**SCOPING PLAN 2022**

**Comments to CARB    1 Sept. 2021**

**David Bezanson, Ph.D., CA voter**

[**2022 Scoping Plan Update - Scenario Concepts Technical Workshop Presentations | California Air Resources Board - ww2.arb.ca.gov**](https://ww2.arb.ca.gov/resources/documents/2022-scoping-plan-update-scenario-concepts-technical-workshop-presentations)

Thank you for presenting the important series of workshops on the SP 2022. The following comments are presented to help you achieve your mission. Some of the following recommendations will require collaboration with other agencies or the Legislature.

CARB's mission is to promote and protect public health, welfare, and ecological resources through effective reduction of air pollutants while recognizing and considering effects on the economy. CARB is the lead agency for climate change programs and oversees all air pollution control efforts in California to attain and maintain health-based air quality standards.

CARBON NEUTRALITY TIMEFRAME

Target CN by 2035 at the latest. Target net negative GHGs by 2045 at the latest.

[https://bit.ly/3t8yR17](https://sd13.senate.ca.gov/index.php/news/getting-to-zero/september-2-2021/what-californias-ghg-trends-tell-us-about-getting-to-zero)

ENGINEERED CARBON REMOVAL

Prior to spending public funds on NET, locate or conduct research that measures GHG and toxic emissions over the lifecycle of any NET. Expend tax revenue on NET only if research verifies that there is net capture of CO2 over the lifecycle of a NET. (Gross capture is insufficient). We oppose the use of smokestack CCS because net CO2 capture over the lifecycle has not been proven, it increases toxic emissions including criteria pollutants, and damage to public health, and violates EJ. We favor the use of 100% renewable DAC and other freestanding100% renewable NET. These are to be paid for by fossil fuel companies in CA. CO2 must be stored immediately and storage sites are to be diligently monitored by CARB, at the expense of all fossil fuel companies in CA. In addition, natural sequestration should be maximized. Set a quota on logging to increase sequestration. (See later section on HFCs and other high GWP emissions).

<https://docs.google.com/document/d/1sY2IIjxTWnfU51nX5QFm7vyrQliakyBlVNeCO1c3_P8/edit>

<https://docs.google.com/document/d/1XAbDOMxtVHIkHyBZ2y6msxVfi3lDcmQZrT_B40nQm3Y/edit>

CARBON FREE GRID

Target 90% renewable electricity by 2030 and 100% renewable electricity by 2035. Several reports have calculated that this is feasible using current technology. Innovations are likely within the next ten years that will make these targets more accessible and affordable. By renewable we mean geothermal, PV solar, wind turbines, tidal, and 100% renewable hydrogen generated via electrolysis of water. Nuclear, RNG, new hydro, and biomass combustion are excluded for a long list of reasons. We select Option A “No Combustion”. This includes generators, i.e., they must be zero emission. Other energy technologies may be considered only if independent research verifies that their lifecycle Carbon Intensity is lower than that of PV solar. More resources should be allocated to achieving a 100% renewable grid than decarbonization of any other sector. When the grid is 100% clean, this will provide a transfusion of clean energy into electrification of all other sectors. If the electrification of other sectors is prioritized, this will increase the use of fossil fuels because the current grid is about half dirty.

Failure to incorporate externalities into the prices of fossil fuels causes their prices to be too low and escalates the cost of electricity.

<https://haas.berkeley.edu/energy-institute/events/energy-institute-webinar-borenstein-bushnell/>

<https://www.oneearth.org/below-1-5-c-a-breakthrough-roadmap-to-solve-the-climate-crisis/>

<https://web.stanford.edu/group/efmh/jacobson/Articles/I/NonEnergySolutions.pdf>

<https://carbontracker.org/reports/the-skys-the-limit-solar-wind/>

<http://web.stanford.edu/group/efmh/jacobson/Articles/I/CombiningRenew/100PercentPaperAbstracts.pdf>

[2021 SB 100 Joint Agency Report Summary Achieving 100% Clean Electricity in California](https://efiling.energy.ca.gov/GetDocument.aspx?tn=237168&DocumentContentId=70348)

<https://www.sciencedaily.com/releases/2019/12/191220150545.htm>

[100% clean energy electrification could save California households $34 billion and create 792,592 Jobs](https://default.salsalabs.org/T7c1ce80c-8de1-46c1-a983-7855f85e390a/e7488f8c-daff-4b96-ab6d-c348b71f0c69)

VMT

Pursue a suite of policies to decrease VMT, especially of passenger vehicles. Target a 25% decrease by 2030. One policy is to impose a mileage tax (based on odometer reading) at the time of sale of a vehicle. The tax would be tiered, based on average miles per year owned.The tax rate for ICE vehicles is to be double that of ZE vehicles.

Remote work incentives should be offered to staff. For every 100 staff that discontinue working on site, and change to working only remotely, a company saves $1 million annually.

VEHICLE FLEET ELECTRIFICATION

Target 100% ZEV sales by 2030 for passenger vehicles, trucks, off-road transport, and buses. Hydrogen fuel cell propulsion vehicles should only qualify if the H2 is generated with 100% renewable energy to power electrolysis of water. Other H2 generation technologies would qualify only if the lifecycle Carbon Intensity is lower than that of renewable electrolysis. Scale up renewable H2 fueling stations and EV charging stations to accommodate this transformation. Establish a higher sales tax and annual registration fee for ICE vehicles. Also increase diesel and gasoline taxes annually via a pre-announced ten year schedule. All ICE owners must feel the pain at the pump, due to higher petrol costs, in order to diminish demand for ICE vehicles. Policies that attempt to keep petrol prices low will fail to impel a transition to ZE.

<https://haas.berkeley.edu/energy-institute/events/energy-institute-webinar-borenstein-bushnell/>

PETROLEUM FUELS

Phase out extraction, refining, and petrochemical production completely by 2030. Set the fastest pace of contraction for extraction, then refining, and then petrochemical Halt issuance of permits for new fossil fuel infrastructure, gas stations, and wells ASAP. Do not await finalization of the 2022 Scoping Plan.

Prohibition of new infrastructure is considerate of the fossil fuel industry including labor. A necessary part of phasing out the industry is to prohibit use of infrastructure to extract and process fossil fuels. This creates stranded assets of fossil fuels and infrastructure. If done without advance notice, this will trigger a sudden decrease in the market value and earnings prospects of firms. In turn, this will trigger sudden furloughs. By announcing a phase out target year of 2030 in 2022, this provides an advanced signal to industry that any new infrastructure they build will need to be shut down by 2030. This prevents firms from having a low ROI on capex. It also allows time to plan an orderly, gradual transition of the labor-force.

It is preferable to import oil and gas with the lowest carbon intensity than to have a fossil fuel industry in CA. When fossil fuel companies have ceased to operate in CA, the influence of that industry on policies will plummet precipitously. This will promote passage of more effective decarbonization policies. Importing increases transport emissions. However, the carbon intensity of viscous CA oil is higher than that of tar sands. Low-carbon shipping options are increasing. There are electric trains and low-carbon power sources are planned for marine tankers. If ambitious decarbonization policies are implemented swiftly, after 2030 the demand for fossil fuel products will be low and demand may dwindle to negligible amounts within a few years. Importing avoids emissions in CA of GHGs and airborne toxics including criteria pollutants, thereby improving EJ and public health.

The phase out should include a just transition plan for workers. Prof. Pollin’s report is a good start. However, it needs refinements to prevent abuses of the process, which would short-change labor and other taxpayers. We want all workers to enjoy health, including executives. Fossil fuel operations and working conditions are one of the most hazardous of all industries. Creating less hazardous jobs requires a transition to less carbon intensive energy sources.

Divestment from fossil fuel investments on the part of public pension plans is recommended to protect the future stream of benefits to beneficiaries. If CalPERS and CalSTRS divested in 2014, each would have earned between $5 and $10 billion more. The fossil energy sector has the highest *beta* and the lowest *alpha*. It has the second highest carbon intensity (MT of CO2e/$1 million in revenue). The utility sector has the highest carbon intensity because it burns fossil fuels.

We invite the fossil fuel industry to participate in the renewable revolution. This will increase jobs and GDP more than continuation of fossil production. In contrast to the fossil fuel sector, the renewable energy sector is sustainable.

<https://s3.documentcloud.org/documents/20805131/pollin-report.pdf?utm_id=30846&sfmc_id=1744898>

['Bottom of the Barrel' CA Oil Can Be Far More Carbon Intensive Than Import](https://default.salsalabs.org/T9347ccf5-f570-4a96-8d14-47de98888cec/e7488f8c-daff-4b96-ab6d-c348b71f0c69)

[The future of work in oil and gas | Deloitte Insights](https://www2.deloitte.com/us/en/insights/industry/oil-and-gas/future-of-work-oil-and-gas-chemicals.html)

SHORT-LIVED POLLUTANTS WITH HIGH GWP

       Methane

       CH4 is referred to as a SCLP. This is misleading. CH4, which has a GWP 83 times higher than CO2 during its initial 20 years in the atmosphere. It naturally degrades into CO, H2O, and CO2. The latter lingers in the atmosphere for centuries. All natural and anthropogenic sources should be addressed.

Fossil fuel infrastructure including active wells, idle wells, and pipelines are notorious for fugitive emissions of CH4. The industry should be required to decrease emission rates from the current norm of 1 - 3% to less than 0.5%. Industry (fossil producers and shareholder-owned utilities) should pay for all costs of this infrastructure maintenance.These emissions can be accurately monitored from satellites. The EPA plans to use this monitoring technology on a nationwide scale and CARB should collaborate with CA EPA to ensure its success.

Most livestock farming, for production of meat and dairy products, should be replaced with regenerative crop farming. This replaces a high-volume source of CH4 emissions with carbon-sequestering and storing processes that have minimal methane emissions. Livestock raising uses 5 to 10 times more water per kg. and acre than crop farming. Agriculture uses more water than any other industry in CA. No amount of imported water can overcome increasing droughts and heat waves that kill livestock, plants and farmers.Biogas capture from livestock operations has not been proven to achieve net CH4 capture. Fugitive emissions from biogas pipelines are common. Until research is published that proves net capture over the lifecycle, biogas technologies should not be publicly funded.

The 2020 report by Lawrence Livermore National Lab, submitted to CARB, wisely recommended that the only source of biomass that should be used for heat or electricity is waste. Branches and leaves that fall in forests are not waste. These are habitats and nutrients for forest ecosystems and increase the ecosystem services of forests, e.g., watershed creation and C sequestration. Woody biomass should not be scavenged for energy production. The lowest Carbon Intensity practices for biomass are composting, nanocellulose, and mulch. These sequester and store C without using combustion. No research has been published to verify whether biomass electricity or BECCS achieves net lifecycle CO2 capture. Until such is published, public funds should not be used for biofuels or biomass electricity.

Woody biomass should not be used for hydrogen production because it has a higher lifecycle Carbon Intensity than renewable electrolytic H2 from water. Biomass of any kind should not be used for biofuels or RNG that may be used in ICE. These are very inefficient and have a higher Carbon Intensity Index compared to battery EVs and renewable hydrogen fuel cells.

Circular economy policies are needed to prevent biomass waste generation and to use waste for regenerative agriculture and landscaping.

HFCs should be replaced with low GWP natural refrigerants. High GWP anesthetic gases used in surgery should be replaced with lower GWP anesthetics. The difference between lower and high is over 1500 GWP units.

.<https://escholarship.org/content/qt3pn8s961/qt3pn8s961_noSplash_b1d302a49f54828e57a5e496836ad255.pdf?t=qep7n5>

[Anaesthetic gases, climate change, and sustainable practice - The Lancet Planetary Health](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196%2817%2930040-2/fulltext)

BUILDING DECARBONIZATION

Option A is preferred , with slight modifications. New buildings and appliances are to be all-electric by 2025. Retrofits are to be completed by 2035. More public education about the health and climate hazards of NG, electrification, and incentives is needed. A page should be dedicated to this on CARB or CEC website. A monthly surcharge on utility bills should be imposed on buildings with functional NG infrastructure. This revenue would be used to incentivize electrification.  New building codes should require sufficient electrical capacity to provide Level II EV charging and this is to be integrated into the inverter and rooftop PV solar panels.

INDUSTRY

Option A is preferred. CARB should consider funding R&D of innovations that provide sufficient energy without using combustion. 100% renewable electrolytic H2 from water is a good candidate that is suitable for commercial application. Cement substitutes for Portland cement are available that require much less energy input. The bill SB 596 is addressing this and it will be voted on before Sept. 10. It is better to produce our own glass, metals, and concrete with low emissions than to import such from other jurisdictions with less effective regulations. This generates jobs and tax revenue in CA and avoids emissions and financial costs of transportation.

All-electric heavy construction equipment is commercially available. Zero emission generators are commercially available, but pricey. CARB should incentivize R&D to improve ZE generator technologies for emergency backup, construction, and landscape maintenance.

ENVIRONMENTAL ANALYSIS

Use interim targets, at least every other year, for each policy. This creates gradual change that is convenient for government and business planning.

Lifecycle cost: benefit analyses should be conducted for each technology. The costs should include a lifecycle Carbon Intensity quantity (e.g., kg. of CO2/MJ) and the Social Cost of Carbon. Benefits should include increases in productivity and GDP due to improved public health, decreased government expenditures for public health, more resilient and sustainable agricultural yields, lower costs of property insurance, higher property values and property tax revenue, improved EJ, and lower financial costs of clean energy. The sooner we decarbonize, the less it will cost and the more suffering it will prevent. Continue to provide opportunities for energy planning on the part of residents of sacrifice zones. Active and public transit are two of the most affordable plans for frontline neighborhoods.

Each dollar that we spend on curtailing airborne emissions and decarbonizing our economy provides two dollars of benefit in the form of prevented medical expenses.

Wang, T., Jiang, Z., Zhao, B. *et al.* Health co-benefits of achieving sustainable net-zero greenhouse gas emissions in California. *Nat Sustain* **3,** 597–605 (2020).<https://doi.org/10.1038/s41893-020-0520-y>.

.[Deaths from fossil fuel emissions higher than previously thought (harvard.edu)](https://www.seas.harvard.edu/news/2021/02/deaths-fossil-fuel-emissions-higher-previously-thought)

Appendix: New Sources of Revenue to Fund the Scoping Plan

Extraction, refining, fugitive emissions, and combustion of fossil fuels is responsible for about 75% of anthropogenic GHGs and toxic airborne pollutants. Thus, the utility and fossil fuel industries should pay for most of the costs of implementing the SP.

To engage utility and fossil fuel (FF) firms and invite them to be part of the solution rather than the problem, these companies should receive tax credits for replacing production of fossil fuels with renewable electricity. E.g., if their FF production falls by 10% from the prior year while their generation of renewable electricity increases by 10%, they would qualify for the lowest credit. If the percent change of each reaches at least 90%, they would qualify for the highest credit.

The credit and other costs of the SP could be funded by any of the following:

+ increase FF corporate taxes to a percentage high enough to offset the effect of federal subsidies plus externalized costs (Social Cost of Carbon)

+ increase the floor auction price of Cap&Trade carbon emission allowances to the current amount of Social Cost of Carbon, i.e., at least $125/MT CO2e, discontinue offering free allowances, set an expiration date for allowances that have been banked, and decrease credits for offsets

+ increase taxes annually on NG, diesel, propane, and gasoline announced for the upcoming 5 years

+ enact carbon tax legislation to complement Cap&Trade. This would be at the Social Cost of Carbon rate and apply to all stationary source polluters (not merely the largest 10% or 20% of firms). A severance tax, mentioned below, is 1 kind of C tax.

+ impose an annual permit renewal fee for active and idle wells

+ increase fees to decommission retired wells

+ issue municipal bonds for publicly-owned distributed renewable energy and infrastructure

+ create an oil and gas severance tax (most states have this)

+ increase airport and flight fees

+ increase sales taxes, smog check fees, subscription taxes, rental surcharge, and annual registration fees for used and new internal combustion vehicles

+ impose a permit fee for new wells

Currently CalGEM does not charge for new or renewal well permits. To avoid a buying frenzy for new permits, the fee should start high (at least $10,000) and be lowered annually only if the number of permit applications decreases by at least 25% from the prior year. If the number of new permit applications is higher than in the prior year, the fee would increase by 25%. An alternative is to hold auctions with a floor price that would drive decarbonization. In other states, the permit fee for a fracking well is between $12,000 and $15,000. Halting the issuance of permits is preferred to charging permit fees.

One objective of the above is to increase the cost of fossil fuels. This would increase demand for renewable energy. To offset cost increases for the indigent, progressive measures would be enacted, e.g., individual income tax credits.