Environmental & Safety Assessment for South Tahoe Refuse Proposed CHP Unit

NOVEMBER 2022 • SOUTH LAKE TAHOE, CA

PREPARED FOR

South Tahoe Refuse & Recycling Services

SOUTH TAHOE REFUSE

2140 Ruth Ave.
South Lake Tahoe, CA 96150

PREPARED BY

WISEWOOD ENERGY

6800 NE 59th Pl
Portland, OR 97218

FOREST HEALTH & WILDFIRE
COMMITTEE ITEM NO. 4 &
CONSENT CALENDAR ITEM NO. 3

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Executive Summary

Like other forested regions in the US West, drought, a hotter climate, and past management practices have contributed to an increased risk of disease, insect infestations, and high-intensity wildfire across the Sierra Nevadas[1,2,3]. Since 1900, only six fires have burned over 200,000 acres in the region, all of which have occurred in the last ten years[4]. This includes both the Dixie and Caldor Fires in 2021, which became the first known fires to ignite in western slopes, crest the ridgeline, and burn down the eastern side, the Caldor Fire causing the entire city of South Lake Tahoe to evacuate. Meanwhile, communities across the state of California are experiencing a crisis in energy reliability, as utilities pre-emptively shut down power lines in an attempt to mitigate the risk of causing new fires. Renewable energy solutions continue to be prioritized to improve grid resilience, and in the Tahoe Basin, new goals have been set to source 100% of the city's electricity from renewable resources 24 hours a day, seven days a week.

Increasing the utilization of low value biomass material in targeted energy applications is one solution to addressing these challenges in the Sierra Nevada region. Numerous studies have documented the efficacy of forest management activities that reduce the density of woody biomass material in contributing to fire mitigation efforts, including reducing fire intensity, creating fuel breaks for fire fighters to engage more safely, and protecting communities[5,6]. Such fuel reduction treatments and defensible space activities generate large volumes of woody material that is typically left in piles to decay or be burned, or, if located near city centers, transported to waste collection sites where it is processed and disposed of elsewhere. Diposing of this material in local, appropriately designed energy applications can support forest management activities that reduce the risk of fire, avoid negative impacts from its alternative fate, and offer an always-on, 24/7 energy resource that helps meet renewable energy goals.

Currently the Tahoe Regional Planning Agency Code of Ordinances includes a moratorium on accepting applications for all new biomass energy facilities in the Tahoe Basin until additional analysis establishes that such projects can be implemented safely and with protection of the environment. The moratorium was put into place in 2012, and is widely understood to be in response to a 2 MW power plant proposal that met with public opposition at that time. However, wood energy systems can be designed for a variety of applications,

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[1] Vose, J.M. *et al.* 2018: Forests. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)). U.S. Global Change Research Program, Washing- ton, DC, USA, pp. 232–267. https://nca2018.globalchange.gov/chapter/forests.

[2] McMahon, Devin *et al.* Mass tree mortality, fuels, and fire: A guide for Sierra Nevada forest landowners. *University of California Agriculture and Natural Resources.* August 2020. https://anrcatalog.ucanr.edu/pdf/8683.pdf

[3] Steel, Zachary L. *et al.* 2022. Mega-disturbances cause rapid decline of mature conifer forest habitat in California. *Ecological Applications.*

[4] 2021: Another historic Sierra Nevada fire season. Sierra Nevada Conservancy. https://sierranevada.ca.gov/2021-another-historic-sierra-nevada-fire-season/.

[5] Kalies, Elizabeth L. and Larissa L. Yocom Ken. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. *Forest Ecology and Management.* 375, 84-95.

[6] Yoohyun, Jung and Paula Friedrich. "These maps show where prescribed burns helped curb the Caldor Fire's rapid growth". *San Francisco Chronicle.* September 17 2021.

contexts, and sizes, and smaller systems designed to serve individual end users can be aligned with relevant environmental requirements where larger power plants may not be.

One such system is being proposed for South Tahoe Refuse (STR), a service provider offering solid waste collection, recycling and disposal services to residents and businesses in the South Tahoe area. STR currently receives approximately 10,000 tons of waste woody material from the area each year, processes it at their South Lake Tahoe site, and transports it to Carson Valley Nevada for disposal as compost. A 125 kW biomass CHP system is estimated to offset nearly all of the facility's grid electricity and natural gas usage, using just 10% of the material currently received at the site and reducing truck traffic (and associated emissions) out of the Tahoe Basin by approximately 72 trucks per year. Other impacts, such as physical footprint, fuel demand, emissions, and noise, are all relatively minor or even positive compared to a business as usual scenario. In documenting these impacts, this Assessment is intended to demonstrate the safety and environmental compatibility of the proposed STR biomass unit, and support a determination that STR be allowed to submit an application for project consideration and potential approval through TRPA.

1 Project Background

1.1 A FOREST HEALTH & ENERGY CRISIS

Past forest management activities that replaced species and canopy heterogeneity with even-aged stands and prioritized extinguishing all wildfires have led to degrading forest health across the US West, including the Sierra Nevada[7,8,9]. Forested landscapes have become more dense with small diameter vegetation and the influx of less fire-adapted species, which has been exacerbated by drought and a hotter climate. These conditions have contributed to an increase in the scale and intensity of wildfire; for example, only six fires have burned over 200,000 acres in the region since 1900, all of which have occurred in the last ten years[10]. This includes both the Dixie and Caldor Fires in 2021, which became the first known fires to ignite in western slopes, crest the ridgeline, and burn down the eastern side, the Caldor Fire causing the entire city of South Lake Tahoe to evacuate. Meanwhile, energy resilience is becoming a critical consideration for communities as utilities pre-emptively shut down power lines in an attempt to mitigate the risk of sparking new fires. Distributed renewable energy resources that can continue operating during a grid outage are increasingly sought after, especially pairing reliable, on-demand generation to complement intermittent resources like solar and wind. For example, in the Tahoe Basin, new goals have been set to source 100% of the city's electricity from renewable resources 24 hours a day, seven days a week.

Increasing the utilization of low value biomass material in targeted energy applications is one solution to addressing these challenges in the Sierra Nevada region. Numerous studies have documented the efficacy of forest management activities that reduce the density of woody biomass material in contributing to fire mitigation efforts, including reducing fire intensity, creating fuel breaks for fire fighters to engage more safely, and protecting communities[11,12] . Such fuel reduction treatments and defensible space activities generate large volumes of woody material that is typically left in piles to decay or be burned, or, if located near city centers, transported to waste collection sites where it is processed and disposed of elsewhere. Diposing of this material in local, appropriately designed energy applications can support forest management activities that reduce the risk of fire, avoid negative impacts from its alternative fate, and offer an always-on, 24/7 energy resource that helps meet renewable energy goals.

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[7] Vose, J.M. *et al*. 2018: Forests. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)). U.S. Global Change Research Program, Washing- ton, DC, USA, pp. 232–267. https://nca2018.globalchange.gov/chapter/forests.

[8] McMahon, Devin *et al*. Mass tree mortality, fuels, and fire: A guide for Sierra Nevada forest landowners. *University of California Agriculture and Natural Resources*. August 2020. https://anrcatalog.ucanr.edu/pdf/8683.pdf

[9] Steel, Zachary L. *et al*. 2022. Mega-disturbances cause rapid decline of mature conifer forest habitat in California. *Ecological Applications*.

[10] 2021: Another historic Sierra Nevada fire season. Sierra Nevada Conservancy. https://sierranevada.ca.gov/2021-another-historic-sierra-nevada-fire-season/.

[11] Kalies, Elizabeth L. and Larissa L. Yocom Ken. 2016. Tamm Review: Are fuel treatments effective at achieving ecological and social objectives? A systematic review. *Forest Ecology and Management*. 375, 84-95.

[12] Yoohyun, Jung and Paula Friedrich. "These maps show where prescribed burns helped curb the Caldor Fire's rapid growth". *San Francisco Chronicle*. September 17 2021.

Such wood energy systems are common in mountain towns across the globe, whether generating energy for a large city, a small village, or a single facility. Operating biomass examples in the United States include a small combined heat-and-power system serving the Health and Human Services Center in Quincy California; a district energy system in eastern Oregon that provides space heating to an elementary school, sheriff's office, courthouse, and mental health facility; and a district system offsetting one million gallons of fuel oil annually at Vermont's Middlebury College. Other wood energy projects in or nearing construction include a district energy plant at Northstar Community Services District in Placer County California, district heating for Mount Bachelor Ski Resort in Deschutes County Oregon, a 2 MW power plant in North Fork California, and a 125 kW CHP system supporting a wood yard in Tuolumne County California. Examples abound outside of the United States, and include combined heat-and-power plants net metering commercial operations in Italy, a small scale power plant in Scotland, and district heating in Austria.

FIGURE 1: In Plumas County California, a 400kW (thermal) boiler with a 35kW (electric) Organic Rankine Cycle supplements geothermal heating for the Health & Human Services Center, and net meters electricity to the grid.

FIGURE 2: 135kw wood gasifier combined heat-and-power facility serving a meat processing operation in Italy.

FIGURE 3: Example of 125kw gasifier system in South Tyrol, Italy.

FIGURE 4: Wood energy is common for district energy in mountain towns, like this facility in Lech Austria that provides heat to over 400 properties, including hotels and ski lodges.

1.2 THE SOUTH TAHOE REFUSE PROJECT

South Tahoe Refuse & Recycling (STR) offers solid waste collection, recycling and disposal services to residents and businesses in the South Tahoe area, operating under franchise agreements with the City of South Lake Tahoe, El Dorado County, and Douglas County. The Transfer Station, including a Material Recovery Facility (MRF) and Resource Recovery Facility (RRF) is located at 2140 Ruth Ave., South Lake Tahoe, California. As part of its waste collection services, STR receives woody material from the surrounding area, including green yard debris, clean construction and demolition (C&D) material, and residual waste from defensible space and fire mitigation activities (i.e., small trees, tops, and limbs). Currently the majority of this material is chipped at the STR facility and trucked out of the Tahoe Basin to Carson Valley, Nevada for composting. In recent years STR averaged approximately 8,000 tons of woody material received and processed each year; however, as local awareness around Firewise, defensible space methods, and other fire mitigation activities continues to grow, woody material received at STR has increased to an average of about 10,000 tons per year, and is expected to remain elevated into the future, with 2022 on track to surpass previous years. Meanwhile, composting outlets have indicated a limited availability to take additional woody material in the future due their own business and site constraints, contributing to a need to consider alternative disposal options.

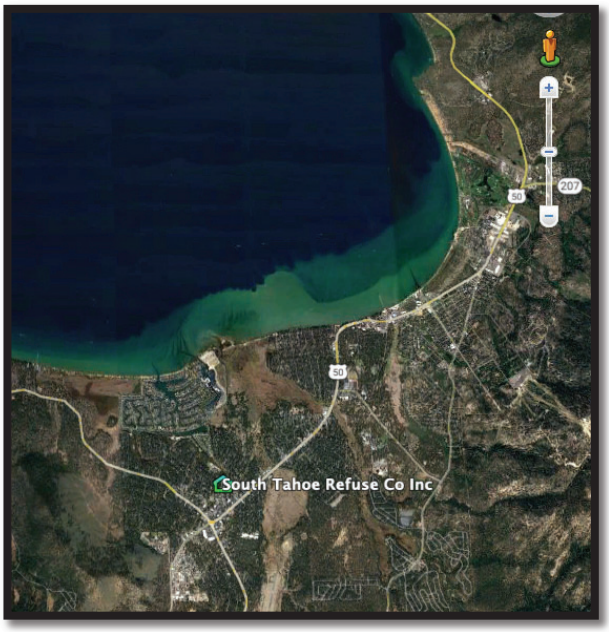

FIGURE 5: South Tahoe Refuse site in South Lake Tahoe.

In early 2021, STR began discussions with Wisewood Energy, a wood energy developer based in Oregon, along with other community organizations, to explore a small-scale combined heat-and-power (CHP) system that would use wood chips from STR operations to generate energy, offsetting grid electricity and natural gas consumed at the STR facility as well as reducing the transportation of wood chips out of the Basin. After preliminary energy modeling, a net metered 125 kW biomass CHP system was estimated to be sufficient to cover the majority of both STR's annual electricity needs and its heating, using about 1,000 tons of wood chips each year. This formed the basis of design for further investigation and analysis into the viability of such a system at STR.

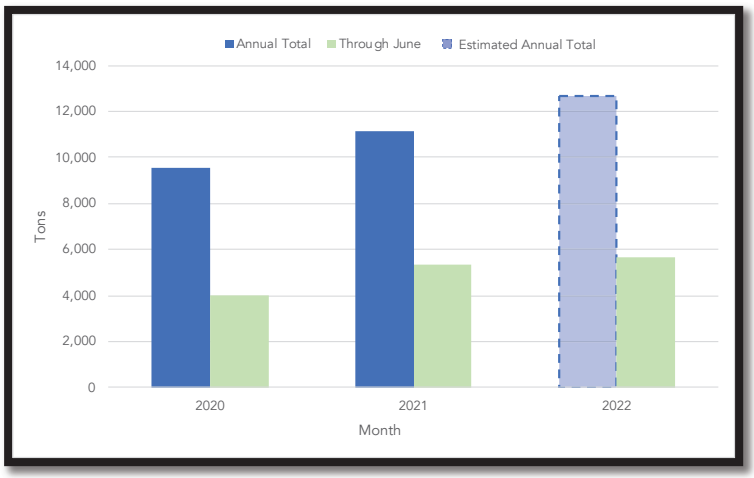

FIGURE 6: Tons of woody material received at STR and transported out of the Tahoe Basin for composting in 2020, 2021, and 2022, shown as annual totals and through June of each year. The annual total for 2022 is estimated based on data available through June. Woody material processed at STR has continued to increase by about 15% each year, with 2022 on track to continue that trend.

2 Wood Energy in the Tahoe Basin

2.1 PREVIOUS PROPOSALS

Biomass projects have been considered in the Tahoe Basin for almost two decades. Advocates champion wood energy for many of the reasons described above, including improving regional air quality by reducing the practice of burning slash piles from forest management activities, incentivizing more fuels reduction treatments for fire mitigation, replacing imported fossil fuels with locally available resources, and establishing firm renewable energy assets to improve energy resilience. In the Tahoe Basin, biomass proposals prior to 2010 included a prototype biomass gasification system to produce heat and electricity for Truckee Donner Publicity Utility District (TDPUD) as a pilot project,[13,14] and a wood boiler to replace aging diesel boilers at South Tahoe High School[15]. These proposals did not come to fruition; the TDPUD system required a specific type of wood chip that was costly to obtain, and resulted in more labor intensive maintenance – that system was decommissioned just two years after being installed. The biomass boiler planned for South Tahoe High School was never installed.

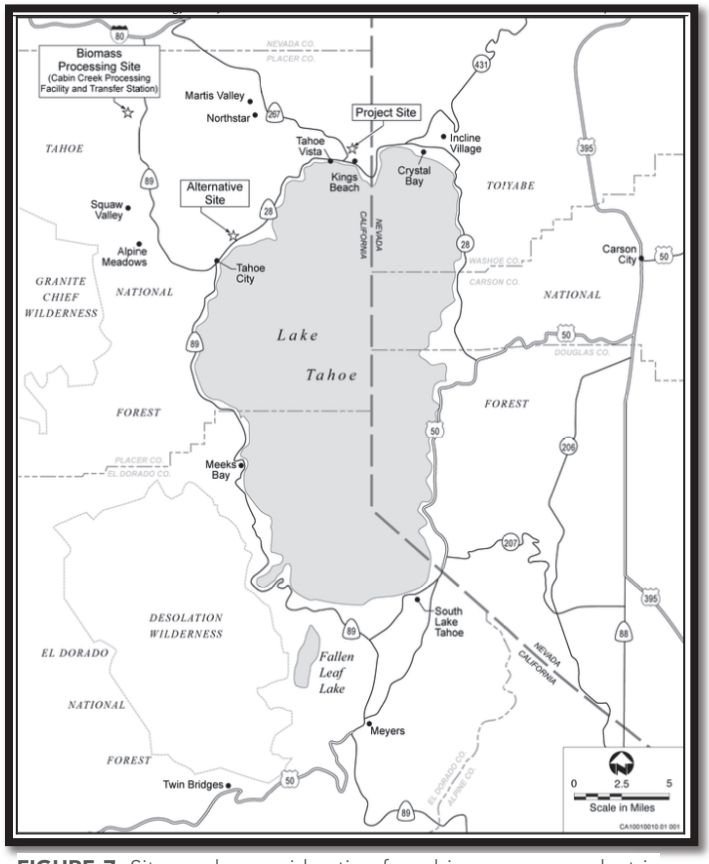

FIGURE 7: Sites under consideration for a biomass power plant in 2010. Note the project was ultimately moved from Kings Beach to Cabin Creek ("the biomass processing site"). Map adapted from Ascent Environmental, 2010.

Despite these setbacks, wood energy has remained a priority topic of investigation in Placer and El Dorado Counties. Most notable for the Tahoe Basin, Placer County and NV Energy proposed a 1-3 MW power plant on the north shore of Lake Tahoe at Kings Beach in 2010, which was updated to a proposed capacity of 2 MW in 2011. Almost immediately, the proposal was met with local opposition[16,17]. Concerns included impacts of smoke, heavy traffic, smells, and noise, especially within close proximity to an elementary school, Boys and Girls Club, and residences. A new non-profit, Friends of Lake Tahoe, was formed to oppose the project, and expressed their concerns at

[13] Biomass scrutinized at Lake Tahoe. Alan Best. 8-31-06. https://www.summitdaily.com/news/biomass-scrutinized-at-lake-tahoe/
[14] Truckee's biomass project will be decommissioned. Greyson Howard. 2-12-2007. https://www.sierrasun.com/news/truckees-biomass-project-will-be-decommissioned/
[15] Biomass would help decrease fire danger, and heat high school, too. William Ferchland. 5/2/06. https://www.tahoedailytribune.com/news/biomass-would-help-decrease-fire-danger-and-heat-high-school-too/
[16] Biomass plant raises concerns in Kings Beach. Matthew Renda. 9/3/2010. https://www.tahoedailytribune.com/news/biomass-plant-raises-concerns-in-kings-beach/
[17] Biomass plant in Kings Beach. Analyzing economics, operations in Loyalton. Matthew Renda. 9/15/2010. https://www.sierrasun.com/news/biomass-plant-in-kings-beach-analyzing-economics-operations-in-loyalton/

public meetings[18]. Influenced by widespread community opposition, the TRPA executive director informed TRPA's governing board in 2011 that the controversial Kings Beach location should no longer be considered an option for development, forcing project proponents to focus on alternative sites[19].

Project development shifted to the Cabin Creek site at the Eastern Regional Landfill (outside of the Tahoe Basin), where woody material was already being transported and processed for disposal elsewhere. The new site was largely considered more appropriate for a biomass power plant, and Placer County proceeded to complete a number of environmental impact studies, a fuel logistics study, and health impact assessments while advancing power purchase negotiations with Liberty Utilities (see Placer County website for links to all completed studies)[20,21,22]. In 2018 Placer County and Liberty Utilities were unable to come to an agreed upon price for biomass power generated at the Cabin Creek site, and negotiations ceased. As of 2022, the power plant at Cabin Creek has still not been constructed.

2.2 TAHOE REGIONAL PLANNING AGENCY MORATORIUM

In December 2012 a moratorium on applications for all new biomass energy facilities in the Tahoe Basin was put into place as part of a larger Tahoe Regional Planning Agency (TRPA) code of ordinances update. Section 65.1.6.F of the TRPA Code of Ordinances states that, "TRPA shall suspend acceptance of applications for biofuel facilities until further research demonstrates the safety and environmental compatibility of such facilities". The moratorium is largely understood to be in response to the Kings Beach project and the significant public opposition it received.

In late 2021, STR and Wisewood engaged TRPA to determine a possible pathway to submit an application for a small-scale biomass unit at STR, on the basis that the proposed net metering system is substantially different than the Kings Beach project and will not have the impacts that were anticipated for that system, and that it will be compatible with TRPA safety and environmental requirements. It was determined that an assessment documenting the expected impacts of the proposed STR biomass system would be an acceptable method to enable a determination as to whether the proposed unit at STR demonstrates the safety and environmental compatibility to allow for an application to be accepted through TRPA. This assessment identifies and addresses anticipated impacts for the proposed STR project, and is intended to inform a TRPA decision to accept and review an application that would allow STR to proceed with a standard permitting process for its biomass net metering project.

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[18] North Tahoe residents continue to air concerns about proposed biomass plant. Matthew Renda. 4/20/2011. https://www.sierrasun.com/news/north-tahoe-residents-continue-to-air-concerns-about-proposed-biomass-plant/

[19] Placer biomass plant for Kings Beach hits major stumbling block. Gus Thomson. 7/29/2011. https://goldcountrymedia.com/news/46059/placer-biomass-plant-for-kings-beach-hits-major-stumbling-block/

[20] Officials begin prelim look at Cabin Creek for biomass facility near Tahoe. Jason Smith. 10/18/2011. https://www.theunion.com/news/officials-begin-prelim-look-at-cabin-creek-for-biomass-facility-near-tahoe/

[21] Logistics Study of a Biomass Facility for the Lake Tahoe Region Task 3.0. Proactive Customer Services: November 2011. https://www.placer.ca.gov/DocumentCenter/View/8465/Logistics-Study-of-a-Biomass-Facility-for-the-Lake-Tahoe-Region-PDF

[22] County of Placer Reports. Community Development Resource Agency. https://www.placer.ca.gov/2910/Reports (includes all completed reports)

3 Wood Energy Technology Advancement

Wood energy technology has undergone significant research and development and subsequent commercial deployment over the past three-plus decades around the world, led by European countries such as Austria, Sweden, and Germany. Modern and efficient wood boiler systems for heat generation have dominated the traditional wood energy industry, while electricity generation has been accomplished by pairing steam turbines or Organic Rankine Cycle (ORC) units with boilers. Recent advances in biomass gasification systems have enabled new opportunities for CHP generation using advanced wood energy technology, such as the gasification unit proposed for the STR project.

Gasifier systems convert woody biomass to energy via the process of "gasification"; it is not a combustion process. In gasifier systems, the biomass fuel is heated in a reactor with limited oxygen, which causes the solid biomass to be converted to a fuel-rich gas (mostly CO and H2) that is subsequently filtered of impurities, cooled and then sent to a modified natural gas engine that is coupled to an electric generator. The water cooling system of the gas engine and gas cooler can generate hot water to be used for wood drying, space heating, and low temperature process heat. Gasifier technology has high electrical conversion efficiency, which makes it better suited than other wood energy technologies when electricity generation is the primary focus.

The gasification technology selected for STR is from Bioenergie Wegscheid (formerly HolzEnergie Wegscheid, or "Holz") out of Germany. Holz has been in business for 13 years and has over 120 downdraft gasifier units operating worldwide, equivalent to an aggregate electrical capacity of about 15 MW. Holz systems come in 65 kW and 125 kW units, which can be stacked in parallel to serve larger loads as needed. According to plant operators at existing sites, individual units have logged over 8,200 operating hours in a given year; this represents an impressive 91% uptime capacity factor for generating energy around the clock, and is indicative of the technology's ability to operate consistently and reliably. Smaller systems such as these have inherent benefits when compared to larger multi-megawatt systems in terms of the volume of their fuel demand, required footprint area, emissions, and operations. The expected impacts of the STR project are described in more detail in the following sections.

4 Environmental & Safety Impacts

Preliminary system sizing for the STR net metering system is based on the estimated energy usage of STR operations. A 125 kW biomass CHP system is estimated to offset over 100% of the facility's annual electrical demand (approximately 75% of its hourly demand), and over 90% of its natural gas usage. As a net metering system, no power will be sold to the grid; rather, energy generated in excess of what STR uses at any given moment will be "trued up" at the end of the year to offset electricity purchased from the grid, much like a net metered solar photovoltaic system. All thermal energy that can be used on-site will reduce natural gas used for space heating. The sections below document estimated environmental and safety impacts for the proposed STR project, including fuel demand, traffic, air quality, site suitability and footprint, noise, and safety.

4.1 FUEL DEMAND

As described previously, STR currently handles approximately 10,000 tons per year of woody biomass material, primarily sourced from residential and commercial yard maintenance, clean C&D material, and residual waste material from defensible space and fire mitigation activities. The volume of this material is expected to continue to increase; for example, the Tahoe Fire and Fuels Team, a collaborative group of 21 agencies and entities including all fire protection districts, has continued to support and urge defensible space treatments in the area, especially after the Caldor Fire. STR has also sought to encourage more defensible space activities in recent years by offering woody material drop-off at no fee for all residential customers as well as select community entities, and offering four events each year for commercial customers to drop off green waste at no charge. This material is received at STR's South Lake Tahoe site and processed into wood chips using an electric horizontal chipper-grinder. The 125 kW biomass system is estimated to require approximately 1,000 tons per year, or about 10% of the volume of material currently handled at STR; hence, the system would require no new procurement of material outside of STR's operations.

FIGURE 8: Example of woody material received and processed at STR. Material is stored until it can be transported out of the Basin (see section 4.2).

The proposed STR project represents a small-scale, distributed approach to local biomass utilization. While the STR project will use material being generated by community defensible space activities, it is not expected to incentivize additional forest restoration activities in the short term due to its small wood fuel demand. However, demonstrating that wood energy technologies can be unobtrusive, clean, and effective may support a broader community discussion about the value of wood energy in the Tahoe Basin. Assuming that about 10 tons of woody material is generated for every acre of fuels treatment in the Tahoe Basin area, a fuel demand of 1,000 tons per year would support about 100 acres of treatment. For perspective, Basin partners are currently treating about 2,000 to 3,000 acres annually, depending on project constraints.

4.2 TRAFFIC

After processing, woody material received at STR is currently shipped approximately 25 miles (one way) to Bently Ranch in the Carson Valley, following Highway 50 through South Lake Tahoe to NV-207. Typical trucks used for hauling can hold about 15 tons each trip, resulting in a total of roughly 700 truck trips each year, or 35,000 traveled miles (roundtrip). This represents STR's "business as usual" scenario.

An STR biomass facility would result in a reduction in truck traffic currently traveling through South Lake Tahoe to Carson Valley. This reduction is equivalent to about 72 fewer chip trucks on the road each year. In addition to benefits associated with reduced transportation emissions (see Table 1), benefits include reduced truck traffic in neighborhoods and through town, resulting in reduced truck noise and potential safety improvements.

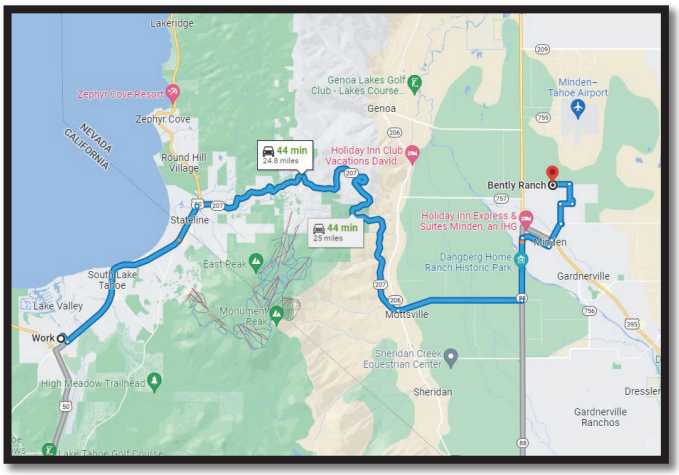


FIGURE 9: Typical route taken to dispose of woody material from the Tahoe Basin area to the Carson Valley, approximately 50 miles roundtrip.

TABLE 1: Average truckloads, traveled roundtrip miles, and associated emissions per year with no action compared to STR installing the biomass gasifier. Chip vans are assumed to have an average of 15 tons per load.

	NO ACTION	WITH GASIFIER
AVG TRIPS/YR	700	628
MILES/YR (ROUNDTRIP)	34,650	31,050
PM (LB/YR)	23.38	20.95
CO (LB/YR)	214.12	191.87
CH_4 (LB/YR)	0.73	0.65
NO_X (LB/YR)	600.19	537.83

4.3 AIR QUALITY

Holz Bioenergie CHP units have low criteria pollutant emissions and virtually no visible smoke. For example, Figure 10 shows a similarly-sized Bioenergie system in a mountain town near the Dolomites, Italy showing no smoke; video is also available upon request.

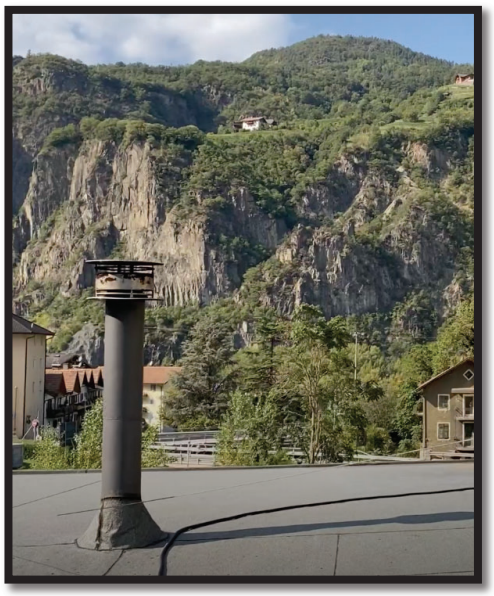


FIGURE 10: 190kW system running at full capacity and showing no visible smoke, located in South Tyrol, Italy.

The El Dorado County Air Quality Management District (EDAQMD) is responsible for regional air quality planning, monitoring, and stationary source and facility permitting to administer California Air Resources Board air quality standards. EDAQMD has established emission thresholds for reactive nonorganic gases (ROG), oxides of nitrogen (NOx), carbon monoxide (CO), particulate matter (PM), and other pollutants. Projects that are estimated to be below emission thresholds may be considered to have an insignificant impact, while those that are expected to exceed emissions may require permitting, implementation of Best Available Control Technology (BACT), and/or additional mitigative action.

The proposed biomass facility at STR will have two sources of emissions: plant operations, and transportation of woody material. As discussed in the previous section, the project will result in a decrease of both truck traffic and vehicle emissions due to a reduction in material transported to Carson Valley; these reductions are particularly beneficial considering that pollutants from diesel combustion engines are among the most harmful. Emissions from plant operations are estimated in Table 2, and compared to EDAQMD thresholds. Based on preliminary analysis, the 125 kW biomass system is estimated to be far below all thresholds except for NO_x (modeling no emission controls). The biomass facility will additionally offset the majority of natural gas used for space heating on-site, which will cause a decrease in existing emissions; this reduction and a calculation of plant emissions versus "no action" was not modeled for the purposes of this Assessment. Emission controls are available should they be required, such as Selective Catalytic Reduction (SCR) to reduce NO_x emissions, and additional modeling can be completed to ascertain a more detailed emissions profile and implications for permitting.

TABLE 2: Emission thresholds set forth by the El Dorado APCD (see chapters 5 and 6), compared to estimated plant emissions of the biomass gasifier system with no emission controls[1].

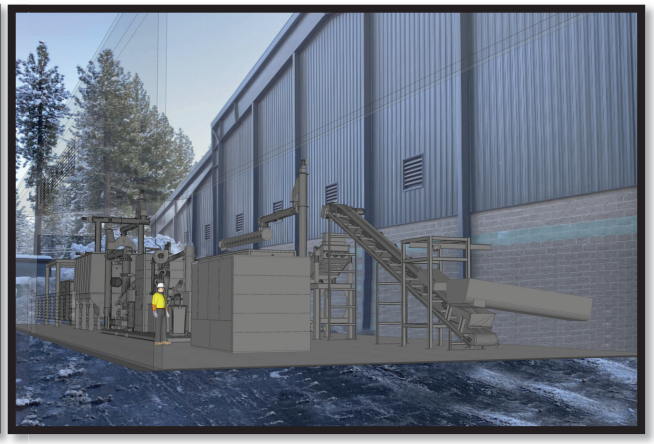
POLLUTANTS	EMISSION THRESHOLDS	PLANT EMISSIONS
ROG (LB/DAY)	82	0.027
NO_X (LB/HR)	0.068	0.498
CO (LB/HR)	3.7	0.038
PM_{10} (LB/HR)	0.41	0.019

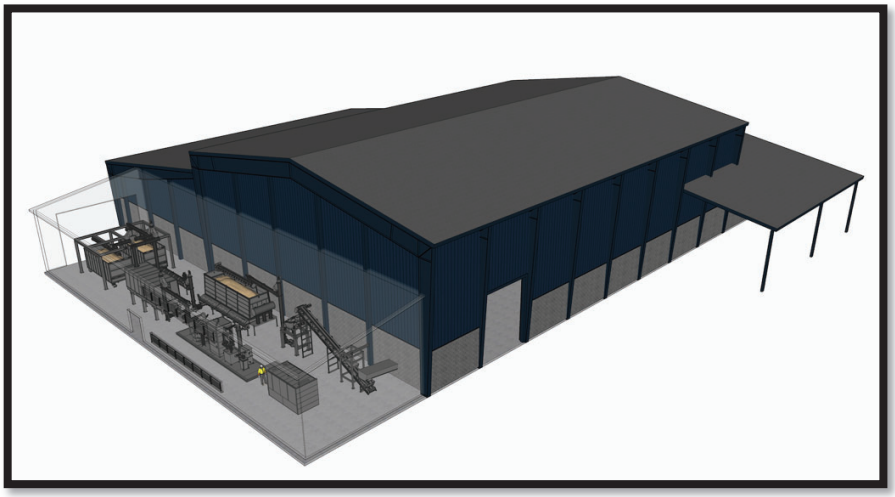
While the proposed STR project is not expected to incentivize new fuel reduction treatments or reduce existing pile burning, it is anticipated to support overall efforts to do so by demonstrating a viable alternative to business-as-usual handling of waste woody material. Both pile burning waste woody material and wildfire results in uncontrolled emissions of all criteria pollutants, which can harm public health and air quality. This

can be mitigated to some extent by an increase in fuel reduction treatments and other defensible space activities that will be encouraged with the proposed STR project.

4.4 SITE SUITABILITY & FOOTPRINT

STR is located in an area zoned commercial mixed use services, with primary use listed as miscellaneous improved industrial property. Current operations include coming and going of waste collection trucks, transport trucks hauling material for disposal, recycling, and composting, grinding of wood chip material, and other miscellaneous equipment operations. The proposed CHP system would be located directly adjacent to the existing structure where woody material is currently received and chipped; it would not require an expansion of STR's footprint. The biomass gasifier, in-feed bin, wood chip storage, and associated equipment will require approximately 6,400 square feet, or about the size of a school gym. See Figures 11-13 for the existing conditions of the site identified for the system, and conceptual visual renderings of the proposed system.





FIGURES 1 - 13: Existing conditions of the area identified for the proposed wood energy system, and two conceptual visual representations. The wood fuel screening system, in-feed bin, dryer, gasifier, and engine are shown adjacent to the existing Resource Recovery Facility, where woody material is currently received, chipped, and stored. The biomass system may be enclosed by an extension of the existing structure; final design to be completed at a later date. It will not require an expansion of STR's footprint.

4.5 NOISE

Like other generators, the wood energy engine creates noise when operating. Wisewood evaluated three sources of noise for the proposed STR system and its overall impact on the area, based on ambient daytime noise levels collected in late July, 2022 and assuming the system is designed with standard noise dampening options. Results are summarized in Table 3, with recorded noise levels included in Attachment 1. The noise level at the STR facility with current operations was recorded to be 63 dBA, and the average daytime noise level of the general vicinity was recorded at 58 dBA. Since none of the three sources of noise at the proposed biomass facility are estimated to be higher than these values, the facility is anticipated to have no increased impact on noise levels at STR or the surrounding area during the day. As ambient noise levels are likely lower during the night, noise from system operations may be more noticeable at this time. STR will work with project engineers to ensure that appropriate enclosures are designed for the system to minimize this potential impact.

TABLE 3: Sound pressure levels estimated for three sources of noise for the proposed STR system, with expected dampening effects of various system enclosures. Noise factors and calculations are based on noisetools.net.

Noise Sources	Sound Pressure Level [dBA][2]	Enclosure Attenuation [dBA][3]	Exhaust Silencer Attenuation [dBA][4]	Building Wall Attenuation [dBA][3]	Sound Pressure Level Outside CHP Building [dBA]
CHP Engine	95.9	-17.8	N/A	-17.8	60.4
CHP Engine Exhaust	77.0	N/A	-20.0	N/A	57.0
Air Compressor	75.0	N/A	N/A	-17.8	57.2

4.6 SAFETY

Holz Bioenergie CHP systems similar to what is proposed for STR have been installed throughout the world, serving a variety of end uses and often located in the midst of urban or semi-urban environments. They include no high-pressure equipment, hazardous materials, or high risk equipment. Operations typically involve brief daily visual checks on sensors and material flow, regular filter changes and other preventative maintenance, and annual cleaning similar to other engines. STR staff will be trained to operate the system, and regular safety checks and other maintenance protocols will be adopted similar to existing procedures at STR. The proposed system is not expected to generate any unusual safety or operational requirements.

FIGURE 14: Existing wood gasifiers are often installed in populated areas, and involve no hazardous or high risk equipment.

5 Conclusions and Next Steps

Like other communities in the Sierra Nevada region, the Tahoe Basin is faced with existential challenges that require a multi-faceted response. Forested landscapes – the natural beauty upon which the Tahoe Basin relies – are at risk of catastrophic wildfire, threatening human and wildlife communities alike. Meanwhile, an at-times unreliable grid and a renewed prioritization of 24/7 renewable energy resources have underscored the need to lean into solutions that are synergistic and complementary with other objectives. Redirecting low value, waste woody material away from pile burning and long-haul transportation to local utilization, where value can be retained in local businesses while offsetting fossil fuel resources, is one means to address these challenges.

South Tahoe Refuse has operated in the Tahoe area for decades and specializes in waste reduction and recycling. Current operations already include the collection and processing of waste woody material derived from defensible space activities, which is transported out of the Basin for recycling. STR represents an ideal location for a pilot project to demonstrate the viability of local, small-scale wood energy generation, and will be in alignment with environmental and safety requirements set forth by TRPA. Installation of the system will mean a reduction in truck traffic out of the Basin and the associated emissions, with very low emissions attributable to the plant itself. The fuel demand will require no new biomass procurement, and the facility will have no change on STR's current footprint. For these reasons, STR requests that TRPA allow STR to submit an application to approve the proposed biomass facility, lifting the moratorium against such action for this pilot project.

Attachment 1

Existing Noise Levels – Data Collection

Existing Noise Data Collection

Noise Range: 50-66 dBA
Average Noise: 58 dBA

#	Address	Owner	Distance from proposed CHP plant [ft]	Current noise level* [dBA]
★	2140 Ruth Ave	STR	0	63
1	2144 Ruth Ave	STR	309	56
2	2152 Ruth Ave	Bell Gary A & Terri L TR	310	59
3	2160 Ruth Ave	Tahoe Basin Container Serv INC	392	55
4	936 3rd St	Bell Gary A & Terri L TR	340	61
5	948 3rd St	Baker John A	392	61
6	2093 Eloise Ave	STR	482	57
7	2085 Eloise Ave	STR	592	54
8	2090 Dunlap Dr	Pacific Bell	725	54
9	2108 Dunlap Dr	STR & TBC serv inc	573	55
10	2116 Dunlap Dr	STR & TBC serv inc	520	62
11	2132 Dunlap Dr	STR	528	66
12	2140 Dunlap Dr	Hassett Robert J TR & Tamara r TR	500	65
13	2119 Ruth Ave	Curtis Steven & Nancy	391	62
14	2127 Ruth Ave	TBC serv inc	459	54
15	2143 Ruth Ave	STR	415	53
16	2173 Ruth Ave	TBC serv inc	662	55
17	2158 Washington Ave	Egri Sarah A	727	50
18	2154 Washington Ave	Clark Constance	654	52
19	2192 Ruth Ave	STR	795	50
20	2172 Dunlap Dr	Guy Geordan	754	60
21	2182 Dunlap Dr	Fleishman David	745	58
22	2212 Dunlap Dr	Caldwell Karl	845	55
23	954 S Shore Dr	CTC	633	57
24	2083 James Ave	Kemper & sons	706	60
25	2107 James Ave	Sarosik Dennis	422	62
26	2141 James Ave	Three RS LLC	633	63
27	2121 Lake Tahoe Blvd	Bank of the West	659	59
28	2161 Lake Tahoe Blvd Ste 1	Bank of the West	657	61

*Noise data was collected early afternoon on July 26th using the NIOSH Sound Level Meter App