

То:	Members of the GSNR Board of Directors
From:	Patrick Blacklock, President
Date:	June 20, 2025
Re:	Discussion and Possible Direction Regarding Next Steps and Potential Revisions to the Forest Resiliency Demonstration Project – <b>ACTION</b>

#### **Background**

The Golden State Natural Resources (GSNR) Forest Resiliency Project has reached a pivotal stage in the California Environmental Quality Act (CEQA) process. Following the close of the 90-day public review period for the Draft Environmental Impact Report (DEIR) on January 21, 2025, the project team is now focused on evaluating options for the next steps in project development – including potential revisions and possible recirculation of the DEIR.

GSNR has received and is currently analyzing more than 5,500 public comments, many of which were received in the form of template letters but also many of which included a significant number of detailed technical responses. Some key themes that emerged from the comments include concerns about greenhouse gas emissions, the carbon accounting of wood pellets, forest treatment methods, air quality impacts, the long-term market viability of proposed biomass products, and an interest in seeing additional alternatives evaluated. GSNR and environmental consultants are assessing these comments to determine whether any changes to the project or additional CEQA review steps are warranted.

At this current time, GSNR's Forest Resiliency Demonstration Project is at a strategic inflection point. Based on the CEQA process and current biomass market conditions, the project team has identified and analyzed three viable pathways to continue moving forest resiliency efforts forward:

- Advance the Proposed Project with Strategic Refinements Continue with the development of full-scale wood pellet production facilities in Lassen and Tuolumne counties, while incorporating targeted refinements and revisions based on CEQA analysis and comments received. This pathway maintains the project's original intent to catalyze a regional biomass-to-markets industry that supports sustainable forest management.
- 2. Pursue a Rescoped Project Alternative Focused on a Domestic Market Explore a revised project scope that could include reducing the size and throughput of the proposed facilities, transitioning from pellet production to wood chips, to support emerging domestic uses within the western United States, such as alternative energy solutions (e.g., sustainable aviation and marine fuels, bioenergy with carbon capture and storage (BECCS)), or wood products such as oriented strand board (OSB).

## 3. Pause Further Development of Either Site

Across all potential pathways, GSNR is prioritizing partnerships with the U.S. Forest Service (USFS) to accelerate forest treatment project approvals through the National Environmental Policy Act (NEPA) process. Advancing more projects to the Record of Decision (ROD) phase will be critical to advance the pace and scale of forest health projects consistent with federal policy and the goals established by the State's Wildfire and Forest Resilience Task Force. This work can be pursued in parallel with any of the three strategic alternatives outlined in this report.

This staff report presents an analysis of key considerations to help inform the decision on how best to proceed with the project. GSNR requests that the Board review the findings and provide direction on a preferred project pathway.

## I. Project Objectives

Regardless of the specific approach chosen, GSNR's Forest Resiliency Demonstration Project is designed to address the accelerating risk of catastrophic wildfire, declining forest health, and the growing need for economically viable forest management solutions in California. The project seeks to advance four primary objectives:

1. **Increase the Pace and Scale and Effectiveness of Forest Health Treatments**– Catastrophic wildfire poses a severe and growing threat to California's ecosystems, air quality, and communities. In response, both state and federal leadership have called for dramatically expanding the footprint of forest restoration. The State's goal of treating 1 million acres annually, a goal not yet being met, is recommended to be revised upward by the California Air Resources Board (CARB) to 2.3 million acres, with forests comprising most of that acreage.<sup>1</sup> Forest treatments that include thinning and prescribed fire reduce wildfire severity by 72%, while treatments that involve thinning alone or prescribed fire alone also result in significant reductions (62–64%).<sup>2</sup> The University of British Columbia's Centre for Climate Justice reinforces this by noting a broad scientific consensus that ecologically informed thinning and burning significantly improve forest resilience.<sup>3</sup> Without intervention, the consequences are dire: In 2020, wildfires accounted for 30% of California's total greenhouse gas (GHG) emissions, erasing nearly two decades' worth of emissions reductions.<sup>4</sup>

<sup>&</sup>lt;sup>1</sup> California Wildfire & Forest Resilience Task Force. (2021). \*California's Wildfire & Forest Resilience Action Plan.

<sup>&</sup>lt;sup>2</sup> Stephens, S. L., et al. (2024). Tamm review: A meta-analysis of thinning, prescribed fire, and wildfire effects on subsequent wildfire severity in conifer dominated forests of the Western US. \*Forest Ecology and Management\*, 561.

<sup>&</sup>lt;sup>3</sup> Centre for Climate Justice, University of British Columbia. (2022). \*High Roads to Resilience: Building equitable forest restoration economies in California and Beyond\*.

<sup>&</sup>lt;sup>4</sup> University of Chicago News, "Wildfires Are Erasing California's Climate Gains, Research Shows," October 25, 2022. <u>https://news.uchicago.edu/story/wildfires-are-erasing-californias-climate-gains-research-shows</u>

2. Expand the Beneficial Use of Forest Residuals – A key challenge facing large-scale forest management in California is identifying viable and scalable markets for low-to no-value woody biomass. These forest residuals, often generated through wildfire cleanup, fuels reduction treatments, and post-salvage logging, currently exceed the capacity of traditional markets such as sawmills and biomass power plants. The GSNR project, whether choosing to prioritize the production of an existing export market through wood pellets or an emerging domestic market with wood chips, addresses the current underutilization of residuals. This strategy aligns with the Shared Stewardship Agreement between California and the USDA Forest Service, which emphasizes managing forests for carbon sequestration while focusing on the strengthening of markets for wood products and the recycling of forest byproducts.<sup>5</sup>

As detailed in CalFire's Biomass Offtake and Opportunities report, California's clean wood chip markets are estimated to have scalable demand of up to 500,000 bone dry tons per year.<sup>6</sup> This estimate is a conservative baseline, given the emerging technologies like BECCS and other alternative uses such as oriented strand board that are forecasted to boost the demand of wood chips. Yet, further infrastructure development is necessary to realize this market potential. Projects like GSNR are essential to expand the beneficial use of wood chips in support of California's forest resilience and climate goals.

- 3. Ensure Financial Feasibility and Attract Investment GSNR recognizes that achieving forest resiliency at the pace and scale required is not possible without attracting significant private investment. A primary impediment to securing this investment is feedstock certainty, which is the assurance of a reliable, long-term supply of biomass. Without it, private investors are unlikely to commit capital to infrastructure-intensive projects. The GSNR project is structured as a publicprivate partnership that seeks to blend public governance and startup investment with private capital. To reduce upfront project risk and signal long-term publicsector commitment, GSNR and its affiliate Golden State Finance Authority (GSFA) have entered into stewardship agreements with the U.S. Forest Service (USFS), including a twenty-year Master Stewardship Agreement (MSA) and an initial Supplemental Project Agreement with the Modoc National Forest (SPA). Looking ahead, GSNR recognizes that supporting the USFS in advancing a pipeline of forest treatment projects to the approval stage (i.e., completing NEPA review and achieving a Record of Decision) will be critical to demonstrating feedstock reliability and unlocking additional private sector investment.
- 4. Minimize Environmental Impacts The project is designed to expand forest treatment while minimizing impacts to biological, cultural, hydrological, and other resources to the fullest extent feasible. The Final EIR for the project will include comprehensive mitigation measures addressing species protection, wetland

<sup>&</sup>lt;sup>5</sup> State of California and USDA Forest Service. *Agreement for Shared Stewardship of California's Forest and Rangelands*, August 12, 2020. <u>https://www.gov.ca.gov/wp-content/uploads/2020/08/8.12.20-CA-Shared-Stewardship-MOU.pdf</u>

<sup>&</sup>lt;sup>6</sup> California Department of Forestry and Fire Protection (CAL FIRE). (2023). \*Biomass Offtake Opportunities and Logistics.

conservation, emissions reduction, and fire safety, and GSNR will continue to prioritize these concerns in any future environmental analyses.

## II. Common Features across Alternatives

As previously stated, GSNR's overarching objective is to increase the pace and scale of forest treatments across California to improve forest resilience, reduce wildfire risk, and support long—term ecosystem health. To achieve this objective, GSNR is committed to establishing and growing partnerships that ensure reliable feedstock availability for its forest resiliency project to attract capital investment and guarantee operational reliability in the long run.

The partnership between GSFA/GSNR and the Forest Service is one critical element of this strategy. Based on the provisions outlined in both the MSA and SPA, the structure and purpose of this partnership can be described as a coordinated, long-term public-private collaboration designed to address forest health challenges on federal lands across California. These agreements collectively establish a framework through which the Forest Service and GSFA/GSNR can carry out a series of mutually beneficial projects under Supplemental Project Agreements (SPAs) that prioritize landscape restoration, hazardous fuels reduction, removal of residuals, and the development of a reliable supply of sustainable woody biomass for GSNR's proposed project. The end purpose of this partnership is to foster a predictable pipeline of forest treatment projects that are environmentally reviewed and implementation-ready.

As the lead agency under CEQA, GSFA plays a central role in the Forest Resiliency Demonstration Project, including approval, financing, and supervision of activities carried out by GSNR. Through enforceable agreements, such as the MSA and individual SPAs, GSFA ensures that forest treatment projects meet environmental requirements, feedstock constraints, and project design standards. This oversight extends to both federal and nonfederal sources, including industrial timberlands and nonprofit-led treatments projects.

All public and private third-party sources of harvest residuals must be approved by GSFA prior to feedstock delivery. GSNR is required to submit environmental documentation (e.g., CEQA, NEPA, or timber harvest plans) and, depending on landowner type, provide certifications, photographs, or site access for audit and inspection. GSFA's Executive Director must approve all sources, and an annual public report on feedstock sourcing and compliance is submitted to the GSFA Board.

Similarly, dedicated treatments undertaken by GSNR for the purpose of biomass recovery on public or private lands will adhere to a public planning and review process led by GSNR in coordination with landowners and resource specialists. Each project is reviewed by GSFA to confirm it falls within the scope of the project's CEQA document (see below) and incorporates all applicable mitigation measures. GSNR is responsible for securing permits, managing contractors, and maintaining compliance for these treatments.

This public-private partnership and oversight mechanisms ensure that all feedstock utilized in the project is obtained transparently, responsibly, and in alignment with the environmental standards and project objectives established by GSFA. To maintain this pipeline and scale up the number of SPAs and other projects executed under these agreements, GSNR may consider expanding the capacity of its Technical & Project Development Team. This team serves as the engine behind forest project planning and development with the USFS and other public and private forest landowners and subcontracting for biomass removal and delivery. A larger, more specialized team would enable GSNR to continuously engage with the forest managers and landowners on project identification at an increased rate, environmental review coordination, and contract administration, ensuring that feedstock supply commitments can be met in both the near and long term.

# III. Strategic Alternatives for Board Consideration

## **Option 1: Original Project – Pellet Production for Export**

By choosing this route, GSNR would proceed with its originally proposed Forest Resiliency Project, as evaluated in the DEIR. This project specifically involves the development of two industrial wood pellet production facilities – one in Tuolumne County and one in Lassen County – designed to process forest biomass into dense, export-grade pellets for international energy markets. The original project configuration represents the highest capacity design regarding the volume of forest residuals that can be treated and removed.

The project sources woody biomass feedstock primarily from hazardous fuel reduction and forest resiliency operations conducted throughout California and adjacent regions. This feedstock includes ladder fuels, slash piles, small-diameter trees, and other low-or negative- value forest materials that would otherwise be burned or left to decay. Material is classified into three categories: GSNR Biomass Only Thinning Projects (i.e., treatments solely undertaken to supply GSNR), Harvest Residuals from unrelated forest management operations, and Mill Residuals generated at existing commercial sawmills.

At each site, the production process begins with biomass intake, debarking, and chipping, followed by screening, drying, hammer milling, pelletizing, cooling, and silo storage. After production, pellets are then transported via rail to a dedicated export terminal at the Port of Stockton, to serve international energy markets that have policy incentives for carbonneutral fuels. Estimates of feedstock requirements and pellet production capacity for each site are derived from the DEIR and provided in Table 1 below.

Variable	Lassen Facility	Tuolumne Facility	
Annual Pellet Production	700,000 metric tons	300,000 metric tons	
Green Feedstock Required	1,183,890 metric tons (1,305,015 US tons)	548,294 metric tons (604,390 US tons)	
Feedstock Mix (by weight)	71% Chips (incl. sawdust), 29% Roundwood	54% Chips (incl. sawdust), 46% Roundwood	

*Table 1: Side-by-Side Comparison – Pellet Facility Production Inputs* 

While choosing this pathway retains the project's original scale and scope, the current stage of the environmental review process presents an opportunity for GSNR to assess evolving international market conditions and forecasted future supply and demand for wood pellets.

#### International Wood Pellet Market Analysis

The long-term success of a pellet-based project is dependent upon securing demand from international energy markets, particularly Asia, where industrial-scale consumers purchase the bulk of globally traded wood pellets. Project success is a function of favorable policy conditions, price competitiveness, and reliable offtake agreements from countries like Japan and South Korea, which have both historically provided strong demand signals due to their renewable energy targets and carbon neutrality commitments.

Global trade in wood pellets has expanded rapidly over the past decade. Between 2012 and 2024, global export volumes increased from 9.4 million metric tons (MT) to 31.4 million MT, with market value expanding by 250% over the same period. Asia's top importers, Japan and South Korea, have driven much of this growth. In 2015, their combined pellet imports totaled 1.7 million MT; by 2024, the number rose 512% to 10.4 million MT, with Japan accounting for 62% of the total increase. Japan is now the fastest-growing global pellet import market, with imports projected to increase an additional 30% by 2030. For instance, in Q1 2025 alone, Japan imported 1.3 million MT from Vietnam, 68% of its quarterly total, with Canada a distant second at 287,000 MT.<sup>7</sup>

Vietnam's wood pellet export sector has grown exponentially in recent years. In 2020, Vietnam exported approximately 3.2 million metric tons (MT) of wood pellets. By 2024, exports had surged to 6.03 million MT, a 29.1% increase from the prior year alone, demonstrating sustained and accelerating growth in response to regional demand pressures in Asia, specifically in South Korea and Japan.<sup>8</sup> This growth is forecasted to be maintained given Vietnam's established price advantage. In 2024, South Korea and Japan imported Vietnamese pellets at average prices of \$104.30 (USD) MT and \$146.30 (USD) MT respectively,<sup>9</sup> substantially below the U.S. export average of \$196.75 MT.<sup>10</sup> Europe accounts for a modest share of demand, with approximately 10% of Vietnam's exports directed to the EU in early 2024.<sup>11</sup>

<sup>&</sup>lt;sup>7</sup> ResourceWise Forest Products. *WMP Market Insights: New Energy Policies in Japan and South Korea Could Shift Wood Pellet Market Dynamics, Particularly for the Region's Dominant Supplier Vietnam.* By Audrey Dixon, Managing Editor/Writer. WoodMarket Prices, ResourceWise, 2025. © 2025 ResourceWise. [Accessed via subscription].

<sup>&</sup>lt;sup>8</sup>Forest Trends and Vietnam Timber and Forest Products Association. *Overview of Vietnam's Wood Pellet Production and Export Trends*. November 2021. <u>https://www.forest-trends.org/wp-</u> content/uploads/2021/11/Vietnam-Wood-Pellet-Production-Brief.pdf

<sup>&</sup>lt;sup>9</sup> Agrideco Vietnam. "European Countries: Potential Markets for Vietnamese Wood Pellets." *Agrideco Vietnam*, 2024.

<sup>&</sup>lt;sup>10</sup> U.S. Energy Information Administration (EIA). "Monthly Biomass Data: December 2024." *U.S. EIA*, 2024.

<sup>&</sup>lt;sup>11</sup> Forest Trends and Vietnam Timber and Forest Products Association. *Overview of Vietnam's Wood Pellet Production and Export Trends*. November 2021. <u>https://www.forest-trends.org/wp-</u> content/uploads/2021/11/Vietnam-Wood-Pellet-Production-Brief.pdf.

While international demand for wood pellets remains robust and there is some evidence of increased demand, GSNR faces an increasingly complex market environment, which points to the need for continued financial modeling and risk assessments. These considerations are central to determining whether continued investment in the exportdriven pellet model remains most advantageous for GSNR under evolving global market dynamics.

Fiscal Implications - If the Board elects to proceed with the original pellet-based configuration, GSNR will allocate additional resources to complete the California Environmental Quality Act (CEQA) process. This would include preparation and circulation of a revised Draft Environmental Impact Report (RDEIR) incorporating refinements based on technical comments received during the public review of the initial Draft EIR. Comments received during the recirculation process would then be responded to, and a Final Environmental Impact Report (FEIR) would be prepared for consideration by the GSFA Board of Directors. Significant consultant hours will be required to revise environmental analyses, respond to agency and public input, and ensure legal compliance under CEQA. The approximate costs to complete the FEIR are estimated below in Table 2. (These figures do not include fixed costs, such as ongoing support from the engineering, forestry, and legal teams, and community outreach expenses, that will be incurred under any of the proposed options.) Please also note that these are preliminary estimates, and that the actual costs may differ considerably based on factors that cannot be fully predicted (such as the volume of CEQA comments received during recirculation.)

Financial Variable	Description	Estimated Cost
Revise DEIR and Technical Analyses	Revise DEIR based on technical comments received, including any necessary additional studies	~\$75,000
Recirculate DEIR, Respond to Comments, and Prepare Final EIR	Complete the recirculation process, including public notice, drafting and reviewing responses to comments, etc.	~\$140,000
Total Estimated CEQA Costs – Option 1		~\$215,000

Table 2: Estimated CEQA Costs Associated with Option 1

In addition to the immediate fiscal implications relating to CEQA-related expenses, it is important to acknowledge that the near and long-term capital outlay for pellet production is significantly higher than the wood chip-based alternative discussed in the next section. This includes investments in specialized pelletizing equipment, hammer mills, industrial dryers, and cooling and storage systems. Furthermore, additional infrastructure must be developed or upgraded to facilitate export logistics, such as rail systems and port facilities,

including construction of domes and conveyors at the Port of Stockton. The next section will discuss the potential capital expenditure savings associated with a revised project design focused on the production of wood chips for domestic use.

**Timeline** – Under Option 1, it is anticipated that revision and recirculation of the DEIR and response to comments would take approximately 6-9 months, upon completion of which an FEIR would be presented to the GSFA Board for consideration. (The project timeline thereafter is dependent upon a number of variables, including permitting and identification of private partners.)

## **Option 2: Reduced Scale Project – Wood Chips for Domestic Use**

This option proposes a reduced-scale project that strategically realigns GSNR's project focus, shifting from the development of industrial-scale wood pellet production for export to wood chip production to serve growing demands within the U.S. domestic market. By foregoing pelletizing, drying, and port logistics infrastructure (with associated reductions in tonnage processed), this alternative significantly lowers the project's capital cost and environmental footprint. A reduced-scale project configuration may also facilitate CEQA review and permitting and expedite site development timelines, improving the feasibility of near-term deployment.

Rather than targeting overseas industrial customers, this option would support the emerging domestic demand in the western United States for wood chips. These would serve a range of potential needs, including alternative fuels and energy production and alternative wood products, that are forecasted to arise from emerging decarbonization-focused sectors that are of priority and interest, according to the Governor's Office of Planning and Research (OPR), the Governor's Office of Business and Economic Development (GO-Biz), the California Natural Resources Agency (CNRA), and California Climate Investments.<sup>12,13</sup> For example, recognizing California's emerging wood chip market, some companies have already developed technologies that turn wood waste into fuel, such as converting wood chips into synthetic gas.<sup>14</sup>

**Potential Long-Term Domestic Markets** – A reduced-scale project would focus on producing bulk wood chips from forest residuals generated through fuel reduction, salvage, and thinning operations. Several sectors in California and the western U.S. are exploring the utilization of woody biomass as a feedstock for decarbonization and energy applications. While current U.S. demand and commercial-scale offtake agreements for these uses remain theoretical, GSNR's strategic positioning provides a distinct advantage. To begin with, ongoing exploratory discussions with potential wood chip users indicate that a key determinant for this market is development of feedstock certainty – which, as noted above, will be GSNR's strategic focus under any alternative. Further, both

<sup>&</sup>lt;sup>12</sup>Governor's Office of Business and Economic Development (GO-Biz). *Interagency Workgroup on Sustainable Biomass Market Development Framework*. February 2022. <u>https://business.ca.gov/wp-content/uploads/2022/02/GO-Biz-Interagency-Biomass-Market-Development-Framework.pdf</u>

 <sup>&</sup>lt;sup>13</sup> California Climate Investments. Leveraging Existing Carbon Incentive Programs to Increase Utilization of Woody Biomass Residues. 2025 Project Profile. <u>https://www.caclimateinvestments.ca.gov/2025-profiles/leveraging-existing-carbon-incentive-programs-to-increase-utilization-of-woody-biomass-residues</u>
<sup>14</sup> Comstock's Magazine. "Out of the Woods: Can Biomass Be the Key to Healthy Forests and Renewable Energy?" Comstock's Magazine, January 10, 2022. <u>https://www.comstocksmag.com/longreads/out-woods</u>.

the Tuolumne and Lassen County sites offer direct rail access, a critical logistical asset that enables cost-effective movement of wood chips to downstream users and emerging market hubs throughout the western United States. This connectivity makes GSNR uniquely situated to support potential future markets, which could include:

- Sustainable Aviation Fuel (SAF) Under California's Low Carbon Fuel Standard (LCFS)<sup>15</sup>, woody biomass such as wood pellets and wood chips, holds the potential as a feedstock for commercial-scale SAF production, contingent upon continuous technological and economic developments. For example, a proposed SAF facility in Port Arthur, Texas, which plans to utilize over 1 million tonnes of biomass pellets annually to produce 30 million gallons of carbon-negative jet fuel per year.<sup>16</sup> Wood chips can also serve as an input for SAF, as federal grants have invested into firms focused on generating jet fuel from wood chips in recent years.<sup>17</sup> (While wood chips produced by GSNR would not serve facilities in Texas, due to transport costs, the foregoing is nonetheless indicative of the viability and potential growth in this market segment.)
- **Methanol Production** Green methanol, produced from biomass or captured CO<sub>2</sub> and renewable hydrogen, is gaining attraction as a clean fuel for shipping and future input for sustainable aviation fuel (SAF), power generation, and off-grid industrial use.<sup>18</sup> Demand for green methanol is expected to grow significantly over the next decade, driven by net-zero targets from the shipping industry and increasing regulatory pressure on fossil fuels. A.P. Moller-Maersk, a global shipping and logistics company, has committed to deploying a fleet of 18 dual-fuel container ships capable of operating on green methanol. In August 2024, the *Alette Maersk*—one of the company's first methanol-powered vessels—became the first of its kind to call at a U.S. port when it arrived at the Port of Los Angeles.<sup>19</sup> Forest biomass and particularly the production of wood chips could serve as a scalable input for bio-methanol pathways.
- **Bioenergy with Carbon Capture and Storage (BECCS)** A process that combines biomass combustion or conversion with carbon capture technologies to produce negative emissions. BECCS is one of the few scalable technologies that can remove CO<sub>2</sub> from the atmosphere while producing usable energy, aligning with climate neutrality targets.<sup>20</sup> The Intergovernmental Panel on Climate Change (IPCC) and the California Air Resources Board (CARB) have both emphasized that carbon dioxide removal (CDR) technologies, including BECCS, are essential to

<sup>&</sup>lt;sup>15</sup>California Air Resources Board (CARB). *Low Carbon Fuel Standard (LCFS)* Program Overview. Retrieved from <u>https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard</u>

<sup>&</sup>lt;sup>16</sup> Lesprom Network. "Drax to Supply over 1 Million Tonnes of Wood Pellets Annually for U.S. SAF Project." *Lesprom*, December 12, 2024.

<sup>&</sup>lt;sup>17</sup> AviationPros. "Georgia Plant Gets \$80 Million Grant to Make Jet Fuel from Wood Chips." *AviationPros*, January 27, 2023.

<sup>&</sup>lt;sup>18</sup>Energy Estate. Methanol Market Brief. April, 2025.

<sup>&</sup>lt;sup>19</sup> *The Maritime Executive*, "Maersk Names Fourth Methanol-Fueled ULCV at Port of LA," June 14, 2024. Available at: <u>https://maritime-executive.com/article/maersk-names-fourth-methanol-fueled-ulcv-at-port-of-la</u> (accessed June 19, 2025).

<sup>&</sup>lt;sup>20</sup> International Energy Agency (IEA). *Bioenergy with Carbon Capture and Storage (BECCS)*. Retrieved from <u>https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage/bioenergy-with-carbon-capture-and-storage</u>

achieving net-zero emissions and offsetting residual emissions in hard-todecarbonize sectors.<sup>21</sup> A 2023 report by the UK Department for Energy Security and Net Zero further concluded that there are no insurmountable scientific barriers to the net removal and permanent storage of CO<sub>2</sub> via BECCS, provided sustainability standards are followed and biomass supply chains are transparently managed.<sup>22</sup> As BECCS is still in the early stages of commercial deployment in California, developers of these facilities are currently exploring potential partnerships that will provide a steady supply of sustainably sourced biomass, which can be provided in the form of non-debarked wood chips.

- Oriented Strand Board (OSB) OSB is a structural engineered wood panel commonly used in residential and commercial construction for applications such as sheathing, flooring, and roof decking. Despite is widespread use, there are currently no OSB manufacturing facilities in California or the broader western United States.<sup>23</sup> This absence may present a significant opportunity to expand sustainable utilization of California's abundant forest biomass, particularly smalldiameter trees and residuals from fuel reduction and thinning operations, as feedstock for OSB production. A feasibility study highlighted that in 2017, demand for OSB within 500 miles of Northern California was approximately 2.8 billion square feet, accounting for about 12% of North American demand.<sup>24</sup> The study also noted that a Northern California OSB plant could benefit from a freight cost advantage of approximately \$35 per thousand square feet over other North American producers, enhancing its competitiveness. The USFS has expressed interest in developing OSB manufacturing in the western U.S to support forest health initiatives and reduce reliance on imported products. As part of the Tuolumne Wood Innovation Campus concept included in this option (discussed in greater detail below), GSNR is proposing to develop a collaborative platform for evaluating how forest project residuals such as small-diameter trees removed during fuel reduction treatments, can be efficiently processed and transported for use in emerging wood product applications such as OSB.
- **Hydrogen Production** Hydrogen produced from woody biomass is emerging as a promising pathway for California's clean energy market, with several projects across the state developing gasification technologies to convert forest residues and wood waste into renewable hydrogen. Supported by grants from the US Forest Service, the California Department of Conservation, and CAL FIRE, there is a recent development taking place in Sacramento County that aims to process up to

<sup>&</sup>lt;sup>21</sup> California Air Resources Board. "Carbon Sequestration and Carbon Capture, Removal, Utilization and Storage." *CARB Programs*. Accessed June 17, 2025. <u>https://ww2.arb.ca.gov/our-work/programs/carbon-sequestration-carbon-capture-removal-utilization-and-storage/about</u>

<sup>&</sup>lt;sup>22</sup> Department for Energy Security and Net Zero (UK). *The Ability of BECCS to Generate Negative Emissions: Task and Finish Group Report*. August 2023.

https://assets.publishing.service.gov.uk/media/64d4b25a5cac65000dc2dd1f/task-finish-group-reportability-beccs-to-generate-negative-emissions.pdf

<sup>&</sup>lt;sup>23</sup> The Beck Group. "California-Based OSB Manufacturing: Holy Grail of the OSB Industry?" *The Beck Group*, December 13, 2018. <u>https://www.beckgroupconsulting.com/single-post/2018/12/13/california-based-osb-manufacturing-holy-grail-of-the-osb-industry</u>.

<sup>&</sup>lt;sup>24</sup> The Beck Group. "California-Based OSB Manufacturing: Holy Grail of the OSB Industry?" *The Beck Group*, December 13, 2018. <u>https://www.beckgroupconsulting.com/single-post/2018/12/13/california-based-osb-manufacturing-holy-grail-of-the-osb-industry</u>.

300,000 metric tons of forest residues annually, producing approximately 21,000 metric tons of carbon-negative hydrogen per year while sequestering over 450,000 metric tons of  $CO_2$ .<sup>25</sup> There have occurred other grant funded projects to establish multiple biomass-to-hydrogen facilities in California, utilizing local forest and agricultural biomass to produce syngas and subsequently hydrogen.<sup>26</sup>

**Site Specific Operations and Staging -** In Lassen County, the reduced-scale project would center around the development of a wood chip processing hub, where biomass collected from nearby forest restoration projects would either be chipped on site or delivered as pre-chipped material via chip vans for aggregation.

The Lassen facility would be designed to produce approximately 820,000 green metric tons of wood chips annually, using a preliminary feedstock blend of 50% residuals from third-party forest projects (by weight) and 50% roundwood. While these figures provide a foundational planning estimate, actual input and output volumes would be further refined during the DEIR rescoping process. Table 3 below provides a summary of potential feedstock and production estimates based on the current conceptual model. This centralized operation in Lassen is envisioned as the primary processing location, taking advantage of existing site control and access to road and utility infrastructure. The site is expected to primarily serve as a chipping facility, but also an aggregation and shipping hub, accommodating a mix of raw biomass and already processed chips. As under the current project description, chips would be transported from the site to end users via unit trains.

Material Type	<b>Estimated Share</b>	Estimated Tonnage (GMT/year)
Forest Residuals	50%	410,000
Roundwood	50%	410,000
Total Input	_	820,000
Total Output (Chips)	_	~803,600 (98% of input)

Table 3: Preliminary Feedstock Input and Wood Chip Output Estimates (Lassen Facility)

\*Note: Final input/output volumes and ratios are subject to modification based on DEIR rescoping and additional technical studies.

At the Tuolumne County site, operations would be limited to processing residual material from third-party forest projects (320,000 GMT/year), and would consist of aggregated chip receiving, storage, and transload infrastructure. Residual forest biomass (typically obtained from piles left upon completion of third-party forest projects) would be chipped in-forest and transported to the Tuolumne site for interim storage and then shipment to chip users in the western United States using manifest railcars.

Under this option, development at the Tuolumne site would also include an Innovation Campus, which is conceived as a think-tank and research hub that would provide physical infrastructure for activities such as collaboration, product prototyping, and community-

<sup>&</sup>lt;sup>25</sup> Mote. "Mote Kicks Off Second Biomass-to-Hydrogen Project in Northern California." *Mote Hydrogen*, accessed May 21, 2025. <u>https://www.motehydrogen.com/news/mote-kicks-off-second-biomass-to-hydrogen-project-in-northern-california</u>.

<sup>&</sup>lt;sup>26</sup> Yosemite Clean Energy. "Yosemite Hydrogen Facility." *California Resources Corporation*, accessed May 21, 2025. <u>https://www.crc.com/carbon-terravault/projects/yosemite-hydrogen-facility</u>.

based training, etc. Implementation of this portion of the project could be guided and supported through establishment of a Wood Innovation Task Force at the Tuolumne site to engage local stakeholders, technical experts, and economic development partners in identifying additional value-added uses for forest residuals. The campus would offer critical space for the Task Force's activities, helping to attract investment, coordinate workforce development initiatives, ensure long-term project sustainability, and align local infrastructure planning with emerging domestic market opportunities.

Material Type	Estimated Share	Estimated Tonnage (GMT/year)
Forest Residuals	100%	320,000
Roundwood	0%	0
Total Input	-	320,000
Total Output (Chips)	_	~313,600 (98% of input)

Table 4: Preliminary Feedstock Input and Wood Chip Output Estimates (Tuolumne Facility)

\*Note: Final input/output volumes and ratios are subject to modification based on DEIR rescoping and additional technical studies

**Fiscal Implications** – To fully evaluate the economic viability of the revised scale project option, GSNR has obtained preliminary cost estimates associated with moving this option forward. The following categories outline the major areas where financial estimates have been calculated to advance this alternative and support refinement of the project scope. (As noted above, these figures do not include fixed costs, such as ongoing support from the engineering, forestry, and legal teams, and community outreach expenses, that will be incurred under any of the proposed options.)

Please also note that these are **preliminary estimates**, and that the **actual costs may differ considerably** based on factors that cannot be fully predicted.

1. Site Re-Engineering and Infrastructure Modifications - Modifying the project scope will necessitate redesigning both the Lassen and Tuolumne sites. This reengineering will need to provide sufficient design detail to support full environmental analysis, determine capital costs, and assess any potential permitting adjustments or impact on utility and transportation layout plans. Table 5 below lists the financial costs for re-engineering.

Financial Variable	Description	Estimated Cost
Revised Design and Grading Packages for Lassen and Tuolumne	Re-engineering of both project sites for reduced-scale project	\$168,000 to \$201,000

*Table 5: Aggregated financial variables associated with Site Re-Engineering and Infrastructure Modifications* 

2. CEQA Revisions and Recirculation Costs - Transitioning from a full-scale export-focused pellet facility to a domestic-focused wood chip model (and the

associated reduction in tonnage processed) is anticipated to significantly reduce environmental impacts in several areas, including air quality and greenhouse gas (GHG) emissions. (Perhaps most notably, this alternative eliminates the project's export component, thereby removing the Port of Stockton as a project feature analyzed under the DEIR.) However, the actual effects of these changes would need to be addressed in a revised Draft Environmental Impact Report (RDEIR). These revisions would be more significant than under Option 1, and would likely include updates to the air quality modeling and several of the technical studies. As above, the RDEIR would be recirculated, and comments received during recirculation would be responded to in a Final EIR, which would be presented to the GSFA Board of Directors for action. Table 6 below lists the aggregated financial cost estimates that are associated with CEQA Revision and Recirculation.

Financial Variable	Description	Estimated Cost
Revise DEIR and Technical Analyses	Revise DEIR based on technical comments received, including any necessary additional studies	~\$143,000
Recirculate DEIR, Respond to Comments, and Prepare Final EIR	Complete the recirculation process, including public notice, drafting and reviewing responses to comments, etc.	~\$130,000
Total Estimated CEQA Costs – Option 2		~\$273,000

Table 6: Estimated CEQA Costs Associated with Option 2

**Revised Capital and Operational Expenditures** – A major potential benefit of this option is the anticipated reduction in capital investment due to the elimination of pellet production equipment, drying, and port logistics infrastructure. Importantly, the original project scope includes procurement of a chipper system as part of the pelletizing process. Therefore, the revised capital expenditure model will evaluate whether modification or capacity adjustments are required to adapt the system for a stand-alone wood chip operation. Additional capital items may include storage and logistics infrastructure at the Tuolumne site, and any necessary utility upgrades to support chip-focused processing. While the Revised-Scale Project offers the opportunity to significantly reduce overall capital requirements by omitting the infrastructure required to produce and export pellets, GSNR will consider all new or modified cost components. Similarly, the reductions in processing steps and tonnage are expected to decrease operational costs – although spreading the project's fixed costs over lesser tonnage may offset the per-ton cost decrease to some extent.

Development of concrete capital and operational cost estimates for this option will require completion of site re-engineering. However, the anticipated cost reductions, combined with the market analysis discussed above, are factors that likely support Option 2.

**Timeline** – Under Option 2, re-engineering and design revisions are estimated to take approximately 2-3 months, with revision and recirculation of the DEIR and response to comments taking another 6-9 months. This would result in presentation of a FEIR to the GSFA Board of Directors roughly 9-12 months after staff receives direction to proceed. (As with Option 1, the project timeline thereafter is dependent upon a number of variables, including permitting and identification of private partners.)

# Option 3: Pause Development across Both Sites and Continue to Prioritize Developing Feedstock Certainty

While this option assumes development is paused at both proposed sites, several components described below are applicable across all project pathways, as briefly described in section III. Regardless of whether GSNR proceeds with pellet production, transitions to a wood chip model, or pauses facility development entirely, advancing a dedicated feedstock certainty strategy will be essential to ensure long-term project viability. This section outlines an organizational pathway that positions GSNR as a forest restoration and sustainable biomass feedstock development facilitator, leveraging strategic agreements and partnerships to increase biomass supply and enable landscape-scale forest management.

**Overview and Strategic Purpose** - Under this option, Golden State Natural Resources (GSNR), operating under the supervision of Golden State Finance Authority (GSFA), would focus on implementing and maximizing the value of GSFA's 20-year Master Stewardship Agreement (MSA) with the U.S. Forest Service (USFS). This Region 5-wide agreement is currently underutilized and represents one of this initiative's most valuable strategic assets. The primary objective of this approach is to build a scalable system for developing fuel reduction projects, matching forest restoration activities with end-user demand, and ultimately creating new economic and environmental value. This strategy also includes engagement with private and state landowners to facilitate feedstock development opportunities beyond federal lands.

**MSA-Enabled Project Development** - GSFA would work directly with the USFS to scope and facilitate priority forest health projects under the MSA, including preparation of any necessary environmental reviews. This requires strengthening working relationships with key agency personnel, including forest supervisors and district rangers. Many provisions within the MSA remain unused, and operationalizing them through consistent communication and project development will be a top priority. To support more predictable and scalable implementation under the MSA, GSFA/GSNR is currently exploring a framework that would establish a long-term project review structure that covers a broad landscape, with treatment activities executed annually based on technical proposals and financial plans submitted through a recurring approval process in partnership with the Forest Service. If successful, this structure would enable GSFA/GSNR to efficiently activate the MSA as a mechanism to increase the pace, scale, and effectiveness of forest health treatments.

**Partnerships with Forest Management Entities** - In addition to its work with the USFS and industrial partners, GSFA would engage with local Resource Conservation Districts (RCDs), Fire Safe Councils, conservation nonprofits, and other land management organizations. These partners often manage forest health grants and have shovel-ready or near-term projects that could benefit from GSFA's ability to scale treatment through the MSA. Where applicable, GSFA could integrate its MSA to complement these organizations' efforts, helping to increase throughput and reduce project costs while expanding access to markets for low-value forest biomass.

**Market Development and Financing Support** - GSFA's experience developing GSNR has generated valuable intellectual capital, including feasibility studies, cost models, policy analyses, and broad stakeholder engagement. This positions GSFA as a resource for new biomass market entrants and forest product innovators. In this role, GSFA could serve as a liaison between private developers and public agencies, offering support with financing tools (e.g., debt issuance, public grant administration) and business model development. These efforts align with GSFA's core competencies and would allow the organization to catalyze private investment in forest-based industries.

Under this option, which GSNR would not, itself, process or produce forest products, GSNR/GSFA would still play a vital role in California's forest resilience strategy. This approach enhances long-term feedstock certainty, supports forest restoration goals, and strengthens the organization's role as a trusted intermediary between land managers and biomass markets.

**Timeline** – Since Option 3 represents a continuation of ongoing efforts, implementation could begin immediately.

# **IV.** Partnerships and Collaboration Opportunities

When considering these options, one factor that may support Option 2 is that a transition toward a domestic wood chip model creates opportunities for GSNR to develop a broader in-state coalition of support around forest restoration, rural economic development, and carbon-neutral innovation. An alternative focused on creating in-state end uses for biomass utilization invites deeper alignment with public agencies, local businesses, research institutions, and environmental stakeholders committed to sustainable biomass utilization in California.

**Strategic Government and Agency Partnerships** – GSNR is currently strengthening coordination with the California Natural Resources Agency (CNRA) to align with the state's forest and wildfire resilience priorities, including the *Wildfire and Forest Resilience Action Plan*<sup>27</sup> and domestic wood product market development strategies. At the federal level, GSNR will continue collaboration and partnership with the USFS under the existing

<sup>&</sup>lt;sup>27</sup> California Wildfire and Forest Resilience Task Force. *California Wildfire and Forest Resilience Action Plan*. April 2021. <u>https://wildfiretaskforce.org/wp-</u>content/uploads/2022/04/californiawildfireandforestresilienceactionplan.pdf.

Master Stewardship Agreement and in future Supplemental Project Agreements, which provide a robust pathway for GSNR to expand feedstock access while ensuring activities align with federal priorities.

**Research and Innovation Collaborations –** As California accelerates investments in carbon removal, emerging clean energy technologies, and biomass utilization, GSNR is exploring strategic partnerships to align its chip-based feedstock with emerging markets. Key opportunities include engaging with research and development institutions, such as Lawrence Livermore National Laboratory (LLNL), which has identified forest biomass as a critical feedstock in its *Getting to Neutral* scientific report.<sup>28</sup> LLNL's research focuses on bioenergy with carbon capture and storage (BECCS) and renewable hydrogen, providing a compelling platform and partnership to explore low-carbon utilization pathways for GSNR's end products. Partnerships like these could be solidified by the development of an Innovation Campus at the Tuolumne site.

**Local Stakeholder Engagement** – Regional environmental groups play a critical role in shaping and supporting forest-based solutions. GSNR will pursue collaborative engagement with locally grounded partners that bring ecological expertise, community ties, and regional credibility to the project. Involving such organizations from the early planning stages helps ensure transparency and co-benefits for biodiversity and public trust.

#### **Recommendation**

The GSNR Board is recommended to review the foregoing options, and provide direction to staff regarding next steps for development of the Forest Resiliency Demonstration Project.

<sup>&</sup>lt;sup>28</sup> Baker, Sarah E., et al. *Getting to Neutral: Options for Negative Carbon Emissions in California*. Lawrence Livermore National Laboratory, January 2020. <u>https://www.osti.gov/servlets/purl/1597217</u>.