engine improvements, evaluate the needs specifically from this sector to meet the state's 2020 and 2050 targets, and adopt regulations to further reduce global warming emissions from this sector as appropriate.**

Public Health (p. 10)
CARB has unparalleled expertise on air quality and health impacts and is a recognized world leader on developing and implementing air quality regulations. Because the scope of the proposed climate policies is so vast and there is a need for a broader range of information on health impacts of global warming policies, the Plan should also establish a role for the public health community in the assessment and implementation of AB 32 policies. **The Plan or the Board resolution should direct staff to establish a formal process to include in a meaningful way state and/or local public health agencies and organizations in the development and review of proposed greenhouse gas reduction measures, particularly the proposed market mechanisms.**

To date, CARB has not analyzed the health impacts of the full set of policies included in the Plan—in particular, the impacts of the proposed cap and trade program. In a July 31 letter, we asked that CARB clearly state in the scoping plan that no regulation or market mechanism included in the scoping plan will be implemented unless it has undergone the health and community impact screenings and meets the requirements established in 38562 (b) (1-9) and (38570 (b) (1-3). CARB should clearly state in the final Scoping Plan that a cap and trade system will not be implemented unless it meets the requirements of AB 32, Sections 38562 (b) (1-9) and 38570 (b) (1-3).

Cap and Trade (p. 12):
The plan appropriately recognizes that cap-and-trade is not a silver bullet, and UCS agrees with the principle that a wide array of tools, including putting a price on carbon, should be utilized across all sectors of the economy to achieve maximum emission reductions. We have many concerns with the proposed cap and trade program.

The Plan allows for too many of AB 32's reductions to be achieved by compliance offsets. The use of compliance offsets should be limited to a small fraction of the emission reductions that the cap and trade program is expected to achieve. **CARB should remove all references to specific offsets levels in the Plan and state that specific limits will be evaluated and finalized during the rulemaking process. CARB should state in the Plan that, if it decides to use compliance offsets at all, it will set quantitative offset limits well below those proposed by the Western Climate Initiative. CARB should state in the Plan that if offsets are used, offsets that maximize environmental and economic co-benefits to California will be given the highest priority.** In addition, we urge California to play a leadership role in urging WCI to adopt similarly strict quality and quantity controls on offsets.

The Plan recognizes that full auctioning, i.e. auctioning 100% of allowances, is a "worthwhile goal." This is a step in the right direction, but the plan should state in unequivocal terms that full auctioning is the only fair and logical end-point for any transition from a system that starts with some free allocation. UCS recommends auctioning 100% of allowances. **At a minimum, the Plan should indicate that auctioning will be the primary method for distributing allowances from the outset and that the state will transition to 100% auctioning well before 2020.**

The scope of the cap-and-trade program should be broad from the outset, instead of expanding to cover gasoline and diesel transportation fuels in 2015 in the second compliance period.

We urge CARB to ensure that the initial 2012 cap is set below 2012 BAU projections. Given problems of over-allocation in previous cap-and-trade programs, this is a crucial decision.

A well-designed cap-and-trade program must include strict penalties for non-compliance. **However, the suggestion that non-complying entities would only have to surrender allowances "equal" to their excess emissions (p.C-12) is inadequate.** If a capped entity does not surrender sufficient allowances at the end of a compliance period, it must be required to surrender a multiple of the allowances, as well as being subject to fines, civil and criminal penalties. The penalty should be large enough that no rational entity would choose to pollute and accept the penalty.

UCS provides more detailed comments on the Plan below.

Electricity Sector

33 Percent RPS by 2020

UCS commends CARB for including a 33 percent Renewable Portfolio Standard (RPS) by 2020. A higher RPS mandate is essential to drive the changes in regulation, utility practices, and capital-intensive investments that are necessary to overcome the transmission, siting, and other market barriers to further development of renewable energy in the state. UCS presumes that CARB's recommendation for 33 percent renewables is consistent with the Governor's Executive Order[1] and most recent decision by the California Public Utilities Commission (CPUC) and California Energy Commission (CEC)[2], which both call for a 33 percent RPS by 2020 for all retail electricity sellers. UCS requests that CARB clarify that its recommendation for a 33 percent renewables mandate applies to all retail providers.

A 33 percent RPS by 2020 will provide a clear and long-term signal to the financial community to continue supporting infrastructure investments and technology development that will significantly increase the amount of renewable generation serving California. Achieving much higher levels of renewables will not happen organically – it requires a firm RPS policy mandate.

New Tools for 33 Percent and Beyond

UCS agrees with CARB that in order to reach a 33 percent renewables target by 2020 and set the stage for deeper reductions in following years, we must develop new policy tools and overcome existing hurdles to widespread renewable development in California.

Transmission – Stimulate Development at the Wholesale Distribution Level

The scoping plan appropriately identifies the state's lack of transmission as an obstacle to achieving current and future renewable energy goals. Fortunately, the Renewable Energy Transmission Initiative (RETI) is bringing stakeholders together with analyses to proactively plan for the most cost-effective and environmentally responsible new transmission line development.

Feed-in Tariffs

Analysis from the ongoing RETI process indicates that significant potential exists to develop small-scale renewable projects in California that are not subject to formidable transmission constraints. The RETI Phase 1B report that was released this August identified 1,375 potential photovoltaic projects, or 27.5 GW (assuming a project size of 20 MW), that would be able to connect at the wholesale distribution level.[3] Tapping into this wholesale distributed generation (WDG) market will be an essential strategy for meeting the state's policy goal of 33% renewables by 2020.

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[1] Executive Order S-14-08, November 17, 2008.

[2] California Public Utilities Commission / California Energy Commission, *Final Opinion on Greenhouse Gas Regulatory Strategies*, April 13, 2008, R.06-04-009, p.12.

[3] Renewable Energy Transmission Initiative Draft Phase 1B resource report, August 2008, P.6-8, available at: http://www.energy.ca.gov/reti/documents/2008-08-16_PHASE_1B_DRAFT_RESOURCE_REPORT.PDF

UCS believes a feed-in tariff for RPS-eligible projects up to 20 MW in size may complement the existing RPS competitive bid solicitation process and stimulate investment in projects that are able to connect at the wholesale distribution level. These projects are less likely to experience project delays due to the state's current lack of transmission. However, many of these projects may face a competitive disadvantage because of the high transaction costs of negotiating an RPS contract. Feed-in tariffs would significantly reduce these transaction costs and facilitate the development of smaller projects. Feed-in tariffs may also help developers of large-scale projects secure financing for smaller initial projects, in order to demonstrate new technology. Scaling up from small projects could lower equipment and construction costs for larger deployments and reduce the risk of seller non-performance.

Setting the price of a feed-in tariff is critical to designing a successful policy. UCS believes that a feed-in tariff set at the MPR may not be robust or stable enough to attract meaningful new investment into the California renewable energy market. **For this reason, we disagree with the Scoping Plan's statement that "A tariff set initially at the ["market price referent"] MPR could immediately benefit small-scale facilities."[4]** UCS believes that establishing a feed-in tariff price set simply at the MPR will not provide adequate cost coverage to encourage project development beyond what will occur through the existing RPS competitive solicitation process, with the possible exception of existing biomass generators.

A pricing system that is set at the MPR, which fluctuates annually based on the volatile price of natural gas, may also not provide enough financial certainty for investors and could also do little to encourage development if the price of natural gas were to suddenly fall. While a value-based pricing system like the MPR may be designed with the intent to encourage the most cost-effective projects with highest value to the grid, developing a methodology to calculate prices at such a granular level could quickly become an overly complex and time-consuming process.

The CEC hosted two workshops in 2008 to discuss the advantages and disadvantages of a feed-in tariff in California. The most recent workshop on this issue, held on October 1, 2008, presented six options for a potential feed-in tariff policy in California.[5] General attributes of pricing systems were discussed, and while a few of the options considered a value-based pricing system, none were assumed to be simply set at the MPR. Subsequently, the CEC released the 2008 Integrated Energy Policy Update which recommends implementing a feed-in tariff for projects sized at 20 MW or less that is set at cost-based and technology specific prices which are *not* linked to the MPR.[6]

Long-Term Planning to Enable Higher Levels of Renewable Energy

[4] California Air Resources Board, *Climate Change Proposed Scoping Plan Appendices Volume I*, October 2008, p. C-129.
[5] The attributes of each option are described in: *California Feed-In Tariff Design and Policy Options*, draft consultant report prepared for the California Energy Commission, Kema Inc., September 2008, CEC-300-2008-009D.
[6] California Energy Commission, 2008 IEPR Update, November 2008, p.36.

UCS urges CARB to include a recommendation in the scoping plan that retail electricity providers coordinate with state energy agencies to ensure that long-term utility resource plans are designed to incorporate significantly higher levels of renewable energy. Conventional utility resource planning tends to over-emphasize near-term investments in fossil-fuel generating capacity at the expense of considering both near- and long-term resource investment decisions that will facilitate greater amounts of renewable generation. For instance, the utility resource planning process typically discounts the importance of investments in flexible fossil fuel and hydro resources that will enable utilities to integrate higher levels of renewable energy. To plan for meeting the 33 percent RPS, utility resource planning should evaluate and plan for long-range investments like transmission and energy storage technologies. Long-term planning for higher levels of renewables will also put utilities on the right path for the post-2020 period, when even higher levels of renewables will likely be required to mitigate climate change.

Voluntary Market Valuation

The CPUC and CEC *Final Opinion on Greenhouse Gas Regulatory Strategies* recognizes the importance of developing a cap-and-trade system that encourages the generation and sale of renewable energy through the voluntary market.[7] However, due to a few lingering questions, the CPUC and CEC fail to recommend an approach to retire emissions allowances on behalf of voluntary renewable energy sales. **The Plan should include language indicating that accounting for the emissions reductions from voluntary renewable energy sales that occur once the cap is in place is an important and necessary step that should be taken to encourage additional renewable energy development in the voluntary market.**

California's voluntary renewable energy market is significant. In 2006, voluntary renewable energy sales in California approached 400,000 million kWh.[8] The demand for renewable energy in the voluntary market often promotes projects that have desirable co-benefits such as local economic stimulation and improved local air quality. Voluntary renewable energy markets engage a broad swath of our economy in investing in renewable energy, which builds public support for using more renewable energy in the future. Moreover, a regional generation attribute tracking system – WREGIS – is now online and can be used to ensure generation in the voluntary market will not also be counted for RPS compliance. The technical details associated with implementing an off-the-top approach, including how to assign emission reduction values to voluntary renewable energy credits (RECs) can be developed by CARB in conjunction with the state's energy agencies.

A simple mechanism to account for voluntary market emission reductions has already been developed by the Northeast Regional Greenhouse Gas Initiative (RGGI). This "off-the-top" rule is essentially the "set-aside" method described in the CPUC and CEC proposed decision. RGGI provides CARB with a workable model from which to develop an "off-the-top"

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[7] California Public Utilities Commission / California Energy Commission, *Final Opinion on Greenhouse Gas Regulatory Strategies*, April 13, 2008, R.06-04-009, p.217.

[8] National Renewable Energy Laboratory, *Interaction of Compliance and Voluntary Renewable Energy Markets*, October 2007, p.19

approach for California and to avoid discouraging the continued growth of the voluntary renewables market.[9] Policymakers in the Northeast have recognized the importance of accounting for emissions reductions provided by the voluntary renewables market; California should do the same.

VEHICLES/FUELS

Low Carbon Fuel Standard

UCS strongly supports CARB's adoption of a low-carbon fuel standard with appropriate safeguards for public health and the environment. The low carbon fuel standard is groundbreaking policy that will, for the first time, hold the fuels industry responsible for global warming pollution in the fuels it sells. The standard should reduce the carbon intensity of gasoline by at least ten percent by 2020, ensure no backsliding in air quality, protect against criteria pollution and toxic hot spots, and promote sustainable fuel production.

Performance-based and fuel-neutral, the standard will stimulate a market for low carbon alternatives, and could help advance petroleum alternatives such as ethanol, hydrogen, and electricity. The standard will foster investment in very low carbon fuels, such as cellulosic ethanol, with the potential to radically cut global warming pollution by 85 percent or more.

Building the low carbon fuel standard regulations on the best available science is fundamental to its ultimate success. We would like to commend the excellent work by CARB to get the most accurate estimates of all significant sources of emissions, particularly emissions from so-called "indirect" land use. Recent science indicates that these emissions are significant, and excluding them unfairly gives biofuels an advantage over other, lower carbon fuels. Excluding emissions from indirect land conversion will send the wrong signal to the marketplace and could have the perverse impact of accelerating global warming pollution.

CARB is estimating emissions from indirect land use through the University of Purdue's Global Trade Analysis Project (GTAP), an open, reproducible and peer reviewed model. We were encouraged by the fact that the GTAP estimates of how much land is converted per thousand gallons of ethanol mandate were quite robust across scenarios, and are broadly consistent with the previously published results of Searchinger et al. The fact that these results are consistent across research groups, even with very different economic models, demonstrates that price-induced changes in land use are significant and will not go away with a slightly different set of assumptions. This confirms the importance of including indirect land use changes in the calculations.

In summary, we applaud the good work CARB is doing in this difficult but crucially important area. As the state moves forward with the LCFS, we need to ensure that California's air quality is protected with strict prohibitions on air quality backsliding and toxic hot spots. In addition, the state will need safeguards in place to promote sustainable fuel production. We look forward

[9] More information on the off-the-top approach for the voluntary renewable energy market in RGGI can be found at: http://www.epa.gov/greenpower/documents/events/rggi_status_table.pdf.

to working with CARB to implement a low carbon fuel standard that will simultaneously promote climate stabilization, air quality, and environmental protection.

Feebates

The Union of Concerned Scientists (UCS) strongly supports the inclusion of a feebates program in the Plan to implement the emission reduction requirements under AB 32. We offer the following specific thoughts on feebates as a transportation sector solution:

- Research from University of Michigan's Transportation Research Institute suggests that a feebates program can achieve GHG emissions reductions as a stand alone measure or as a complement to the existing vehicle GHG regulations.

- We believe that a feebates program that is designed to include larger passenger vehicles (>8,500 lbs. GVW) will achieve a measurable amount of GHG reductions because these vehicles are not part of any vehicle GHG regulations.

- A feebates program will not only encourage automakers to make improvements in their vehicle fleet, but can engage the general public in the battle to combat global warming by offering direct incentives for consumers to make choices that help reduce pollution. A feebates program would be one of a few programs in the Plan that engages consumer directly to be part of the climate solution puzzle. While UCS agrees with the Plan that most of the emissions reductions would come from manufacturers adapting to the feebates program by installing clean technologies on most of their vehicles, there is a quantifiable, but unknown amount of emissions reductions through non-rational changes in consumer choice in response to a surcharge or rebate. We encourage ARB to fully examine this affect in their pending research on feebates.

- A feebates program can work well as a complement to existing and future global warming regulations for vehicles. Because a feebates program provides financial incentives for automakers to install clean technology, it provides market incentives for auto manufacturers to meet California's GHG regulations sooner. A well-designed feebates program should lead to substantial *cumulative* reductions over the lifetime of the program.

UCS believes that a feebate program will be a powerful, yet flexible tool for CARB to meet the challenges of global warming. It can not only work as a backstop to existing GHG vehicle regulations, but also work in conjunction with the regulations to bring more emissions reductions sooner. We support CARB's effort to research the effects of feebates and believe that its adoption will benefit California.

Medium and Heavy-Duty Trucks

Medium and heavy-duty trucks account for a full 20 percent of transportation related global warming emissions. Reductions from this sector will help us meet our 2020 targets and will be absolutely critical to meeting our 2050 goals. Given the average 20 year operational life of these trucks and the increase in turnover expected in the coming decade prompted by air quality needs, it is imperative that CARB do what it can to reduce emissions from this source as soon as possible.

We are asking that CARB

- **Reinstate the heavy-duty engine efficiency measure that was included in previous versions of the draft scoping plan.** Setting technology forcing efficiency standards for medium and heavy-duty engines will accelerate improvements, drive investments in engine R&D, and move new technologies in to the market place.
- **Add a commitment in the Plan or the Board resolution to evaluate the full technical and regulatory potential to reduce emissions from medium and heavy-duty trucks beyond engine improvements, evaluate the needs specifically from this sector to meet the state's 2020 and 2050 targets, and adopt regulations to further reduce global warming emissions from this sector as appropriate.** Other improvements in total vehicle efficiency are available, from improved transmissions and drive-train components, weight reduction, and more efficient vehicles accessories. Additional gains in aerodynamics and tire rolling resistance beyond today's performance are also likely to be significant. Evaluating the potential for these technologies to reduce emissions and the regulatory options available would lay the groundwork for future CARB regulation. In parallel, an assessment of the reductions needed from this sector in the post 2020 timeframe to be consistent with the 2050 reduction goals should be carried out.

We support CARB's proposals to improve heavy-duty truck emissions through aerodynamic improvements, use of low rolling resistance tires, and hybridization. Improving the aerodynamics and rolling resistance of heavy-duty trucks using technology available today, as proposed in the draft GHG truck regulation scheduled to be heard in December, could achieve significant reductions through 2020. This measure will improve the efficiency of certain types of heavy-duty trucks by up to 10 percent, reduce fuel consumption, reduce global warming emissions and criteria pollutants, and save truck operators money.

These proposed regulations are based on getting technology that is currently available onto trucks to reduce emissions. There is still a need for technology-forcing standards that will drive advances in technology and create even greater reductions in the future.

The federal government has begun a process to develop fuel economy standards for these same trucks, but the level of global warming emission reduction from these actions is uncertain as is the timing of their implementation.

By completing a pre-regulatory technical evaluation, CARB will be prepared to move forward on their own, if the federal government fails to act sufficiently. If CARB takes a "wait and see" approach to see if federal action will go far enough and fast enough to achieve the emissions reduction California needs, California could be years behind in developing their own standards.

PUBLIC HEALTH

Californians currently experience up to 24,000 premature deaths, 350,000 asthma attacks, thousands of hospitalizations and emergency room visits, and millions of missed school and work days from respiratory and cardiac illnesses caused by pollution. In addition, children in polluted areas of the state are growing up with reduced lung capacity due to pollution

exposures that slow and stunt lung growth and development. Unfortunately, global warming will only make this situation worse. Therefore, it is critical that the state's efforts to tackle global warming contain strong public health protections, especially for vulnerable populations such as low-income communities and communities disproportionately impacted by air pollution. These communities are both highly impacted by global warming and handicapped in terms of their ability to adapt to the acute impacts that will result from warming and possibly from policies to reduce global warming emissions.

AB 32 requires that "prior to the inclusion of any market-based compliance mechanism in the regulations, to the extent feasible and in furtherance of achieving the statewide greenhouse gas emission limit, the state board shall…
1) Consider the potential for direct, indirect, and cumulative emission impacts from these mechanisms, including localized impacts on communities that are already adversely impacted by air pollution,
2) Design any market-based compliance mechanism to prevent any increase in the emissions of toxic air contaminants or criteria pollutants,
3) Maximize additional environmental and economic benefits for California, as appropriate.[10]

We urge the board to take the following actions to maximize the public health benefits of the Plan and protect disproportionately-burdened and vulnerable communities:

1) To date, CARB has not analyzed the health impacts of the full set of policies included in the Plan—in particular, the impacts of the proposed cap and trade program. In a July 31 letter, we asked that CARB clearly state in the scoping plan that no regulation or market mechanism included in the scoping plan will be implemented unless it has undergone the health and community impact screenings and meets the requirements established in 38562 (b) (1-9) and (38570 (b) (1-3). CARB should clearly state in the final Scoping Plan that a cap and trade system will not be implemented unless it meets the requirements of AB 32, Sections 38562 (b) (1-9) and 38570 (b) (1-3).

2) Establish a formal role for the public health community in the assessment and implementation of AB 32 policies. There is a strong need for a broader range of information on health impacts of global warming policies. It is important that the Scoping Plan include a clear commitment from the board to reach out to the broad range of health constituencies. **The Plan or the Board resolution should direct staff to establish a formal process to include in a meaningful way state and local public health agencies and organizations in the development and review of proposed greenhouse gas reduction measures, particularly the proposed market mechanisms.**

3) Strengthen and add several measures to boost public health co-benefits of the Plan in all communities. The air quality benefits associated with PM and NOx reductions occurring as a result of efforts to reduce greenhouse gases, as presented in the Plan, amount to roughly 400

[10] California Health and Safety Code, Chapter 488, Division 25.5, Section 38570 (b) (1-3).

premature deaths avoided and $2.2 billion in health cost savings. These significant health benefits could be improved by more than 60%, saving an additional $1 billion, if all technologically feasible and cost-effective measures that were evaluated by CARB, including industrial sources, are included as direct measures in the Plan. This estimate is based on methods discussed in *Boosting the Benefits: Improving Air Quality by Reducing Global Warming Pollution in California*, NRDC and Redefining Progress, June 2008.

CAP-AND-TRADE

Summary

The Plan contains provisions for a state and possibly region-wide cap-and-trade program that would work together with other regulations to reduce global warming pollution. The plan appropriately recognizes that cap-and-trade is not a silver bullet; Table 2[11] shows that, after accounting for CARB's best estimate of the effects of foundational policies, cap and trade accounts for 34.4 MMT of reductions, about 20 percent of the required reductions of 169 MMT. Direct regulations, measures targeting particular sectors, what we refer to as foundational policies, account for about 80 percent of the required reductions. UCS has many concerns with the proposed cap and trade program.

The scope of the cap-and-trade program should be broad from the outset, instead of expanding to cover gasoline and diesel transportation fuels in 2015 in the second compliance period.

The Plan allows for too many of AB 32's reductions to be achieved by compliance offsets. The use of compliance offsets should be limited to a small fraction of the emission reductions that the cap and trade program is expected to achieve. **CARB should remove all references to specific offsets levels in the Plan and state that specific limits will be evaluated and finalized during the rulemaking process. CARB should state in the Plan that, if it decides to use compliance offsets at all, it will set quantitative offset limits well below those proposed by the Western Climate Initiative. CARB should state in the Plan that if offsets are used, offsets that maximize environmental and economic co-benefits to California will be given the highest priority.** In addition, we urge California to play a leadership role in urging WCI to adopt similarly strict quality and quantity controls on offsets.

The Plan recognizes that full auctioning, i.e. auctioning 100% of allowances, is a "worthwhile goal." This is a step in the right direction, but the plan should state in unequivocal terms that full auctioning is the only fair and logical end-point for any transition from a system that starts with some free allocation.[12] **UCS recommends auctioning 100% of allowances. At a**

[11] California Air Resources Board Climate Change Proposed Scoping Plan, October 2008, p. 17.

[12] For some key studies, in particular on fairness concerns, see:

Burtraw, Dallas, Rich Sweeney, and Margaret Walls. 2008. "The Incidence of US Climate Policy: Where You Stand Depends on Where You Sit," Resources for the Future DP 08-28 (September)

CBO, 2007. *Trade-Offs in Allocating Allowances for CO2 Emissions*. http://www.cbo.gov/ftpdocs/80xx/doc8027/04-25-Cap_Trade.pdf

minimum, the Plan should indicate that auctioning to be the primary method for distributing allowances from the outset and that the state will transition to 100% auctioning well before 2020.

We urge CARB to ensure that the initial 2012 cap is set below 2012 BAU projections. Given problems of over-allocation in previous cap-and-trade programs

Need for Effective Limits on Compliance Offsets

Appendix I contains a UCS analysis on the implications of the proposed 49% upper limit on offsets. Unfortunately, little information about what this rule really means has entered the public discourse. UCS estimates that if the 49% limit is reached, 213 MMT of offsets will be added into the California cap-and-trade program, in essence raising the cap by 213 MMT.

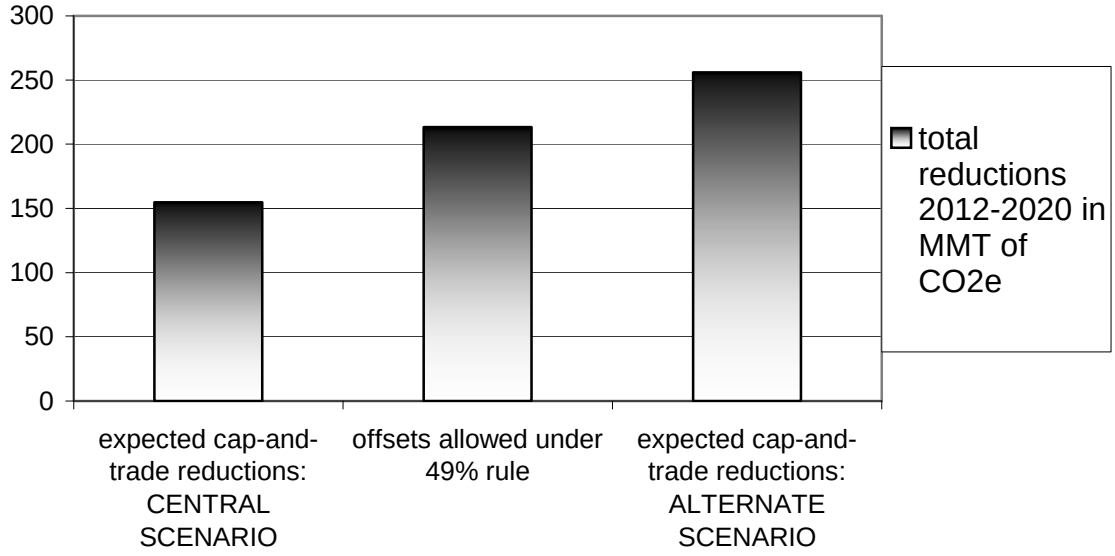
Our analysis suggests that the proposed offset upper limit would create the disconcerting possibility that cap-and-trade itself would fail to produce any reductions in the capped sectors that are the program's primary target--beyond those achieved by foundational policies. This would undermine what should be a guiding principle of cap-and-trade design: the cap-and-trade program itself should yield *meaningful* reductions in capped sectors.

Table 1. Offsets allowed vs. expected cap-and-trade reductions (MMT of CO2e)

	Central scenario		**Alternate scenario**	
	2020	2012-2020	2020	2012-2020
Offsets allowed	47.4	213	47.4	213
Expected cap-and-trade reductions	34.4	155	56.9	256

Burtraw, Dallas and Karen Palmer. 2007. "Compensation Rules for Climate Policy in the Electricity Sector," Resources for the Future DP 04-41 (January).

Figure 1. Offsets allowed vs. expected cap-and-trade reductions in two scenario



For comparative purposes, we explored possible emission reductions from two cap and trade scenarios relative to the upper bounds of the proposed offset limit, as is shown in Table 1 and Figure 1.

The central scenario is one in which direct regulatory policies (such as the RPS or clean car standards) achieve 80 percent of the required emission reductions. While a well-designed cap and trade program will establish a price on global warming emissions that will facilitate compliance with these foundational policies, cap-and-trade alone is still responsible for achieving 34.4 MMT of emission reductions, or 20% of the reductions in 2020. In this scenario, offsets allowed under the proposed limit (47.4 MMT) far exceed the amount of needed emission reductions not achieved through foundational policies (34.4 MMT)—in other words, there would be more offsets allowed than tons of emission reductions expected from the addition of cap and trade to the package of foundational policies in the Plan. Total offsets allowed over 2012-2020 amount to 138 percent of expected cap-and-trade reductions in the central scenario.

We also develop an **alternate scenario** in which foundational policies in capped sectors are less effective than they are forecast to be, producing 20% less than the regulators predict. Thus, in the alternate scenario, while the cap-and-trade program still assists in meeting some of the direct regulations through the establishment of a price on carbon, cap and trade is solely responsible for a larger portion of the overall reduction effort. In this alternate scenario, total offsets allowed over 2012-2020 under the proposed limit amount to 83 percent of reductions expected from cap-and-trade.

Prioritize Offset Projects that Maximize Co-Benefits for California

The draft plan proposes no geographic limits or other means to prioritize projects in California, creating the likelihood that some or all emission reduction projects would be outsourced under the proposed approach to offsets. This would be a missed opportunity and would counter AB 32's call for environmental benefit maximization for the people of California. Carefully designed limits on offsets are important to the construction of an effective cap-and-trade program and will promote investment in clean air, clean energy, and greater energy security in California.

Benefits of Greater Limits on Offsets

Ineffective limits on compliance offsets such as those included in the Plan could lead to large outflows of capital through the outsourcing of emission reduction projects and related losses in economic and environmental benefits for the people of California. In contrast, carefully designed quantitative and geographic limits will demonstrate the benefits of climate action and will allow the Golden State to become a model of climate action, thereby inspiring action throughout the world. Effective limits on compliance offsets will:

- *Provide clean air and public health benefits for residents of California*
  While reducing global warming pollution offers valuable climatic benefits in its own right, it will also provide many other important environmental benefits. When electricity providers, oil and gas companies, and other industrial sources reduce the amounts of global warming pollution that they produce, Californians will be exposed to lower levels of conventional smog-forming and toxic air pollutants as well. This improved air quality will in turn lead to better public health, lower health care costs, and higher levels of worker productivity and student performance. If offsets are allowed from anywhere in the world, which would be equivalent to the outsourcing of emission reductions project, then valuable health benefits will be lost.

  At present, Californians are quite literally dying from dirty air. The state has three of the five most polluted air basins in the country and the Los Angeles air basin has the worst year-round small-particulate pollution and the worst ozone levels in the country. CARB estimates that the policies cited in its proposed Scoping Plan would reduce nitrogen oxides (NOx) and small particle emissions enough to result in 400 premature deaths avoided and a range of other public health benefits, with a combined economic value of $1.5–$2.4 billion in 2020. The Natural Resources Defense Council, which recently released its own assessment, concludes that the improvement in air quality and reduction in health care costs would be even larger, preventing more than 700 premature deaths and saving $3.2–$5 billion in 2020.

- *Spur clean-tech investment, green-job development, and innovation*
  A 2004 survey of venture capitalists by Environmental Entrepreneurs found that one of the main reasons why they are motivated to invest in California's clean-technology industry is the state's strong climate policies. As a result, that sector is surging. In 2007, California garnered 45 percent of North America's venture capital investment in clean-energy technologies, or $1.8 billion, up from $1 billion in 2006. California last year attracted more venture capital in clean tech than did all of Europe combined. Carefully

designed offset limits will help maintain this momentum, thereby preserving the rates of investment and innovation in California's clean-tech industries that will be the foundation of the future's low-carbon economy.

By contrast, overly permissive offset policies would shift emissions reductions from capped sectors to other sectors or to other geographic areas. Investor expectations on the future profitability of technological advances in the capped sectors would be reduced, thereby depressing investment. Moreover, the learning-by-doing and economies of scale that come with increased utilization would be lost. California's competitive advantage in the rapidly growing clean-tech global market should not be squandered; it makes much more sense to prioritize investment and innovation in clean tech—within the state, as opposed to essentially outsourcing—to take advantage of present opportunities. Another related ancillary benefit that results from progress toward a clean energy future is reduced reliance on imported fossil fuels, greater insulating from volatile oil and gas markets and improved energy security.

- *Ensure meaningful reductions and avoid lock-in to higher-emitting capitla*
  The broad reach of the cap-and-trade program proposed in the Scoping Plan means that almost all fossil-fuel combustion (in transportation, electricity generation, and other industrial activities) will be capped. Carefully designed offset limits promote technological changes in capped sectors by forcing emissions reductions within those sectors instead of diverting the reductions to other sectors of the economy or to other geographic areas.

Support for 100% Auctioning of Allowances

UCS supports 100% auction as the preferred method of distribution for allowances under the cap. This position reflects the principle that the public owns the sky and that the pollution that causes global warming should have a price.

The Plan's 10 percent minimum for a beginning auctioning and 25 percent minimum for auctioning by 2020 are too low. UCS urges the Plan to state a preference for auctioning 100% of allowances. At a minimum we would hope that the final Plan will call for auctioning to be the primary method for distributing allowances from the outset and that it will call for a quick transition to 100% auctioning—certainly by 2020.

UCS supports 100% auction in the electricity sector, which is a patchwork of publicly or consumer-owned utilities and investor-owned utilities operating under cost-of-service regulation. Auction revenue can be substantially returned to consumers via the utility that serves them for investments in efficiency and other investments that reduce the pollution that causes global warming. NRDC/UCS have conceptualized a "use it or lose it" approach to revenue recycling that returns some auction revenue to the service area from which it originated, thereby avoiding geographic wealth transfers.

By distributing allowances via auctions, we can:

- *Avoid Windfall Profits to Polluters*
  The allowances created under a tight cap are a valuable, scarce commodity that commands a market price. The European experience under cap-and-trade has shown that free allocation leads to windfall profits in competitive markets.[13] When the European Union launched its Emissions Trading System in 2005, virtually all the allowances were distributed for free. In the U.K., this lead to electric power generators reaping windfall gains of about $2.5 billion in 2005. A World Wildlife Fund report estimates that in Germany windfall profits in the electricity sector will range from $46 billion to $94 billion by 2012. Giving away allowances to covered emitters does not protect consumers from price rises in competitive markets. Electric utilities and other covered emitters in Europe have been able to raise prices to consumers to reflect the market value of the allowances, even though they received them for free. The total value of allowances will far exceed the adjustment costs that business may face, and this is why unfair windfall profits result from giving away allowances. The National Commission on Energy Policy explains how windfall profits can come about: "Economic analysis and experience with Europe's trading system suggests that energy companies can and will pass most program costs through to consumers and businesses at the end of the supply chain. If the same companies get a large allocation of free allowances, the value of those allowances is likely to substantially exceed any actual net costs they incur as a result of the policy."

  In contrast, almost every state in the Regional Greenhouse Gas Initiative (RGGI) has wisely opted for nearly or fully 100 percent auctioning of emission allowances. The minimum amount of auctioning that will occur under RGGI is 90% in Maryland. Europeans have learned that auctioning is a crucial element of a well designed cap-and-trade program, and the proposed (albeit not yet finalized) design for the EU ETS in its next (third) phase calls for a rapid ramp up in auctioning, from about 60% auctioning in 2013 to close to 100% auctioning in 2020.[14]

- *Offer an Efficient Source of Revenue for the Public Benefit*
  Revenue gained from auctioning permits enhances economic efficiency because it is

[13] Two recent reports have documented and explained the occurrence of windfall profits in the European Union's Emission Trading System. These are: (i) National Commission on Energy Policy, 2007, *Allocating Allowances in a Greenhouse Gas Trading System* (ii) Deutsche Bank Research, March 2007, *EU Emissions Trading: Allocation Battles Intensifying*.

[14] For an empirical view on the windfall profits for polluters in Phase 1 of the EU ETS, see:

Heymann, Eric. 2007. "EU emission trading: allocation battle intensifying," Deutsche Bank Research (March 6)

For a prospective study on the extent of windfall profits in Phase 3, see:
New Carbon Finance. "The impact of auctioning on European wholesale electricity prices post-2012" (Sept. 16, 2008), available at http://www.newcarbonfinance.com/?p=about&i=freereports

For more on the proposed outlines of the program in Phase 3, see: The Commission of the European Communities' Proposal for a Directive of the European Parliament and of the Council amends Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance-trading system of the Community. Brussels, 23 January 2008.

gained by correcting the "externality" that has been associated with the lack of a cost for emitting global warming pollution. The revenues generated by an allowance auction can be used to invest in emission reductions outside of the cap-and-trade program, in particular measures that will assist energy consumers. It is particularly important the lower income households not endure disproportionate impacts, as these are the most economically vulnerable households. CARB lists a number of appropriate possible uses of revenue generated under AB 32 in the draft plan.

- *Reward Early Action*
  A policy of 100 percent auction will reward those who have taken early action to reduce their emissions. Businesses that create less global warming pollution per unit of production would have to purchase fewer allowances, placing them at a competitive advantage. By contrast, a system that allocates free allowances based on emissions could fail to reward these "good" actors.

- *Create a Level Playing Field*
  Auctions allow new firms entering the market to compete on a fair and equivalent basis with existing firms, with the same access to allowances.

- *Help Create Administrative Simplicity and Lower Transactions Costs*
  Allocating allowances for free would set in motion a time-consuming and costly process of lobbying and negotiation over which businesses, institutions, and individuals would get how many allowances.

- *Support a Transparent, Well-functioning Market and Price Discovery*
  The auction of allowances is an effective way to provide clear, timely information about the market value of these allowances, which helps firms make informed decisions about future production and investments. Moreover, auctioning should contribute to lower price volatility. Suppliers of allowances (those who may have received or purchased excess allowances) can be late in entering the market, or they may simply hold onto their excess allowances as a hedge against the possibility that allowance prices might rise in the future. On the other hand, those who need to buy allowances (the "demanders") would tend to enter the market first and place an immediate value on allowances. This can quickly create a price spike due to a mismatch in market information. Once suppliers see the high price, they may enter the market in large numbers, causing a price crash. This kind of scenario and the resultant price volatility have been observed in the EU ETS context. Price stability and early price discovery will be important to developing a successful, smoothly operating market.

Scope

UCS supports a broad cap-and-trade program including transportation fuels from the start. There are at least four advantages to a broad scope for cap-and-trade that includes transportation fuels.

- *Creates a specific quantitative cap for a key sector*

An advantage of including transportation fuels is that it extends a hard cap to this important sector. This feature can be contrasted with other policies that can improve energy intensity but do not guarantee a particular level of reductions.

- *Provides the right long run incentives*
  The long-term price response can be expected to be significant. In a recent working paper that he submitted to the WCI, UC Berkeley Professor Lee Friedman makes the point that with the increasing availability of alternate fuels, both the long run and short run elasticity should increase over historical experience. We add that the addition of public transit options would have the same effect, making it easier for people to change their behavior in response to a change in prices. In the long run, including transport fuels can play a useful role in contributing to smart growth. In this way, including transportation fuels can contribute to putting us on a path to meeting our long run objectives. 2020 is an arbitrary milestone along in a longer journey toward much deeper reductions. Moreover, including transportation in cap-and-trade program early on when the reductions are more modest could help keep costs relatively low in these initial years.

- *Creates a more secure market*
  The larger market would make market manipulation more difficult as more players and more allowances would be involved.

- *Efficient investment across sectors.*
  As the Cal EPA Market Advisory Committee (MAC) observed, a program with comprehensive coverage of all major emitters will send a price signals across all relevant sectors of the economy. This will encourage efficient investment decisions. There is also an element of fairness in equal treatment (i.e. inclusion) of all high emitting sectors.

Though we present these arguments for including transportation fuels, we cannot emphasize strongly enough that the most cost effective strategy for achieving significant emissions reductions will combine inclusion of the transportation sector in a cap and trade program and complementary policies such as low carbon fuel standards, light duty vehicle efficiency standards, heavy duty efficiency improvements, anti-idling enforcement, alternative fuel promotion, and specific smart growth policies.

Cap Level within Cap-and-Trade

We urge CARB to ensure that the initial 2012 cap is set below 2012 BAU projections. Given problems of over-allocation in previous cap-and-trade programs (RECLAIM, EU ETS Phase 1, possibly RGGI), this is a crucial decision.

The proposal from the WCI recommends that the level of the cap for the first compliance period be set at the level of emissions expected in 2012 under a business as usual scenario, meaning that capped entities could avoid any emission reductions through 2012. This raises

great concerns. The path to the 2020 reductions will be smoothed by getting started on the task as early as possible. There is no time to waste.

Finally, because of the magnitude of the emissions reductions called for under AB 32 and the varying levels of certainty attributable to each emissions reduction program, we call on CARB to develop a total set of emission reduction programs that will reach the AB 32 cap while taking into account that possibility that some programs may fall short as to their expectations. The broad scope of the proposed cap-and-trade program reduces the risk in this regard. Nonetheless, CARB should address the role of uncertainty and how unexpectedly high emissions in uncapped sectors such as forestry and agriculture would be managed.

Enforcement and strict penalties for non-compliance

We agree with the Proposed Scoping Plan's statement that a well-designed cap-and-trade program must include strict penalties for non-compliance. (p.C-11) However, the suggestion that non-complying entities would only have to surrender allowances "equal" to their excess emissions (p.C-12) is inadequate. If a capped entity does not surrender sufficient allowances at the end of a compliance period, it must be required to surrender a multiple of the allowances, as well as being subject to fines, civil and criminal penalties. The penalty should be large enough that no rational entity would choose to pollute and accept the penalty.

Conclusion

Again, UCS commends Chairperson Nichols and CARB staff for a tremendous effort on developing the Plan. We look forward to continuing to work with the staff and Board as the policies in the Plan are evaluated and implemented.

APPENDIX I

Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

Proposed Scoping Plan offset policy analysis

November 17, 2008

Purpose

The quantitative limit on offsets in the California Air Resources Board Proposed Scoping Plan ("the Plan") has generated much confusion and neither the Plan nor the associated supporting documents give any insight into the quantitative implications of the proposed offset limit. In order to contribute to the public dialogue, UCS aims to provide some insight into the amount of offsets that would be allowed under such a limit. We encourage feedback and are happy to share the spreadsheet containing the calculations underlying the figures and tables included. (Please send comments or questions to Chris Busch: cbusch@ucsusa.org.)

I. Summary

We develop an analytical framework using a variety of inputs, most taken directly from the Plan itself, to evaluate the proposed offset limit that would allow offsets up to an amount equal to 49% of reductions in the cap level below the 2012 cap for any given year. (More insight into the proposed limit, including an illustration, can be found below.) In addition to results, this memo discusses the inputs utilized and the assumptions needed to make the analysis tractable.

Using assumptions implicit in the Plan itself we develop a central scenario, in which direct regulatory policies (such as the RPS or clean car standards) achieve 80 percent of the required emission reductions. A well-designed cap and trade program will establish a price on global warming emissions that will facilitate compliance with these foundational policies. In this light, the price signal can contribute to the success of other measures and the separation between foundational policies and cap-and-trade is somewhat artificial. That said, we move forward based on the notion that the 34.4 MMT in Table 2 of the Plan are the reductions achieved by cap-and-trade itself, meaning that cap and trade alone is responsible for "sweeping up" about 20 percent of the needed emission reductions. This approach follows from the implications in the proposed scoping plan that 80% of the reductions would be achieved in the absence of cap-and-trade. Following this logic, we attribute 20% of the reductions to cap-and-trade alone in the central scenario. In the central scenario, offsets allowed under the proposed limit far exceed the amount of needed emission reductions not achieved through foundational policies—in other words, there would be more offsets allowed than tons of emission reductions

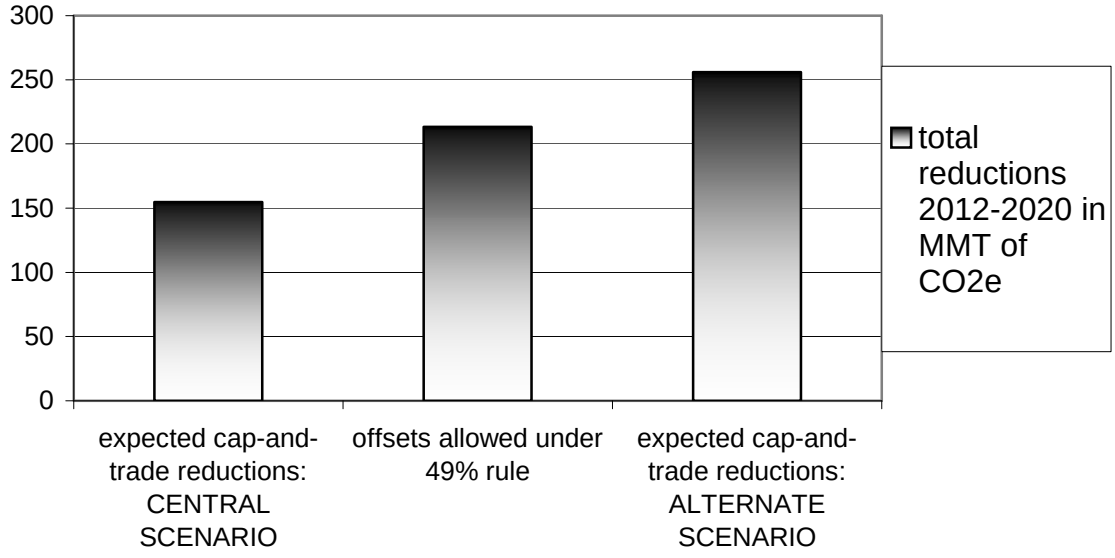
expected from the addition of cap and trade to the package of foundational policies in the Plan. Total offsets allowed over 2012-2020 amount to 138 percent of expected cap-and-trade reductions in the central scenario.

We also develop an alternate scenario in which foundational policies in capped sectors are less effective than they are forecast to be, producing 20% less than the regulators predict (as reported in Table 2 of the Plan). Thus, in the alternate scenario, while the cap-and-trade program still assists in meeting some of the direct regulations through the establishment of a price on carbon, cap and trade is solely responsible for a larger portion of the overall reduction effort. In this alternate scenario, total offsets allowed over 2012-2020 under the proposed limit amount to 83% of reductions expected from cap-and-trade. Table 1 and Figure 1 summarize these findings.

Table 1. Offsets allowed vs. expected cap-and-trade reductions (MMT of CO2e)

	Central scenario		Alternate scenario	
	2020	2012-2020	2020	2012-2020
Offsets allowed	47.4	213	47.4	213
Expected cap-and-trade reductions	34.4	155	56.9	256

Figure 1. Offsets allowed vs. expected cap-and-trade reductions in two scenario



II. Discussion of Results

In the central scenario, reflecting CARB's best estimate of the contributions of various policies to the total reductions needed under AB 32, we find that the amount of offsets allowed (213 MMT) exceeds the amount of reductions expected beyond foundational policies over the 2012-2020 time period. Our analysis suggests that in 2020, when CARB projects 34.4 MMT of CO2e in reductions from cap-and-trade beyond the foundational policies, about 47.4 MMT of

offsets would be allowed for the purposes of alternative compliance under cap-and-trade. 47.4 MMT amounts to more than one quarter of all reductions and almost one third of reductions in capped sectors sought in the year 2020.

To clarify why offsets allowed exceed what is expected from cap-and-trade, see that expected reductions are based on both business-as-usual (BAU) trends and anticipated reductions across policy instruments (i.e. whether or not the reductions associated with each recommended measure are realized as predicted in Table 2, p. 17 in the Plan). In contrast, the 49% of reductions rule is solely in reference to the level of the cap-and-trade program's cap in 2012, not business as usual reductions or the effects of other policies. Below we provide some further insight into how the proposed 49% limit would be translated to particular quantitative limits and the magnitude of offsets allowed in each year as a fraction of the total compliance obligation.

In our alternate scenario, we explore the sensitivity of our results to variation in the central point estimates reported in Table 2 of the Plan. In the alternate scenario, foundational policies produce fewer reductions than anticipated, meaning that cap-and-trade alone is required to produce a larger share of the overall reduction effort. We suppose that foundational policies fall short of achieving 100 percent of their expected emission reductions and only achieve 80% of the level of reductions CARB estimates they will achieve as listed in Table 2. So, for example, instead of the 15 MMT given in Table 2, in the alternate scenario the low carbon fuel standard achieves 12 MMT in reductions.

Figures 2 and 3 show the year-by-year quantities of expected cap-and-trade reductions and offsets in the two scenarios we have developed.

Figure 2. Central scenario: More offsets allowed than expected reductions from cap-and-trade

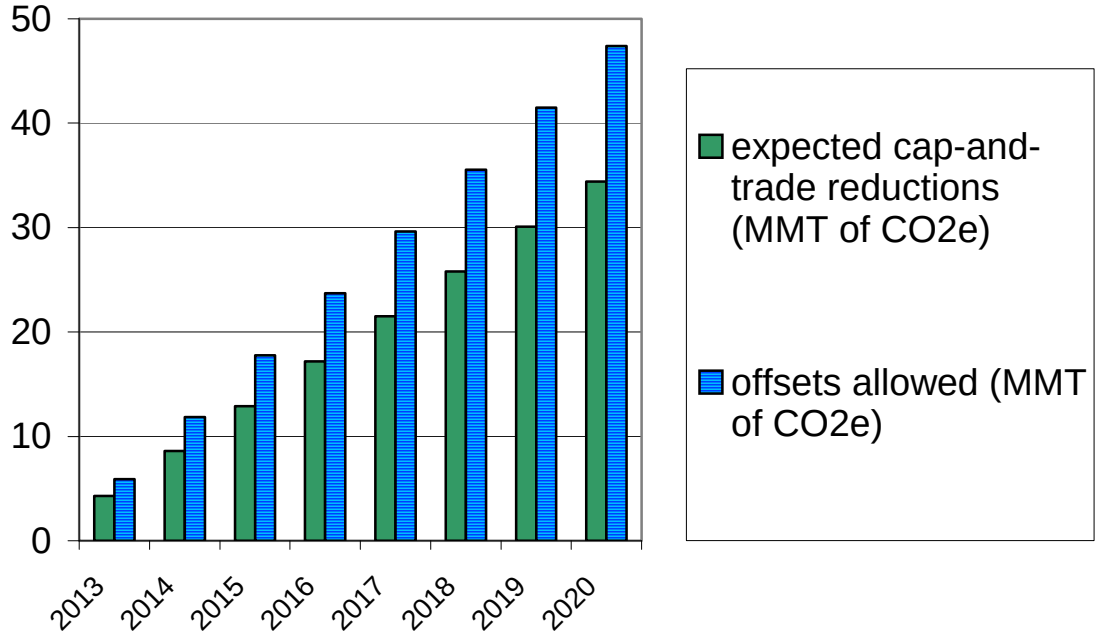
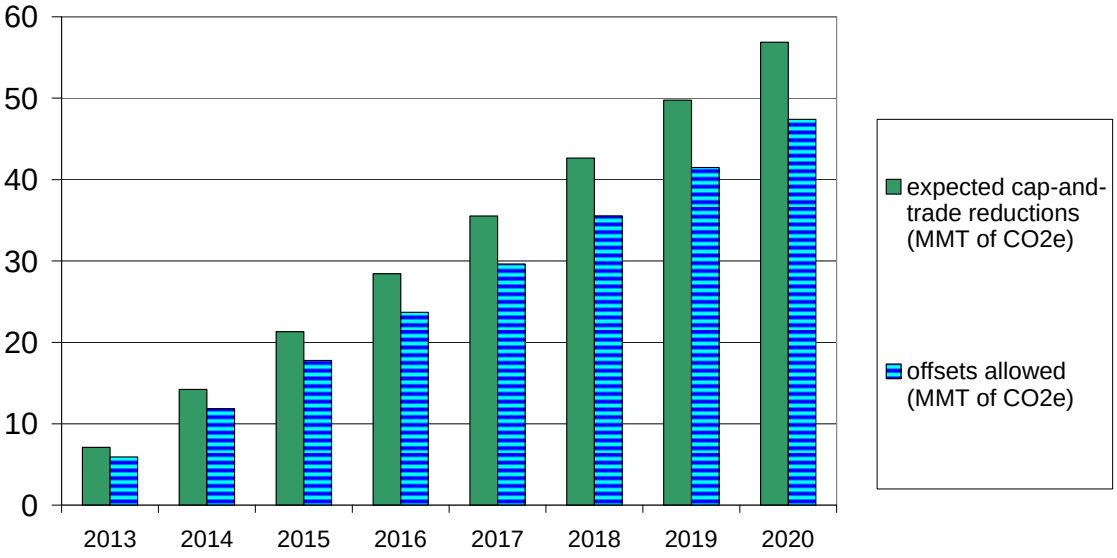


Figure 3. <u>Alternate Scenario:</u> offsets almost equal expected cap-and-trade reductions



Now we provide some further insight into the proposed 49% limit graphically and with tabular results. The approach has generated much confusion. The quantitative limit put for in the Plan calls for determining the amount of offsets that would be allowed into the system according to

the amount of reductions below the 2012 cap level. Figure 4 shows the 2012 cap level and the annual declining cap levels, which will determine the amount of offsets allowed. Offsets allowed in the figure are represented by the distance between the middle and bottom lines.

Figure 4. Offsets allowed under 49% rule

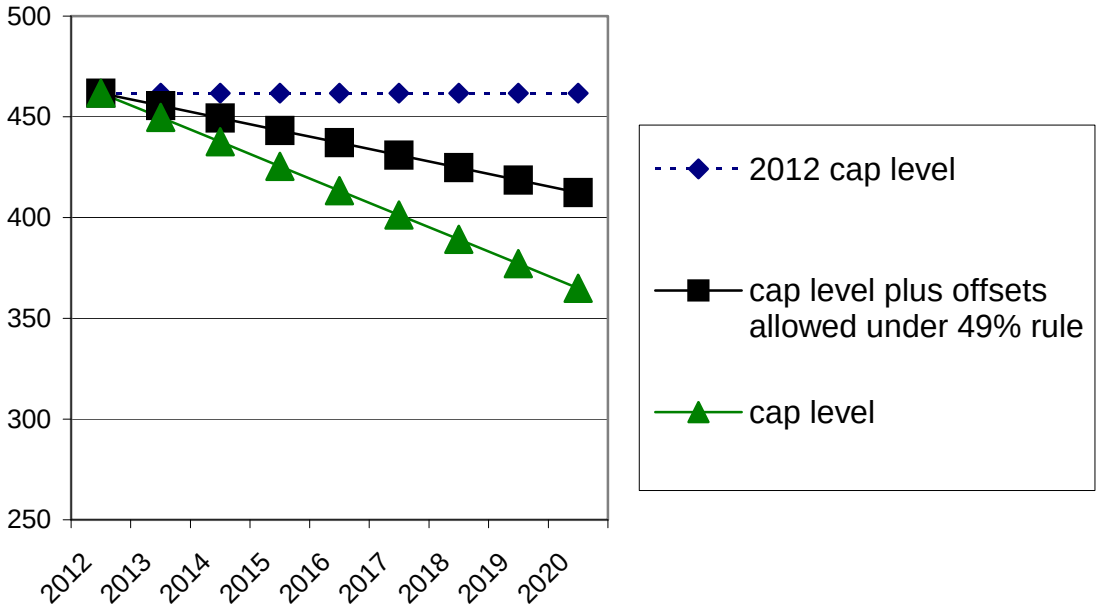


Table 2 gives a year-by-year look at the amount of offsets that would be allowed and the corresponding percentage of total emissions that could be covered by offsets that this implies.

Table 2. Quantity of offsets allowed by year

Year	Offsets allowed (MMT of CO2e)	Offsets allowed as percentage of total emissions
2012	0[15]	0.0%
2013	6	1.3%
2014	12	2.6%
2015	18	4.0%
2016	24	5.4%
2017	30	6.9%
2018	36	8.4%
2019	41	9.9%
2020	47	11.5%

[15] Since the amount of offsets allowed is calculated as a fraction of the reductions in the cap below the 2012 cap level, the amount of offsets allowed in the year 2012 would be zero. As we note below, CARB has indicated that it plans to structure the quantitative limit by compliance period.

III. Inputs

From Scoping Plan

- Current level of emissions, 15% above 1990 (*Proposed Scoping Plan*, p. ES-1).
- Business as usual figures for 2020: total, capped sectors, non-capped sectors (p.21).
- Cap level in 2020: 365 MMT
- Total expected reductions in capped and non-capped sectors
- 49% of reductions (applied to 2012 cap)

From WCI

- 2012 cap level to be set at business-as-usual minus other policies

Associated spreadsheets with more details and underlying calculations available on request.

IV. Assumptions and simplifications

- Assumptions about BAU growth 2008-2012
    - Ignore early action policy effects in 2010-2011.
    - Assume proportion of total emissions between capped and non-capped remains same as 2002-2004 CARB data through 2008, then trends to 2020 BAU levels in Plan in the absence of AB 32 implementation.

- Assume for simplicity that coverage is complete in the first compliance period instead of starting in the second, and thus covers all but agriculture, forestry, waste, and High Global Warming Potential gases. The Plan proposes a more complicated staggered expansion of the scope of the cap-and-trade program.

- We assume annual limits, instead of limits by compliance period. Annual results are largely analogous to those that would be expected when looking at the question form a compliance period perspective.

Suggested frame for interpreting results:

- It is important to consider the distribution of reductions across policy instruments: foundational policies, direct reductions produced by cap-and-trade in capped sectors, and offset reductions.

- These results aim to provide some insight into the relative magnitude of offset reductions allowed compared to the percentage of emission reductions that are needed that will not come from foundational policies, but will be achieved by cap and trade alone. As explained above, we have used inputs drawn from the Plan (BAU projections, estimation of reductions across policy instruments and sectors). Due to

time constraints we develop only a single alternative scenario, one in which foundational policies are less productive than expected, meaning that cap-and-trade must produce more reductions than the 34.4 MMT listed in Table 2 of the Proposed Scoping Plan. A complete sensitivity analysis would explore a larger range of variations from the most likely predicted scenario that CARB has developed. In addition to varying the amount of reductions expected from foundational policies, different BAU growth scenarios could be analyzed. For example, if BAU growth after 2012 turns out to be higher (lower), then offsets allowed would be a smaller (larger) slice of the overall reduction pie. We have tested a scenario in which foundational policies are less effective than expected, however if foundational policies turn out to be more successful, produce more reductions than expected, then the amount of offsets allowed would increase in relation to the size of the expected direct contribution from cap-and-trade.