Tahoe Central Sierra Cal FRAME Project

Case Study: Biomass Supply Report

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The report is intended to support the objectives of the Tahoe Central Sierra Cal FRAME Pilot Project and relied on constant communication and direction from the region's team members.

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List of Acronyms Used

BDT	Bone dry ton
Cal FRAME	California Forest Residual Aggregation Market Enhancement
CEQA	California Environmental Quality Act
EFRT	Emergency Forest Restoration Team
FSC	Fire Safe Council
JPA	Joint Powers Authority
LTO	Licensed timber operator
MSA	Master Stewardship Agreement
MBF	Thousand board feet
MMBF	Million board feet
MW	Megawatt
NF	National Forest
OPR	Office of Planning and Research
PCWA	Placer County Water Agency
RCD	Resource Conservation District
RPF	Registered Professional Forester
SPI	Sierra Pacific Industries
SOFAR	South Fork American River [Collaborative]
TCS	Tahoe Central Sierra
TCSI	Tahoe-Central Sierra Initiative

Executive Summary

Introduction

The Tahoe Central Sierra (TCS) Pilot Project is one of five Cal FRAME[1] pilots funded through OPR and California's 2021 Wildfire and Forest Resilience Expenditure Package, and is led by the Placer County Water Agency (PCWA). The overall goal of the TCS Pilot Project is to provide a collaborative recommendation for an institutional arrangement that will help overcome the TCS Region's (Placer, Nevada, and El Dorado Counties) feedstock contracting challenges, and outline development of one or more potential biomass utilization pathways.

This Biomass Supply Report is part of the TCS Pilot Project and is for a proposed biomass facility based at PCWA's Ophir Road pumping plant. In partnership with its technology partner, Arbor Energy, PCWA intends to build an 8 megawatt (MW) bioenergy facility adjacent to PCWA's water treatment plant in Ophir, California, referred to as the Arbor Biomass Gasification Facility (Arbor Facility). Of the 8 MW that will be generated, 5 MW will be reserved for on-site power needs for both the biomass and new water treatment plants, and 3 MW will be exported to the grid. The facility is scheduled to be deployed in 2026, and will consume roughly 35,000 bone dry tons (BDT) of biomass feedstock per year in the form of wood chips.

This Biomass Supply Report includes an overview of the facility's projected feedstock supply needs and assessing feedstock-generating activities in the TCS Region within a reasonable haul distance from Ophir. This includes a general assessment of licensed timber operator (LTO) capacity and perspectives, major entities in the area that are advancing forest restoration work or generating biomass, and opportunities around sourcing feedstock from nonindustrial forestlands and fire safe projects.

Findings and Recommendations:

According to California Department of Tax and Fee Administration data on timber harvests, there is on average 115,915 thousand board feet (MBF) of timber harvested per year and 104,324 BDT of biomass generated per year in the TCS Region. Furthermore, Tahoe Central Sierra Initiative (TCSI) Phase I Restoration Wood Supply Assessment from 2020 identifies that an increase in the pace and scale of forest restoration projects in the TCSI landscape has the potential to generate an additional 320,000 BDT of available biomass per year.

There is extensive work occurring in the TCS Region to plan and implement forest health activities across many land ownerships, especially by partner groups to the US Forest Service, such as National Forest Foundation and Placer County. This is in part due to the TCS Region containing important and valued watersheds for state water supply, an extensive wildland urban interface landscape, a high degree of tourism due to the Lake Tahoe Basin, and the existence of TCSI supporting efforts to advance the pace and scale of forest restoration. These forest health activities often generate woody biomass, but the amount of biomass available for procurement by a biomass facility can vary from project-to-project

[1] The California Forest Residual Aggregation Market Enhancement (Cal FRAME) Pilot Program is designed to explore the facilitation of regional biomass aggregation to centralize feedstock collection and manage contracts for collection, transport, and utilization of biomass feedstock material generated by forest health and community-based wildfire projects.

based on location (and distance to a biomass facility), project design (such as mastication vs biomass removal, or a forest health project vs timber harvest), and funding for implementation.

Based on stakeholder outreach in the TCS Region as described in this report, CLERE Inc. offers the following recommendations to the Arbor Energy team for pursuing biomass supply for the Arbor Facility:

- If Arbor Energy prefers to obtain biomass supply guarantees quickly, then we recommend working directly with a prominent logging operator in the TCS Region, to discuss logistics around supply contracts, price, and biomass delivery and unloading in Ophir. Operators are the main artery into forest management activities that generate biomass, particularly timber harvest activities occurring on private lands that are often not reliant on grant funding; thus it is important to establish contact with these operators to guarantee biomass supply, particularly if grant funding for forest health projects dries up due to state budget limitations.
- If sourcing biomass from local community wildfire prevention and green waste disposal initiatives is of interest to Arbor Energy, then Arbor Energy should work directly with the Nevada County FSC and other Resource Conservation Districts in the region that focus on fuels reduction projects in the foothill communities closer to the Arbor Facility.
- Further pursue opportunities around sourcing biomass from green waste disposal efforts with local city and county governments, especially related to SB 1383 requirements for organic waste collection by jurisdictions.
- Explore partnerships with National Forest Foundation, Placer County (or other entities that administer projects on behalf of the US Forest Service) to obtain feedstock guarantees from forest restoration projects on the Tahoe National Forest.
- For ease of coordinating feedstock delivery, considering purchasing biomass directly from existing facilities, such as Rio Bravo Rocklin or Placer County Western Regional Landfill. Arbor Energy may consider exploring this option further to fill in gaps in fuel supply needs.

<u>Opportunities:</u>

Joint Powers Authority in TCS Region and Long Term Feedstock Contracting

Longer term, Arbor Energy should consider tracking Cal FRAME efforts and the possible future formation of a biomass aggregation entity that may help to derisk procurement contracts and help secure long-term feedstock agreements. If the TCS Region chooses to advance a biomass aggregation entity to support the biomass feedstock supply chain, Arbor Energy could work directly with this entity to set up feedstock contracts and receive other services, alleviating Arbor of the administrative burden around feedstock contracting, allow contract insurance protections to be obtain, and support Arbor with project financing.

Forest Resource and Renewable Energy Decision Support System (FRREDSS) and Validation

The Forest Resource and Renewable Energy Decision Support System (FRREDSS) model developed by UC Davis in 2020 provides a multi-step framework for siting bioenergy facilities, and calculates the twenty-year cash flow statements based on the full delivered price of forest-based feedstock. The FRREDSS tool also calculates timber operator costs to deliver in-woods biomass feedstock to a facility. Currently, the Northeastern California OPR Pilot Project is working with UC Davis to test the model's effectiveness in determining long-term feedstock contract price points, and its potential use as a long-term feedstock price mechanism through a sensitivity analysis. The FRREDSS model will continue to be refined to assess

its viability to be used as a pricing mechanism, and its results will be helpful to Arbor Energy in identifying adequate prices for delivered biomass in the TCS Region.

Resilient Sierra Digital Marketplace Launch

In 2023, OPR and the Cal Poly Digital Transformation Hub developed and is now nearing release of its Resilient Sierra tool, which offers a digital marketplace for landowners to connect with LTOs and biomass facilities for biomass removal from properties. The tool will serve as an implementation arm for public institutions working together through a Joint Powers Authority (JPA) to manage forest biomass supplies at the local level. Ultimately this tool will enable JPAs to provide a reliable long-term feedstock supply contracting mechanism to biomass businesses to help grow rural economies and incentivize fire defensible space compliance and fuels reduction work. While this tool is still in its infancy, Arbor Energy may consider engaging with developers of this tool for potential participation in the marketplace.

Increasing Demand for Green Waste Disposal

There is increased recognition of the importance of advancing green waste disposal opportunities for small landowners in the wildland urban interface, and to approach biomass in this context as waste disposal. This represents a considerable volume of biomass that could be utilized by the Arbor Facility, and quantities of available green waste may increase in the coming years as local jurisdictions must comply with SB 1383 requirements for organic waste diversion. We recommend that Arbor Energy discuss opportunities around sourcing feedstock from green waste disposal efforts with the Nevada County FSC, Nevada County, and other relevant city or county governments in the TCS Region that are working to advance green waste disposal options in forested areas.

I. Introduction

The California Forest Residual Aggregation Market Enhancement (Cal FRAME) Pilot Program is designed to explore the facilitation of regional biomass aggregation to centralize feedstock collection and manage contracts for collection, transport, and utilization of biomass feedstock material generated by forest health and community-based wildfire projects. The Tahoe Central Sierra (TCS) Pilot Project is one of five Cal FRAME pilots funded through OPR and California's 2021 Wildfire and Forest Resilience Expenditure Package, and is led by the Placer County Water Agency (PCWA). For the purpose of this Pilot Project, the TCS Region is defined as Placer, Nevada, and El Dorado Counties. The overall goal of the TCS Pilot Project is to provide a collaborative recommendation for an institutional arrangement that will help overcome the TCS Region's feedstock contracting challenges, and outline development of one or more potential biomass utilization pathways.

Through the TCS Pilot Project, PCWA is tasked with investigating pathways, including the creation of a public entity, to reinforce and facilitate feedstock supply chain logistics for woody biomass. This includes biomass gathered from public and private forestlands, utility and transportation corridors, and forest thinning projects. The project also includes consideration of facilities to advance utilization of the biomass in an environmentally sustainable way that supports a circular forest economy.

Other reports produced by the TCS Pilot Project include the: 1) Water Agency Forest Health Report, which explores PCWA and other proximate water agencies' potential role in biomass feedstock procurement and utilization; 2) Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California report, which identifies the best options for an institutional model for biomass feedstock aggregation in the three-county region; and 3) Community Collaboration Report, which assesses the current status of forest health work among stakeholders in the region, and identifies stakeholder needs to achieve forest health and biomass utilization goals.

Task 5 of this TCS Pilot Project is to conduct a Biomass Conversion Facility Case Study Report for a proposed biomass facility based at PCWA's existing Ophir Road parcel, which is adjacent to PCWA's Ophir Road pumping plant, and to the soon-to-be-constructed Ophir Road Water Treatment Plant. This Biomass Supply Report is part of the Biomass Conversion Facility Case Study, and includes an overview of the facility's projected feedstock supply needs and assessing feedstock-generating activities in the TCS Region within a reasonable haul distance from Ophir.

The TCS Region falls within the Tahoe-Central Sierra Initiative (TCSI), which is a public-private partnership that aims to restore the resilience of 2.4 million acres of Sierra Nevada forests and watersheds through innovative planning, investment, and management to increase the pace and scale of forest health and wildfire risk reduction work across its landscape. The TCSI area encompasses the Lake Tahoe Basin, and the American, Bear, Truckee, and Yuba River watersheds. As the TCS Region encompasses Placer, Nevada, and El Dorado Counties, it occupies a portion of the overall TCSI landscape, but not all of it.

This study aims to expand the findings of a feedstock availability in the TCSI area released in 2020 by The Nature Conservancy and Mason Bruce & Girard[2]. This report, titled the Phase I Restoration Wood Supply

[2] https://www.scienceforconservation.org/assets/downloads/MBG_Tahoe_Central_Sierra_Initiative_v6.pdf

Assessment, provides a thorough analysis of a range of potentially available wood from forest restoration projects in the TCSI landscape, but takes a large-scale and theoretical approach to doing so. To build from the Phase I Restoration Wood Supply Assessment, this Biomass Supply Report as part of the TCS CalFRAME Pilot Project is to assess potentially available biomass specific to PCWA's proposed biomass facility within reasonable haul distances. This includes a general assessment of licensed timber operator (LTO) capacity and perspectives, major entities in the area that are advancing forest restoration work or generating biomass, and opportunities around sourcing feedstock from nonindustrial forestlands and fire safe projects.

As this study is part of the TCS Pilot Project, it is important to note that while Arbor Energy can procure biomass on its own through a direct agreement with suppliers, it can also be procured through the future biomass aggregation entity that the TCS Pilot Project is exploring creation of. Potential benefits of using such an entity include feedstock contract insurance for long-term contracts, and voluntary use of a transparency biomass pricing mechanism. This proposed entity is discussed further in Section VI: Conclusion and Recommendations.

Proposed Facility Overview

Placer County Water Agency (PCWA) and its technology partner, Arbor Energy, intend to build an 8 megawatt (MW) bioenergy facility adjacent to PCWA's water treatment plant in Ophir, California, referred to as the Arbor Biomass Gasification Facility (Arbor Facility). Of the 8 MW that will be generated, 5 MW will be reserved for on-site power needs for both the biomass and new water treatment plants, and 3 MW will be exported to the grid. The facility is scheduled to be deployed in 2026. A site overview of the facility can be found in Figure 1 and Figure 2.

Arbor Energy's biomass conversion process incorporates biomass carbon removal and storage, which will remove carbon sequestered from biomass via high pressure and high temperature processing, and capture the resulting carbon dioxide for storage. This process is designed to produce "carbon negative power", through production of electricity and supercritical carbon dioxide. The facility involves pre-treatment of biomass through torrefaction[3], which is then loaded into a gasifier which uses a series of chemical reactions to convert the solid biomass into syngas. Next, the syngas is fed into a combustor where it's mixed with oxygen and burned in an oxy-combustion reaction producing pure carbon dioxide, water, and thermal energy (heat). This high-temperature, high-pressure gas is fully contained so the heat can be converted to electricity via a turbine generator, and the carbon dioxide is compressed to a highly dense supercritical carbon dioxide fluid so that it can be stored and returned to Earth's natural biogeochemical cycle. Electricity generated will be utilized for on-site demands by PCWA's water treatment facility, and the system will be interconnected to the grid via a net metering agreement with Pacific Gas & Electric.

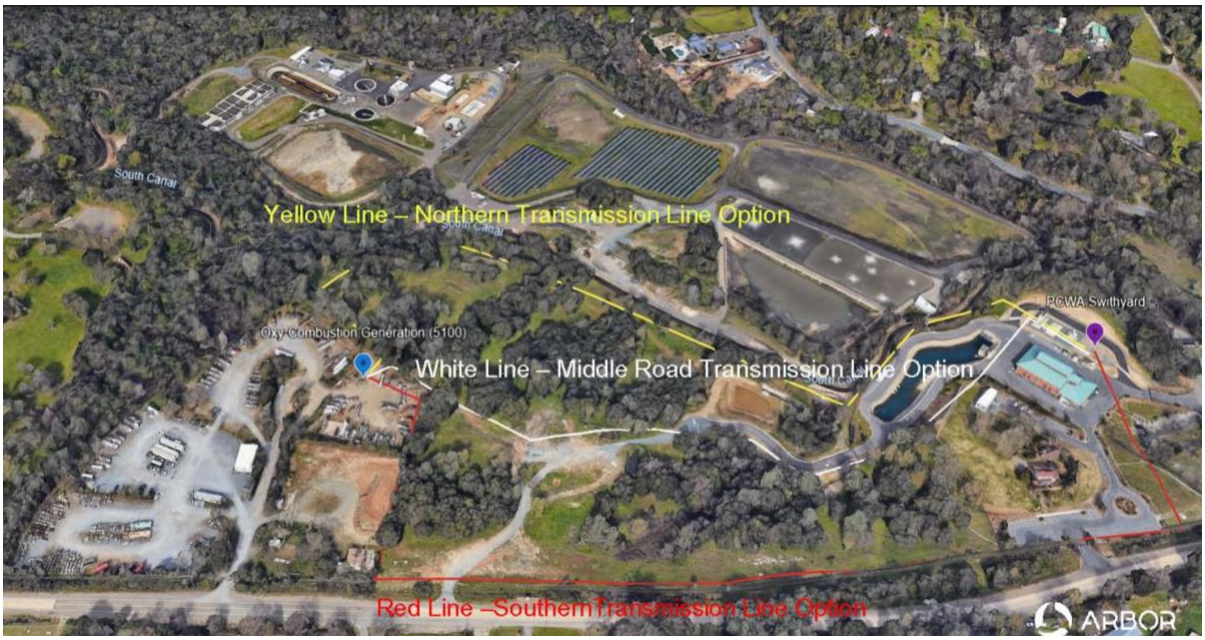
This facility will consume roughly 35,000 bone dry tons (BDT) of biomass feedstock per year in the form of wood chips, but not slash or whole logs. A truck dump will be on-site to unload chip vans. PCWA will maintain on-site storage space for 30-60 days-worth of material.

[3] Torrefaction is a process in which biomass is thermally treated, reducing its content of volatile components, making it a more energy-dense and hydrophobic material.

As the Arbor Facility generates supercritical carbon dioxide, which can be sold as carbon offsets, Arbor Energy expects that this will allow the purchase of biomass at a higher price than is typical at more traditional biomass-to-energy facilities which are limited by the electricity offtake pricing.

Figure 1. Placer County Water Agency's property in Ophir, including the proposed site of the Arbor Facility (circled in orange).

Figure 2. Three possible points of interconnection for the planned Arbor Facility.



TCS Region vs Case Study Area

This report broadly focuses on the TCS Region as the study area, as the TCS Region is the focus area of the TCS Pilot Project (see Figure 3Figure 3). However, because this report also serves as a case study specific to the Arbor Facility, forested areas within the TCS Region that are within a reasonable haul distance to the Arbor Facility in Ophir, or roughly a 90-minute haul distance, are defined as the Case Study Area (see Figure 4). Sections IV and V of this report use the Case Study Area as a basis for evaluating potential biomass supply opportunities and licensed timber operator capacity in this area, as the Case Study Area represents areas that are within a reasonable haul distance to Ophir. Section IV also highlights a significant biomass supply opportunity in Yuba County outside of the TCS Region and Case Study Area; this is explained further in Sections IV and V.

Figure 3. TCS Region boundary, consisting of the entirety of Nevada, Placer, and El Dorado Counties

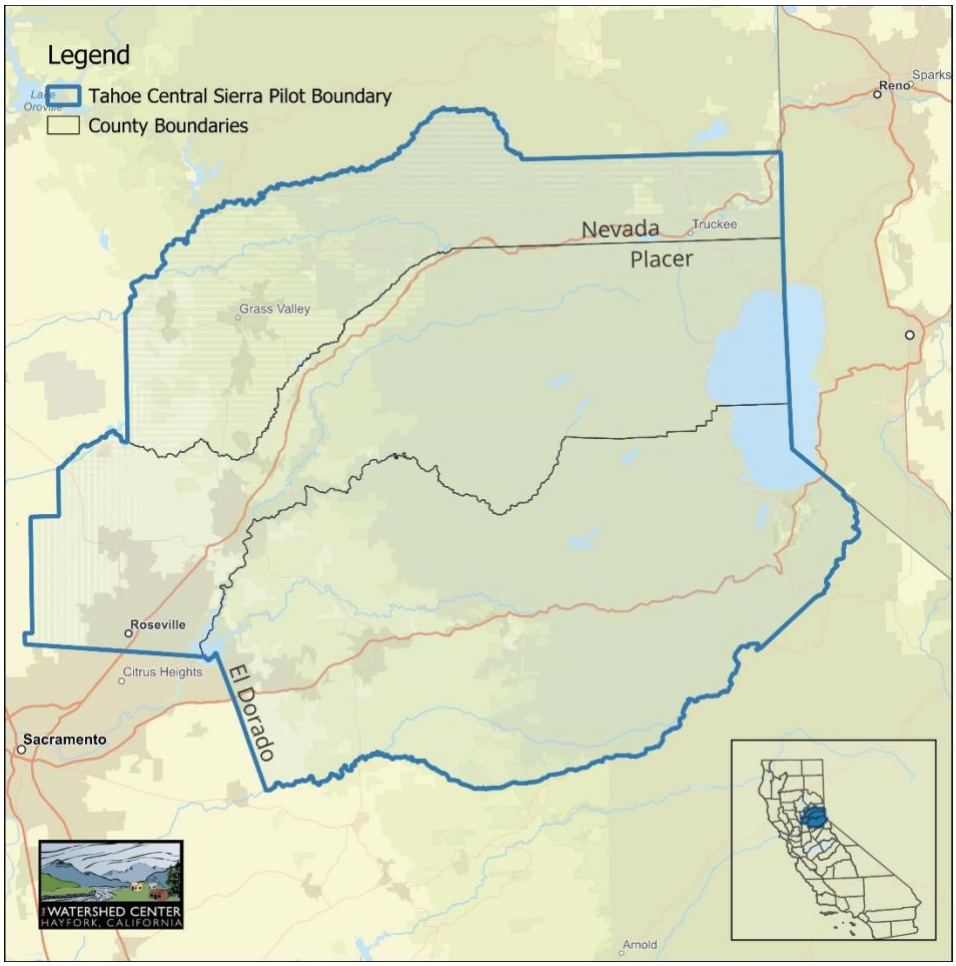
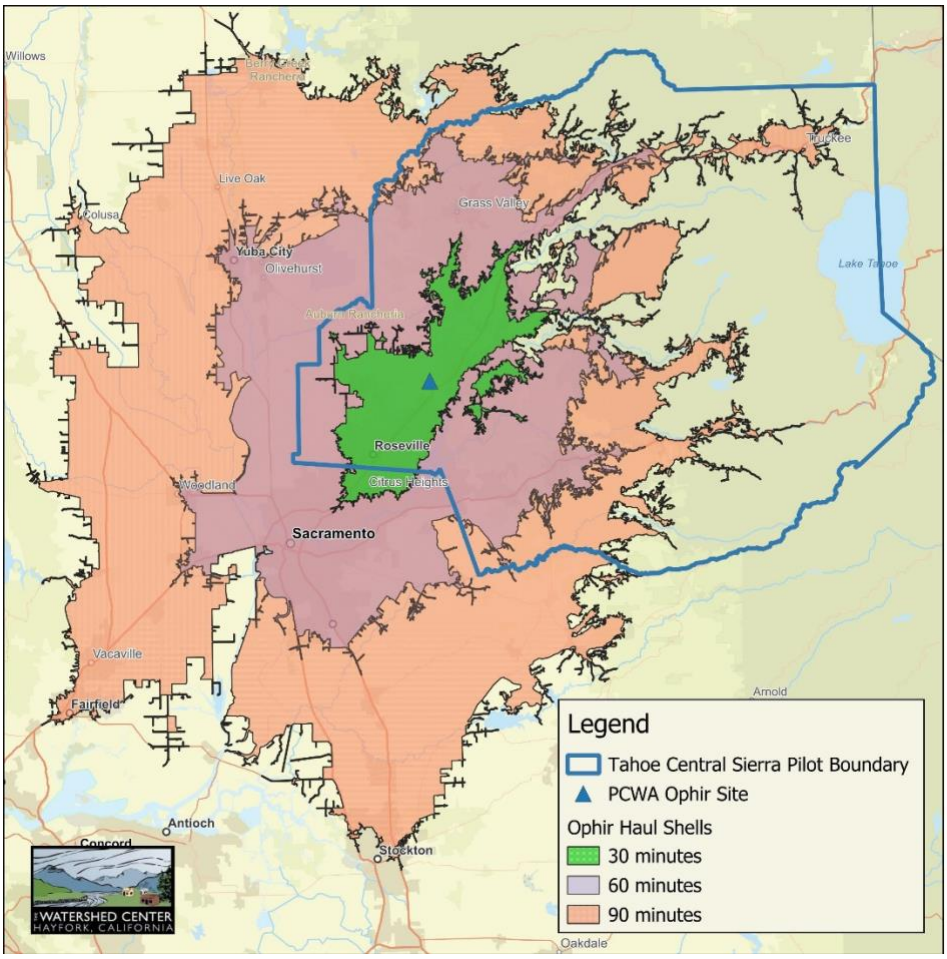


Figure 4. Case Study Area: 30 - 60 - 90 minute haul circles to Arbor Facility in Ophir



Report Objectives

This report seeks to assess the availability of biomass feedstock in the TCS Region by building upon existing feedstock assessments, and to describe current and anticipated barriers to obtaining feedstock. This report does not seek to solely quantify the specific amount of biomass available, rather it provides developers of the Arbor Facility with an informed sense of forest management and biomass-generating activities within a reasonable haul distance to its project site in Ophir, and to highlight the major entities involved with this work. For those interested in an in-depth analysis that quantifies potentially available feedstock in the TCS Region, refer to the TCSI Phase I Restoration Wood Supply Assessment from 2020.

Overall, the objectives of this report are to:

- Review vegetation, land ownership, wildfire history, and acreage characteristics of the TCS Region.
- Complete a feedstock analysis that describes current and future barriers to obtaining feedstock.
- Summarize major takeaways from the TCSI Phase I Restoration Wood Supply Assessment developed by The Nature Conservancy and Mason Bruce & Girard, as it relates to the TCS Region.

- Assess existing fuels reduction and forest health work and opportunities to treat more acres if a robust biomass market is established.
- Develop an understanding of the scope of forest management and biomass-generating activities that counties, Fire Safe Councils (FSCs), and Resource Conservation Districts (RCDs) in the TCS Region perform to advance community wildfire prevention and forest health activities on private nonindustrial lands, as this is a gap in the TCSI Phase I Restoration Wood Supply Assessment study.
- Identify strategies to develop utilization pathways from identified community-scale fire mitigation efforts.
- Assess local operator capacity and interest to process and haul biomass to the Arbor Facility in Ophir, and provide a range of potential prices for delivered biomass to the Arbor Facility in Ophir.

II. TCS Region Landscape Overview

The TCS Region includes the entirety of Nevada, Placer, and El Dorado Counties (Figure 3). It spans from the Sacramento Valley in the west to Lake Tahoe and the Nevada border to the east, covering a total of 2,728,734 acres across all three counties. The TCS Region spans across the Sierra Nevada, where the elevation increases gradually from an elevation of 164 feet in Roseville and the Sacramento Valley to the Sierra Nevada crest at more than 10,000 feet before it drops to the Lake Tahoe Basin and runs up to the Nevada state border.

To quantify acreages of each county, vegetation type, and land ownerships in the TCS Region, a spatial analysis was performed using the California Wildlife Habitat Relationships system. The results are presented below.

County Acreages in the TCS Region

The approximate acreage for each county in the TCS Region can be found below in Table 1. El Dorado County covers the greatest area relative to the other TCS counties, while Nevada County is the smallest of the three.

Table 1. TCS Region Acreage by County

County	**Acres**
El Dorado	1,144,943
Nevada	623,849
Placer	959,942
Total TCS Region	**2,728,734**

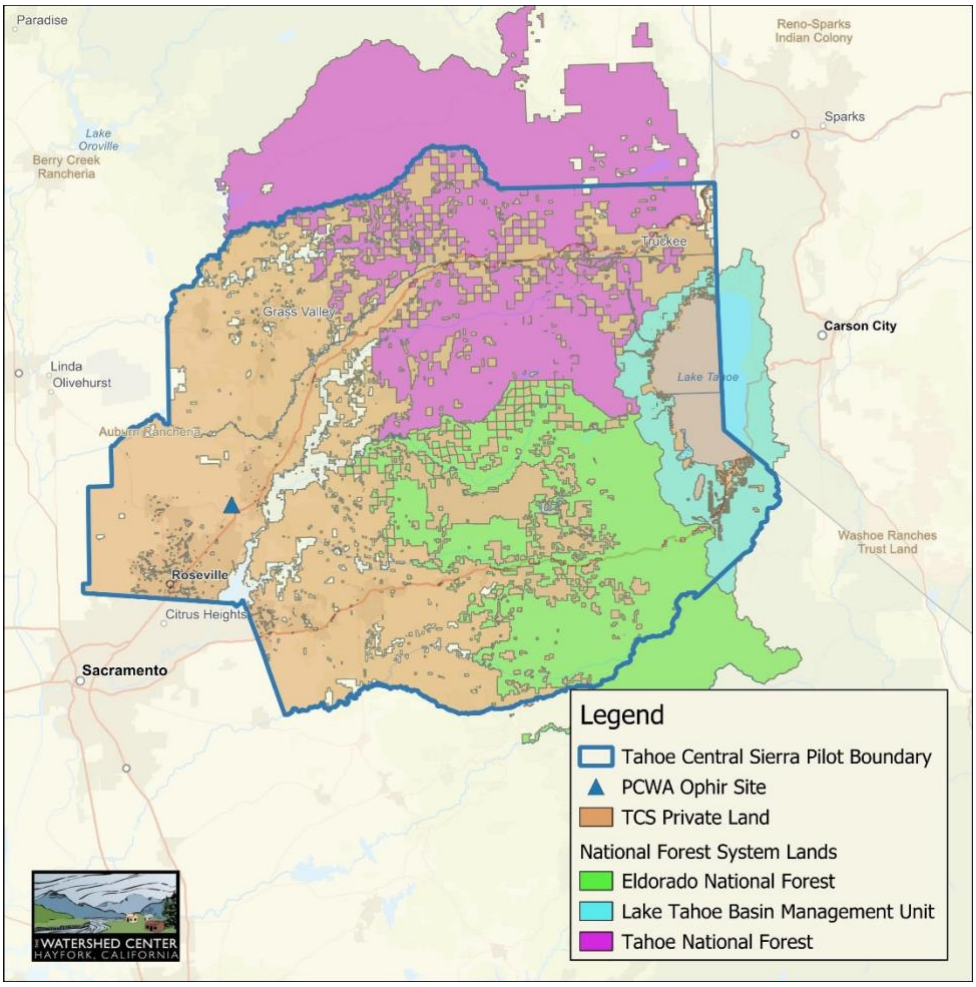
Land Ownership

The TCS Region consists of a variety of land ownerships, with most privately owned lands occurring in the western portion of the region where the urban and metropolis areas exist. Moving up the west slope of the Sierra Nevada, the landscape changes to being dominated by forestland, featuring a checkboard of ownership between US government managed lands and privately owned timberland—see **Error! Reference source not found.** 5 below.

Privately owned lands within the TCS Region make up 1,487,85 acres, or 54.5% of the total area, however this number includes non-forested agriculture and privately owned areas in the urban areas on the west side of the region. To refine this number into a more relevant value for assessing biomass availability, the TCS Region has 896,902 acres of conifer and hardwood forest under private ownership. While the exact value is unknown, it is likely that a considerable percentage of this land base is owned by Sierra Pacific Industries (SPI), a prominent timberland owner in California. Other industrial timberland owners in the TCS Region include Siller Brothers and CHY Company, but the land base owned by these companies is small relative to that of SPI.

The most significant land ownership type in the TCS Region is National Forest System lands, including the Tahoe National Forest (Tahoe NF) and Eldorado National Forest (Eldorado NF), as well as the Lake Tahoe Basin Management Unit. National Forest System lands within the three-county area include approximately 1,063,781 acres, accounting for 39% of the study area. See Figure 5 for a spatial representation of the National Forests in the TCS Region.

Figure 5. National Forests and privately owned land within the TCS Region, in relation to the Arbor Facility at PCWA's Ophir Site.



Other prominent ownerships include Bureau of Land Management, the Auburn State Recreation Area above Folsom Lake (administered by the US Bureau of Reclamation and managed by California State Parks), wildlife areas managed by US Department of Fish and Wildlife, California Department of Parks and Recreation, non-profit conservancies and land trusts, and local government (including irrigation districts). A full list of land ownership types can be found in Table 2.

Table 2. Acreage by Landownership in the TCS Region, Organized Alphabetically

Landownership Type	**Total Acres in TCS Pilot Area**
Bureau of Indian Affairs	1,427

Landownership Type	Total Acres in TCS Pilot Area
Bureau of Land Management	64,902
Bureau of Reclamation	32,607
CA Department of Fish and Wildlife	9,671
CA Department of Parks and Recreation	19,721
Department of Defense	2,774
Local Government	12,938
Non-Profit Conservancies and Trusts	26,294
Other Federal Lands	470
Other State Lands	7,516
Private (including urban areas and agricultural lands in Central Valley) *Private (Conifer and Hardwood Vegetation Type Only)*	1,487,058 *896,902*
USDA Forest Service	1,063,781

Vegetation Cover

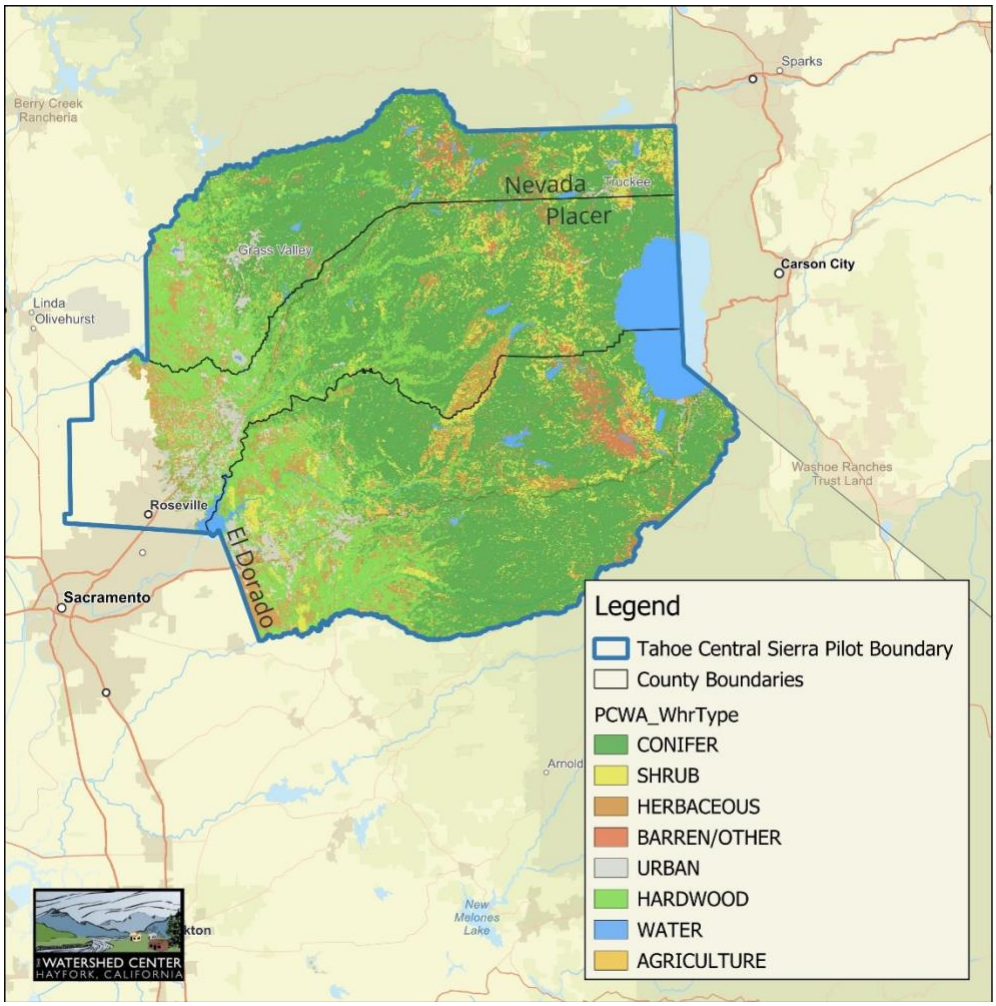
Vegetation cover in each county, sourced from spatial data from the California Wildlife Habitat Relationship System, is summarized below in Table 3 and displayed in Figure 6 . In the TCS Region, conifer forests make up most of the vegetation cover (1,301,958 acres), followed by hardwood forests at 498,649 acres.

Table 3. Acres of Vegetation Type by County in the TCS Region.

	El Dorado	Nevada	Placer	Total (Acres)
Agriculture	5,513	2,052	3,030	**10,595**
Barren/other	39,302	24,683	18,990	**82,975**
Conifer	550,533	310,573	440,853	**1,301,958**
Hardwood	217,677	129,450	151,522	**498,649**
Herbaceous	107,270	34,985	58,500	**200,755**
Shrub	101,166	56,876	74,000	**232,042**
Urban	41,940	22,727	42,494	**107,161**
Water	81,267	42,575	29,500	**153,341**
Outside WHR extent*	427	34	141,211	**141,672**
Total Acres	**1,145,095**	**623,954**	**960,100**	**2,729,149**

*Note that outside of the California Wildlife Habitat Relationship (WHR) System Extent refers to low elevation privately owned areas of the Sacramento Valley dominated by urban areas or agriculture.

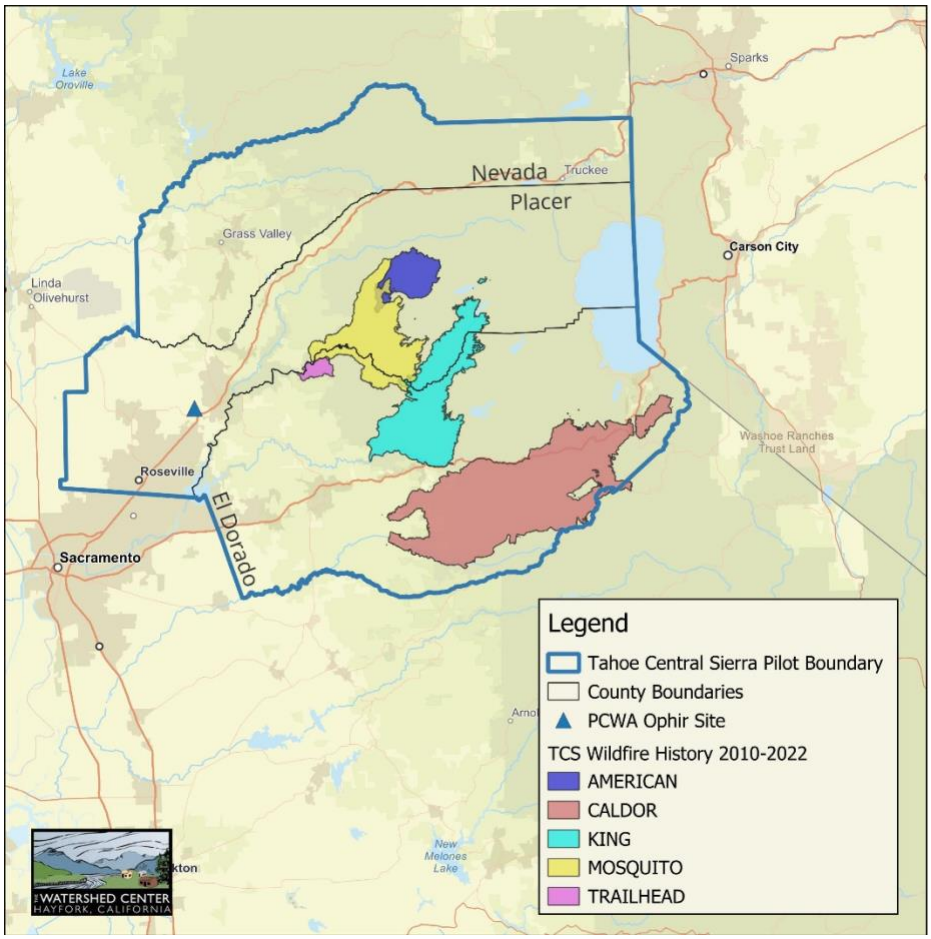
Figure 6. Vegetation cover in the TCS Pilot Project boundary.



Recent Wildfire History

Significant wildfires (greater than 50,000 acres) that have occurred in the TCS Region in the last 10 years include the King Fire (2014), 97,000 acres; the Caldor Fire (2021), 221,832 acres; and the Mosquito Fire (2022), 76,788 acres. Refer to Figure 7 for a map of recent and significant wildfires in recent years. Nevada County has had a noticeable absence of significant wildfire in the last 10 years, which is made clear by Figure 7. Wildfire impacts at a large-scale could result in a period with less biomass availability as forests re-establish themselves and grow biomass material once more. Alternatively, the more recent wildfires identified in Figure 7 could represent a source of biomass in the short term from salvage operations and other post-fire recovery work.

Figure 7. Major wildfires in the last 10 years within TCS Region boundary



Potential Competition

Rio Bravo Rocklin

The primary and most prominent woody biomass facility in the TCS Region is Rio Bravo Rocklin. Rio Bravo is a 24.4 MW biomass facility that operates under a Bioenergy Renewable Auction Mechanism (BioRAM) Power Purchase Agreement (PPA) with Southern California Edison. Rio Bravo consumes roughly 180,000 BDT per year, with 100,000 BDT procured directly from forest operations on average per year. Rio Bravo also procures biomass in the form of sawmill residuals from various wood processing facilities, including from the nearby SPI Lincoln sawmill.

Rio Bravo's BioRAM PPA requires 80% of its annual fuel consumption to be sourced from CAL FIRE-designated High Hazard Zones, though sawmill residuals and material from utility line and highway right of way clearance projects count toward the High Hazard Zone requirement. Thus, Rio Bravo consumes roughly 150,000 – 160,000 BDT of High Hazard Zone biomass per year.

Biomass supply assessment modeling performed for TCSI in 2020 (see Section III for more detail) found that an increase in forest restoration in the region has the potential to produce an additional 320,000

BDT of biomass per year for 20 years, which would easily exceed Rio Bravo Rocklin's total processing capacity of 180,000 BDT per year (100,000 BDT of which is directly from forest-sources).

Because of the large scale of Rio Bravo's operations, it does not necessarily need to be viewed as a competitor to Arbor Energy. In fact, given Rio Bravo's prominence in feedstock procurement in the TCS Region, preliminary conversations between Arbor Energy and Rio Bravo have suggested there could be opportunity around Arbor Energy sourcing biomass supply directly from Rio Bravo.

Sierra Pacific Industries Lincoln

The SPI sawmill in Lincoln hosts a 18 MW biomass cogeneration that primarily sources low-cost sawmill residues from on-site milling operations, but on occasion it will procure biomass from in-woods projects.

Cabin Creek Biomass – Planned

Placer County is planning for development of the 2 MW Cabin Creek biomass facility in the Truckee area which will source up to 17,000 BDT of biomass per year. It is expected that Cabin Creek's feedstock procurement area will be in the greater Truckee area and Tahoe Basin, provided that the number of planned forest restoration projects in the Lake Tahoe Basin Management Unit and eastern Tahoe National Forest proceed as planned. According to a technical memorandum released March 2022 by West-Yost for Placer County, there is enough currently and anticipated biomass material available annually within a 30 mile radius/source area of Cabin Creek to supply Cabin Creek and planned facilities in the area, including planned facilities by the Northstar Community Services District, Town of Truckee, and Loyalton co-gen restart. Since the planned Cabin Creek facility is 72 miles from the Arbor Facility, the expected feedstock procurement areas of the facilities do not overlap. Cabin Creek does not need to be viewed as potential competition to the Arbor Facility.

El Dorado County Network of Small Biomass Facilities

There are a variety of biomass facilities in development throughout El Dorado County that are primarily small-scale systems generating 125 kilowatts of electricity or less, including at South Tahoe Refuse, Golden Sierra High School, and Georgetown Elementary School. These proposed facilities will have a small demand for biomass relative to the Arbor Facility and will source material from their specific areas, and therefore also do not represent competition to the Arbor Facility.

III. Review of Tahoe-Central Sierra Initiative Phase 1 Restoration Wood Supply Assessment Results

In 2020, The Nature Conservancy, in partnership with Mason Bruce & Girard, released its Phase 1 Restoration Wood Supply Assessment for the Tahoe-Central Sierra Initiative (TCSI) area[4]. As the TCS Region includes a portion of the overall TCSI area, the report results have some relevancy to this study. Some key takeaways from this report as they relate to the TCS Region include:

- The report identifies that under a business-as-usual harvesting scenario (based on an average of 5 years of data prior to 2020), 80,000 BDT of biomass is generated per year in the greater TCSI area.
- Increasing the pace and scale of forest restoration in the TCSI landscape by **an additional 610,000 acres over 20 years could generate an additional 320,000 BDT per year for 20 years**, equivalent of an additional 40 MW of biomass to energy. This will overwhelm existing regional wood processing infrastructure.
- At present, Rio Bravo Rocklin constitutes 100% of the biomass-processing capacity serving the TCSI study area; therefore, any increase in biomass removal exceeds Rio Bravo Rocklin's capacity. It is estimated that Rio Bravo Rocklin consumes at least 100,000 BDT/year of biomass directly from forest sources annually (as opposed to sawmill residuals or wood waste from local jurisdictions).
- On average, **delivered biomass to Rio Bravo Rocklin has a negative value of -$15/BDT;** however, this value is based on 2020 pricing and the differential is likely larger today given inflation and the rise in fuel prices.
- Haul distances are key to the economics of biomass removal – **facilities closer to supply will be more successful**. Current haul distances from TCSI projects are too long to support positive biomass stumpage at current delivered biomass prices.
- An optimized fleet of small to mid-sized biomass processing centers could offset the average project biomass stumpage deficit from -$15/BDT to -$3.35/BDT and result in positive biomass stumpage values for locations closest to the new processing centers (e.g., mid-elevation areas).

However, the report clearly acknowledges that a key limitation of this assessment is that it does not account for changes in harvests and biomass volumes caused by future wildfires. This report was issued in 2020, just prior to significant wildfire years of 2020 (North Complex), 2021 (Caldor Fire and Dixie Fire), and 2022 (Mosquito Fire), all of which likely contributed to a decrease in "business as usual" harvests given the increase in salvage logging on private timberland. While not all of the aforementioned fires occurred in the TCS Region, they all likely impacted the log and biomass markets within the TCS Region.

Additionally, while it's not explicitly stated in the report, it is also important to recognize the uncertainty of whether current funding programs administered by state and federal agencies will continue at current or historic levels, as this could affect both the amount of biomass material generated per year and potential biomass prices.

The TCSI Phase 1 Restoration Wood Supply Assessment can be read here.

[4] https://www.scienceforconservation.org/products/TCSI-phase-1

IV. Forest Management Activities Within the TCS Region and Case Study Area

Intro and Methods

To better understand land management activities and subsequent feedstock availability in the TCS Region as it pertains to potential biomass supply for the Arbor Facility, we assessed the degree to which forest management activities are already occurring in the region through obtaining available data on timber harvests and interviewing stakeholders involved with planning and implementation of forest restoration projects. Groups interviewed include representatives from the US Forest Service, SPI, consulting foresters, non-profits (such as FSCs), RCDs, forest collaborative groups, and county governments (note that LTOs were also interviewed but this is discussed in Section V). These phone and video conferencing interviews occurred from 2022 – 2023.

Interviews and assessment of proximate projects and potentially available biomass were focused on within the Case Study Area, or 90-minute one-way haul distance from Ophir, considering results from the TCSI Phase I Restoration Wood Supply Assessment stating that haul distance is a key factor contributing to high biomass prices.

Annual Timber Harvests in TCS Region – Data from Past 7 Years

The existence of the SPI Lincoln sawmill and Rio Bravo Rocklin biomass facility support a modest level of timber harvesting in the TCS Region on both federal and private lands. Harvest data per county is broken down in

Table 4 below, sourced from California Department of Tax and Fee Administration data. Data includes annual volume of timber (sawlog) harvests in thousand board feet (MBF), the volume per year relative to the total statewide harvests for each year, and the percentage of harvests each year from public lands. These timber harvests were likely absorbed by the existing timber and biomass markets, and therefore should not be interpreted as potentially available material for a new facility. However, this data could still be helpful to understand the general degree of existing wood harvesting and processing capacity in the TCS Region, and potential material that the Arbor Facility could compete for access to.

Public lands in the TCS Region include those managed by the Tahoe National Forest, Eldorado National Forest, Lake Tahoe Basin Management Unit, Bureau of Land Management Motherlode District, Bureau of Reclamation, California State Parks, and Bureau of Indian Affairs. It is likely that the National Forests are the primary contributor of timber from public lands in this data set given their prominent acreage in the TCS Region.

Note that because county-wide data could not be clipped to the Case Study Area, data is presented for the entire TCS Region.

Table 4. Harvest Data per County in the TCS Region

El Dorado County

Year	Volume (net MBF)	Net Volume (% of Total Statewide Harvests that Year)	Net Volume: % of harvests from Public land
2022	128,001	8.39	23.25
2021	38,901	2.28	4.52
2020	81,840	5.57	41.65
2019	71,331	5.01	41.47
2018	90,953	5.76	26
2017	73,606	4.66	50.84
2016	60,353	4.02	43.43
7 Year Average	**77,855.00 MBF/year**	**5.10%**	**33.02%**

Nevada County

Year	Volume (net MBF)	Net Volume (% of Total Statewide Harvests that Year)	Net Volume: % of harvests from Public land
2022	2,977	0.19	68.59
2021	7,326	0.43	8.32
2020	13,545	0.92	6.78
2019	12,018	0.84	0
2018	19,772	1.25	13
2017	23,158	1.47	37.34
2016	9,437	0.63	0
7 Year Average	**12,604.71 MBF/year**	**0.82%**	**19.15%**

Placer County

Year	Volume (net MBF)	Net Volume (% of Total Statewide Harvests that Year)	Net Volume: % of harvests from Public land
2022	2,977	0.19	68.59
2021	7,326	0.43	8.32
2020	13,545	0.92	6.78
2019	12,018	0.84	0
2018	19,772	1.25	13
2017	23,158	1.47	37.34
2016	9,437	0.63	0
7 Year Average	**25,455.29 MBF/year**	**1.68%**	**40.88%**

Of the three-county TCS Region, El Dorado County had the highest net volume of timber harvests (see

Table 4, Figure 8, and Figure 9) at 77,855 MBF (or 77,855,000 board feet) on average per year. This could be due to the large land base of private industrial timberland present in El Dorado County. The high level of harvests in 2022 can likely be attributed to the substantial increase in salvage logging due to the Caldor Fire. Similarly, while 2023 data is not yet available, it is reasonable to assume that the 2023 harvest values for Placer County will be higher than normal due to salvage logging in the Mosquito Fire footprint.

Next, Placer County's average timber harvest is 25,455 MBF (or 25,455,000 board feet) per year, while Nevada County's is 12,604.71 MBF (or 12,604,000 board feet) per year. These values are illustrated in Figure 8.

The sum of the average annual timber harvest for all three counties is 115,915 MBF. Using TSS Consultant's BDT per MBF recovery factor of 0.9 BDT per MBF, this is equivalent to **104,324 BDT of biomass generated and available per year.** Considering that Rio Bravo Rocklin sources at least 100,000 BDT per year of forest biomass, it is likely that Rio Bravo absorbs much of this biomass generated.

Table 5. Average Volume of Timber Harvested and Biomass Generated Annually

Summary of Timber and Biomass Harvested on Average in TCS Region	
Annual Volume of Timber Harvested	115,915 MBF/year
Annual Biomass Generated	104,323.5 BDT

Figure 8. Volume of timber harvested in the TCS Region, 2016 - 2022.

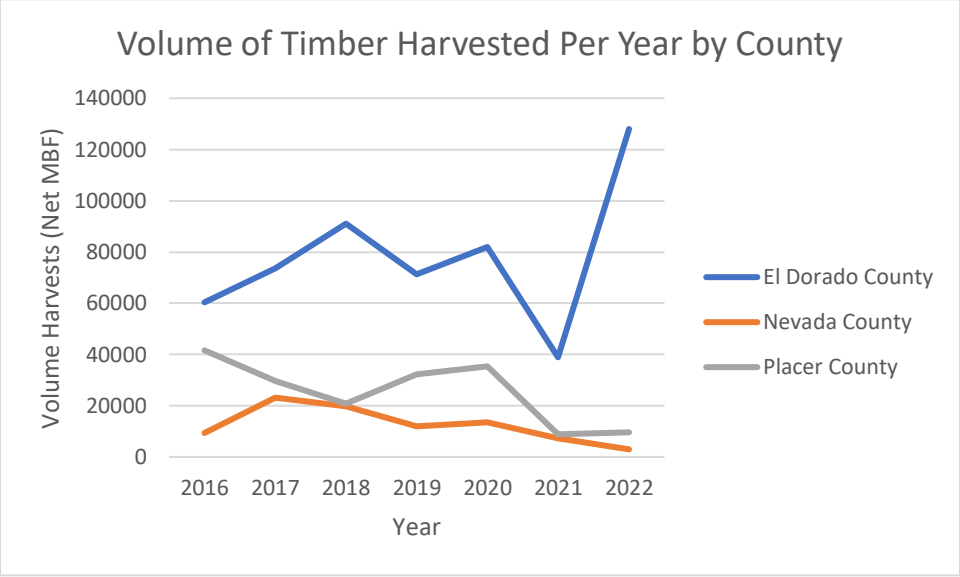
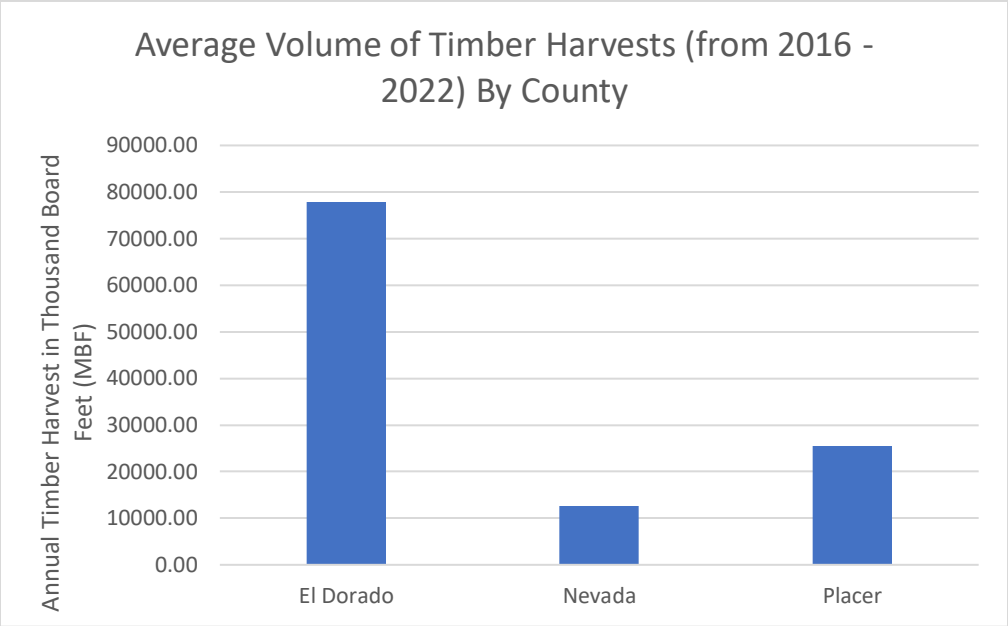


Figure 9. Average annual volume of timber harvested in the TCS Region



3

Figure 10. Percentage of timber harvested from public lands in TCS Region, 2016 - 2022

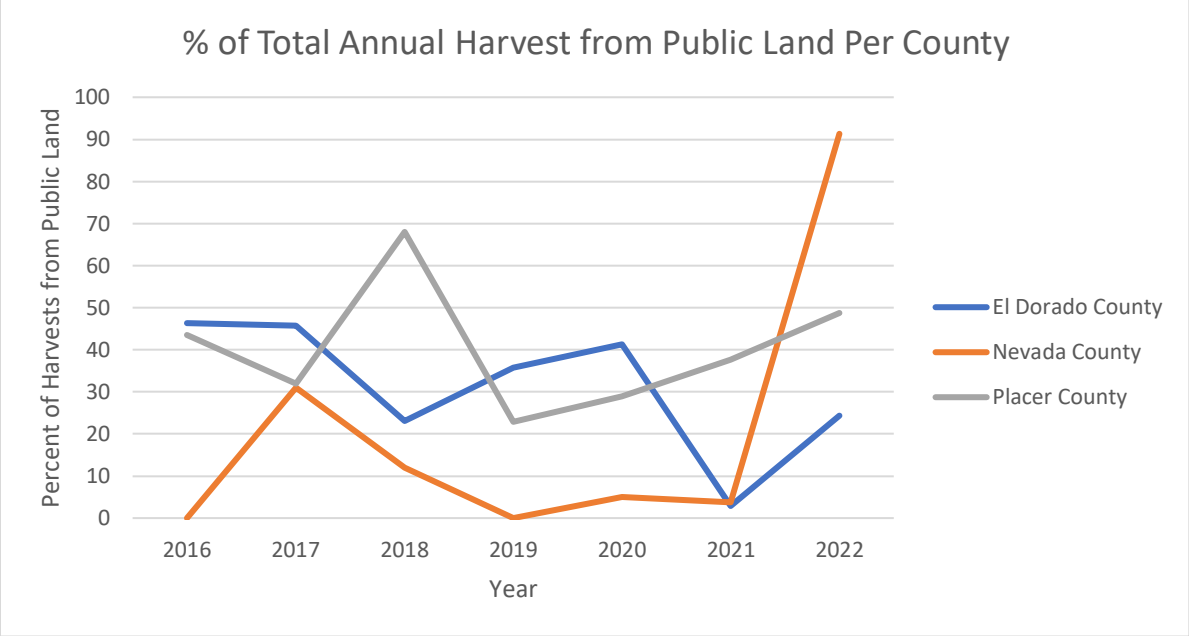


Figure 10Error! Reference source not found. suggests that there is volatility in the consistency of project offerings on US Forest Service lands in the TCS Region. Another cause of this volatility could be due to

on-the-ground conditions such as extended winter season or large-scale wildfires that shut down projects or impose work restrictions, even if a project is funded and under contract.

While there are efforts underway in state policy initiatives to increase the pace and scale of forest restoration on federal lands, biomass facilities seeking feedstock might take note of trends shown in **Error! Reference source not found.** 10 and plan for feedstock sources accordingly.

US Forest Service Projects

The National Forest System lands near the Arbor Facility are the Tahoe NF, Eldorado NF, and Lake Tahoe Basin Management Unit; see Figure 5 above for a map of National Forests relative to Ophir.

In general, according to Tahoe NF representatives, forest health activities on the Tahoe NF that involve a sawlog removal component can generate as many as 20-28 green tons of biomass per acre depending on the project area. However, regular timber sale contracts on the forest do not require biomass removal; rather, the contractor can purchase biomass at 10 cents per ton and deliver it to the facility of their choosing (which is typically either Rio Bravo in Rocklin or more distant Honey Lake Power near Susanville, CA). According to the same individual, the Tahoe NF could generate an enormous amount of biomass if a stronger market for biomass became present in the region, and that the west side of the Tahoe NF alone could generate 60,000 tons per year, particularly from the Yuba Landscape Resilience Project (which is detailed below).

Eldorado NF staff have been largely consumed with Caldor Fire recovery since 2021, and it is likely that the fire impacted most of the planned and fuels treatment projects currently listed on the South Fork American River (SOFAR) Collaborative project page. Primary partners to the Eldorado NF include the Health Eldorado Landscape Partnership (HELP) strategy group, which supports the Forest with leveraging state funding for forest health projects, and the Great Basin Institute, which supports the Forest with project implementation through a Master Stewardship Agreement.

Ultimately, should Arbor Energy desire to source biomass from US Forest Service-managed activities, it would be prudent to also communicate directly with logging contractors that typically bid on this work—this is discussed further in Section V.

With the push from state policy to increase the pace and scale of forest health activities in the Sierra Nevada, there are several large existing forest resiliency projects in the TCS Region, many of which fall within the TCSI boundaries. Two more significant active projects are the North Yuba Forest Partnership (in partnership with National Forest Foundation) and the French Meadows Restoration Project (in partnership with Placer County).

North Yuba Landscape Resilience Project

The North Yuba Resilience Project is a 275,000-acre project area in Yuba and Sierra counties, launched by the North Yuba Forest Partnership. Of the total project acreage, 210,000 acres are in the Tahoe NF. The National Forest Foundation has a 20-year Master Stewardship Agreement (MSA) with the Tahoe NF to support project management of activities under this partnership, including NEPA and other planning

needs as well as oversight during implementation. There are currently two main projects within this landscape: “Yuba 1”, a 14,545 acre project east of the Sierra Buttes in Sierra County which has had partial implementation, and “Yuba 2”, a 16,800 acre treatment area to the west which includes the Trapper and Pendola Projects in the vicinity of Bullards Bar Reservoir in Yuba County and is mostly still in the planning phase. Both Yuba 1 and Yuba 2 have been financed by Blue Forest Conservation’s Forest Resilience Bond.

More recently in 2022, the North Yuba Landscape was one of 10 initial high-risk landscapes nationally selected for investment as part of the Forest Service’s Wildfire Crisis Strategy, receiving $160 million in funding to implement wildfire risk reduction work. The landscape includes the North Yuba Landscape Resilience Project, and fuels management projects will commence over the next 15-20 years.

According to Tahoe NF representatives, some biomass from work on the Yuba 1 project has been sent to Honey Lake Power in Wendel, CA, a nearly 2-hour one-way haul distance to the north, but a lot of material has also been piled and burned. Treatment areas in the Yuba 1 landscape are at least a 2-hour haul distance from Ophir, but it is worth pursuing further discussion with Yuba 1’s project managers to discuss feasibility and interest around sending biomass to the Arbor Facility. Additionally, Arbor Energy should meet with Yuba 2’s project manners to discuss biomass availability when Yuba 2 begins the implementation phase, given that it is a shorter haul distance to Ophir than Yuba 1.

Contact: Matt Millar, Sierra Nevada Program Manager for National Forest Foundation, for North Yuba Forest Resilience Landscape, mmillar@nationalforests.org

French Meadows Restoration Project

French Meadows Restoration Project is in Placer County around the French Meadows Reservoir, a reservoir managed by PCWA. The French Meadows Project is managed in partnership with Placer County through a MSA. The partnership evaluated a 28,000-acre area, identifying the need for roughly 9,000 acres of active treatment. Project implementation is active, but due to the project’s remote location, recent contractor cost increases for fuel and personnel, and due to Mosquito Ridge Road (the primary and shortest-distance access route) washing out following the Mosquito Fire, all biomass is currently being masticated or pile-burned in place. Prior to the Mosquito Fire, project managers of French Meadows were optimistic to haul biomass off-site, having secured funding from the Sierra Nevada Conservancy to support transportation costs and a contract with Rio Bravo to accept material.

Contact: Kerri Timmer, Placer County, ktimmer@placer.ca.gov

Mosquito Fire Restoration Project

In 2023, Placer County modified its MSA with the Tahoe NF to include Mosquito Fire restoration work. This project aims to remove fire-killed timber before it poses a danger to visitors and workers while it has economic value to help offset the cost of doing the work. The project covers 2,636 acres and will remove approximately 15 million board feet (MMBF) of salvaged timber. However, the Tahoe NF wants this work to be completed in the 2024/2025 season, so the Arbor Facility will not be online in time to source material from this work, but there may be additional projects related to Mosquito Fire restoration that could be implemented after 2026.

Contact: Kerri Timmer, Placer County, ktimmer@placer.ca.gov

Lake Tahoe West Restoration Project

According to representatives from the Lake Tahoe Basin Management Unit, specifics of the Lake Tahoe West project are still being worked out as the draft Environmental Assessment is in development. However, pending project funding to subsidize possibly extensive haul costs from the West Shore of Lake Tahoe, these projects may represent a source of biomass for the Arbor Facility.

Contact: Brian Garrett, Assistant Vegetation Management Staff Officer, Lake Tahoe Basin Management Unit, brian.garrett@usda.gov

Summary

There are myriad forest health activities on the Tahoe NF that could supply material to the Arbor Facility; it is unclear what might be available from the Eldorado NF considering Caldor Fire impacts and existing efforts to advance biomass utilization efforts in El Dorado County.

If Arbor Energy desires to procure biomass from federal forest restoration projects mentioned above, it is recommended to do so through MSA partnerships (including National Forest Foundation and Placer County) as there is more likely to be available funding for subsidizing forest management activities and biomass hauling and removal, since partnership projects are grant eligible. For biomass from standard projects on the Tahoe NF without a partner leading the project, PCWA should consider connecting directly with logging contractors under contract for work on the Forest, as contractors will be looking for cost-effective ways to dispose of biomass, particularly if removing biomass makes their proposals more attractive or financially feasible.

Private Industrial Timberland

Private timberlands are typically managed on an uneven aged basis, supporting lower stem densities than on public lands, therefore representing a large potential volume of sawlog and biomass yields. Within the TCS Region, industrial forestland owner SPI owns a considerable amount of timberland in its Tahoe District, though the exact quantity is unknown. Regular timber harvests do occur in the TCS Region on SPI timberlands, and biomass is often sent to Rio Bravo Rocklin. But according to SPI representatives, forest managers don't always arrange for biomass disposal in the Tahoe District. The price for biomass at a facility coupled with infrastructure availability is what dictates the decision on whether to chip and leave in-woods or to remove biomass off-site during operations.

According to SPI representatives, if there is no feasible outlet for biomass from a timber harvest, SPI will have contractors broadcast chip, masticate, or spread biomass and tree tops uniformly on the ground. Per representatives, there can be a benefit to leaving material on-site to retain soil moisture and extend planting windows.

In the context of providing biomass to the Arbor Facility, SPI representatives from the SPI Tahoe District stated that SPI could provide feedstock on a case-by-case basis only. Because their land in the Tahoe District is extremely dispersed, operations can be spread out and they are therefore not able to commit

to a long-term contract or a consistent price. If the biomass price is right, and the material is being generated nearby, then SPI would be open to supplying material. Additionally, it is likely that much of the biomass material generated from SPI's lands in the TCS Region is utilized by their 18 MW biomass facility at the SPI Lincoln sawmill.

In conclusion, biomass from existing harvests on industrial timberland are likely already absorbed by the existing biomass and sawlog markets, but there could be opportunity to source biomass feedstock from SPI projects on a case-by-case basis.

Nonindustrial Private Forestland and Wildfire Prevention Activities in the Wildland Urban Interface

The California Forest Practice Rules define a nonindustrial private forestland owner as someone who owns less than 2,500 acres and is not primarily engaged in the growing and selling of timber for wood products. Often, this landownership group is not included in larger initiatives to treat at pace and scale, in part due to lower capacity to manage their lands, and more fragmented ownership across the landscape and around communities.

On the western portion of the TCS Region's forested area, below the elevations where the National Forest boundaries typically start, is an abundance of privately owned forestland that vary in size. Many consulting foresters in the TCS Region work with nonindustrial landowner clients, but saturated log and biomass markets in the region in recent years have made it difficult to advance work. According to a major consulting forester in Nevada County, he has not written a Timber Harvest Plan for a non-industrial timberland owner in several years due to the limited sawlogs and biomass market in this region that would otherwise allow the project to proceed in an economically viable manner.

Fortunately, there are several organizations in the TCS Region that leverage grant funding to advance forest restoration and fuels reduction work on nonindustrial forestland, including the Nevada FSC, Placer RCD, and the El Dorado RCD.

Fire Safe Council of Nevada County

The Fire Safe Council of Nevada County is a nonprofit organization based in Grass Valley, with a mission to protect the citizens, property, and natural resources of Nevada County from the effects of catastrophic wildfires, to improve forest health, and to improve air and water quality. Based on Clere Inc.'s outreach, it is apparent that the FSC is the primary entity in Nevada County advancing community wildfire prevention efforts at a large scale.

According to staff, the FSC's scope of work ranges from defensible space to vegetation removal. The FSC will also take on landscape-level fuels reduction and has one project totaling 1,500 acres of private and Bureau of Land Management lands in the planning stages. A primary focus of FSC's projects is to advance community-driven projects that protect infrastructure via treatment of privately owned lands. All FSC projects are planned in a way that can allow for biomass removal if it is cost effective and the market allows.

In 2022, the FSC launched a pilot green waste program funded by a CAL FIRE Fire Prevention Grant. The FSC hosted community green waste drop-off events in partnership with Nevada County, where FSC contractors then chipped the material to be sent to Rio Bravo. The first year of this effort yielded 15,000 green tons (or 7,500 BDT) of biomass that were sent to Rio Bravo. FSC staff made it clear during an interview with Clere Inc. that the program would function better with additional nearby outlets for biomass, such as the Arbor Facility.

While the green waste pilot does not have remaining funding at the time of this report, its success has motivated the FSC and Nevada County to identify a more long-term funding solution to green waste collection and disposal in the area.

Placer Resource Conservation District

The Placer Resource Conservation District (RCD) plays a central role in vegetation treatment on nonindustrial lands in Placer County, excluding the Lake Tahoe basin (see Figure 11). The Placer RCD is a self-governing California special district that provides technical assistance, funding, and other resources directly to private landowners to help them implement stewardship practices on their properties. Placer RCD fulfills its mission through a variety of non-regulatory and voluntary projects, such as establishment of fuel breaks, fuels reduction, invasive weed removal, stream restoration, erosion control, and outreach and educational efforts.

Figure 11. Placer Resource Conservation District boundaries

The Placer RCD has implemented a number of fuel breaks on private lands in recent years, including a 1,000 acre project south of Colfax consisting of 20 landowners, funded by a CAL FIRE Fire Prevention Fund grant. Primary treatment activities of these projects consist of broadcast chipping, mastication, and piling of biomass material; biomass removal and off-hauling are not typically incorporated because the primary vegetation types in these projects is non-merchantable vegetation, such as manzanita, toyon, and oak. Additionally, biomass removal is avoided so that important fire prevention work is not tied up in the unreliability of the biomass market in the TCS Region.

More recently, the Placer RCD has taken on Mosquito Fire recovery work and is merchandizing sawlog and biomass material from nonindustrial forestlands that burned in the Mosquito Fire. The Placer RCD

has funding to treat 2,000 acres of private lands in the Mosquito Fire footprint, with most properties being 5 acres or less; thus, the primary activities are hazard tree removal.

Placer RCD also has a residential chipping program, but it is at a small-scale and it is cost prohibitive to do anything besides broadcast chip that material, therefore it is not likely to be a suitable feedstock source for the Arbor Facility.

Some barriers to sourcing feedstock from Placer RCD projects include: 1) the configuration of private parcels can be restrictive to biomass operations in that there is limited space; and 2) much of the RCD's projects are permitted via their own CEQA processes, and any merchandizing of material would need to be tied to a CAL FIRE exemption or Timber Harvest Plan; however, the RCD is open to addressing this and incorporating California Forest Practice Rules compliance to its projects should a considerable market for biomass emerge nearby.

In summary, much of Placer RCD's fuel break projects do not involve biomass removal. However, should a new market for biomass emerge at the Arbor Facility, RCD staff may take new approaches to planning for fuels reduction projects to involve product removal. Long term, Placer RCD staff intend to continue to advance fuels reduction projects in Placer County, provided that funding stays available.

El Dorado and Georgetown Divide Resource Conservation Districts

The El Dorado and Georgetown Divide Resource Conservation Districts are two RCDs based in El Dorado County. Recently, the El Dorado RCD led the Emergency Forest Restoration Team (EFRT) for Caldor Fire recovery, which included hazard tree removal from 757 acres of burned forest at Sierra at Tahoe ski resort. Logs from this effort were sent to the under-construction Tahoe Forest Products sawmill in Carson City, Nevada. The next phase of the RCD's EFRT project will involve hazard tree removal from private parcels in the community of Grizzly Flats.

Both entities take on a variety of fuels reduction projects, though according to its website, most involve mastication, hand piling, and broadcast chipping. Thus, fuels reduction projects by the El Dorado and Georgetown Divide RCDs as they are currently planned may not serve as potential sources of biomass for the Arbor Facility, but if additional outlets for biomass were to develop near project sites, RCD staff may plan considering planning projects differently to include biomass removal.

Nonindustrial Lands Conclusion

In summary, fuels reduction and forest health work on nonindustrial private forestland, particularly in the wildland urban interface, is often dependent on grant funding without strong local markets for biomass. However, if Arbor Energy can offer a high biomass price and a consistent outlet for biomass material, then this might incentivize additional fuels treatments in forested areas of the foothills of Placer and Nevada counties (as those are within a reasonable haul distance to Ophir). Thus, it is recommended that Arbor Energy work directly with the Nevada County FSC, Placer RCD, and El Dorado RCD (as they are the main entities leading work on nonindustrial forestlands in the TCS Region) to discuss opportunities around utilizing biomass from nonindustrial forestlands.

Another primary barrier to sourcing material from community wildfire prevention projects is that many of these efforts in foothill communities currently broadcast chip material in place, rather than chip and remove biomass off-site. Many focus areas for RCDs and FSCs are true wildland urban interface landscapes, and the configuration of properties doesn't always leave room to deck and chip biomass on-site. While it might ultimately be cost prohibitive to put effort into aggregating biomass from community fire prevention projects, if RCDs and FSCs are aware of a good market for biomass, then they might be able to expand the types of projects they take on to treat the landscape.

Water Agencies

Prominent water agencies within the Case Study Area include Nevada Irrigation District (NID), PCWA, El Dorado County Water Agency (EDCWA), and El Dorado Irrigation District (EID). Other water agencies present within the TCS Region include Northstar Community Services District (NCSD) and North Tahoe Public Utilities District (NTPUD). These agencies have vegetation management and defensible space programs and acknowledge the need for improved forest health and wildfire resilience of watersheds in which their infrastructure is located. As a result, these agencies have treated and continue to treat thousands of acres to protect and maintain infrastructure, reservoirs, and nearby communities. This work is typically done through a combination of agency implementation and funding, partnerships, and grant funding from Sierra Nevada Conservancy, CAL FIRE, or US Forest Service.

Much of the information in this section is sourced from the Water Agency Role in Forest Health Report prepared as part of the TCS Pilot Project.

Placer County Water Agency

PCWA recognizes the importance of reducing fuel loading and fire risk around its water infrastructure. PCWA is a project partner on the French Meadows Restoration Project, which is discussed in detail in the US Forest Service Projects section of this report. In March 2024, Placer County Water Agency was awarded funding from Sierra Nevada Conservancy for environmental planning work associated with the Long Canyon Watershed Protection Project on 6,200 acres around the Middle Fork of the American River, east of Foresthill. An implementation phase of this project will likely commence following completion of environmental review and when implementation funding is secured. However, the remoteness of this project could pose a barrier to cost-effectively hauling biomass to Ophir.

Nevada Irrigation District

NID has implemented several projects to reduce fuels and improve forest health surrounding its resources, including fuels reduction work at Scotts Flat and Rollins Reservoirs. Some biomass material was initially sent to Rio Bravo from the Scotts Flat project, but it was eventually found to be economically infeasible so project managers opted to masticate and broadcast chip biomass instead. Other projects conducted by NID, including the fuels reduction work in the Bear River watershed, also involved mastication and broadcast chipping and did not send material to a biomass facility.

According to conversations with NID, the district has identified a current need to treat approximately 10,000 acres of NID lands within the watershed. To support this effort, NID entered into a MSA with the Tahoe NF to advance projects that improve forest health and resilience in the Middle Yuba Watershed on

US Forest Service managed lands. To allow for adequate biomass disposal outlets in future projects, NID has set up an agreement with Rio Bravo to deliver 7,500 BDT of biomass per year from NID fuels treatment projects. NID has also worked closely with the Nevada County FSC to explore opportunities around biomass utilization closer to project areas, but most conversations have been preliminary at this time. Given NID's efforts to pursue forest restoration work in its watersheds, Arbor Energy should consider ensuring NID is aware of biomass disposal outlets at its Arbor Facility. To do this will require engagement with NID during project planning to ensure that projects are designed for biomass removal, provided that NID is interested in this course of action.

El Dorado Irrigation District

Biomass from fuels reduction projects led by EID is typically piled and burned, masticated, chipped, or lopped and scattered, although large capital-funded projects have included biomass removal to off-site destinations. As presented in the Water Agency Role in Forest Health Report, EID is generally able to meet its landscape objectives through masticating, pile burning, and broadcast chipping in its fuels treatments projects. Additionally, many of its projects around water infrastructure are located on steep terrain and with challenging road access, which would pose a challenge for biomass removal. However, EID representatives state that EID would consider participation in a contract with a biomass facility if it were deemed to be economically feasible and would not hinder project progress.

El Dorado County Water Agency

EDCWA is a public agency that collaborates with water entities in El Dorado County to proactively address long-term water supply reliability, climate resiliency, and regulatory requirements. EDCWA does not own or operate facilities, but is involved with bringing agencies together to address watershed (and forest) health in El Dorado County. EDCWA has been involved in post-Caldor Fire recovery efforts including hazard tree removal and watershed restoration through project initiation, securing funding, and working with agency partners to implement projects. Recently, EDCWA helped form the Upper American River Watershed Group which convenes regional stakeholders to address forest health and biomass utilization needs across its region.

Northstar Community Services District and North Tahoe Public Utilities District

NCSD implements fuels reduction projects on 2,040 acres within its district boundaries, with 150-180 acres treated on average per year. However, NCSD is pursuing a small biomass thermal energy facility of its own to utilize biomass generated by its fuels reduction activities, so this material should not be considered a realistic source of biomass for the Arbor Facility.

In the same region, NTPUD conducts hazardous fuels reduction work in its service area, but at a very small scale with most biomass disposed of by pile burning and broadcast chipping.

Other Potential Sources of Biomass

Utility Line Right of Way Clearing Work

Utility line clearing activities could be another significant source of biomass material for the Arbor Facility. A major utility line clearing contractor in the area currently hauls biomass from its line clearing

work to its own chip yards, where it is stored until it is delivered to Rio Bravo. During conversations in 2022, this contractor expressed interest in providing PCWA with 10,000 BDT of biomass per year.

There are other smaller contractors in the Case Study Area that perform utility line clearing work and could be contacted to explore opportunities around sourcing biomass material for the Arbor Facility.

Post-Fire and Disaster Recovery Work

As demonstrated by the Caldor and Mosquito Fires in the TCS Region, large-scale wildfires generally come with ample funding from government agencies (including California Office of Emergency Service, Federal Emergency Management Agency, US Forest Service, and CAL FIRE) to address both emergency cleanup activities such as hazard tree removal around burned lots, site-prep activities on forestland to promote effective reforestation, and roadside hazard tree removal. Wildfires therefore result in a large abundance of available biomass material for several years following an event. While it is not feasible to plan for such a scenario, nor should one really hope for this scenario given all the negative impacts of wildfire to infrastructure, properties, forests, and even human life, it is worth noting so that Arbor Energy might anticipate it should a large-scale wildfire occur again in the Case Study Area.

From Existing Facilities

Rio Bravo Rocklin

Rio Bravo Rocklin is a 24.4 MW biomass facility that sources 80% of its biomass feedstock from High Hazard Zone forests (which includes sawmill residues). It consumes up to 184,000 BDT of biomass per year, and according to the TCSI Phase 1 Restoration Wood Supply Assessment, it likely procures 100,000 BDT annually from forest sources.

Rio Bravo Rocklin is the primary and most significant outlet for biomass in the TCS Region. The TCSI Wood Supply Assessment identifies that any increase in biomass production in the region will exceed the processing capacity of Rio Bravo Rocklin.

Given Rio Bravo's prominence in feedstock procurement in the TCS Region, there could be opportunities for Arbor Energy sourcing biomass supply directly from Rio Bravo.

Western Regional Landfill

Western Regional Landfill (Placer County) has both green waste and wood waste disposal options at its facility in Lincoln. Its green waste program is mostly targeted at material derived from landscapers and curbside green waste programs (which include lawn clippings, leaves, small woody material, and compost), but the wood waste program takes dimensional lumber scraps, plywood, and sometimes tree trimmings for $12.50 per cubic yard or $40 per ton. Wood waste material is ground and then sold to Rio Bravo, at roughly 20,000 BDT per year.

Existing Biomass Piles

The 2023 report, "California Forest Biomass Pile Data Collection Project", developed by Clere Inc. and Spatial Informatics Group for the California Joint Institute for Wood Products Innovation, worked to quantify the total amount of biomass piles sitting on the landscape from 2018-2021. Depending on the

type of pile, such as if it's a landing pile leftover from a logging operation, it is likely that much of the estimated volume of material is already captured by California Department of Tax and Fee Administration data for the region on timber harvesting featured earlier in this section. However, this data is being included in this report as a representation of the extent to which biomass piles may already exist on the landscape and within 100 feet of roads.

The report identifies that from 2018-2021, Placer County had 10,472 acres of piles sitting on the landscape, equal to roughly 126,282 BDT. More specifically, there were 1,487 acres of piles within 100 feet of a road, or 18,0007 BDT of biomass. El Dorado County had fewer piles relative to Placer, with 1,726 total acres of piles from 2018-2021, equivalent to 12,783 BDT of biomass. Within 100 feet of roads, El Dorado County only had 159 acres of piles, or 1,132 BDT of biomass. The data on biomass piles is organized by air district, so county-specific data for Nevada County is unavailable as it is part of the Northern Sierra Air Quality Air District with three other counties.

As the data from this report is already several years old, not all of this quantified material may still be sitting on the landscape. However, this data may be helpful for identifying land management trends in individual counties within the TCS Region and potential existing sources of biomass.

Implementation of California Senate Bill 1383 and Organic Waste Reduction

California Senate Bill 1383 (passed in 2016) requires jurisdictions in California to provide mandatory organic waste curbside collection services to residents and businesses, including green waste and wood waste, in an effort to divert organic waste from landfills and reduce subsequent methane emissions[5]. Initial targets include a reduction of organic waste disposal by 75% statewide by 2025.

To meet landfill diversion requirements under this legislation, jurisdictions may opt to send organic waste to biomass conversion facilities to meet compliance. Western Regional Landfill, for example, is already achieving this with their wood waste program that sends 20,000 BDT per year to Rio Bravo. Other jurisdictions in the TCS Region are actively exploring biomass utilization options to help meet requirements of SB 1383, including the Town of Truckee and Pioneer Community Energy. As the 2025 deadline looms near and the remaining jurisdictions in the TCS Region navigate SB 1383 requirements and begin to launch waste diversion-programs, there may be an increase in available wood waste on the biomass market. This will be the case particularly for jurisdictions in the wildland urban interface of the TCS Region where disposal of woody green waste is an existing need among residents, such as in Grass Valley and Nevada City.

However, a June 2023 report from the Little Hoover Commission identifies that the SB 1383 legislation disadvantages rural Californians, and that the state has created temporary waivers for some rural areas, primarily in the form of providing jurisdictions with an extension for the deadline for required compliance[6]. Furthermore, the Little Hoover Commission recommends that the state should permanently exempt counties that produce less than 200,000 tons per year of waste. In summary, as

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5 https://calrecycle.ca.gov/organics/slcp/#:~:text=SB%201383%20requires%20counties%20to,activities%20and%20food%20recovery%20organizations.

6 https://lhc.ca.gov/wp-content/uploads/Reports/274/Report-274.pdf

larger city governments in the TCS Region have already met SB 1383 requirements, and given proposed exemptions for rural areas, it is unclear at this point how much more wood waste will be made available in the near future by this legislation.

V. Licensed Timber Operator Perspectives and Range of Prices for Biomass Delivered to the Arbor Facility

Introduction and Methods

In 2022 and 2023, Clere Inc. interviewed five major LTOs that perform logging and forest health treatment activities in the Case Study Area, to discuss opportunities around providing biomass supply to the Arbor Facility and potential barriers to doing so. While it is helpful to understand the extent of planning for forest management activities in the TCS Region as discussed above in Section IV, ultimately it will be the LTOs who deliver biomass material to biomass facilities; thus, this section of the report focuses on activities within the Case Study Area. Logging contractors are keenly aware of opportunities and risks around mobilizing biomass, so their perspective is invaluable to feedstock availability assessments.

All LTOs interviewed were mid- to large-sized, with multiple sides to the operation, and those that typically take on timber harvesting or biomass removal projects (not just mastication and hand piling). Operators interviewed also typically generate sufficient biomass to supply a large percentage of the Arbor Facility's annual feedstock demand.

Questions asked of LTOs included background on their company, where they typically pick up work within the Case Study Area, the size of their company and average acres treated per year, types of projects/landownerships they work on, capacity to generate and transport biomass chips, current methods taken for biomass disposal, level of interest in a contract with the Arbor Facility, and a range of possible prices for delivered biomass to the Arbor Facility.

Below, we provide some results and key quotes from interviews that are relevant to understanding the extent of biomass available to the Arbor Facility.

Results

General Industry Capacity

Much of the work taken on by LTOs and operators in the Case Study Area is timber harvesting on SPI lands, or utility line clearing. This is understandable as there is a more regular demand from SPI for loggers to perform timber harvesting on SPI lands than other types of forestland. This notion also aligns with results shown in Figure 10 in Section IV on county-level data on volumes of timber harvested from private vs public lands.

All operators interviewed have some sort of chipper or grinder in their fleet of equipment; however, it's important to note that should consistent and reliable markets for biomass develop in the Case Study Area, operators are comfortable with purchasing whatever type of machine would fit their operations best to provide chipped biomass, as that is the standard approach in the industry. Operators are not shy about adding equipment to their fleet if there is a reliable market to pay for the equipment.

Limited Biomass Disposal Options and Need for Consistent Outlets

It should be no surprise to any reader that operators struggle with finding outlets to dispose of biomass material from forest management activities in the Case Study Area. As a result, many projects have been

designed in the Case Study Area (and the entire TCS Region) to allow for broadcast chipping or piling and burning rather than chipping and off-hauling. Land managers have stated that this is not the preferred option, but they would rather make progress with treating the landscape in some capacity than give up due to limited biomass markets. According to one LTO in the context of forest management activities in Placer County, the local chipping industry shifts constantly based on the market. In recent years, even SPI slowed their extent of chipping and hauling biomass off-site, and instead often will broadcast chip top piles.

Similarly, with the abundance of contracts for mastication and hand work (see discussion in Section IV above), many operators have incorporated mastication sides to their company so that they can be sure to find work in the area.

That said, LTOs in this area are still often eager to find biomass outlets. One operator stated he is willing to haul chips to a facility up to two hours away- this should be a testament to the eagerness for LTOs to find new ways to dispose of biomass. One operator with various service contracts for work on federal land shared:

> "I'm not worried about price, I'm just desperate to dispose of biomass. My operations are suspended without places to take biomass."

Regarding work on the Yuba Forest Resilience Landscape, another LTO shared:

> *"The limiting factor is getting rid of biomass and long haul distances, so we aren't taking on a lot of work. However, I would treat more acres if the biomass market was stronger."*

Others reiterated this point, that there is tremendous value to operators in having a consistent outlet for biomass in that it helps de-risk their work. Two operators expressed interest in setting up at least a 5-year supply contract with Arbor Energy.

Overall, feedback from LTOs on limited biomass disposal options should make it clear that if the Arbor Facility is successful in establishing a consistent market for biomass within the Case Study Area, it is reasonable to expect that local operators will be eager to set up contracts (particularly 5-year contracts) with Arbor Energy.

Biomass Disposal is Cost Prohibitive

A conversation with any logging contractor in California will reveal that current market prices for delivered biomass from forest restoration activities are nowhere near as high as the cost to cut, process, and haul biomass to a facility today. Interviews with contractors have proved this to be particularly true in the Case Study Area given the fragmentated ownership patterns and distance of US Forest Service restoration projects from biomass processing facilities. As a result, LTOs are less likely to bid on a project that does not offer subsidy for biomass processing and removal.

To add complexity, one major LTO in the Case Study Area shared:

"Biomass facilities keep lowering their prices because they know there is grant money subsidizing the fuels treatment work. So this work only stays alive if it is subsidized."

In summary, this implies that biomass facilities are aware that with the presence of funding to pay for in-woods biomass removal and fuels treatment work, and therefore don't have to offer high prices to ensure biomass is delivered to their facility.

The same LTO agreed that overall, biomass needs to be approached as waste disposal.

Beyond operator perspectives, a major summary point in the TCSI Wood Supply Assessment report confirms that on average, delivered biomass to Rio Bravo Rocklin has a value of -$15/BDT, and that haul distances within the TCSI region are generally too long to support biomass stumpage at a contemporary estimated delivered price of $40/BDT. However, this value was based on 2020 pricing and given inflation and increases in fuel prices, this differential is likely greater today. Other reports that investigate costs of biomass production and hauling find that the cost of cutting, skidding, processing, and hauling biomass can range from $80/BDT[7] to $105/BDT[8]. However, the actual cost to deliver biomass can be very dependent on specific factors, such as haul distance and type of forest health project (such as if it's bundled with timber harvesting or if it's biomass removal only, for example).

Range of Prices for Biomass Delivered to Arbor Facility

Operators in the Case Study Area were also asked to provide a price for potential delivery to Ophir. Given that many of the operators interviewed perform a range of types of logging work in the Case Study Area that all have varying implications on the cost of doing business and if biomass removal is subsidized (such as timber harvesting on SPI land, stewardship work on US Forest Service lands, utility line clearing, or miscellaneous forest management activities for RCDs and Fire Safe Councils), there was a significant range of prices provided.

One operator stated that without grants subsidizing the work in the forest to cut, skid, process, and haul biomass, prices for delivered biomass could sometimes be as high as $200/BDT. This is likely in reference to sources of biomass that are long distances from a biomass facility, assuming current transportation rates at $150/hour and high diesel prices that grew to more than $5/gal in 2023.

Another operator echoed this statement from the opposite angle:

"It all depends on grant subsidies. If the work is subsidized, we could supply chips at $50/ton on average."

And:

"We haul to Rio Bravo if the customer wants to pay for it…but without grant subsidy, the biomass price might as well start at $100/bdt."

[7] The Beck Group; Mason Bruce & Girard. 2019. High Hazard Fuels Availability Study; Prepared for The High Hazard Fuel Study Committee and PG&E Natural Resource Management Contract #C9333

[8] TSS Consultants. 2023. Biomass Feedstock Supply Availability and Cost Analysis for the Central Sierra Region of California, Final Report. Prepared for Sierra Business Council.

To pay for a full harvesting system of cutting, skidding, and processing biomass, the price ranges from $56-$64/BDT just to get a loaded truck. Trucking costs adds $28 - $48/BDT, resulting in a grand total of $84-$112/BDT.

In summary, operators provided a significant range of prices for delivered biomass, from $50/BDT to $112/BDT, up to $200/BDT for material from more distant locations. This input is consistent with results from the TCSI Wood Supply Assessment, which suggested that $40/ton (the industry standard in the TCSI region) is far too low to make forest restoration activities economically feasible.

One contractor expressed eagerness to enter into a supply contract with Arbor Energy, and shared that he could easily supply 20,000 BDT per year for the Arbor Facility.

Conclusion

Based on feedback from LTOs that work in the Case Study Area, Arbor Energy should expect potential prices for delivered biomass to be at least $50/BDT on the low end, assuming that it's from a forest restoration project with funding to subsidize biomass processing and removal, or from timber harvesting projects that just need an outlet for top piles. However, it is important to note that while there has been strong state and federal support for forest restoration treatments and biomass hauling incentives in recent years, but it is unclear if the current level of funding will continue long-term, which could in turn affect the cost of biomass delivered.

While there are considerable efforts to increase the pace and scale of forest restoration activities in the TCS Region (as discussed in Section IV), at the end of the day it is the licensed timber operators who generate biomass and haul it long distances to disposal sites to adhere to their contract requirements for product removal. Based on this notion and stakeholder outreach conducted under this project, and in the scenario that the TCS Region does not pursue a feedstock aggregation entity, Clere Inc. feels that Arbor could work directly with licensed timber operators performing work in the Case Study Area and even beyond the TCS Region boundary. Operators are the workhorse of the forest products and forest management industry, and if operators can be offered a guaranteed outlet for biomass, they are more likely to pursue involvement in large-landscape forest restoration projects that will have a substantial biomass removal component, often at distant locations from facilities.

However, if the TCS Region chooses to advance a biomass aggregation entity to support the biomass feedstock supply chain (refer to TCS Pilot Project report on Legal Tools for Government Entities to Incentivize Utilization of Forest Biomass in California), Arbor Energy may also consider working directly with this entity to set up feedstock contracts and receive other services. This could alleviate Arbor Energy of the administrative burden around feedstock contracting, could offer the use of a semi-public available price mechanism, and add contract insurance protections.

VI. Conclusion, Recommendations, and Opportunities

Conclusion and Recommendations

According to California Department of Tax and Fee Administration data on timber harvests, there is typically 104,324 BDT of biomass generated per year on average from timber harvests in the TCS Region. Furthermore, TCSI Phase I Restoration Wood Supply Assessment identifies that an increase in the pace and scale of forest restoration projects in the TCSI landscape has the potential to generate an additional 320,000 BDT of available biomass per year.

There is extensive work occurring in the TCS Region to plan and implement forest health activities across many land ownerships, especially by partner groups to the US Forest Service, such as National Forest Foundation and Placer County. This is in part due to the TCS Region containing important and valued watersheds for state water supply, an extensive wildland urban interface landscape, a high degree of tourism due to the Lake Tahoe Basin, and the existence of TCSI supporting efforts to advance the pace and scale of forest restoration. These forest health activities often generate woody biomass, but the amount of biomass available for procurement by a biomass facility can vary from project-to-project based on location (and distance to a biomass facility), project design (such as mastication vs biomass removal, or a forest health project vs timber harvest), and funding for implementation.

Based on stakeholder outreach in the TCS Region as described in this report, CLERE Inc. offers the following recommendations to the Arbor Energy team for pursuing biomass supply for the Arbor Facility:

- If Arbor Energy prefers to obtain biomass supply guarantees quickly, then we recommend working directly with a prominent logging operator in the Case Study Area, to discuss logistics around supply contracts, price, and biomass delivery and unloading in Ophir. Operators are the main artery into forest management activities that generate biomass, particularly timber harvest activities occurring on private lands that are often not reliant on grant funding; thus it is important to establish contact with these operators to guarantee biomass supply, particularly if grant funding for forest health projects dries up due to state budget limitations.
- If sourcing biomass from local community wildfire prevention, forest health projects, and green waste disposal initiatives is of interest to Arbor Energy, then Arbor Energy should work directly with the Nevada County FSC. The Placer RCD, El Dorado RCD, and Georgetown Divide RCDs may also be worth exploring partnership opportunities given the focus of these RCDs on fuel breaks in the foothill communities that are closer to the Arbor Facility.
- Further pursue opportunities around sourcing biomass from green waste disposal efforts with local city and county governments, especially related to SB 1383 requirements for organic waste collection by jurisdictions.
- Explore partnerships with National Forest Foundation, Placer County (or other entities that administer projects on behalf of the US Forest Service via a MSA) to ensure feedstock guarantees from forest restoration projects on the Tahoe National Forest.
- For ease of coordinating feedstock delivery, considering purchasing biomass directly from existing facilities, such as Rio Bravo Rocklin or Placer County Western Regional Landfill. Arbor Energy may consider exploring this option further to fill in gaps in fuel supply needs.

Longer Term Opportunities Related to the TCS Pilot Project for Arbor Energy

Joint Powers Authority in TCS Region and Long Term Feedstock Contracting

While Arbor Energy may likely pursue biomass supply contracts on its own in the near term as part of facility development, long term Arbor Energy should consider tracking Cal FRAME efforts and the possible future formation of a biomass aggregation entity that may help to derisk procurement contracts and help secure long-term feedstock agreements. If the TCS Region chooses to advance a biomass aggregation entity to support the biomass feedstock supply chain (see Legal Tools For Government Entities To Incentivize Utilization Of Forest Biomass In California Report), Arbor Energy may also consider working directly with this entity to set up feedstock contracts and receive other services. This could alleviate Arbor of the administrative burden around feedstock contracting, could offer the use of a publicly available price mechanism, and add contract insurance protections. It could also help Arbor with financing, such as obtaining better debt financing or other project equity investments.

Forest Resource and Renewable Energy Decision Support System (FRREDSS) and Validation

Developed in 2020 by UC Davis, the Forest Resource and Renewable Energy Decision Support System (FRREDSS) model provides a multi-step framework for siting bioenergy facilities, and calculates the twenty-year cash flow statements based on the full delivered price of forest-based feedstock. More specifically, the FRREDSS tool calculates timber operator costs to deliver in-woods biomass feedstock to a facility. Currently, the Northeastern California OPR Pilot Project is working with UC Davis to test the model's effectiveness in determining long-term feedstock contract price points, and its potential use as a long-term feedstock price mechanism, through a sensitivity analysis based on locations, biomass harvest systems, and various expansion factors. The Arbor Facility at Ophir is included in this analysis and preliminary modeling shows that the price for delivered biomass the Arbor Facility should be $88/BDT on average to adequately pay for costs of forest restoration in the Case Study Area. The FRREDSS model will continue to be refined to assess its viability to be used as a pricing mechanism, and its results will be helpful to Arbor Energy in identifying adequate prices for delivered biomass in the Case Study Area.

Resilient Sierra Digital Marketplace Launch

In 2023, OPR and the Cal Poly Digital Transformation Hub developed and is now nearing release of its Resilient Sierra tool, which offers a digital marketplace for landowners to connect with LTOs and biomass facilities for biomass removal from properties. The goal of this tool is to coordinate services related to contracting LTOs and Registered Professional Foresters (RPFs), and coordinating the movement and delivery of biomass on all relevant forestland types including private and non-commercial lands. The tool will serve as an implementation arm for public institutions working together through a Joint Powers Authority (JPA) to manage forest biomass supplies at the local level. Through this tool, the JPA entities can assistant landowners with finding local contractors to conduct fuel treatments, and will help buyers and sellers reach a fair price for biomass. Ultimately this tool will enable JPAs to provide a reliable long-term feedstock supply contracting mechanism to biomass businesses to help grow rural economies and incentivize fire defensible space compliance and fuels reduction work. Spatial Informatics Group is currently testing Resilient Sierra as part of OPR's Northeastern California Pilot Project, from the perspective of RPFs, forest landowners, and agency personnel. While this tool is still in its infancy, Arbor Energy may consider engaging with developers of this tool for potential participation in the marketplace.

Increasing Demand for Green Waste Disposal

There is increased recognition of the importance of advancing green waste disposal opportunities for small landowners in the wildland urban interface, and to approach biomass in this context as waste disposal. This represents a considerable volume of biomass that could be utilized by the Arbor Facility, and quantities of available green waste may increase in the coming years as local jurisdictions must comply with SB 1383 requirements for organic waste diversion. We recommend that Arbor Energy discuss opportunities around sourcing feedstock from green waste disposal efforts with the Nevada County FSC, Nevada County, and other relevant city or county governments in the TCS Region that are working to advance green waste disposal options in forested areas.