Sierra Club California Comments on the Climate Change Scoping Plan First Update Discussion Draft, October 2013

Submitted via webpage on November 1, 2013:
http://www.arb.ca.gov/cc/scopingplan/2013comments.htm

Sierra Club California appreciates the opportunity to provide these comments to the California Air Resources Board on the Climate Change Scoping Plan First Update Discussion Draft dated October 2013. (Quotes from the draft plan are shown in italics.)

SUMMARY OF SIERRA CLUB'S KEY RECOMMENDATIONS

We recommend that the Discussion Draft

- Set stronger, more urgent goals for greenhouse gas (GHG) reduction;
- Propose new, stronger renewable portfolio standards (RPS) targets in the electricity sector.
- Discourage new natural gas infrastructure in favor of cleaner alternatives.
- Emphasize non-fossil-fuel technologies for grid-integration of renewables.
- Put fresh emphasis on non-CO2 climate pollutants like methane.
- Incentivize municipalities to do more for climate protection.

II. Latest Understanding of Climate Science

> The latest science makes it urgent that California go faster than just aiming to reducing emissions to 80% below 1990 levels by 2050, as specified in Executive Order S-3-05. The best available scientific data now indicates that the threats posed by even small increases in temperature are far greater than previously thought. Stabilization of greenhouse gas emissions at 450 ppm and targets of less than 2ºC increase are insufficient to minimize the risk of catastrophic outcomes.[1] These analyses show the

[1] Jordan A, et al. 2013. Going beyond two degrees? The risks and opportunities of alternative options, Climate Policy, 13:6, 751-769, DOI: 10.1080/14693062.2013.835705, plus slide show at http://www.slideshare.net/DFID/professor-kevin-anderson-climate-change-going-beyond-dangerous

best available science strongly supports immediately stopping all GHG emissions in order to prevent dangerous climate change and protect the health and safety of all Californians.

Executive Order S-3-05 lists several of the consequences of climate change where it states, "…increased temperatures also threaten to further exacerbate California's air quality problems and adversely impact human health by increasing heat stress and related deaths, the incidence of infectious disease, and the risk of asthma, respiratory and other health problems."[2]

CEQA calls for the identification of "any critical thresholds for the health and safety of the people of the state."[3] This critical threshold for GHGs is avoiding dangerous anthropogenic interference with the climate system. Therefore the Scoping Plan must analyze and take account of the level of net cumulative GHG emissions that affect the health and safety of the people of the state. With regard to GHGs, the critical threshold is zero. The reason for this is that the evidence is overwhelming that the current level of GHGs is already having large effects on the health and safety of the people of the state, as evidenced by increased wildfires, decreasing snow pack and water supplies, sea-level rise, etc. In addition, the more CO2 and other GHGs that go into the atmosphere, the more overall impact on the climate and the greater the risk of crossing tipping points that could result in irreversible damage to the human habitability of most of the earth. The International Panel on Climate Change (IPCC) Assessment Report 5 (AR5) report says current trends are heading toward 900 ppm CO2, which would likely increase global average temperatures to over +4ºC.[4]

Thus a plan based on compliance with Executive Order S-3-05 with target of 80% below 1990 levels by 2050 is out of date. This Scoping Plan Update should focus on reducing California emissions to zero as soon as possible. AB 32 requires the state to take "all technologically feasible and cost effective steps…"[5] towards achieving its goals. It is more cost effective to do that now, as stated in the discussion draft 2013 Scoping plan, "*To reduce the global concentration to 450 ppm after delaying action 10 years, it would cost an additional $3.5 trillion, compared to levels of investment needed if low carbon strategies were to be adopted immediately."*[6]

A review of reports and studies from global reinsurance companies clearly documents the dramatically growing costs resulting from increased damage caused by climate change and future increased costs in the absence of more aggressive climate mitigation strategies now. We must take all feasible steps to reduce GHG emissions as soon as possible to cost effectively minimize much greater future costs of adaptation, more expensive delayed mitigation costs and increased damage repair costs. An ounce of prevention is worth a

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Also: Anderson, K., Bows, A., (2011) Beyond 'dangerous' climate change: emission scenarios for a new world. Philosophical Transactions of the Royal Society A: 369, 20-44, doi:10.1098/rsta.2010.0290

[1] Governor Arnold Schwarzenegger, Executive Order

[2] Governor Arnold Schwarzenegger, Executive Order S-3-05, 2005.

[3] CA Pub. Res. Code § 21000(d).

[4] IPCC WGI AR5, Summary for Policymakers, 2013, Figure SPM-10.

[5] California Health and Safety Code Division 25.5: 38560.

[6] IEA. 2013. *Redrawing the Energy Map: World Energy Outlook Special Report*. International Energy Agency. June. www.worldenergyoutlook.org/energyclimatemap carb

pound of cure. California Air Resources Board's (CARB's) Discussion Draft must make clearer the higher level of urgency needed to address this existential threat.

Because, *"California will need to continue to be a global leader in addressing climate change, helping drive critically needed actions in other states, provinces, and nations around the world,"* it is vitally important that California lead the nation and world to show what can be done.

Recommendations: At the end of Section "B. Achieving Climate Stabilization" on Page 9, following this sentence: *"To reduce the global concentration to 450 ppm after delaying action 10 years, it would cost an additional $3.5 trillion, compared to levels of investment needed if low carbon strategies were to be adopted immediately."*

Add additional language:

> Achieving goals of 80% GHG reduction by 2050 compared to 1990 levels will not be sufficient to avoid the worst impacts of climate change. The goal of Executive Order S-3-05 is no longer adequate in light of recent science.[7] The faster the reduction of GHGs the better, since earlier reductions more cost effectively reduce the economic and other adverse impacts of climate change and reduce the risks of hitting irreversibly damaging tipping points. Therefore California needs to be an example for the world to set much more aggressive intermediate targets and more rapidly reduce emissions than is currently called for under S-3-05.

We recommend that CARB institute a process as soon as possible to set new more aggressive GHS reduction targets for 2020, 2030 and beyond and then to work towards their expeditious adoption.

We recommend that, Table 1: Global Warming Potential for Selected Greenhouse Gases should be updated with the latest values from the IPCC, which include a value of 34 for methane over a 100 year period.

III. Progress Toward the 2020 Goal

B. Progress by Scoping Plan Sector

9. High Global Warming Potential Gases (HGWP)

Sierra Club applauds the significant successful and developing efforts that CARB has made to reduce HGWP gases. Its identification of further reduction of these climate pollutants could have an outsized positive impact of slowing climate change because they are short lived. We support CARB's efforts to focus on this area to come up with a new plan by 2016 to further reduce these pollutants expeditiously.

Recommendation:

Sierra Club recommends that, in the creation of the new plan to reduce these pollutants by 2016, those measures labeled "Currently not feasible" in the list of mitigation

[7] Matthew Vespa, 2009: http://www.aqmd.gov/ceqa/handbook/GHG/2009/april22mtg/CBDcomments.pdf

measures be addressed immediately with the objective of developing ways of taking vitally important action to reduce the sources of these climate pollutants.

IV. California, Interstate, Federal, and International Climate Change Mitigation Efforts

B. Local and Regional Government Efforts

Sierra Club applauds the draft's recognition of California's local and regional governments as critical partners in meeting the State's GHG goals. That could be strengthened by providing leadership and technical assistance to coordinate, streamline, and reduce the cost of local government permitting activities. For example, the preparation of model planning guidelines, ordinances, and programmatic Environmental Impact Reports for the siting of small-scale, community-based renewable generating systems (such as solar PV or cogeneration systems) can help guide and facilitate local government planning and siting activities, and reduce permitting costs and delays. CARB should support the adoption of statewide uniform standards and procedures for online over the counter PV installation permits, such as described on the website: www.ProjectPermit.org. In addition, most California municipalities will need state financial aid and incentives to have the capacity to respond to the energy-climate challenge.

V. Continuing Progress Beyond 2020

General Recommendations on Actions and Next Steps

The draft report does a good job of listing many of the proposed paths, technologies and programs that can help us get to further GHG reductions. However, they are often listed in a non-action oriented way referencing the "plan" but without being specific on what is the plan, who is to create it and within what timeframe.

Overview Recommendations

1. In all the "Key Recommended Actions" boxes under section E. "Recommendation to Transition Beyond 2020", additional specificity on next steps should be added to, for example, list a proposed lead agency, the process through which the action step can be implemented, a suggested timeframe for achievement and a numerical objective target where applicable.
2. There needs to be an improved, comprehensive integrated process across all energy agencies on creating a grand plan and then assigning which agencies have prime responsibility for which tasks.

C. 2030 Emissions Targets

Setting aggressive but feasible targets for 2030 is essential to maintain and build upon current momentum to minimize climate change damage to our society. California has made excellent progress thus far on achieving reductions towards its 2020 goals. Now with programs, policies, technologies, financing programs and lower cost solutions in place, California can accelerate the pace of reductions. As noted above merely

continuing to aim at a target of 80% GHG reductions by 2050 and following the GHG reduction trajectory of E.O. S-3-05 are no longer sufficient.

The electricity sector is an especially good and important sector to move more quickly. A common strategy to reduce GHGs in many sectors is to "electrify" processes that rely on fossil fuels such as gasoline fuel for transportation, natural gas for space and water heating and gas combustion for industrial processes. By "greening the grid" sooner, all of the other processes that rely on substituting electricity for GHG producing dirty fossil fuel dependent processes, will result in faster, deeper emissions reductions.

Further, it's critically important for these new targets for 2030 to be set as soon as possible. This is especially true in sectors where planning must be done over long term planning horizons and where change requires several years. In the electricity sector for example, the California Public Utilities Commission (CPUC) does long term planning every two years for a 10 year time horizon. It is currently finalizing its long term plan for the investor owned utilities through 2022.

"Avoiding the worst impacts of human-caused climate change will require reducing emissions of greenhouse gases substantially and quickly. For instance, in order to stabilize atmospheric concentrations of CO2 at 450 parts per million by the year 2050, which would give a 50% chance of holding global temperature rise to 2^{o}C, emissions would have to be decreased 5.1% per year for the next 38 years. This rate of reduction has not been achieved in any year in the past six decades, which puts the magnitude and urgency of the task in perspective."[8]

Sierra Club agrees with the Discussion Draft statement on page ES-3, "*Meeting these challenges will not be easy, but failing to continue on the current path to reduce emissions will have grave consequences.*"

The Discussion Draft's assertion, "Emissions from 2020 to 2050 will have to decline at more than twice the rate needed to reach the 2020 emissions limit," is too conservative and can actually be exceeded in the electricity sector. In 2008, the state's RPS was 13% and by the end of 2012 was 19.6% for an increase of 6.4% in four years or a 1.6% increase / year over that period. If this rate were continued to 2030, it would produce an RPS of 48.4%. The CPUC is forecasting that the state will add over 3,500 megawatts (MW) of new renewables in 2013 alone. If this happens and it results in a 24% RPS, then it would mean California has added renewables at a rate of more than 2.2% / year. Extending this rate out to 2030 would produce a 57% RPS. However, with all the new programs now in place, continuing declining prices for solar and some other renewable resources, a robust industry, new supportive programs, the improving economy and other factors significantly increasing momentum, achieving a 40% RPS by 2020 and 70% RPS by 2030 should be quite feasible.

Recommendations:

1. The report should recommend that California reduce GHG at least 5.1% / year starting with 2014 toward near-total decarbonization of the entire energy economy as soon as possible.

[8] Scientific Consensus Statement - http://mahb.stanford.edu/wp-content/uploads/2013/05/Consensus-Statement.pdf

2. The report should recommend that an open public process be put in place to determine more aggressive overall medium- and near-term targets and individual sector targets be critically evaluated towards more GHG reductions faster than on a path of merely 80% by 2050. In fact, CARB is mandated "to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions…." [9]
3. In the electricity sector, Sierra Club recommends that the CPUC use its authority to increase the 2020 RPS from 33% to 40%. Further that an RPS of 70% be set for 2030 via the appropriate legislative or regulatory vehicle. (Currently, the IOUs have essentially already contracted for all the renewables generation they need to achieve 33% RPS. Higher RPS targets would keep the momentum going for the utility scale renewables industries and provide long term certainty to this marketplace helping to keep competition high and pricing low.)
4. CARB should describe a process, lead agency and timeframe to convene or recommend a process that would set the new RPS targets for the electricity sector for 2020 and 2030 so that these new targets could be made and implemented within one year from now.

D. Overarching Needs for a Post-2020 Transition

1. Technology Refinement, Development, and Deployment

There is a high probability that battery costs will have significant cost reductions over the next 3-8 years. This will be facilitated by the tremendous public and private investment in battery research such as the Department of Energy funded Joint Center for Energy Storage Research (JCESR - http://www.jcesr.org/) project which is designed to create a battery that is five times as energy dense and at one-fifth the cost of current batteries in five years (The "5-5-5" plan). The commercialization of a technical breakthrough in combination with cost reductions from economies of scale fueled by the new CPUC approved storage decision could produce major inflection points in even more cost effective integration of high penetrations of renewables and of much lower costs of electric vehicles accelerating their adoption. This could lead to accelerated GHG reductions in the electricity and transportation sectors.

Recommendation

The California Energy Commission (CEC) should specifically launch a new process and/or new component of an existing report that closely tracks costs and technology improvements for energy storage. Just as it currently tracks natural gas prices, the Cost of Central Station Generation Resources and other key assumptions in significant detail, it should also track similar attributes for storage including forecasts of future costs of these technologies. Now with the CPUC approved Storage Decision and the importance

[9] California Health and Safety Code Division 25.5: 38560. "The state board shall adopt rules and regulations in an open public process to achieve the maximum technologically feasible and cost-effective greenhouse gas emission reductions from sources or categories of sources, subject to the criteria and schedules set forth in this part." 38561. (b) "The plan shall identify and make recommendations on direct emission reduction measures, alternative compliance mechanisms, market-based compliance mechanisms, and potential monetary and nonmonetary incentives for sources and categories of sources that the state board finds are necessary or desirable to facilitate the achievement of the maximum feasible and cost-effective reductions of greenhouse gas emissions by 2020."

that storage and its costs (especially battery storage) will play in integrating renewables and adoption rates of electric vehicles, it warrants special study to help better guide planning processes.

3. Supporting Sustainable Choices by Homes and Businesses

Sierra Club is pleased CARB recognizes the key role of supporting sustainable choices: 9-17% energy savings is huge and can be accomplished at low cost. The Discussion Draft needs a much stronger section on energy conservation, including specific targets, strategies and metrics as well as assigning state and local agency responsibilities. Contracts with local non-profit agencies have proven successful in campaigns such as low flow toilets. The Discussion Draft should outline the strategies to induce and incentivize "behavior change" by people and businesses to consume less energy by shedding services and altering their daily routines. If more research is needed, list specific areas of promise. Define the public and private sector policies and programs that will add to individual commitments and actions to help reduce over-consumption of energy and materials and hasten the transition to a clean energy future**.**

E. Recommendations to Transition Beyond 2020

1. Energy

Recommendations

1. Sierra Club supports the overall goal**: "***Develop a near zero emission strategy to reduce greenhouse gas emissions in the energy sector, reduce energy costs, and maintain reliability of the electrical grid."*
2. A correction is needed in the following statement in the plan:
   "For example, the plan should evaluate and recommend the most appropriate combination of clean energy technologies, which include clean flexible gas units, demand response advancements, large- and small-scale storage systems, carbon capture, use and storage, and energy conservation practices that can be used to maximize decarbonization of the State's centralized power generating system at the lowest cost." Pg. 84

   Natural gas generation is anything but clean – it produces significant quantities of CO2 emissions and nitrous oxide pollution. Some studies have concluded that when the fugitive methane involved in the extraction, refining and transfer processes of natural gas is included in a "wells-to wheels" analysis, it would show that natural gas is nearly as bad as coal on GHG emissions.

   a. Please remove "clean flexible gas units" from this list of clean energy technologies entirely.
   b. Please remove the adjective "clean" in front of all types of gas fired units. Describing these units as clean as a great untruth. If any adjectives are to be used in their description, it should be something like "climate polluting" or 'dirty".

3. **New Utility Business Model** – Sierra Club strongly supports the reference in the report to the need to re-examine and develop a new Utility Business Model. **We**

recommend that CARB work with the other agencies and the Governor to begin this process.

The traditional utility business model was developed many decades ago for industrial-scale, central-station, one-way flow, fossil-fuel energy and is no longer suited to advanced emerging technologies and new economic circumstances. The regulatory apparatus and oversight structure itself is also outdated and in need of significant reform.

The primary purpose for the new models is first and foremost to serve the public interest and to achieve legally mandated environmental goals set by the state.

New models should be designed to pay utilities to deliver what society wants (clean, decentralized, efficient, sustainable, resilient power) going forward. A new model should also facilitate local communities in developing local energy resources. Community choice aggregation may serve as a model for local decision-making in this regard. CARB's Discussion Draft should point the way to thorough examination of the options.

4. **Sierra Club recommends** the following additions to the "Key Recommended Actions for Energy" box.

   Renewable energy

   a. "Evaluate the potential for expanding or revising the Renewable Portfolio Standard to maximize GHG emission reductions." We recommend that a new RPS of 40% by 2020 and 70% by 2030 be added to this.
   b. Insure that zero emissions generation lost from the San Onofre Nuclear Generating Station (SONGS) shutdown will be replaced with zero emission renewables / preferred resources and not conventional generation.
   c. Increase the percentage mix of distributed generation compared to utility scale generation to realize many benefits including, faster implementation, meeting local capacity requirements and avoiding the need to build expensive and difficult to permit /construct new transmission facilities. Put in place supportive policies, programs and incentives to accelerate distributed generation such as upgrading distribution circuits for two-way power flow and increased capacity, smart inverters and distributed generation combined with storage.
   d. Promote geothermal heat pumps to help replace natural gas as the current primary fuel for space and water heating.
   e. Promote an increased percentage of the RPS of "baseload" renewable generation technologies such as appropriately sited concentrated solar plants including several hours of thermal storage (such as molten salt) and geothermal generation.

   Natural Gas Fired generation

a. Aggressively implement preferred resources to avoid the need for any new gas fired generation.
b. Create a list of existing natural gas fired plants and a time-phased retirement plan for them as new renewables come on line to replace the need for their generation capacity.
c. Regarding the recommendation: "*Decarbonize natural gas generation via carbon capture, use, and storage or other mechanisms.*" Carbon capture and storage is much more expensive than employing the preferred generation alternatives listed above and does nothing to mitigate the negative community and environmental impacts of natural gas extraction, especially fracking. We recommend deleting this recommendation. If anything, any research into CCS should focus on cost effective and environmentally benign methods to remove CO2 from the atmosphere.
d. CARB also needs to focus its Discussion Draft on reducing natural gas use for water, space and industrial heating areas. Geothermal heat pumps and solar hot water are among various technologies that are available now to begin massive reduction of gas use in home and business heating

We recommend adding a new Category for "Grid modernization and management"

a. Track and manage progress of IOUs in implementing their Smart Grid Deployment plans (as required by SB 17, 2009) so that priority to these is given to projects that can better integrate renewables sooner, support increased distributed generation, meet local capacity requirements and otherwise support the highest priority needs of the state to reduce GHG expeditiously.

5. **Sierra Club recommends** that the discussion draft clearly state that going forward, California will avoid building any new gas-fired generation (except for appropriate CHP projects) so that it can meet its GHG reduction goals as soon and as cost effectively as possible. Instead, it will meet any new generation and integration needs with renewables, storage, demand response and other integrating systems.

   The Discussion Draft's assumption is invalid that new major central-station natural gas generating plants will be necessary to meet demand and integrate renewables. More natural gas infrastructure is inconsistent with an overall climate-protection goal of decarbonizing the state's electrical sector as quickly as possible, and is at odds with current state policy requiring large increases in renewable energy, rooftop solar, energy efficiency, storage, smart inverters, and other means to reduce peak demand, such as demand reduction.

6. **Sierra Club recommends** that CARB make a statement in favor of a 100% preferred resources solution to the SONGS shutdown and OTC retirement discussion. We believe that as the prime agency responsible for continuing to reduce GHG in the state, that it has a responsibility to make this recommendation.

7. In support of the above recommendation, **Sierra Club recommends** that CARB lead working with IOUs in partnership with the CEC, CPUC and CAISO to create a task force to develop a comprehensive integrated and time phased plan to meet any new generation needs and renewables integration requirements with a 100% preferred resources plan.

   Discussion: With respect to the SONGS shutdown and planned Once Through Cooling (OTC) retirements in Southern California, there are new many new factors that greatly increase the cost-effective feasibility of doing this while retaining or improving existing levels of grid reliability. Some of these include the following:

   a. Achievement of the CEC's demand forecast for the mid-case additionally achievable energy efficiency (AAEE) produces a relatively flat demand growth curve for the involved utilities in Southern California.

   b. New significant additional distributed generation beyond current forecasts is highly likely and planning assumptions should be updated to include:

      1. AB327 now removes the cloud over possible early curtailment of the existing net energy metering (NEM) program and will most likely facilitate the full implementation of over 5,000 MW of NEM power probably by 2017.
      2. This law also removes any cap on NEM renewables and under a new "NEM 2.0" program to be developed by the CPUC, and could well support an additional 1,200 – 5,000 MW of DG by 2020.
      3. SB 43 will promote 600 MW of new shared renewables through July 2016. If successful, this program could be further expanded to enable new residential and commercial building owners who cannot put solar on site to do so and this could help them comply with upcoming zero net energy (ZNE) optional and ultimately required rules.

   c. Storage requirements under the CPUC Storage Decision – More than just requiring storage of each of the IOUs, the storage decision will create a market for storage leading to competition, new applications for storage and lower costs that will help integrate newly installed renewables and eliminate the need for new gas fired generation.

      As Governor Brown noted in his Clean Energy Jobs Plan: **"**California funds many "peaker" natural gas plants that run for just a few hours a year, usually on hot summer afternoons. These plants pollute more and are less efficient than other power plants. We also import out of state coal and pay very high prices on the spot market to satisfy peak demand. Energy storage will help reduce the need for peaker plants and imports of out of state coal."

d. Re-power existing OTC plants with battery storage arrays on-site instead of polluting gas fired peaker plants. Battery storage can provide the voltage support and integration services previously provided with dirty gas fired generation. Battery arrays offer many advantages over gas fired generation/peaker plants including lower costs, more reliable design, no water requirements, much faster responding, modular for optimal "right size" installation, faster to build (2-3 years vs. 7-8 for gas fired plants), zero emissions and higher utilization. These battery arrays could also facilitate the importation of additional electricity from adjacent areas over existing transmission lines reducing local capacity requirements.

2. Transportation

The scoping plan does a good job of laying out the challenge and need to achieve and extend movement toward zero and near-zero vehicles. Sierra Club also appreciates the proposal to advance the use of zero and near-zero vehicles in the freight sector. However, planning must assure a sufficiently comprehensive charging infrastructure to support not just the initial EVs but eventually a mostly-EV fleet.

However, the draft scoping plan's transportation discussion falls short in a number of areas. Specifically, appears to advocate for increasing dependence on natural gas as a fuel source. This makes no sense given that natural gas extraction throughout the country, especially through fracking technologies, is linked to high levels of methane leakage. Additionally, developing a larger natural gas infrastructure to fuel vehicles will drain investment from cleaner vehicle fuels and infrastructure.

Additionally, the state has in the past played a stronger, greater role in helping ensure effective mass transit within cities, especially through funding incentives and other methods. The CARB scoping plan should discuss ways in which the state can help accelerate mass transit development and improve existing mass transits' operations.

Certain market mechanisms that can help advance cleaner transportation are hindered by existing state laws. Road tolling is one example. Other market mechanisms can be advanced by new regulations, laws and incentives. This would include parking pricing. The scoping plan should note this and offer recommendations that encourage the use of reasonable pricing mechanisms.

The scoping plan should also suggest recommendations for reducing black carbon emissions from the freight sector that will supplement existing regulations. This may be part of the anticipated sustainable freight planning, but the scoping plan should make specific mention of reducing black carbon as a necessary outcome of that planning. The scoping plan should also note that in certain cases, modal shifts may be the best route to accelerating emissions reductions in the freight sector.

Finally, non-motorized transportation receives no mention. Something as simple as a recommendation for a statewide infrastructure program designed to highlight and accelerate complete-streets projects would at least acknowledge that non-motorized transportation plays a role in reducing greenhouse gas emissions from this sector.

3. Agricultural Sector

Sierra Club supports the emphasis in the Discussion Draft on carrying forward multiple efforts beyond 2020 on cutting GHG emissions in the agricultural sector. However, the Draft's recommendations, while emphasizing needed research, fall short in respect to practical, immediate actions. Experience shows farmers and ranchers have a wealth of experience and motivation to put into practice greater energy efficiency and conservation in their operations, but many say unwieldy and, to them, opaque and inflexibly designed CPUC incentive programs make monetizing and implementing efficiency measures harder than need be. To give more urgency and specificity to the Draft's proposed actions, Sierra Club suggests the following:

a. Sierra Club Recommends Adding to "Key Recommended Actions" List (p. 93)

1. That the Discussion Draft explicitly state the value of organic farming with no-till farming as a sure, significant way to cut GHG emissions compared to conventional agriculture and call for increased acceptance statewide.
2. That CARB highlight findings that composting ranchland and farmland materially increases carbon storage there (while also keeping organics out of methane-generating landfills and enriching depleted soils) and call for wider application of these findings.

3. That for agricultural applications and operations, CARB support maximizing renewable energy, principally solar PV.

4. As a principle, that the state maximize electrification of agricultural operations that currently use internal combustion engines and fossil fuels.

5. That state agencies support research into micro-pump storage of energy – water, gravity, solar -- on farms and horticulture.

6. That CPUC institute long-term, zero-interest on-bill financing for energy efficiency improvements in agriculture.

7. That CPUC review and reform tier pricing of electricity for agriculture and institute a more flexible, equitable, modular approach that takes account of real-world agricultural economics.

8. That CPUC make incentives more accessible for agriculturalists to take advantage of state programs for efficiency and renewables, and correct causes for low agricultural participation in energy efficiency programs.

b. Special Recommendation on Agricultural Management Practices:

Discussion: Farmlands have been losing net carbon since they began to be tilled for farming. Tillage releases carbon through erosion and emissions. Irrigation and runoff from natural precipitation gradually removes soil carbon since it is lighter than other soil components and thus washes away once soil is broken up in tilling. Soil emits carbon dioxide and other GHG when organic soil components break down as a result of decomposition caused by soil microbes.

One way to reduce the net carbon loss is no-till farming. Another means is putting carbon back into the soil in a stable, oxidation-resistant form known as biochar. As Bill McKibben has said, "We can unmine some of the coal, undrill some of the oil," through biochar technology.[10]

Adding biochar can make agricultural soils a net carbon sink and reduce emissions of nitrous oxide, a non-organic greenhouse gas.[11] Agricultural crop residues (such as corn leaves and stalks, almond and walnut hulls, and orchard wood) can be burnt at high temperatures (pyrolyzed) to make gaseous fuel such as methane and the resulting biochar (>80% pure carbon). Biochar can be tilled into the soil as a soil amendment that improves nutrient and water retention[12] sequesters carbon and facilitates nitrification. Moreover, biochar resulting from gasification of forest residues (logging slash or woody biomass removed in thinning and restoration projects) can be added to agricultural soils. This enables forests to contribute actively to a technology of carbon sequestration that goes far beyond storing carbon in leaves and wood.

Furthermore, biochar adds value to energy production via gasification of biomass. For example, the small Phoenix Energy gasification plant near Merced, California (500 kW) derives approximately 60% of its revenue from selling biochar.[13] The Phoenix plant also sells small orders of biochar. [14] The gas produced through gasification of woody biomass can be used as combustible fuel or in fuel cells.[15,16]

Under a cap-and-trade program, that raises the price of emitting carbon into the atmosphere, gasification will become more competitive and profitable since it is a net carbon-negative technology.

Recommendation: That state agencies promote biochar to enhance farmlands' carbon-sink capacity and improve soil productivity.

4. Water

Sierra Club strongly supports CARB's overall goal, *"Maximize efficient use of California's surface and ground water supplies through integrated policies and strategies that reduce the carbon footprint of water …."* We particularly congratulate

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[10] McKibben, B. 2009. Plants Suck. Orion Magazine, March/April 2009. "If you could continually turn a lot of organic material into biochar, you could, over time, reverse the history of the last two hundred years...We can, literally, start sucking some of the carbon that our predecessors have poured into the atmosphere down through our weeds and stalks and stick it back in the ground. We can run the movie backward. We can unmine some of the coal, undrill some of the oil. We can take at least pieces of the Earth and – this is something we haven't done for quite a while – leave them Better Than We Found Them."

[11] Cayuela M, et al 2013. Biochar and dentrification in soils: when, how much and why does biochar reduce N_2O emissions? Scientific Reports, April 25, 2013.

[12] Clough T, et al 2013. A Review of Biochar and Soil Nitrogen Dynamics, Agronomy, April 2013

[13] Greg Stangl, owner-manager Phoenix Energy, presentation at Community Scale Bioenergy from Woody Biomass at the McClellan Wildfire Training Center, December 14, 2012.

[14] http://www.phoenixenergy.net/shop

[15] Lehmann, Johannes, S. Joseph (eds.) Biochar for Environmental Management: Science and Technology. Earthscan, London, 2009.

[16] Lehmann, Johannes, Biochar Systems Science: Climate Change Mitigation with Multiple Sustainability Outcomes? A PowerPoint presented at Copenhagen 15 in 2009. Lehmann, a leading figure in the study of biochar, is on the faculty of Cornell University's Department of Crop and Soil Sciences.

CARB for emphasizing the need for more efficiency and conservation in agriculture and food-processing industries,

Recommendation: Sierra Club recommends that this goal be strengthened: *"Reduce water use by efficiency and conservation of surface and ground water supplies …"*. The goal should be not only making existing uses more efficient but finding ways to avoid unnecessary uses and finding alternative uses that save more water, and aiming to use less, not more water. However, it is important to take a holistic view: For example, gravity-flow deliveries that depend on upstream diversions from dams sometimes cause other environmental impacts in comparison to pumped deliveries from downstream diversions. Also, water recycling can be fairly energy intensive in comparison to traditional water uses that don't involve extensive retreatment and pumping uphill from downstream collection and treatment locations.

Recommendation: We recommend that a specific water/climate goal be affirmed: a 20-percent reduction in water use and a specific GHG benefit from this reduction be mentioned. We further recommend that efficiency goals be set for the agricultural sector, consumer of the greater part of California's fresh water, and specific GHG reduction goals for electricity used to move water throughout the state, currently some 20 percent of all electricity consumed.

Recommendation (Funding): We recommend a public goods charge for funding investments in water efficiency and conservation that will lead to reductions in greenhouse gases. We also recommend stronger support for "pay as you save" programs for water conservation. We recommend reducing current energy subsidies that make cheap energy available to the water transportation sector.

Recommendation (Technology): We recommend that no non-traditional water supply source (such as ocean-water desalination plants) be supported if it does not reduce net carbon emissions, especially if conservation and efficiency instead can supply needed water. (An exception to our desalination caveat is desalination of wastewater, which is essential to make water recycling and reuse work.) Increasing the percent of statewide renewables can arguably mitigate the energy/GHG impact of more desalination in this case. We also recommend installation of smart radio-protocol water meters (aka Advanced Metering Infrastructure - AMI) with adjustable pressure reduction valves for homes, industry and agriculture. The state Water Board, CPUC and CARB should be asked to coordinate.

Recommendation (Administration): We recommend greenhouse gas emission credits for water savings, allowed to the water purveyor based on a calculation that includes greenhouse gas emissions from the customer's side of the water meter.

5. Waste Management

Sierra Club believes that "Waste Management" is a 20th Century failed paradigm. Waste is a verb not a noun. If a system of production and consumption generates wastes, it generates excessive GHGs; there is resource mismanagement.

It is estimated that 37% of global GHG are emitted in the extraction, manufacturing, use, and discarding of resources that are made into products. Every product consumed has embedded energy. Reducing the material and energy intensity of products and services

will reduce GHG emissions. The goal of section 5 should be to reduce the environmental impact of material consumption, i.e. reduce the amount of carbon-based energy sources consumed and minimize the amount of natural resources used to provide essential services and products. The use of energy and resources to produce frivolous, extravagant and excess goods and services needs to be heavily taxed to discourage their production and to make consumption of such eco-destructive goods and services culturally unacceptable. The 21st Century needs a new resource ethic where clean renewable bio-compatible products are manufactured and used. Managing wastes is not the challenge for the 21st Century – our goal is to eliminate wasteful processes and products that result in excessive GHG emissions. AB 32 is a tool to achieve that end.

The Sierra Club recommends that Section 5 be re-named "Resource Management," to focus on managing resources not waste. The principal objective of this section is to reduce the environmental impact of production, use and discarding of organic and inorganic products.

Resources only become "wastes" when they are co-mingled and made toxic with other resources. The key to reduction of GHG emissions is to keep resources source-separated and clean; thus enabling recovery and reuse of those resources as secondary material feedstock for new products.

Recommendations: The primary strategies for AB 32's "Resource Management" section 5 should be to:

- Incentivize the building-out of appropriately scaled "Clean Stream" material handling and reprocessing infrastructure; while at the same time actively regulate producers/importers of products to adhere to the highest and best use principles of resource management. To this end, AB 32's policy instruments and programs must foster at all levels – in the home, the community, the county, the region, and the state -- appropriately scaled services to facilitate clean-streaming source separation and recovery of all resources for reuse, repurposing and recycling.
- Heavily tax single-use products and packaging to incentivize the use of reusable, repairable and multi-use recyclable products and packaging.
- Incentivize the re-designing of products and processes to achieve Zero Waste along the full length of the production/consumption /recovery supply chain.
- Ban all organics from disposal facilities (aka landfills) by providing alternative infrastructure to reclaim and reuse organic materials to revitalize soil fertility.
- Support the establishment of secondary material reprocessing industrial infrastructure within the State of California.
- Facilitate with education, incentivize with tax breaks and eventually legislate all commercial and industrial organizations to produce their own site specific "Zero Waste Plans" that set tangible Zero Waste goals and report performance.
- Ban the destruction of product resources by incineration conversion technologies.
- Adopt an integrated "resource conservation education strategy" that includes energy, material consumption, and water to assist in the transformation to a low carbon economy.

6. Natural and Working Lands

Inventory Development and Research: We request the forest inventory include the carbon in the soil and to account for the soil loss from clear-cut lands.

Planning and Actions: We support all the recommended actions. In addition, we recommend expansion of programs to restore natural forest ecosystems (where damaged by fire) in ways that maximize carbon storage. We recommend CARB retain a clear leadership role in evaluation of strategies and standards set by other agencies, particularly the certainty of emission reductions and the consistency of inventory and accounting. We recommend that any perceived reduction in potential wildfire-related emissions attributed to fuels reduction activities should be considered speculative and not be used for GHG targets. We recommend that biomass utilization not lead to adverse forest management practices or impact on important or sensitive habitat areas, and that forest thinnings for fire protection be used, where environmentally justifiable, for composting or biomass fuel.

Funding: We support all the recommendations

Offsets: Sierra Club continues to oppose the use of offsets for any forests where clear-cutting is practiced.