

Proposal for Bren School of Environmental Science & Management Group Project  
January 25, 2019

**PROJECT TITLE**

*Prioritizing restorative wood products by market readiness, climate impact and carbon storage potential*

**PROPOSERS**

Allison Wolff + Teal Brown Zimring

**Commonwise**

Email: allison@commonwise.org; teal@commonwise.org

Phone: 323-309-8812

**LETTER OF SUPPORT:**

- Joseph Desmond, former **Chairman, California Energy Commission** - *policy and market landscape*

**ADDITIONAL EXPERT RESOURCES, MENTORSHIP AND ORGANIZATIONAL PARTNERS.** The following individuals and organizations have made themselves available to support this project.

David Marvin & Christopher Anderson, Salo Sciences, Inc.

- Advisory role with regard to forest ecology, forest carbon, remote sensing, and data processing.
- Provide access to data that includes high resolution forest cover and mortality. Guidance on collecting and processing data related to carbon modeling, vegetation, and wildfire.

Dan Sanchez, UC Berkeley, Carbon Negative Laboratory + Woody Biomass Specialist

- Advisory role with regard to biomass technologies and gasification
- Advisory role with regard to political feasibility + implementability
- Provide access to data and research relating to commercialization of carbon negative technologies

Joe Caves, Conservation Strategies Group

- Advisory role with regard to current and projected state policy landscape
- Advisory role with regard to upcoming and feasible regulatory and administrative environment surrounding woody biomass end-markets

**CLIENT:**

Teal Brown Zimring

**Commonwise**

Email: teal@commonwise.org

Tel: 323-309-8812

## A) OBJECTIVES

**The ultimate goal of this work is to increase the demand in our state for woody biomass products, with a priority on those that store carbon for as long as possible.** Sierra Nevada forests are dangerously overcrowded. To help address our wildfire challenge in the state, we need to increase the pace and scale of removing accumulated fuels on our public lands through of prescribed burning and ecologically-sound thinning. Getting healthy, low-intensity prescribed and natural fire back into this fire-adapted forest system is paramount as is using biomass removed from forests in carbon smart ways. One of the key barriers that must be overcome is the economic cost of sustainable forest management practices, which are often prohibitively expensive, particularly for private landowners and smaller communities.

**The immediate objective of this work is to evaluate the potential to support community forest management through woody biomass products, including their use for local energy generation. Evaluation would consider market-readiness, current and projected demand, carbon emissions and carbon storage potential.** Through collaboration with Latitude Climate and other experts, we have evaluated woody biomass end-market products and plotted their market-readiness and carbon storage capabilities on a matrix<sup>1</sup>. We hope this project will result in a similar - though significantly more robust - tool that takes into account avoided carbon emissions from fires, potential carbon storage and secondary carbon capture of woody biomass products, technological capabilities of processing and harvesting infrastructure, vegetation and biomass availability, and regulatory frameworks or policy incentives that currently govern end-uses for woody biomass products. The markets that are of highest priority will be those that create the greatest opportunity for regional and rural economic resilience, long term carbon storage, decreased transportation emissions, swift removal of woody biomass (resulting in significant avoided carbon emission and wildfire recovery costs) and avoided loss of habitat, biodiversity, water quality and quantity reduction and more.

## B) SIGNIFICANCE

Commonwise is focused on igniting the policy change, public will, technology solutions and investment that will speed the pace and scale of forest restoration in our state. One critical challenge is the swift removal of woody biomass from our public lands, where decades of fire suppression has resulted in overly dense forests<sup>2</sup> -- biomass in the form of thin diameter trees (which choke out the growth of the larger trees that store significantly more carbon), dead and dying trees, and what is known as 'slash' (branches left on the forest floor from previous thinning efforts). This is both a supply and demand challenge. While scientists and technology experts work to better map the flow of biomass off of our public lands, modeling regulatory, market and ecological conditions to create better predictability of supply for end-markets, this work will provide the scientific basis the end-markets we prioritize - helping us to aim investment, advocacy and campaign resources at those markets with the greatest potential for growth and ecological benefit. The goal is to encourage the wisest use of forest biomass in products that store carbon for decades - ideally products with secondary carbon storage potential like biochar.

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<sup>1</sup> This initial analysis and resulting graph are included below and may serve as a starting point for researchers.

<sup>2</sup> Note we focus here only on forests where change in fire return intervals have been shown by scientific consensus to be significant.

## C) BACKGROUND.

**California wildfires have become more frequent, more severe, and spread over a longer season**, despite significant increases in expenditure and attention focused on the problem. About 1/3 of California's land area - 33 million acres - is forested. These landscapes are home to national parks, tribal lands, alpine lakes, the largest stands of giant sequoias in the world, and a treasure chest of wildlife and habitat. Forested regions are also home to numerous rural communities that often lack strong economies or tax bases - the most at risk and the most unable to rebound. Fighting wildfire cost California \$1.5B in 2017, alone, and that number continues to grow. One week of uncontrolled wildfire adds more carbon to the air than all the pollution control in CA saves over an entire year<sup>3</sup>. Wildfire, which releases 35% of black carbon in the state, is a serious public health issue associated with significant and measurable increases in mortality and morbidity ranging from increased heart attacks, strokes and asthmatic flare-up. And wildfire that enters urban areas often releases hazardous material as it burns through vehicles and structures. Today's fires burn so hot they release mass amounts of soil carbon and often sterilize forest seed stocks converting lands to brush and grassland. The impact on CA's water storage and filtering system (trees) and on air quality, endangered species habitat, property, recreation, crop yields, and local/regional economies, and people's' lives is devastating. And, finally, the impact of wildfires on our state carbon emissions may render us unable to meet our climate goals if we are not able to address the challenge swiftly<sup>4</sup>.

**Ecological thinning and the removal of biomass from our forest lands.** Our public lands are dangerously overcrowded due to decades of fire-suppression and a harvesting-transport-processing system which makes removal of woody biomass from public lands extremely difficult.

Yosemite Valley over time: from a healthy forest to a dangerously overcrowded one.



**To decrease catastrophic fire risk in the state, we need to swiftly increase the pace and scale of ecologically sound thinning and removal of accumulated fuels in our arid forests.** This will enable forest managers to allow healthy, low-intensity prescribed and natural fire back into a restored and fire-adapted forest system. Over time, as the forests are restored, public lands may be managed with prescribed fire alone and we will need to down-shift our use of forest biomass.

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<sup>3</sup> [Economic Development and Wood Utilization in Rural California Communities](#): A Need and an Opportunity, January 2017, Jonathan Kusel et al., Sierra Institute for Community and Environment.

<sup>4</sup> [As California Burns, Climate Goals May Go Up In Smoke](#) — Even After the Flames Are Out, CALMatters



## D) AVAILABLE DATA.

### LANDSCAPE OF CURRENT WOODY BIOMASS PRODUCTS, POLICY AND REGULATORY INCENTIVES AND MARKET READINESS:

- **Biomass remediation, processing technologies and end-market products white paper database:** commonwise has built a large database of research papers + policy analysis which provide a strong landscape for current technology innovations across biomass harvesting, transportation and processing, including cogeneration + gasification, and end products and markets.
- **SB859 Wood Products Working Group, Wood Innovation Task Force of the Forest Management Task Force,** and other public agencies and collaborative working groups are currently working to break down some of the 'logjams' in the woody biomass supply chain. Their analyses and reports (such as this [2017 Wood Products report](#)) are valuable overviews of existing end-market uses.
- **Whole Trees, Katerra, Pacific Biochar, FullCycle,** and several other private companies producing and selling woody biomass end-products have industry and annual reports that will also be of use. Researchers will be connected with key leaders at each of these companies as necessary/useful.

### ECOLOGICAL DATASETS

- **Carbon emission data:**
  - **Statewide carbon stock projections:** The Nature Conservancy and USGS simulations of California carbon stocks and flows (annual 2001-2100, 1-km spatial resolution) under varying climate change and land management scenarios, likely available by April or May 2019.
- **Biomass availability and 'feedstock' data:**
  - **The Nature Conservancy and other key members of the Tahoe Central Sierra Initiative** will have a completed 'wood flow estimate' for a 2.4m acre landscape in the Tahoe Basin known as the Tahoe Central Sierra Initiative. This should help researchers estimate the types of biomass and quantities that are recommended for harvesting based on scientific consensus of biomass removal needs for fire risk reduction and forest restoration.
  - **Raw and frequently updated data sets:**
    - **High resolution forest cover and tree mortality:** generated by partner organization Salo at 3-5 m resolution. Carbon stock data may be available by fall 2019.
    - **Forest Inventory and Analysis (FIA):** Field-collected data on forest growth + other forest properties, and Historical harvests: CAL FIRE timber harvest plans, North American Forest Dynamics (NAFD) data. Forest habitat type: available from the LANDFIRE mapping program and from the the California Fire Resources and Assessment Program (FRAP).
    - **Remote Sensing Lab and USFS Lidar Data:** publicly available lidar-derived canopy height model and raw point clouds for further processing.

### SOCIOECONOMIC DATASETS

- **CA Department of Finance:** demographic projections to assess the ability of this type of grid to accommodate the projected increase in population + resulting demand for energy.

### POLICY + REGULATORY LANDSCAPE RESEARCH

- **Timber harvesting and hazardous fuels treatments** spatial datasets are available for US Forest Service lands through the Forest Service Geodata portal. High Hazard Materials are subsidized

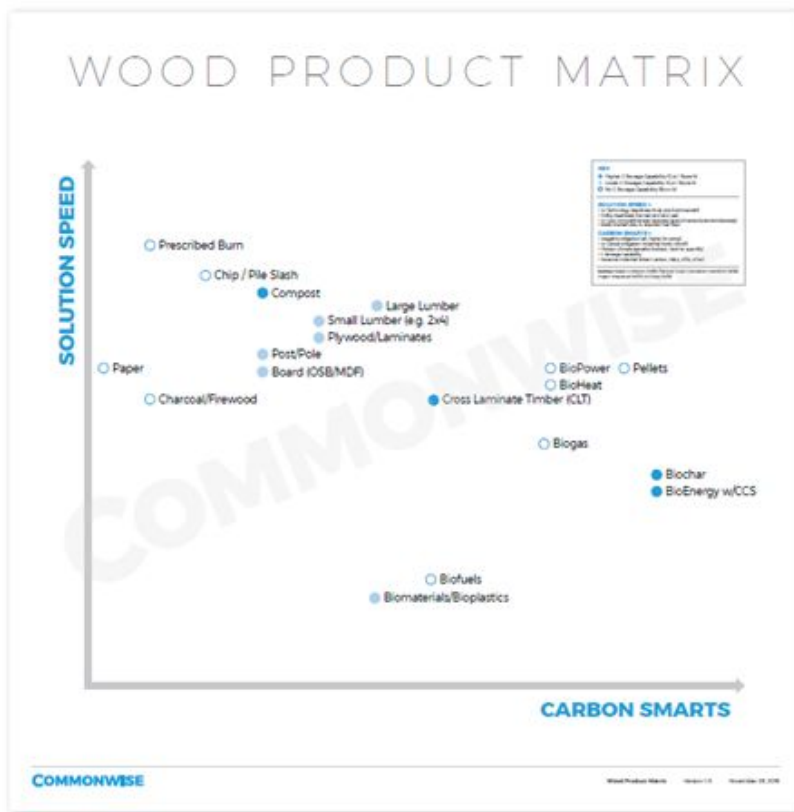
through California state policy (BIORAM and BIOMAT) because these materials are considered a significant factor in increasing fire risk. These are the materials that should be prioritized for use both from an economic standpoint, due to subsidies, and from a risk reduction standpoint. Despite subsidies, even HHZ materials can be prohibitively expensive for small, local processing facilities to purchase. A valuable case study in understanding this challenge is the Loyalton Biomass facility in Loyalton, California.

## E) POSSIBLE APPROACHES

We anticipate students will refine and build upon the below significantly, but here are a few ideas to help think through project structure:

Our aim for this work is to take in to account some of the market barriers listed above in assessing market readiness across woody biomass technologies and compare that economic and technology data with carbon modeling to help us stack rank industries. We have taken an initial stab at this and will provide researchers with all data and modeling used to consider how we might go about prioritizing markets. Below is our estimated stack ranking based on simple modeling which could serve as a possible basis or visual concept for final deliverables.

## Carbon Smart Wood Matrix



### Carbon Smarts (def): *ability to*

- + contribute to global/CA climate goals as measured by its total 1) direct and 2) indirect 2050 mitigation potential, and to
- + directly sequester carbon in products or the ground (increasingly important as energy is decarbonized and/or atmospheric capture is required to compensate for missed targets) and to
- + potentially generate additional near-term revenue from existing carbon, REC or other eco-credit markets.

### 'Speed to scale' (def):

- + technological/market readiness (demo/pre-/commercial)
- + policy support for supply/processing/use stages
- + cost competitiveness of end-use products (and associated subsidy/carbon/price premium required)
- + scale and ability to address significant components of anticipated fuel flows with market-scaled implementations.

**There is elasticity in these factors of course.** This is a first draft (thank you to Jeff Cole for his great and fast work on this and Joe Desmond's support!). The number of dots will expand and position will likely move as we continue to study this product landscape. One use for a future iteration of this matrix might be to explore how a single policy or financial intervention or technology innovation might dramatically expand or contract—or move—a particular technology.

## **F) DELIVERABLES.**

OVERALL: a recommendation to investors, policy makers, communities and economic stakeholders as to which woody biomass products will have the greatest positive impact in enabling sustained restorative forest management practices.

WITHIN THIS, SPECIFIC DELIVERABLES MAY INCLUDE:

- Determining the key metrics by which 'carbon-smartness' (to use the term in the analyses embedded in this proposal) is defined and by which 'market-readiness' is defined.
- Woody biomass end-products plotted on a grid or matrix which provides a visual assessment of ability for markets to scale vs. potential for a product to store carbon and avoid carbon emissions through local processing, avoided fire or other ecological impacts, etc.
- A section of the report which explores the socio-economic ramifications of various products for rural communities including the impacts of processing and potential benefit of regional market growth.
- Possibly a section which explores the potential regulatory or policy incentive changes on the horizon which might affect (positively or negatively) the potential of some key subset (or all) of the end-products which appear in the matrix.

## **F) INTERNSHIP.**

We have the capacity and desire for one 10-week summer internship for one student, with mentoring through the partners and resource organizations listed in this proposal. The position is designed for a motivated student who desires the chance to look at forest resilience as a systems-challenge: engaging policy makers, technology innovators, scientists, communications + public education experts and local leadership to increase the net carbon drawdown into our forest lands and from our forest products and avoiding the massive anticipated carbon emissions of catastrophic wildfire in California.

The intern will have the opportunity to work directly with resource agencies, policy influencers in Sacramento, and regional economic resilience organizations in the Sierra Nevada and high profile national and global communications experts. The scope of internship will exceed the scope of the research and may involve the planning and execution of convenings focused on a variety of relevant efforts including: small group data 'hacks' to improve risk modeling, emergency response and other key fire challenges; larger 'learning journeys' aimed at sharing real forest and carbon science with legislators and industry leadership, and more.

Funding will be available for this internship but cannot currently provide an exact amount.

# COMMONWISE

January 25, 2019

Group Project Committee  
Bren School of Environmental Science and  
Management University of California, Santa Barbara

Commonwise is pleased to submit as a client the attached proposal, *“Prioritizing restorative wood products by market readiness, climate impact and carbon storage potential”*.

Commonwise is focused, broadly, on carbon negative technologies and landscape resilience. At present, we’ve aimed ourselves and all our resources as the wildfire crisis in California. We are on a mission to restore our California forests before we lose them, to increase the pace and scale of removal of woody biomass from our dangerously overcrowded public lands. We operate at the intersection of science and narrative change: illuminating complex science with clear information design and focused convenings, briefings and immersive learning journeys in our forests, amplifying that work through large public campaigns and targeted advocacy, and incubating catalytic ideas that will help create the enabling environment for entrepreneurs to help grow restorative wood markets.

Working with a Group Project through the Bren School of Environmental Science and Management will increase our shared ability to restore our arid western forests and increase resilience to wildfire in our state. Outcomes of this work will provide commonwise and our partners with critical insight as to the prioritization of investments and community resources in our region, resources which are increasing swiftly as organizations, investors, utilities and regional foundations increasingly dedicate themselves to the promotion of ecological thinning and forest restoration.

Commonwise is a member of the Forest Management Task Force’s subcommittee for the Sierra and Cascade region and a leading partner in developing game-changing technologies alongside Planet Labs and Salo, Inc to enable swifter and more accurate risk modeling for our forests landscapes; among those listed in this proposal are individuals directly advising the governor or wildfire response; and our partners include a network of highly skilled and deeply respected scientists, industry leaders, foresters and agency leadership. We hope and believe this assembled expertise will provide students with the resources needed to excel in this project. Thank you for your consideration.

Sincerely,



Teal Brown Zimring, Director, Policy + Programs, Commonwise



January 25, 2019

**Joseph Desmond**

*Former Chairman, California Energy Commission*

Dear Selection Committee,

I write to express support for the Commonwise proposal "*Prioritizing restorative wood products by market readiness, climate impact and carbon storage potential*".

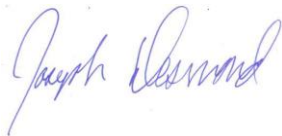
If the proposal is accepted by the Group Project Committee of the Bren School of Environmental Science & Management at the University of California, Santa Barbara, I will cooperate with you and the student group by:

- Providing mentorship, guidance, access to knowledge and resources, and insight to the researchers.
- Providing relevant and timely information on market readiness, economics and the policy landscape for biomass products in the state of California.

This work will help provide a critical basis for investors and state agencies to understand how, within the complex landscape of policy and regulatory environments, everyone can best prioritize human and financial resources and advocacy efforts toward achieving the greatest carbon negative outcomes possible.

I look forward to the opportunity to work with the Bren students and Commonwise on this important effort and to share my knowledge and expertise in support of the project's goals and objectives.

Sincerely,



Joseph Desmond  
Former Chairman  
California Energy Commission