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Non-Energy Impacts of Woody Biomass Energy

Additional submitted attachment is included below.

RE: Comments on Non-Energy Impacts (24-OIIP-03) of Woody Biomass Energy

To the California Energy Commission,

The Center for Biological Diversity ("Center") submits the following comments on the California Energy Commission's ("CEC") Order Instituting Informational Proceeding, 24-OIIP-03, to integrate non-energy benefits ("NEBs") and social costs (collectively "Non-Energy Impacts" or "NEIs") into energy planning and investment decisions ("NEI OIIP"). We appreciate the CEC undertaking this important proceeding.

These comments focus on the NEIs of woody biomass energy, i.e., energy made from forest and agricultural biomass. Woody biomass energy in California has, to date, primarily been produced through biomass combustion to generate electricity. However, new proposals for biomass energy production have focused on gasification or pyrolysis of woody biomass to generate electricity and other products including methane, hydrogen, and bio-oil. Therefore, these comments address biomass combustion, gasification, and pyrolysis.

Woody biomass energy production, whether through combustion, gasification, or pyrolysis, has significant negative impacts. It degrades local air quality; worsens climate change; is expensive; reduces wildfire resilience and forest ecosystem resilience; has high water usage in the case of hydrogen production; and can lead to detrimental land use change. As the CEC develops NEI values, we ask that you ensure that the methodologies can capture the impacts from biomass energy detailed in this comment.

I. Local Air Quality Impacts

Woody biomass combustion, gasification, and pyrolysis degrade local air quality by emitting a wide range of health-harming air pollutants including fine particulate matter, NOx, and benzene. Woody biomass energy facilities routinely exceed their emissions allowances, and air quality violations are common. Biomass energy facilities are frequently sited in low-income communities and communities of color, worsening environmental injustice. Biomass proponents incorrectly claim that woody biomass residues must either be piled burned or used to make energy, when in fact there are cleaner alternatives for biomass that do not create air pollution.

A. Biomass combustion, gasification, and pyrolysis produce a wide array of health-harming air pollutants that must be accounted for.[1]

Biomass combustion power plants are among the largest emitters of nitrogen oxide (NOx) and fine particulate matter (PM 2.5) in California. In the San Joaquin Valley Air

Basin, three biomass power plants—DTE Stockton, Rio Bravo Fresno, and Mount Poso—were the 9th, 10th, and 12th biggest stationary source of NOx, respectively, in 2022 out of 144 sources.[2] Rio Bravo Fresno and DTE Stockton were also the 11th and 19th largest stationary sources of PM 2.5 in 2022.[3] In the Sacramento Valley Air Basin, 8 of the 10 worst NOx polluters were biomass power plants, and 5 of the 10 worst PM 2.5 polluters were biomass plants in 2022 out of 55 sources.[4]

Biomass power plants also emit hazardous air pollutants such as hydrochloric acid, dioxins, benzene and other BTEX chemicals, formaldehyde, arsenic, chromium, cadmium, lead, and mercury.[5] For example, in 2022, Humboldt Redwood Company's Scotia biomass cogeneration facility reported emitting a whopping 13,672 pounds of the carcinogen benzene (second-highest benzene emitter across the state's stationary sources) and 14,472 pounds of the toxin formaldehyde (tenth-highest formaldehyde emitter across the state's stationary sources).[6]

Fine particulate matter (PM 2.5) can penetrate deeply into the lungs, even enter the bloodstream, and cause serious health problems including heart disease, premature death, stroke, and aggravated asthma. NOx damages the respiratory system and contributes to acid rain, harming ecosystems. Benzene is a well-known human carcinogen, and toluene and xylenes damage the brain and nervous system, respiratory system, kidneys, and liver.

Biomass gasification and pyrolysis processes also emit a wide range of air pollutants. Gasification of biomass at high temperatures (800-1200°C) produces a "syngas" containing large amounts of CO_2, as well as methane (CH_4), carbon monoxide (CO), and hydrogen (H_2), in addition to liquid hydrocarbons and tar, solid char and ash residues, and numerous air pollutants.[7] Pyrolysis heats biomass to temperatures of 350-600°C without oxygen and produces similar products to gasification, including large amounts of CO_2, with the addition of pyrolytic oil ("bio-oil") and larger quantities of char. Heath-harming pollutants from biomass gasification and pyrolysis include fine particulate matter, NOx, SOx, benzene, toluene and xylenes (BTEX), tars and soot, and persistent organic pollutants such as polycyclic aromatic hydrocarbons (PAHs) (e.g., naphthalene), polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/Fs).[8] The formation of NOx precursors, including NH_3, HCN and HNCO, during biomass pyrolysis has been widely reported.[9]

The formation of liquid tar is also an inherent problem in biomass gasification. Tar contains toxic substances such as benzene, toluene, and naphthalene, while tar build-up also lowers energy efficiency, interrupts continuous operation, and increases maintenance costs of gasification processes.[10] Methods to clean tar from equipment would create large amounts of toxic wastewater, with resulting environmental and community harms.[11]

B. California's biomass power plants routinely exceed their permitted emissions.

California's biomass power plants are guilty of repeated air quality violations.[12] For example, the U.S. Environmental Protection Agency (EPA) issued a notice of violation in 2022

to the Desert View biomass power plant in the Coachella Valley for repeated emissions exceedances of mercury, hydrochloric acid, carbon monoxide, sulfur dioxide, nitrous oxides, and opacity.[13] The plant was the largest single emitter of smog-causing pollutants in the valley — producing nine times as much as the second largest source, a gas-fired power plant.[14] Residents voiced concerns for years about smoke plumes from the biomass plant blowing over their homes, a school and a daycare center.[15] The EPA in 2016 cited and fined the Blue Lake biomass power plant, located near Blue Lake Rancheria Indian Tribal lands, for multiple air pollution violations.[16] Tribal members, especially children and the elderly, reported severe health harms from the air pollution from the plant.[17] Merced Power and Chowchilla biomass power plants in the San Joaquin Valley have been fined for excess emissions of nitrogen oxides and fine particulate matter.[18]

Between 2015 to 2021, at least 2,034 cases of emissions exceedances and violations were reported by 18 California biomass power plants, according to records obtained by the Center for Biological Diversity from air districts via Public Records Act requests. The records received were incomplete and therefore represent an underestimate of excess emissions. Reported pollutants included NOx, CO, and particulate matter. Of these 18 biomass power plants,[19] four reported more than 200 instances of excess emissions during the reporting period: Honey Lake had an average of 66.5 exceedances/year, followed by Collins Pine with 56.2 exceedances/year, Humboldt with 48 exceedances/year, and SPI Quincy with 47.4 exceedances/year. Across all 18 plants, the most common type of emissions exceedance was opacity. Opacity measures the reduction of light after passing through emitted smoke, and higher opacity indicates higher particulate matter. Emissions exceedances are incidents during which the biomass power plant exceeded its permitted pollution level. A single exceedance can last hours or multiple days. Emissions exceedances are in addition to the sizeable emissions from these power plants that are already allowed by permits.

C. Biomass facilities are often sited in environmental justice communities.

California's biomass power plants are often sited in environmental justice communities. In the San Joaquin Valley, eight of the 10 active and idle biomass plants are located in communities already severely overburdened by pollution.[20] Fresno's Rio Bravo biomass plant is located less than a half-mile from the Malaga Elementary School, Malaga Community Park, and surrounding homes, all in a majority Hispanic neighborhood with a pollution burden score of 100.[21] The DTE Stockton biomass power plant is located about a half-mile from homes and less than a mile from an elementary school and community center in majority Hispanic neighborhood with a pollution burden score of 99.[22]

Proposals for new woody biomass energy facilities also frequently target environmental justice communities. For example, in California's Central Valley, idled biomass power plants including the Mendota, Delano, and Madera plants have been proposed to be reopened as biomass gasification or pyrolysis facilities to produce electricity, methane, and hydrogen, threatening to worsen pollution for these communities.[23] Another proposal envisions a massive

build-out of 50 to 100 biomass processing facilities—many of them biomass gasification and pyrolysis facilities—that would be concentrated in the Central Valley, paired with a polluting network of CO_2 pipelines, railcars, and trucking, and the injection of 100 million tons of CO_2 underground each year,[24] with inevitable harms from air pollution, water pollution, noise pollution, CO_2 leakage, earthquake risks, and ecosystem damage.

D. Biomass proponents incorrectly claim that woody biomass must be used for energy production or pile burning – and ignore cleaner alternatives.

Bioenergy proponents often claim that woody biomass residues must either be pile burned or made into energy, but this is a false choice between two polluting options. There are alternative methods for managing forest and agricultural biomass residues that do not create air pollution. For forest biomass, the most beneficial practice is leaving these materials in the forest to maintain soil organic carbon, retain nutrients in the ecosystem, and support wildlife habitat.[25] Forest residues break down over time, releasing nutrients that stimulate forest growth and add to forest soil carbon, which keeps carbon circulating in forest ecosystems. Coarse woody debris and downed logs provide important wildlife habitat.[26] Forest materials can be broken down into large pieces and scattered in a way that maintains their contact with the forest floor, often called "lop and scatter," or masticated or chipped into smaller pieces and scattered across the forest floor. Research indicates that chipping, mastication, and "lop and scatter" of materials in the forest do not appear to increase wildfire intensity.[27] When forest residues are scattered across the forest floor, without creating deep layers or piles of material, they are unlikely to produce methane emissions, in contrast to the significant methane emissions that are released by the log landings and wood chip piles created as part of bioenergy production.[28] If wood must be removed from forests, it can be turned into mulch, shavings, and other non-incineration products.[29]

For agricultural biomass, mulching, and chipping and reincorporation—as alternatives to pile burning—have been shown to promote soil health, increase crop yields, create agricultural drought resistance, and sequester carbon in soils for the long-term.[30] Whole orchard recycling is a chipping and reincorporation practice used in California with perennial crops like almonds. When an agricultural operation is ready to replant an orchard, the old orchard biomass is ground and shredded using land clearing equipment, and the resulting chips are reincorporated into the soil in preparation for new tree plantings. Following whole orchard recycling, studies have found that trees grew more, trees were more productive, trees were more efficient in irrigated water usage, soil nutrient content was greater, soils were able to hold more water, and the carbon sequestered in the soil was greater—out to nine years following the start of the study.[31] Mulching, or simply leaving agricultural waste on the ground, even without actively reincorporating it into soils, has also been shown to have numerous benefits: controlling erosion, conserving soil moisture, reducing soil compaction, removing harmful heavy metals, reducing weed growth and minimizing the need for pesticides and herbicides, and regulating soil temperature which will be increasingly beneficial in a heating climate.[32]

Using agricultural waste for mulching or chipping and reincorporation can provide notable climate benefits. These methods enable carbon to be incorporated into soils or plants as the waste decomposes, leading to additional carbon storage. Using agricultural waste in place of nitrogen-based fertilizers has also been shown to reduce nitrous oxide emissions from soils, leading to climate benefits. The combination of improving soil health and carbon storage makes techniques of agricultural waste management such as mulching and chipping and reincorporation more beneficial than using them for bioenergy production.

II. Climate Impacts

Biomass energy production emits significant greenhouse gas emissions across the lifecycle that worsen climate change and reduce climate resilience. These emissions must be fully accounted for. We ask the CEC to review and revise its treatment of greenhouse gas emissions from biomass energy to fully account for these emissions and their impacts.

Bioenergy proponents incorrectly claim that making bioenergy using woody biomass is carbon neutral, asserting these processes lead to no net increase of CO_2 to the atmosphere.[33] This claim has been repeatedly debunked by scientific experts and assessments,[34] including the Environmental Protection Agency's Science Advisory Board and Intergovernmental Panel on Climate Change (IPCC).[35] At the smokestack, biomass power plants emit more CO_2 per unit of energy produced than coal.[36] Making electricity and fuels using woody biomass is polluting across the lifecycle, resulting in decreased forest carbon sequestration; substantial upstream emissions from biomass extraction, transport, processing, and storage; and significant downstream emissions from combustion, gasification, and pyrolysis.

Decreased forest carbon sequestration: Cutting down trees ends their carbon sequestration. Because a tree's carbon sequestration rate increases with size, large trees capture carbon more efficiently than smaller trees.[37] Therefore, it takes many years for trees that grow back after logging/thinning to become large enough to draw down the same amount of carbon as the trees that were cut, resulting in decreased forest carbon sequestration.

Substantial upstream emissions: Substantial upstream emissions are released during cutting, extraction, transport, and processing of woody biomass in preparation for making bioenergy and fuels. Climate and air pollution is released from the use of heavy machinery to cut and extract trees from forests; the use of fertilizers and pesticides after cutting; transporting biomass often long distances in diesel trucks; and processing biomass through chipping and drying.[38]

Methane emissions from wood chip storage piles and log landings: The wood chip storage piles and log landings at biomass facilities release substantial methane emissions that can be large enough to significantly add to the overall climate impact of bioenergy production.[39] One study reported that wood chip piles can cause "remarkable" methane emissions as well as nitrous oxide (N_2O) emissions, and that "greenhouse gas emissions from storage [in wood chip piles]

can, in some cases, be much greater than emissions from the rest of the biofuel production and transportation chain."[40]

Significant downstream emissions: The main processes used to turn woody biomass into energy and fuels—combustion, gasification and pyrolysis—are dirty processes that emit significant climate and air pollution.[41] Combusting woody biomass to make electricity is more carbon-polluting at the smokestack than coal per unit of energy produced.[42] Biomass gasification and pyrolysis are similarly dirty. Gasification and pyrolysis heat biomass to high temperatures using water and a controlled oxygen stream (or no oxygen in the case of pyrolysis) to produce a "syngas" that contains large amounts of CO_2, as well as the climate super-pollutant methane (CH_4).[43]

Bioenergy production—including using "residues"—is not carbon neutral. Bioenergy proponents incorrectly claim that bioenergy production is carbon neutral by (1) ignoring upstream emissions and foregone forest carbon sequestration and (2) taking credit for future forest growth, ignoring the time lags and uncertainty in that growth. Specifically, bioenergy proponents immediately offset the CO_2 emissions released from logging/thinning, processing and transport, and biomass combustion, gasification and pyrolysis by taking credit for the CO_2 that will be absorbed by future tree growth.[44] This is misleading because forest growth takes time and is uncertain—there is no requirement that cut forests will be allowed to grow back or that forests won't be converted to other land uses. Once trees are cut, numerous studies show it takes many decades to more than a century—if ever—for forests to regrow and drawdown the CO_2 emissions that were released when they were cut and turned into energy or fuels.[45]

Importantly, research shows that making bioenergy using forest "residues" or "waste" feedstocks—referring to biomass that would otherwise be disposed of—is also not carbon neutral. The combustion or gasification of forest residues leads to a *net increase* of carbon emissions in the atmosphere for decades.[46] One study found that combusting all wood types, including forest residues (defined as branches, tree tops and bark) and fire-killed trees, to generate electricity increases carbon emissions in the atmosphere for more than a century compared to generating that electricity with fossil gas.[47] These conclusions would be similar for gasification and pyrolysis since CO_2 is a primary product.

As summarized in a recent review by Mackey et al. (2025), "burning forest biomass for energy is not carbon neutral or beneficial":

> We found that models used to evaluate bioenergy rely on key assumptions that are in themselves capable of delivering results supportive of bioenergy as an effective strategy. Yet there is abundant evidence that these assumptions are invalid and that burning forest biomass for energy is not carbon neutral or beneficial. From our assessment, we concluded that burning forest biomass, including logging residues, increases atmospheric CO_2 concentration; land sector reporting using net greenhouse gas inventories obscures the impact of forest harvesting on ecosystem

carbon stocks; and biomass energy will most likely displace other renewable energy, rather than fossil fuels.[48]

In short, making fuels and energy using woody biomass, including residues, is polluting and expensive, resulting in foregone forest carbon sequestration and significant upstream and downstream carbon emissions, while displacing clean solar and wind energy. Biomass energy production has the overall effect of worsening climate change and reducing climate resilience.

III. Affordability Impacts

Burning or gasifying trees for energy is an inefficient and expensive way to make electricity. The significant costs associated with biomass removal, transport, processing, and combustion or gasification result in biomass power being very expensive compared to other electricity sources.[49] Biomass power plants depend on public subsidies to prop them up such as the BioMAT program (Bioenergy Market Adjusting Tariff) and BioRAM program (Bioenergy Renewable Auction Mechanism). The BioMAT and BioRAM programs require electric utilities to buy biomass electricity at high prices that are passed down to California customers in higher electricity bills. SoCal Edison buys BioMAT power at $199.72/MWh[50] which is ~4 times higher than the average wholesale price of power on the California grid – and much higher than PV solar and wind energy. PG&E buys BioMAT power $127.72 – $199.72, which it confirms "is much higher than the average cost of incremental wholesale electric generation today, even when considering only RPS-eligible resources."[51] BioRAM prices are similarly high at ~$115/MWh.[52] PG&E and SoCal Edison are on record opposing extending the BioMAT beyond its current December 31, 2025 end date because, among other reasons, it is "administratively complex, costly, and largely unused."[53] Based largely on the high costs, the California Public Utilities Commission has proposed to end the BioMAT subsidy program on December 31, 2025.[54] Public subsidies for biomass energy production reduce resources for affordable, truly low-carbon solar and wind energy, impeding California's progress on affordable, clean energy.

IV. Wildfire Resilience Impacts

Thinning forests for bioenergy does not increase wildfire resilience and can even be counter-productive. It does not stop wildfires or reduce wildfire emissions, and it is not effective for community wildfire safety.

A. Thinning forests for bioenergy does not stop wildfires which are largely being driven by climate change.

Contrary to bioenergy proponents' claims, forest logging and thinning projects do not typically stop fires or reduce the amount of area burned.[55] Forest thinning projects can even increase fire intensity and rate of spread by creating hotter, drier, more wind-prone conditions and introducing invasive fire-prone grasses.[56] One comprehensive study covering three decades and 1,500 fires in the western US, including California, found that forests with the most

protection from logging/thinning burned with the lowest intensities.[57] Instead, the amount of forest area burned is primarily influenced by weather and climate and has little relationship to the amount of forest area treated. [58] Regardless of logging/thinning, forests are burning in extreme fire weather conditions—periods of high temperatures, low humidity, and strong winds—which are becoming more prevalent due to anthropogenic climate change. Anthropogenic climate change has been identified as the primary driver of the increases in area burned, extreme fire weather, and community wildfire destruction in California in recent decades.[59]

B. Thinning forests for bioenergy does not reduce wildfire emissions.

Biomass proponents often claim that logging/thinning will reduce the amount of area burned and lead to a decrease in wildfire emissions. While this claim can sound appealing, it is not supported. Instead, numerous studies have demonstrated the opposite: that broad-scale thinning for wildfire management leads to *more* carbon emissions than it prevents from being released in a wildfire, and results in a net increase of carbon emissions to the atmosphere and net decrease in forest carbon storage.[60]

Forest logging/thinning does not reduce overall emissions primarily because the carbon loss from forest thinning followed by wildfire is greater than the carbon loss from wildfire in un-thinned stands, when cumulative tree mortality is accounted for. In other words, thinning kills more trees than it prevents from being killed in wildfires.[61] In contrast to thinning, wildfire consumes a small percentage of forest carbon while improving availability of key nutrients and stimulating rapid forest regeneration. Research from California shows that even very severe fires combust less than 2% of living tree biomass on average.[62] Most of what is combusted is small material such as needles, twigs and small branches. In short, logging/thinning is the largest cause of carbon loss from California (and U.S.) forests rather than wildfire.[63]

C. Thinning forests for bioenergy is not effective for community wildfire safety.

A large body of research and on-the-ground experience demonstrates that the most effective way to protect communities from wildfires is to reduce the ignitability of structures themselves through proven "home hardening" retrofits paired with vegetation trimming within 60 to 100 feet of homes and other structures—not logging/thinning forests.[64] California-focused studies have found that vegetation management beyond 100 feet from homes and other structures provide *no additional benefit* for protecting those structures from burning.[65]

A 2023 study co-authored by U.S. Forest Service scientists concluded that "[t]he best way to make existing wildfire-vulnerable developments ignition resistant is to work within the limited area of the 'home ignition zone'—a home and its surroundings within 100 feet (which may include neighboring homes)."[66] The scientists emphasized that addressing the community wildfire destruction crisis will require changing from a "focus on the wildlands to one centered on the structure and its immediate surroundings," highlighting that the current approach "primarily directed toward fuel treatments in natural areas" is ineffective and insufficient.[67]

Similarly, Calkin et al. (2014) emphasized that treating wildland fuels does not "measurably impact the susceptibility of homes to ignition and subsequent destruction."[68] The study highlighted that home losses are increasing despite enormous investments in modifying wildland fuels because home susceptibility to wildfire is a direct function of their ignitability, which is dependent of the small area of the "home ignition zone" which "is independent of fire behavior in the nearby wildlands." According to the study, "research demonstrates a home's characteristics in relation to its immediate surroundings principally determine home ignition potential during extreme wildfires." The scientists emphasized that "[o]vercoming perceptions of wildland-urban interface fire disasters as a wildfire control problem rather than a home ignition problem, determined by home ignition conditions, will reduce home loss."

In a California-focused study, Syphard et al. (2014) found that structures were more likely to survive a fire if the vegetation was treated in the defensible space immediately adjacent to them.[69] These scientists reported that "[t]he most effective treatment distance varied between 5 and 20 m (16–58 ft) from the structure, *but distances larger than 30 m (100 ft) did not provide additional protection*, even for structures located on steep slopes. The most effective actions were reducing woody cover up to 40% immediately adjacent to structures and ensuring that vegetation does not overhang or touch the structure." Subsequent studies have re-affirmed the important role of defensible space adjacent to structures.[70]

V. Forest Ecosystem Resilience Impacts

Logging and thinning forests for biomass use in energy facilities can reduce forest ecosystem resilience. Logging and thinning cuts and removes trees, often big trees and large numbers of trees, and other forest vegetation using heavy machinery that degrades soils and wildlife habitat.[71] A recent review concluded that "the use of bioenergy results in major negative cascading impacts for forest ecosystem integrity and consequently a reduction in the resilience and natural adaptive capacity of species in the face of climate change impacts."[72]

Dead trees, which are often clearcut during "post-fire salvage logging," are a common source of woody feedstock for biomass energy facilities. However, removing dead trees lowers forest ecosystem resilience. Dead trees do not increase wildfire risk, including no increase in fire severity, rate of spread, or extent.[73] Instead dead trees – standing or fallen – provide numerous ecological benefits such as wildlife habitat, soil stabilization, and improved water quality.[74] Dead trees left standing in the forest after intense fires provide critical carbon storage by retaining the vast majority of their carbon and undergoing subsequent slow decay.[75]

In a recent PNAS study titled "Removing dead trees will not save us from fast-moving wildfires," the researchers concluded that "a substantial body of evidence shows that such largescale [dead] tree removals will have cumulative and mostly negative ecosystem and climate consequences, reducing the ability for ecosystems to regenerate after severe natural disturbances, emitting vast quantities of carbon from commercial logging activities, and increasing the risk of fires and floods. Put simply, the wholesale removal of dead trees will make the fast-fire situation

worse."[76] Many studies recommend restoring forest health by allowing natural disturbance processes – such as wildfire – to proceed to increase forest resilience and adaptation under climate change.[77]

VI. Water Quantity Impacts

Biomass gasification to make hydrogen has extremely high water usage that should be accounted for. A recent study estimated that biomass gasification uses 306 kg water per kg of H_2 produced, which is orders of magnitude more than electrolysis production pathways estimated at 9 to 18 kg water per kg H_2.[78] This would put extra stress on water supplies in areas already suffering from climate change-intensified drought.

VII. Land Use Impacts

Subsidies and incentives for biomass energy projects risk driving an increase in forest logging and thinning, leading to harmful changes in land use and land management practices. When incentives are designed to encourage the cutting and burning of forest biomass, it is only reasonable to expect that these incentives change the way that forests are cut, and that more and more forest "biomass" will be cut and burned. Biomass subsidies in the European Union have led to the development of wood pellet manufacturing industries in the US Southeast that cut whole trees specifically for biomass production.[79] The extent and the intensity of forest cutting in the US Southeast have been far-reaching, leading to extensive land use change and distorted markets for wood products.[80]

Conclusion

We thank the CEC for undertaking this important proceeding and for considering our recommendations. We have provided the pdfs of the cited references in the box.com folder at this link for your reference: https://diversity.box.com/s/b59vxbimtr4ysmj17yfmrx0h7fql9b1j. We respectfully request that, as the CEC develops NEI values, you ensure that the methodologies capture the impacts from biomass energy detailed in this comment.

Sincerely,

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[18] Greene, Ronnie, 'Green' biomass isn't always so clean (2011), https://publicintegrity.org/environment/green-biomass-isnt-always-so-clean/.
[19] The 18 biomass power plants are Burney Forest Products, Chowchilla, Collins Pine, DG Fairhaven, DTE Stockton, El Nido (Merced), Honey Lake, Humboldt Redwood Company, Mt. Poso, Rio Bravo Fresno, Roseburg Forest Products, Rio Bravo Rocklin, Sierra Pacific Industries (SPI) Anderson, SPI Burney, SPI Lincoln, SPI Quincy, Wheelabrator Shasta, and Woodland Biomass Power.
[20] Four active biomass plants (Rio Bravo Fresno, DTE Stockton, Merced Power, and Ampersand Chowchilla) and four idle biomass plants (Community Recycling Madera Power, Covanta Mendota, Dinuba Energy, and Covanta Delano) are in census tracts designated as disadvantaged under SB 535, *SB 535 Disadvantaged Communities*, Cal. Off. of Env't Health Hazard Assessment, https://oehha.ca.gov/calenviroscreen/sb535; *see CalEnviroScreen 4.0*, Cal. Off. of Env't Health Hazard Assessment, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40 (showing that communities in the San Joaquin Valley near biomass facilities are at or above the 90th percentile in air pollution burden).
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