Issues with Proposed CDF Fuels Management/Biomass Strategy[1]

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Issue #1: Reduced GHG emissions from fire

One of the principal objectives of the proposed Fuels Management/Biomass Strategy (Fuels/Biomass Strategy) is to reduce GHG emissions from forest fires.

According to CDF, mean emissions from a forest fire in California range from 20 to 57 TCO2E/acre. (p. 211[2]) However, the probability of fire on any particular acre is relatively low, on the order of 0.5%/yr. As a result, the average annual emissions rate from forest fires in California is only 0.30 TCO2E/acre/year. (p. 212) Because the potential GHG emission reduction benefit is constrained by the rate of emissions, if a fuels treatment measure totally eliminated fire, the emissions benefit would be 0.3 TCO2E/acre/year.

Of course, complete fire suppression is not possible. The Fuels/Biomass Strategy is based instead on a treatment that it claims can achieve a 50% reduction in fire extent. (p. 210) This objective is ambitious and unproven. However, even if we assume that it is possible to reduce emissions from fire by 50%, the GHG emissions reductions benefits is only 0.15 TCO2E/acre/year (p. 212).

While the Fuels/Biomass Strategy doesn't estimate the time period over which the treatment will provide benefits, if we assume the treatment provides benefits for 30 years, then total average emissions reductions from the fuels treatment is 4.5 TCO2E/acre (= 0.15 TCO2E/acre/year x 30 years)

We can use an estimate of the value of carbon savings to provide some perspective on the potential benefits of the Fuels/Biomass Strategy. If we assume an average carbon price of $20/TCO2E, then the benefits of the Fuels/Biomass Strategy are $3/acre/year (= 0.15 TCO2E/acre/year x $20/TCO2E) and the total value of the benefits is $90/acre (= $3/acre x 30 years). Since the benefits of the program occur over a long time, it makes sense to discount the costs back to present value. Discounting the 30-year stream of benefits to present value at 5% results in estimated total benefits of $46/acre. A higher average carbon price would result in increased value of emissions reduction, but even at $50/TCO2E the total discounted benefit is only $115. On the other hand, if the treatment only provides fire reduction benefits for 20 years, the discounted net benefits are $31/acre (at $20/TCO2E).

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[1] Source: Updated Macroeconomic Analysis of Climate Strategies Presented in the March 2006 Climate Action Team Report, Att. B: Climate Strategy Updates, Oct. 15, 2007, pp. 198-221

[2] All page number references are to the source document.

The foregoing emission reduction estimate does not include emissions associated with the fuels reduction treatment including, in particular, transportation-related emissions, which are likely to be significant given the remote and inaccessible nature of much of California's forestlands. By way of comparison, the estimated lifetime emission reduction of 4.5 TCO2E/acre is equivalent to the emissions that would result from combustion of 513 gallons of gasoline.[3] If the treatment requires the use of heavy equipment and/or large crews, fuel use could result in a significant reduction in the net emissions benefit.

Issue #2: Reduced fire suppression costs

A second principal claimed benefit of the proposed Fuels/Biomass Strategy is a reduction in fire suppression (i.e. fire fighting) costs. In general, if there are fewer, smaller fires then the State should be able to reduce the annual cost of fighting fires.

CDF estimates average fire suppression cost savings of $1,500/acre based on case studies of recent fires. (p. 214) However, as noted above, the probability of fire on any given acre is on the order of 0.5%. If the proposed treatment reduces the total extent of fire by 50%, then the probability of fire will decrease on treated acres from 0.5% to 0.25% and the average cost of fire suppression will decrease from $7.50/acre/year (= $1,500 x 0.5%) to $3.75/acre/year (= $1,500 x 0.25%).

Assuming the treatment provides fire reduction benefits for 30 years, the total undiscounted benefits from reduced fire suppression costs are $113/acre (=$3.75/acre/year x 30 years). Discounted back to present value at 5% results in estimated lifecycle present value benefits of $58/acre.

If we assume that the fuels treatment lasts for at least 15 years, then in 2020 all of the treated acres will be providing reduced fire suppression benefits. The cumulative area treated by 2020 totals 6,159,908 acres (p. 218) and the annual fire suppression savings in 2020 can be calculated as $21,559,678 (= $3.75/acre x 6,159,908 acres).

Issue #3: Displaced fossil fuel emissions

The third principal claimed benefit of the Fuels/Biomass Strategy is the displacement of fossil fuels from electricity generation and liquid fuels production using biomass removed from treated forests.

In order to account for the net GHG benefits from the use of wood to displace fossil fuels, it is necessary to compare the total amount of carbon sequestered in the forest with and without the program. A program that results in an increased rate of sequestration in the treated forest can provide net GHG benefits, but those benefits must be balanced against

[3] Based on estimated CO2E emissions per gallon of gasoline provided by CARB: http://www.arb.ca.gov/cc/factsheets/1mmtconversion.pdf

reductions in the stored carbon in the treated forest over the treatment lifetime. On the other hand, if wood is extracted from a forest and that wood is not replaced through increased regrowth, relative to an untreated forest, then there is no net climate benefit.

The Fuels/Biomass Strategy doesn't claim that there will be an increase in the rate of sequestration as a result of the program. While it is possible that a forest could sequester carbon at a higher rate as a result of a carefully designed and implemented strategy, it is by no means certain. If the proposed treatment doesn't result in an increased sequestration rate relative to an untreated forest then there is no net GHG benefit.[4]

The Fuels/Biomass Strategy proposes to extract an average of 13 tons of wood (BDT) per acre (p. 204), which is equivalent to approximately 24 TCO2E/acre.[5] Even if we assume that net sequestration increases by 10% relative to an untreated forest and that the sequestration rate in the untreated forest is 3 TCO2E/acre/year, then by the end of a 30-year program lifetime the treated forest will have stored, on average, 19.6 TCO2E/acre less carbon than the untreated forest. In other words, under these assumptions, the removal and use of 24 TCO2E/acre of biomass should be credited with displacing only 4.4 TCO2E/acre of fossil fuels, or 18% of the gross benefit. The other 19.6 TCO2E/acre of biomass represents a loss in carbon stored in the forest, or net deforestation. (If we include the avoided emissions of 0.15 TCO2E/acre/year from fire that is also claimed for the treatment, then the amount of displaced emissions is increased to 6.5 TCO2E/acre, or 27% of the gross reduction.[6])

The response of a forest to a fuels reduction treatment that involves significant disturbance is unlikely to be immediately positive. Instead, forest growth and net sequestration may even decline initially as the forest recovers from the treatment. This delay in response to the treatment would further degrade the gross program impact. For example, (using the assumptions from the previous paragraph) a delay in the increase in net sequestration rate for five years reduces the amount of displaced emissions from 4.4 to 3.0 TCO2E/acre, or 12.5% of the gross reduction.[7]

The current draft of the Fuels/Biomass proposal fails to account for the loss of carbon storage in treated forests and instead credits the program with 100% of the fossil fuel displaced. Instead, proper accounting of the removed biomass suggests that the claimed GHG benefits should be reduced substantially, depending on the increased rate of carbon sequestration that can be achieved by the treatment, if any, relative to an untreated forest.

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[4] If the treatment results in a decreased relative sequestration rate, then the net impact is an increase in GHG emissions.

[5] Assuming average carbon content of 50% and then converting from carbon to CO2E at 3.67 TCO2E/TC.

[6] In the Fuels/Biomass Strategy the emission reductions from reduced fire is accounted for separately from emissions reductions from displaced fossil fuels.

[7] This calculation optimistically assumes that the treated forest will continue to sequester carbon at the same rate as the untreated forest for the first five years following treatment.