

Appendix 5A: Primary Sources – Individual and Organization Interviewees

| Organization | Individual | Detail / Sector |
|---|--|--|
| Allotrope Partners | Robert Hambrecht, Glenn Zane | Small Log Processor in Redding |
| American Renewable Power | Kevin Lee, Jim Turner | Biomass Power Facility in Loyalton |
| Black Rock Investments | Melissa Maquilan | Insurance Investment Manager |
| Blue Forest Conservation | Zach Knight | Innovative Finance for Forest Restoration |
| Bioenergy Association of California | Julia Levin | |
| California Energy Commission | Joe Desmond (JIWPI Advisory Council Member) | |
| California Forestry Association | Steve Brink | Private Landowner Network |
| Calrecycle | Matt Hennigan (JIWPI Advisory Council Member) | State Recycling Agency |
| California Organized Investment Network (Coin) | Sukh Randhawa | Impact Investment: Insurance Company Matchmaker |
| Center for the Study of the Force Majeure | Josh Harrison | Academic Organization Focused on Public Education, Policy, and Social Change to Restore Forests Quickly |
| Conservation Strategies Group | Joe Caves, Sam Uden | Policy Development and Advocacy (Building Upcoming Climate Bond) |
| Ecotrust | Brent Davies, Lizzie Marsters, Amrita Vatsal | Part Research and Economics Firm, Part Timber Investment Management Organization (No Land In CA) |
| Encourage Capital | Ricardo Bayon | Impact Investment Fund and Advisory Firm, Wrote <i>Liquid Capital</i> And Could Replicate For Forest Capital |
| Green Diamond | Neal Ewald | Timber Industry, Land Owner (No Longer Milling) |
| Karuk Tribe | Bill Tripp | |
| Forest Management Task Force and Wood Products Working Group | Debbie Franco | Governor's Office of Planning and Research (OPR): Rural Affairs Advisor and Local Drought Liaison |
| Freres Lumber | Tyler Freres | CLT and Small Diameter Mass Timber Processor in Oregon |
| HDR Architects | Matt Cunha-Rigby | Major Global Architecture Firm, Won 2018 Mass Timber Award |
| Katerra CLT | Tyler Pryde | Developer Utilizing Innovative Wood Technologies |
| Motivate Capital | Suzanne Kim (JIWPI Advisory Council Member) | Investment Management and Consulting Firm |
| New Island Capital | Chris Larson | Investment Firm |
| Oregon State University's Oregon Wood Innovation Center | Scott Leavengood | Fostering Innovation of Wood Products |
| The Nature Conservancy | Jason Pelletier, Dan Porter, August Ritter | Focus on Forest Restoration of Federal Lands |
| Washington State University School of Design and Construction | Karl Englund, Vik Yadama | |

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|---|---|---|
| The Tallwood Design Institute | Mikhail Gershfeld (JIWPI Advisory Council Member), Lain Macdonald | Interdisciplinary Research Collaborative Focusing on the Advancement of Mass Timber and Structural Wood Products Building Solutions |
| Pacific Biochar | Josiah Hunt | Manufacturer and Distributor of Biochar |
| Quantified Ventures | Seth Brown | Outcome Based Capital Firm |
| Post Road Foundation | Seth Hoedl | Helping Communities Develop Intelligent, Broadband-connected Infrastructure |
| S.D. Bechtel Jr Foundation | Gary Knoblock | California Foundation Supporting Environmental Programs |
| Sierra Business Council | Steve Frisch, Kristin York | |
| Sierra Pacific Industries | Dan Tomascheski, Mark Luster, Andrea Howell | Forest Harvest, Mill, Distribution |
| Spatial Informatics Group | Jean-Pierre Wack | Environmental Think Tank |
| Salo | Dave Marvin | Conservation Tech |
| Tahoe Truckee Community Foundation | Stacy Caldwell | Local Foundation Engaged in Forest Innovation and Investment |
| Titan Grove Capital | Cisco DeVries | Impact Investment and Business Development |
| UC Santa Barbara Bren School Of Environmental Science | Naomi Tague | |
| Woodworks | Heather Strong | Wood Products Council |
| CAL FIRE | Tim Robards | |
| Weyerhaeuser | Ara Erickson, Robert Laishley | Forest Harvest, Mill, Distribution |
| University of California Agriculture and Natural Resources | Glenda Humiston, Gabe Youtsey | |
| USDA Conservation Finance Program | Catherine Herbert | |
| USDA Wood Products Lab | Brian Brashaw | |
| USFS | Larry Swan (JIWPI Advisory Council Member), Jason Ko | |
| XPrize | Amir Banifatemi | |
| Yale School of Forestry | Brad Gentry | |
| USDA 4FRI | Dick Fleishman | Leading a 2.4M-acre Forest Restoration in Arizona |
| Shasta Community College | Sara Cyz | |

Appendix 5B: Centers of Excellence for Wood Innovation Labs and Curricula

Domestic

- Auburn University Forest Products Development Center, School of Forestry and Wildlife Science: <https://wp.auburn.edu/forestproducts/>
- Cal Poly San Luis Obispo Urban Forests Ecosystem Institute: <https://ufe.calpoly.edu/>
- International Society of Wood Science and Technology: <https://www.swst.org/wp/>
- Louisiana State: <http://www.lfpdc.lsu.edu/>
- Michigan Technological University, School of Forest Resources and Environmental Science: <https://www.mtu.edu/forest/>
- Mississippi State University, College of Forest Resources, Department of Sustainable Bioproducts: <https://www.cfr.msstate.edu/bioproducts/>
- North Carolina State University, College of Natural Resources, Department of Forest Biomaterials: <https://cnr.ncsu.edu/fb/>
- Oregon Forest Resources Institute: <https://www.oregonforests.org>
- Oregon State University
 - College of Forestry, Department of Wood Science and Engineering: <https://wse.forestry.oregonstate.edu/>
 - Oregon Wood Innovation Center: <http://owic.oregonstate.edu/>
- Pennsylvania State University, Department of Agricultural and Biological Engineering: <https://abe.psu.edu/>
- Purdue: <https://ag.purdue.edu/fnr/Pages/reshardwoodproducts.aspx>
- Shasta College, Natural Resources and Forestry Science: <http://www.shastacollege.edu/Academic%20Affairs/bait/nr/Pages/4169.aspx>
- Tallwood Design Institute: <http://tallwoodinstitute.org/>
- UC Berkeley, Department of Environmental Science, Policy, and Management: <https://ourevironment.berkeley.edu/>
- UC Davis Forest Biology Research Center: <https://forestbiology.ucdavis.edu/>
- University of California Agriculture and Natural Resources: <https://ucanr.edu/>
- University of California Office of Innovation and Entrepreneurship, UC Innovation Program: <https://www.ucop.edu/innovation-entrepreneurship/uc-innovation.html>
- University of Arkansas, Fay Jones School of Architecture (first school in the country to build a large, CLT-based residential complex): <https://fayjones.uark.edu/>
- University of Idaho, College of Natural Resources: <https://www.uidaho.edu/cnr/undergraduate-majors/bs-renewable-materials>
- University of Maine, Advanced Structures and Composites Center: <https://composites.umaine.edu/key-services/wood-composites/>
- University of Minnesota, Department of Bioproducts and Biosystems Engineering / Sustainable Systems Management: <https://bbe.umn.edu/>
- Virginia Polytechnic Institute, Department of Sustainable Biomaterials: <https://sbio.vt.edu/>
- West Virginia University, Division of Forestry and Natural Resources: <https://forestry.wvu.edu/>
- Washington State University School of Design and Construction: <https://sdc.wsu.edu/>
- Woodworks: <https://www.woodworks.org/>

International

- University of British Columbia Center for Advanced Wood Processing: <https://cawp.ubc.ca/>
- Agro Innovation Lab, Vienna, Austria: <https://www.agroinnovationlab.com/story/>
- Norwegian Institute of Wood Technology, Norway: <http://www.treteknisk.no/english>
- University of Natural Resources and Life Sciences, Vienna Institute for Wood Technology and Renewable Materials: <https://boku.ac.at/en/map/holztechnologie>

Appendix 5C: Forest Futures Gathering, Truckee and Loyalton, CA, September 2019



HARVESTING

CURRENT STATE:

There are hundreds of thousands of tons of biomass sitting on the Tahoe-Truckee forest floor and most will never make it out due to economic constraints. Those piles don't even account for the dangerous overcrowding, millions more tons of biomass and small diameter trees still standing, which the USFS should be removing to keep up with forest growth. Throughout our region, we lack the equipment and the skilled operators necessary to address this challenge - the economics simply don't pencil out for the removal of these fuels, despite the very real threat of catastrophic wildfire. Over time, as a result, Processing* infrastructure -- like sawmills and biomass plants -- have shut down one by one throughout the area, unable to guarantee supply to their facilities and therefore unable to secure lasting investment. And, accordingly, Harvesting businesses shut down, unable to guarantee they will have an end-buyer for the materials they harvest. The result has been a devastating decline in populations and prosperity of forest based rural communities.

VISION:

- Innovative business models for Harvesting equipment, such as owner cooperatives, shared lending/leasing nonprofits and b-corporations, are established. They are incubated with technical assistance and ready access to diverse capital in order to scale across the state.
- A diversified fleet of heavy machinery is available to harvesters -- this fleet is low-carbon intensity, and accessible and affordable across an array of harvesting operations.
- Harvesting equipment workforce is trained and available -- there are relevant, accessible curricula and training initiatives in place at community colleges (particularly those community colleges which are adjacent to relevant regions for the work itself) and through rural regional collaboratives supported by CA workforce investment boards.
- Project planning and implementation are streamlined in order to better provide supply predictability for private investment and end-Markets.
- Biomass plants are operating and sustained state-wide via improvements in the economics and predictability of harvesting timelines, increased supply predictability has generated longer term investments and longer term power agreements with utilities.



There are hundreds of thousands of tons of biomass sitting in landing piles in the Tahoe-Truckee forests, very few will ever make it out of the forest.

- A distribution network is mapped for current and planned fuel reduction projects, including existing biomass piles and piled decks of small diameter and dead/dying logs relative to the wood baskets of each processing facility, this map has \$\$ attached to it with estimated transportation costs to closest processing facility, across the State. This relies on and builds upon the current UCCE and USFS collaboration to map supply chains and harvesting capabilities state-wide for small diameter trees and biomass.
- Harvesting equipment is, ultimately, a closed-loop energy system which relies on the biomass in the forest to produce the fuel necessary for the harvesting itself, decreasing fuel costs and improving the carbon and financial efficiency of harvesting operations.

Policy Considerations:

- Decrease redundancy, cost and time required in the environmental compliance and permitting processes
- Create a 3rd party NEPA clearing house
- Establishment of tax exemption for forest management vehicles extended to help people transition to a lend/lease program for harvesting + transportation equipment
- Link enforcement of county vegetation management plans to flexible financing for landowners needing assistance to comply
- Revisit PURPA policy pre-2000 (which considered non-energy co-benefits as a means of subsidizing higher generation costs - AB 1890)
- Change contracting methodologies on federal land and improve outcomes / mandate biomass + small-diameter tree removal
- Better leverage MSAs (and other contracting mechanisms which can provide long term guarantees) in our contracting processes to increase supply predictability + mandate biomass + small-diameter tree removal

Financial Capital Opportunities:

- Provide low interest financing for equipment
- Establish workforce investment bonds
- Replicate existing pre-development loan funds
- Encourage/establish philanthropically funded pilot projects
- Establish an opportunity zone fund which fuels the research, development and deployment of improved harvesting technologies and operations.

PRIORITIES:

- Provide diverse financial capital from philanthropic start-up funds to investment capital for equipment purchase to support an innovative models for Harvesting equipment businesses. Use Loylton as a pilot.
- Develop a regional Forest Landscape Restoration Fund in collaboration with public, private and philanthropic resources.
- Leverage federal and state tax policies, like Opportunity Zone legislation and new market tax credits, to build diversified investment funds which provide capital to support harvesting equipment improvements and innovative wood industry operations as part of a portfolio of lower risk investments.
- Create strategies that enable smoother career pathways from community college; wood innovation industries from land management through heavy machinery operation and end product development.
- Invest in the R+D of lower carbon harvesting and processing tech.

KEY STAKEHOLDERS AND PARTNERS:

- County collaboratives - to explore funding and help streamline harvesting are in place across and between rural counties with shared 'wood baskets'
- CalTRANS - explore partnerships around transportation and maintenance of Harvesting equipment
- Community Colleges - explore curriculums around Forest Futures workforce development
- Impact Investors, Philanthropic and Public Funders who can provide ready capital to advance equipment and workforce efforts
- Universities and technical laboratories to improve upon harvesting technologies and the use of in-forest biomass fuels to power harvesting operations.

FURTHER RESEARCH NEEDED:

- Predictive, real-time and widely available data-analytics which enable greater visibility into forest inventory and estimated feedstock flow from public forest lands.
- Development of data analytics user-interfaces that enable both public and private usage.
- Development of lower-carbon intensive harvesting technologies.
- Development of electric fleet of equipment.



MARKETS

CURRENT STATE:

At present, California wood innovation markets under-perform relative to other western States, the EU and northern Europe. There are a variety of contributing factors to this reality -- from the near-monopsony conditions in the California wood industry to the lack of predictability of feedstock flow from public land to processing facilities which creates risk and uncertainty for private investment. There is a supply-demand logjam with both sides waiting for certainty from the other.

A wood innovation campus such as that proposed at Loyalton may address many of the barriers-to-entry associated with wood innovation markets in California through a single regional case-study, while providing substantial co-benefits to rural forested communities, developing a meaningful alternative to open pile-burning in the Sierra, and enabling existing bio-energy facilities to remain in operation.



VISION:

- Investors make money by solving climate change across product categories like power generation, wood/biomass from harvesting, carbon storage and phyto-remediation
- California is in compliance with international sustainability standards for wood products so that California wood is immediately viable in international marketplaces for international green bonds and green financing
- California leap-frogs international wood innovation markets with technology and products.
- Avoided costs are counted in carbon markets, including avoided catastrophic fire, air quality reduction, loss of ecosystem services, decrease in water quality and quantity, carbon release. Project pro-formas mandate the use of avoided cost calculations
- California has robust and competitive bioplastics, wood cellulose, 3-D printing and timber manufacturing industries
- The California energy industry relies on biomass-fed fuels as primary fuel sources in some areas, and back-stop fuel sources in other areas - particularly as the risk of grid shut down through natural disaster increases and regional back-up energy options are increasingly needed.
- Feed-stock contracts are in place for 20 Years in parts of rural California, particularly Loyalton where the 27.5MW plant can maintain this input level over time
- Wood innovation and California wood products use are integrated in higher education including architecture, engineering, technical labs

PRIORITIES:

- Develop a market for low grade small diameter wood (wui waste included) in rural markets
- Public school system operates product innovation and applied research labs
- Build more 'solid' connections along the supply chain
- Create opportunities for new buildings such as workforce housing, larger scale industrial projects, etc. are all built with CA wood and mass timber
- Business and entrepreneurial incubators and kick-starter funds see the value in wood innovation product development and invest in early-stage ideas



Key Stakeholders and Partners:

- Build partnerships with visible/large consumer product companies to drive 'CA wood first' narrative
- Build applied research labs with cutting edge tech development
- Explore how to consciously grow urban-rural partnerships
- Engage the Outdoor Recreation economy more effectively
- Leverage instagram / social media / peer pressure to drive high end brands toward CA wood use + drive consumers toward those high end brands that commit to CA wood use
- Incentivize the replacement of plastics in all their uses with wood fibers
- X prize and other early stage investors and/or public education tools

Further Research Needed:

- End market study which identifies value chain: the suite of products that could be viable in CA and the supply chains associated
- Seek opportunities for international export and carbon-math to better understand these markets and their trade-offs

POLICY CONSIDERATIONS:

- State to develop requirements / mandates for wood use to drive markets
- Improve the State's ability to identify and incent 'resilient markets'
- Establish tax incentives for low income housing developed from innovative wood products
- Encourage brownfield redevelopment with California wood and timber
- Create performance-based building codes, such that innovation is not hampered by codes as innovation develops
- Subsidize process certification for CLT and other structural products - allowing a consumer or end-product company to track and mark (and celebrate) CA wood first
- Incentivize wood product companies to locate in CA
- Establish State investment in annual biomass volume removal requirements - measured not in board feet but in more relevant metrics for the materials in consideration effect in order to improve supply certainty and attract private catalyze investment
- Revise Public Utilities Code to explicitly state that wildfire reduction and carbon sequestration are ratepayer interests and that forest biomass projects focused on reducing wildfire hazards are part of the utilities' wildfire safety programs
- In exchange for relief from liability, require utilities to: 1) accelerate forest BioMAT project development, 2) create a non-bypassable surcharge that helps to fund vegetation removal, bioenergy development that uses that vegetation, and interconnection of those facilities to the transmission grid, 3) require that all utility removed vegetation be used for bioenergy or wood product production and, 4) include forest bioenergy in utilities' climate adaptation and distributed energy resource (DER) plans

FINANCIAL CAPITAL OPPORTUNITIES:

- Invest in a mass timber production facility
- Build a diversified Opportunity Zone fund - relying on land purchases to de-risk the portfolio and including significant investment in regional bio-economies and biomass use
- Build a larger pre-development loan fund similar to Blue Forest Conservation Bond
- Encourage/establish philanthropically funded pilot projects
- Invest in better technology, data mapping and research to improve supply predictability and predictive estimates of biomass/small-diameter/dead+dying tree flow off of public land



PROCESSING

CURRENT STATE:

Communities across the State have shut-down or dilapidated, barely operating infrastructure for processing the wood and biomass from our forests. With the loss of infrastructure, the surrounding communities, mostly rural, have suffered often creating disadvantaged areas of the State.

Processing our biomass has few options to extract the most value from management projects. Small and large piles are left behind without separating for different types of processing that could drive economic opportunities to help the entire forest management system be more financially sustainable.



VISION:

- Embrace and invest in existing technologies and infrastructure to act as a bridge to future innovation.
- Sort-on-site methodologies are in place throughout rural regions in CA.
- New ‘profitable’ uses of biomass are part of an ecosystem alongside energy producing plants.

PRIORITIES:

- Address the skeptics in biomass use and wood as a tall-building structural option
- Map and access needs of current infrastructure (UCCE)
- Invest in the R+D of lower carbon processing technology
- Keep existing facilities open + processing

FURTHER RESEARCH NEEDED:

- Research connecting the decline of rural economies to the decline of the forest infrastructure (biomass, sawmills, etc.)
- Development of new processing technologies for innovative products like nanomaterials, bioplastics and more - including improvement in existing technologies to decrease costs and increase efficiency.
- Research to understand the true cost benefit analysis of retrofitting existing small-log processing infrastructure to produce oriented strand board and other materials which might have near-term viability in California markets.

**This is one of a four of Forest Futures Issue Briefs on Harvesting, Transporting, Processing and Markets*

POLICY CONSIDERATIONS:

- State to increase/improve the efficacy of incentives for biomass removal from public lands
- Consider investment in retrofitting small log processing facilities with the necessary materials to produce oriented strand board (OSB)
- Through funding programs + public education curriculum improvements, leverage the power of the University of California system and improve California's cutting edge technology development and deployment of new processing technologies to enable California to 'leap-frog' national and international markets.

FINANCIAL CAPITAL OPPORTUNITIES:

- Invest in capital improvements of existing infrastructure
- Partner with large foundations and community foundations to catalyze pilot projects that have long term economic viability
- Capital investment in lower carbon harvesting and processing technologies
- Encourage private investment (or state investment) in county funds for local biomass businesses
- Establish workforce investment bonds
- Use credit enhancements to unlock private capital
- Build a larger pre-development loan fund similar to Blue Forest Conservation Bond but with broader application
- Encourage/establish philanthropically funded pilot projects
- Low interest deferred loans of up to \$1.0m for 3 MW projects to complete their engineering with solid capital budgets (thus providing more data / info on how to create a mix of tools for the rest of the financing - CEC grants, CDFI loans, Opportunity Zone investment tax incentives, New Markets Tax Credits, etc). The seed capital loans would likely need to be deferred and repaid when construction financing is obtained; there would likely be little collateral for these loans.

KEY STAKEHOLDERS AND PARTNERS:

- State funders to invest in infrastructure
- UCCE mapping
- Utilities
- Large regional power + heat users to create anchor 'clients' for regional facilities



TRANSPORTATION

CURRENT STATE:

In the Tahoe region and throughout the State, there is no collective mapping of the biomass that needs to be removed. Large decks and small piles sit awaiting transport, but designing smart logistics, to save on fuel and carbon, remains in the minds of a few local experts.

In addition trucks and harvesting equipment need upgrades to electric vehicle technology that is both carbon neutral and provides smarter access to different forest terrains.

VISION:

- Affordable, autonomous transportation systems -- which rely on multimodal, CARB-compliant, closed energy systems -- is available in rural regions
- Energy from the forest is used to fuel harvesting and transportation of that same project site. *closed energy systems* (non-petroleum energy systems dominate)
- Rail systems connect rural/coastal regions for value added and innovative wood product transportation
- Creation of an open-source map which tracks current and planned projects by land-owners
- Transportation incentives in place which decrease in \$-value over distance, decreasing the competition across wood baskets by small wood innovation processing facilities

PRIORITIES:

- Create an online clearing house for transportation + haulback (eg: task rabbit or lyft of wood transport)
- Engage transportation sector to design transportation solutions
- Create cooperatives or collaboratives that enable smoother career pathways from community college; wood innovation industries from land management through heavy machinery operation and end product development

FURTHER RESEARCH NEEDED:

- Potential of electric harvesting + transportation equipment.
- Avoided emissions and co-benefit analysis
- Feedstock inventory and accessibility assessment
- Create strawman (or horse:) business plan for cooperative transportation model

Policy Considerations:

- Exemption for forest management vehicles extended to help people transition to a lend/lease program for harvesting + transportation equipment
- Transportation subsidies which decrease in \$-value over distance to decrease competition between wood baskets; subsidies may also reward low-carbon technologies over time to incentivize use of forest materials as transportation fuels, for example
- Establish reliable longer-term funding streams for training, monitoring and program improvement that do not rely on bond financing alone
- Invest in rail systems which enable connection between rural and coastal regions for wood product transportation

Financial Capital Opportunities:

- Development of transportation technologies that utilize forest biomass and enable closed-loop energy systems for harvesting and transport
- Development of a third-party private company which connects empty trucks traveling one way with biomass transportation needs in the area

Key Stakeholders and Partners:

- US Forest Service and Calfire
- Caltrans
- Local governments of forested communities
- National Forest Foundation
- State Conservancies
- Philanthropic and private investors
- Private transport companies, specifically electric (Tesla) or large trucking companies
- California Air Resources Board

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Policy Considerations

Our hope is for a future in which California state policy....

- Is directly and consistently informed by cutting edge science and data
- Incentivizes specific, regional action in forested regions of the state through regional bioeconomic models which include effective accountability measures
- Better calculates and includes avoided costs and co-benefits in state funding decisions and regulations that affect building, harvesting, transportation and environmental prescriptions for land management
- Creates a reliable funding stream for ecological land management which is not dependent on a bond measure and does not require repeat legislative approval
- More effectively accounts for forest-related carbon including sequestration in products, carbon release through harvesting and net increase in State carbon stocks with forest health recover -- and accounting for carbon across state agencies is streamlined to use the same calculations and decrease friction and inefficiency in the carbon accounting system
- Ensures that forest health and ecological forest management is monitored maintained even as wood innovation markets grow
- Shifts CPUC regulations to incent utilities to offer financially attractive power purchase agreements - attracting investors and improving the economics for biomass energy processing facilities in rural California

Across the supply chain for wood innovation products, policy options include...

► HARVESTING

- Decrease redundancy, cost and time required in the environmental compliance processes.
- Create a 3rd party NEPA/CEQA clearing house
- Establish tax exemptions for forest management vehicles extended to help people transition to a lend/lease program for harvesting + transportation equipment
- Link enforcement of county vegetation management plans to flexible financing for landowners needing assistance to comply
- Prepare for a capital investment in 5-7 years time which specifically invests in improved harvesting technologies state-wide (delaying for this time in order to 1) build the capital required through public-private investment and 2) wait for (& invest in) improved and lower carbon-intensity harvesting technologies to come to market)
- Revisit PURPA policy pre-2000 (which considered non-energy co-benefits as a means of subsidizing higher generation costs - AB 1890)
- Change contracting methodologies on federal land and improve outcomes / mandate biomass + small-diameter tree removal
- Better leverage MSAs (and other contracting mechanisms which can provide long term guarantees) in our contracting processes to increase supply predictability + mandate biomass + small-diameter tree removal

► TRANSPORTATION

- Establish tax exemptions for forest management vehicles extended to help people transition to a lend/lease program for harvesting + transportation equipment
- Establish incentives which reward decreased carbon intensity of transportation - such as ability to use forest fuels to fuel transportation vehicles over time
- Establish transportation subsidies which decrease over distance -- decreasing the competition across wood baskets by small wood innovation processing facilities
- Invest in rail systems which enable connection between rural and coastal regions for wood product transportation
- Establish reliable longer-term funding streams for training, monitoring and program improvement that do not rely on bond financing alone

► PROCESSING

- Broadly, increase and improve the efficacy of incentives for biomass removal from public lands
- Through funding programs + public education curriculum improvements, leverage the power of the University of California system and improve California's cutting edge technology development and deployment of new processing technologies to enable California to 'leap-frog' national and international markets
- Consider investment in retrofitting small log processing facilities with the necessary materials to produce oriented strand board (OSB) per recommendations of the CAWBIOM second report

► MARKETS

- State to develop requirements / mandates for wood use to drive markets
- Improve the State's ability to identify and incent 'resilient markets'
- Establish tax incentives for low income housing developed from innovative wood products
- Encourage brownfield redevelopment for increased processing capability for California wood and timber
- Create performance-based (vs. prescriptive) building codes, such that innovation is not hampered by codes as innovation develops
- Incentivize wood product companies to locate in CA
- Revise Public Utilities Code to explicitly state that wildfire reduction and carbon sequestration are ratepayer interests and that forest biomass projects focused on reducing wildfire hazards are part of the utilities' wildfire safety programs
- In exchange for relief from liability, require utilities to: 1) accelerate forest BioMAT project development, 2) create a non-bypassable surcharge that helps to fund vegetation removal, bioenergy development that uses that vegetation, and interconnection of those facilities to the transmission grid, 3) require that all utility removed vegetation be used for bioenergy or wood product production and, 4) include forest bioenergy in utilities' climate adaptation and distributed energy resource (DER) plans.
- Establish State investment in annual biomass volume removal requirements - measured not in board feet but in more relevant metrics for the materials in consideration - in order to improve supply certainty and attract private catalytic investment

Appendix 5D: Bibliography

To be provided with final report