

An Evaluation of Forest Biomass Transportation Subsidies

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Objective: This paper identifies the known issues in subsidizing the transportation of wood fiber to processing facilities. California-specific challenges and opportunities are provided, and recommendations are made for a pilot program.

Executive Recommendations

Transportation subsidies can reduce the financial costs of production along the supply chain, which impacts markets by increasing supply and/or increasing profitability. Government intervention can impact competitive markets. Planning and implementation of a subsidy program should consider those impacts to avoid unanticipated, negative consequences. Forest biomass (woody by-products of forest management treatments, excluding sawlogs) is currently subsidized in California across the supply chain. State and federal support is available for fuels reduction projects on public and private lands. The Bioenergy Renewable Auction Mechanism (BioRAM) and Bioenergy Market Adjusting Tariff (BioMAT) Programs are notable subsidies. Both affect markets by requiring public utility companies to purchase power at premium rates when feedstock originates from designated sources, such as High Hazard Zones (HHZ).

This paper recommends considerations and appropriate opportunities for California to subsidize the transportation of forest biomass. Subsidies should support specific objectives and recognize that promoting one category of biomass will likely displace another. Programs should be adjustable to changing conditions. Combined with other incentives and regulations, transportation subsidies can be an effective tool to:

1. support the establishment of new biomass conversion facilities and the retention, reopening, and expansion of existing conversion facilities,
2. prepare post-wildfire lands for reforestation, or
3. remove residual piles from completed forestry projects that can be utilized at a biomass conversion facility rather than open-air burned.

There also needs to be a clear purpose and metrics to evaluate subsidy program effectiveness and a monitoring loop to identify issues and make changes to the program, as needed.

Overview of the California Forest Biomass Market

There is limited competition currently for forest biomass. BioRAM facilities are often at capacity and some regularly close their gates to additional deliveries. The BioMAT program has potential to expand, though currently only Collins Pine Co. in Chester is operational. FEMA aid for fire cleanup, pre- and post-fire highway right-of-way clearing, and utility right-of-way clearing further contribute to a feedstock supply that exceeds facility utilization capacity. When facilities are at capacity, subsidizing transportation only alters the feedstock sources and/or reduces prices.

Recent fire salvage has also reduced demand for public and small forestland owner sawlogs because many remaining sawmills are already near or at capacity for both processing and decking (i.e., storing logs). Many of the mills remaining in California, at least in or near recent major wildfires, are owned by industrial timberland owners. Those owners focus on processing their own burned wood before it decays and loses value. When mills do buy logs, prices tend to be lower because of over-supply.

The excess supply of lower-value forest biomass and logs has enabled bioenergy facilities to lower the prices they pay for feedstock. When BioRAM first started there was competition for HHZ fuel, since HHZs were limited. With the expanded definitions of HHZ, an influx of material from utilities, fire cleanup from private lands, vegetation management along State highways by Caltrans, and materials generated in Cal Recycle projects funded with FEMA dollars, prices for delivered biomass have dropped. BioRAM facilities paid up to \$80 per bone dry ton (BDT) in 2019. Today, sellers are fortunate to get \$45-50 per BDT, and some deliveries pay tipping fees.

Literature Review

Several studies that evaluated biomass subsidies were reviewed. Becker et al. 2009 examined incentives to biomass harvesting to stimulate fuels reduction objectives. Modeling analysis estimated that transportation accounted for 64-69% of harvest operation costs. Co-location of processing facilities that resulted in shorter distances traveled was the single most important strategy for reducing costs for all scenarios modeled. Per-acre subsidies and certified product premiums were the next highest ranked in providing economic incentive, followed by production tax credits and cost-share programs. Fuel surcharge waivers and transport tax credits provided the least gains.

Mason et al. 2006 found that investments in biomass removal to reduce wildfires may in turn result in substantial economic and environmental benefits. When nonmarket considerations, such as smoke and recreational opportunities, were included in the cost/benefit analysis, the benefits of public investment in hazardous fuel reduction projects were substantial.

China also engages in biomass transportation programs to support power production. One study from China addressed how to optimize subsidy programs to meet multiple objectives, rather than single objectives such as power plant profits. Optimization of a biomass power subsidy requires balancing the different goals of the feedstock owner, power plant, and the public. Subsidy combinations seek the solution that maximizes environmental benefit for the public and economic profit for companies, as well as minimizing the cost for government subsidies (Wang et al., 2021).

Another study from China explored the impact of the interaction between stakeholders in the sustainable development of the agriculture and forestry waste power generation industry (Zhu et. al 2022). They found that power plants dominated the social network while feedstock providers were on the periphery. Government agencies were too fragmented and seldom established contact with the stakeholders. Three recommendations from this study could apply to California:

1. Coordinate the functions and powers of multiple government agencies to facilitate better planning.
2. Highlight importance of feedstock providers to increase visibility and consideration of their issues and concerns within the supply chain.
3. Facilitate feedback from business enterprises about how subsidies are working so that they are considered in policy formulation.

A report prepared for the Congressional Research Service in 2015 by McMinimy summarizes the Biomass Crop Assistance Program (BCAP) including the origin of the program, project eligibility, payment structure, and unintended consequences. BCAP offered a 1:1 matching payment designed to share in the cost of the collection, harvest, storage, and transportation of biomass to an eligible biomass conversion facility. An early version (2008-2013) of the program offered this match up to \$45/BDT but was then revamped in a later version to \$20/BDT (2014-2018).

Chantz Joyce (Personal Communication, 2022) with the American Forest Foundation was interviewed to review the lessons learned from the My Sierra Woods Forest Biomass Transportation Incentive (FBTI) program. Funded via CAL FIRE's Forest Health Grant Program, this program offered a transportation subsidy for biomass generated from forest management projects occurring on small private ownerships.

Larry Swan (Personal Communication, 2022), Wood & Biomass Utilization Program Leader with the U.S. Forest Service, was interviewed on the utilization and history of federal Biomass Crop Assistance Program (BCAP) in California.

Recent Biomass Transportation Subsidies in California

Biomass Crop Assistance Program

BCAP, which was administered by USDA Farm Services Agency (FSA), provided funds to assist with growing, maintaining, and harvesting biomass that could be used for energy or biobased products. BCAP provided financial assistance in three ways. Specifically, payments for biomass crop establishment, biomass crop maintenance, and matching payments. Matching payments were made for the collection, harvest, storage, and transportation of biomass to an eligible biomass conversion facility. California experienced geographically widespread participation in the program with 24 facilities documented as qualified biomass conversion facilities, several of which for woody biomass conversion. Despite the apparent widespread recognition of the program, Larry Swan (Personal Communication, 2022) posited that the program was generally underutilized by the forest products industry, which may have contributed to its discontinuation.

Valuable lessons regarding exploitation and unintended consequences can be learned from BCAP. Under the first iteration of the program, the pulp and paper industry was able to obtain BCAP matching payment by applying the general definition of "biomass" to costs associated with handling by-products of the pulping process, such as "black liquor". This interpretation was

estimated to have cost taxpayers over \$4 billion in 2009, until the program was modified to close the loophole (McMinimy, 2015).

Other unintended consequences associated with BCAP have also been documented. After program initiation, some manufacturing and nursery industries that used wood shavings, wood chips, sawdust, and other wood “scraps” noticed an increase in price for their raw materials. This increase was linked, by some, to BCAP matching payments, which offered payments for the same materials if delivered to an FSA-designated biomass conversion facility. The matching payment of up to \$45 per ton created an incentive for material owners to sell to biomass facilities rather than to manufacturers that use the same raw materials for products like composite panels, particle board, and fiberboard; or to nurseries and landscaping firms that use bark and wood chips for mulch. This issue was alleviated in the later iteration of the program by reducing the payment to a maximum of \$20 per ton and disqualifying payments for biomass that might have otherwise been used for higher-value products.

My Sierra Woods Forest Biomass Transportation Incentive

FBTI offered an incentive to private forest landowners across several northern California counties to engage in forest restoration projects by covering a portion of the cost of transporting biomass to eligible bioenergy facilities. Subsidy amount varied according to distance from a biomass facility and ranged from approximately \$4 - \$28 per BDT, initially. These rates did not garner adequate participation and were thus doubled as part of an amendment to the program along with an alternative to pair the original rate with a per-acre cost-share mechanism for forest treatments. This amendment ultimately resulted in the successful implementation of the program. To date, 158 projects have been completed thinning 11,366 acres and delivering 97,800 BDTs of biomass. The average size of a thinning project is 72 acres, and the average mileage to a biomass facility is 73 miles. The subsidies have totaled \$2,750,000. The program is still operating and is expected to run through at least March 2023.

FBTI faced several challenges. Joyce (Personal Communication, 2022) stated that wildfires in the project area resulted in several direct impacts to the program. The gate price for chips was significantly reduced, which created a funding shortage on projects that relied on FBTI and chip revenue to offset project costs. Furthermore, there were times when several facilities severely curtailed or completely closed their gates to biomass deliveries. These impacts were magnified as emergency funding from State and federal sources poured into communities, delivering material to facilities as no cost. One lesson learned has been to consider contracting directly with facilities to obligate those facilities to accept deliveries. Managing the \$9 million FBTI program over 4 years required a full-time equivalent position with additional support from contracted foresters.

Sierra Forest Products Facility-Specific Subsidy

In 2000, a portion of the Sequoia National Forest was designated as the Sequoia National Monument. The designation resulted in a substantial decrease in available timber volume. Sierra Forest Products (SFP) was the southern-most industrial sawmill in California and relied on timber from the Sequoia National Forest for a significant portion of its raw material supply.

The mill was the only sawmill in this area that could service the forest management needs of the Sequoia National Forest, south half of the Sierra National Forest, Tule River Indian Reservation, and Southern California Edison lands near Shaver Lake. The next closest sawmill was 200 miles north. Senator Feinstein's staff were active in finding funds and supporting legislation that would subsidize transportation costs to enable SFP to haul timber from locations that would not normally be economically viable. Grants to SFP in the amount of approximately \$8.4 million over a period of 6 years ultimately succeeded in allowing the facility time to identify and transition to alternative private and public sources of raw material supply (Swan, Personal Communication, 2022).

Recommendations for a Transportation Subsidy Pilot Program

Fuel reduction and thinning treatments are needed to reduce the potential impacts of intense wildfires in California. Larger trees can often be removed to manufacture products that have an established market and demand, such as lumber. The market for smaller trees, which can form ladder fuels that create conditions for intense, destructive wildfires, is often very limited, local, and the value less than harvest and hauling costs. Due to these high costs, most biomass generated is either masticated, left in the woods to decay, or piled and burned. To remove those ladder fuels, public investment is being applied. Generation of forest biomass is supported through existing subsidies and currently outpacing the capacity of existing biomass facilities. Additional public investment in existing infrastructure, including subsidies for transportation, may only displace other feedstock or supplant biomass that economic markets would have delivered regardless. Subsidizing the transport of biomass may also discourage in-place treatments, such as lop-and-scatter and mastication, even when those may be preferred given local conditions.

A well-planned transportation subsidy can facilitate the removal of additional trees that have low value in current forest product markets. It needs to establish whether the goal is to increase the amount of forest treated or change the fate of material that is already being removed. A pilot program would be appropriate to test the efficacy of a subsidy before applying it to a wider scale. The pilot should be limited to a geographic area that has current or expanding biomass utilization capacity and explicitly address one or more of the following objectives:

1. Support the establishment of new wood processing facilities or the retention of facilities with documented risk of closing. Facilitate reopening of mothballed facilities. Incentivize existing facilities to expand where feedstock supply exceeds their current capacities.
2. Prepare post-fire lands for reforestation.
3. Remove residual piles from completed forestry projects that can be utilized at a facility rather than open-air burned.

Because subsidies will impact markets, it will be important to first document the characteristics, structure, and functions of the current market (e.g., current costs of harvest, hauling, feedstock, and products in the pilot area). This information could be used to track market impacts over time and allow the program to be modified to minimize negative consequences. The subsidy should be structured to serve as the minimum cost to bridge the value of the product with the cost of production. The program should function only for the duration necessary to complete the

identified objectives and should identify a transition strategy that enables long-term sustainability. Additionally, the following should be considered as part of program planning and design:

- Dedicate adequate staff to administer the program. This includes:
 - Program management at the level necessary to administer contracts, monitor progress, collect and synthesize required information, and manage public funds. Recent programs, such as My Sierra Woods, have indicated the time-intensive nature of managing such programs. Specifically, administrators will be responsible for the following types of activities:
 - Tracking market impacts
 - Communication with subsidy participants and other stakeholders
 - Collecting standardized reports from program participants
 - Establishing and tracking metrics to assess program effectiveness
 - Documenting both intended and unintended consequences
 - Amending the program, as needed, in response to changing conditions
- Pair subsidy funds with newly developed or expanded biomass utilization infrastructure.
 - Supporting facilities during the startup, restart, and expansion can promote long-term success by easing associated financial strain, such as working capital needs.
- Allow a broad range of facility technologies for eligibility to encourage a diversity of utilization methods and products.
- Consider new guidelines in concert with subsidy objectives.
 - For example, if the objective is to remove residual landing piles, restrict the practice of open burning where removal options exist.
- Insert the appropriate subsidy into the supply chain where it most effectively supports program objectives (i.e., Who gets paid and who benefits?).
- Consider piloting one program at the facility level and another with land owners.
- Work in collaboration with other agencies and other subsidies to identify the potential for co-benefits and to avoid conflicts and unintended, negative consequences.

References

Becker, D.R.; Larson, D., Lowell, E.C. 2009. Financial considerations of policy options to enhance biomass utilization for reducing wildfire hazards. *Forest Policy and Economics*. August 2, 2009

Mason, C., Lippke, B.R., Zobrist, K.W., Bloxton Jr., T.D., Ceder, K.R., Comnick, J.M., McCarter, J.B., Rogers, H.K. 2006. Investments in fuel removals to avoid forest fires result in substantial benefits. *Journal of Forestry* 104 (1),27-31.

McMinimy, M.A. 2015. Congressional Research Service Report. Biomass Crop Assistance Program (BCAP): Status and Issues.

Wang, Siyi, Wang, Shen, Wu, J., Zhang, B., Lv, L. 2021. A multi-objective nonlinear planning model of biomass power generation for supporting subsidy policies optimization. Chinese Research Academy of Environmental Sciences, Beijing 100012, China. October 26, 2021.

Zhu, J.; Lin, H.; Yang, X.; Yang, X.; Jiang, P.; Marin Del Valle, T. 2022. Social Network Relationships between Biomass Industry Stakeholders in the Agricultural Waste Power Generation Industry—A Case of Northern Jiangsu, China. *Sustainability* 2022, 14, 571. <https://doi.org/10.3390/su14010571>.