

Pre-Development Work for the Construction and Operation of a Three-Megawatt Biomass Power Plant in The Mammoth Lakes Area



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What is Trying to Be Solved?

- Catastrophic Wildfire



- Forest Health Issues



- Reduction/Elimination of Open Burning Emissions



- Economic Utilization of Forest Thinnings from Sustainable Forest Management



Long-Term Solutions w/Emphasis on Bioenergy

The Eastern Sierra Climate & Communities Resilience Project (ESCCRP) has begun implementing ecological forest restoration on over 55,000 acres





Why Bioenergy?

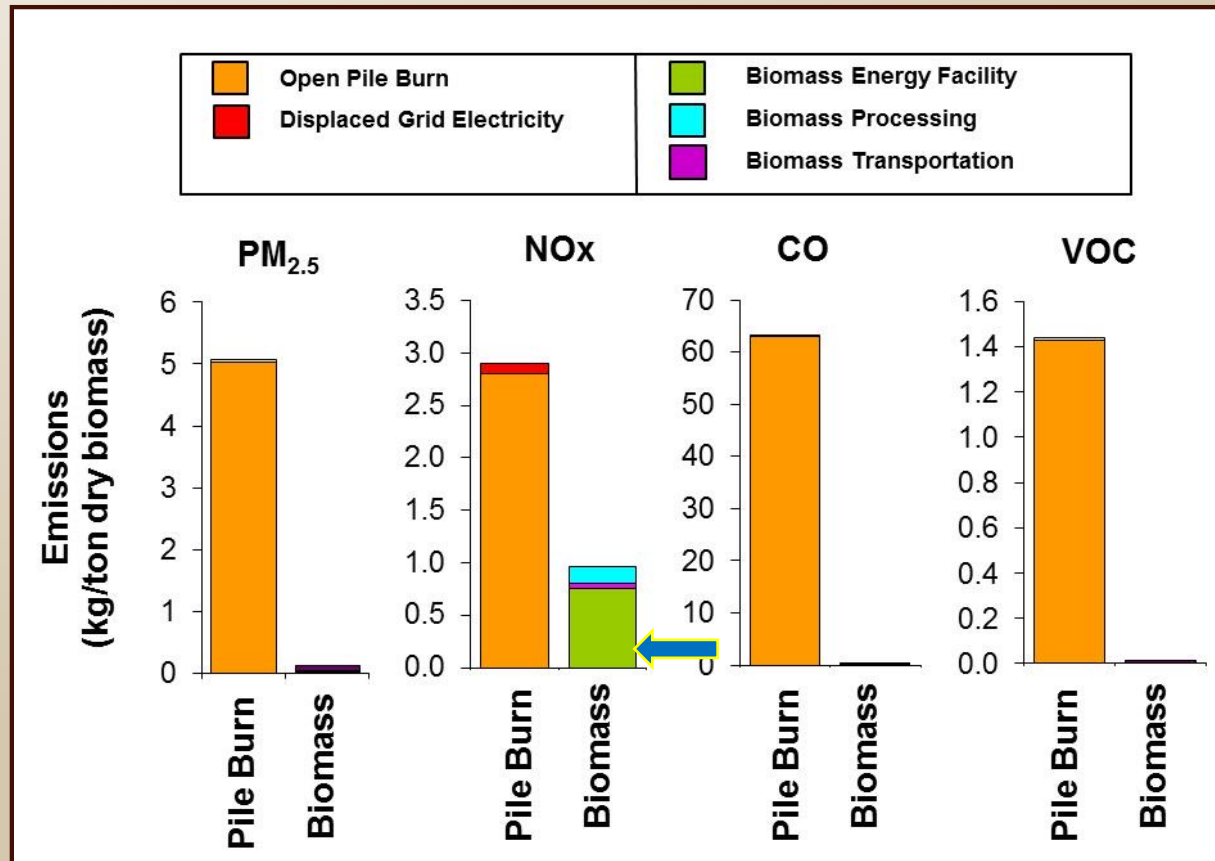
- A bioenergy system such as a community-scale biomass power plant can deal with the pace and scale of hazardous forest fuels removal for Mono County
- Could utilize 30,000-plus bone dry tons of sustainable forest management activities per year – in line with what is envisioned for the region
- Can use all forms of woody biomass – bark, tops, limbs, beetle-infested wood, needles/cones,
- Produce 3 MW (23,650 MWh/yr) of reliable/renewable/ distributed/baseload electricity, delivered to the rural grid under a **guaranteed** offtake power purchase agreement
- Create biochar, a byproduct of the bioenergy facility, which can be used for carbon sequestration
- Emissions are significantly controlled by a state-of-the-art biomass power plant with open pile burning essentially eliminated
- Create 15-plus well-paying jobs in the Mammoth Area
- Significant U.S. Dept. of Energy grant available for selected bioenergy technology developer (up to \$10MM)
- Potential to also be able to deal with food waste/organics from the Mammoth Lakes and Mono County MSW stream



Why Bioenergy?

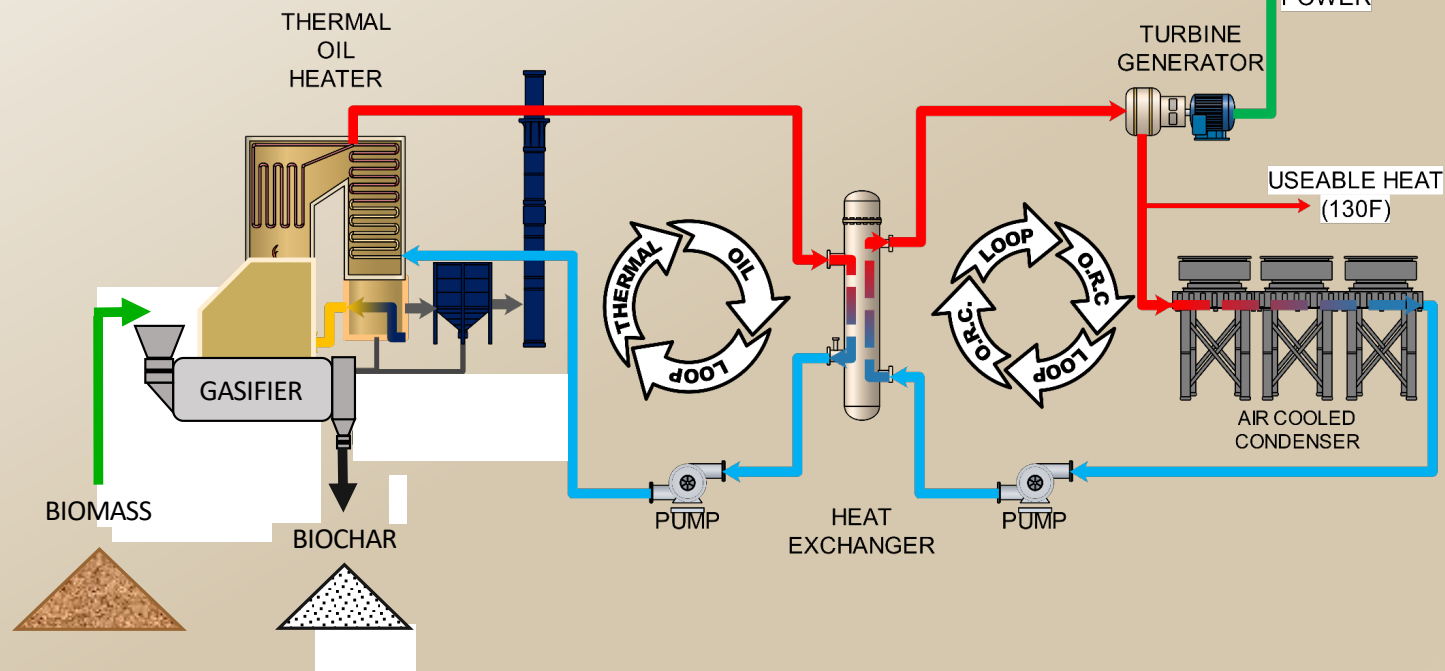
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Biomass to Electricity reduces criteria air pollutants from both open burning and wildfire emissions



Graphic courtesy of Placer County Air Pollution Control District

State of the Art Bioenergy Technology





Bioenergy Pre-Development Tasks

	Pre-Development	
1	Select potential bioenergy developer and work with developer conduct the following activities	
2	Develop site control	
3	Develop feedstock procurement plan and implement - Agreements/contracts with feedstock suppliers	
4	Interconnection and BioMAT Power Purchase Agreement with SCE	
5	Preliminary Civil Engineering and Design	
6	CEQA/NEPA review	
7	Land Use and Air Quality permitting	
8	Community and Regulatory Agency Outreach and Support	
9	Project Management	
	Construct bioenergy facility	



Bioenergy Project Essentials

Technology	Direct Combustion w/ORC
Site	Casa Diablo - ORMAT
ORC	Must be able to use ORMAT manufactured ORC
BioMAT PPA	Key to economic feasibility – guaranteed offtake for electricity
Mid-Term Storage	Airport or? Even with ORMAT as site, still need area to store logs and chip material for transport to ORMAT facility
USFS Stewardship Contract & Other Mechanisms	Needed to insure feedstock supply
Facility size	3 MW for export via BioMAT PPA



Key Considerations Regarding a Biomass Utilization Facility

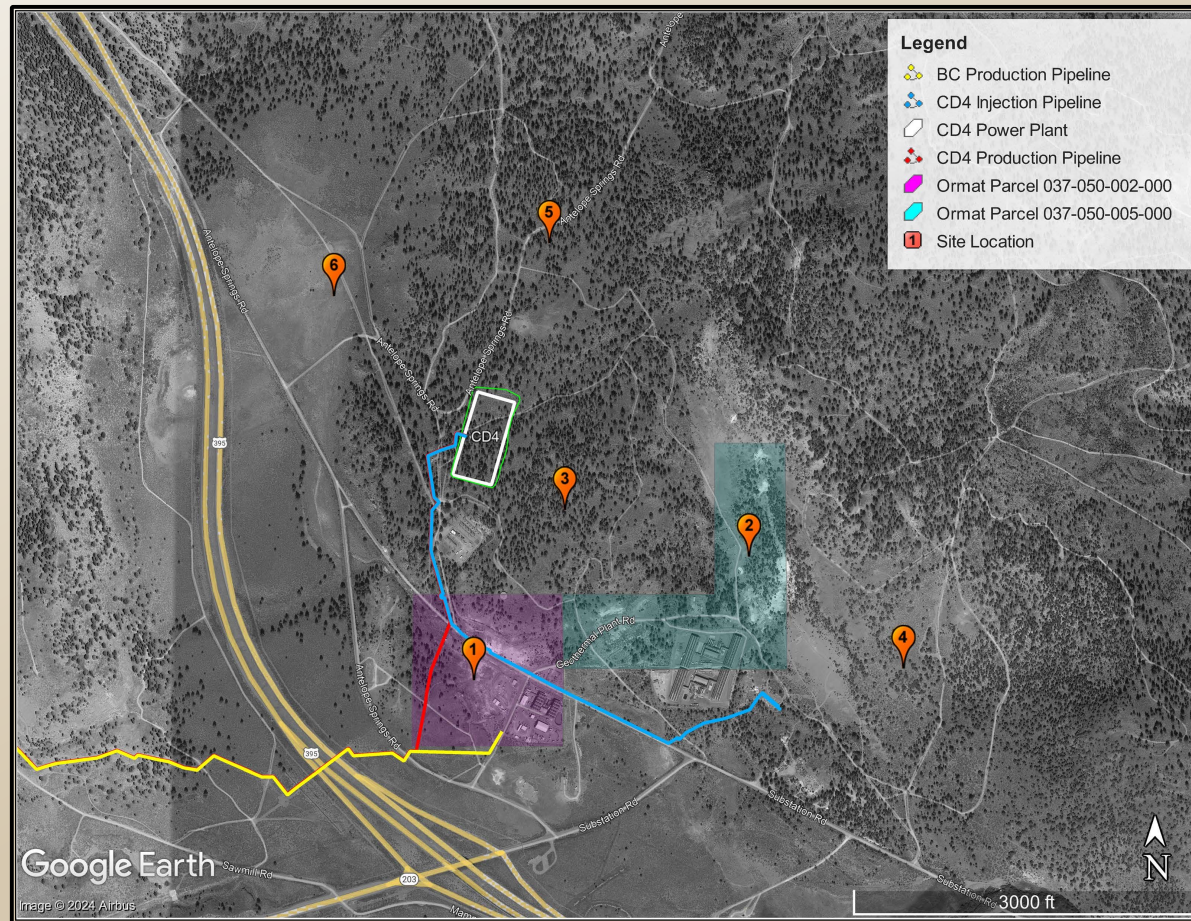
	Timber Harvest Residuals (BDT/Yr)	Forest Fuels Reduction (BDT/Yr)	Forest Products Manufacturing Residuals (BDT/Yr)	Urban Wood (BDT/Yr)	Powerline Corridor Maintenance (BDT/Yr)	Totals (BDT/Yr)
Potentially Available	1,961	28,000	360	1,864	350	32,535
Practically Available	1,765	25,800	360	1,678	245	29,848

Note: This data is being updated

Feedstock Type	Low Range (\$/BDT)	High Range (\$/BDT)	Average Delivered Price to Mammoth Lakes (\$/BDT)
Timber Harvest Residuals	\$50.00	\$55.00	\$52.50
Forest Fuels Reduction	\$46.00	\$56.00	\$51.00
Forest Products Manufacturing Residuals	\$10.00	\$20.00	\$15.00
Urban Wood	\$10.00	\$20.00	\$15.00
Powerline Corridor Maintenance	\$5.00	\$10.00	\$7.50



Casa Diablo Sites



From Michael Stallard and Margie DeRose of ORMAT 9/11/24



Technology Company Selection Matrix

Company	Aries Clean Energy	Engemann	EQTEC	West Biofuels	Earthcare
Tech Products	Gasification w/ combustion of syngas to electricity via ORC	Direct combustion electricity via steam cycle	Gasification to electricity via IC engine gensets	Direct combustion of woody biomass to electricity via ORC	Gasification w/ combustion of syngas to electricity via ORC
Conversion Rate	1 to 1.25BDT/MW				
Experience w/ Woody Biomass	No, currently only biosolids	Yes, operational facilities outside U.S.	Yes, some operational facilities outside U.S.	Yes, in California	Experience with manures and poultry litter (some mixed with wood shavings bedding)
Relative Score	0	4	4	5	3
Permitted Facility in CA	Two in permitting process	One permitted in California. Constuction not yet begun	One under construction in California	One 3 MW facility, two additional under construction in California	None
Relative Score	3	4	4	5	1
Feedstock Costs	Feedstock costs <\$20 ton needed	Feedstock costs <\$20 ton needed	Feedstock costs up to \$40 ton	Feedstock costs up to \$40 to \$50 ton	Tipping fee may be required
Relative Score	2	2	3	5	1
Capital Cost (assuming 2.5 MW)	\$15 - 20 MM	\$20-\$25 M (5MW plant)	\$20 - \$25 MM	\$15 - \$20 MM	\$15.5M
Relative Score	4	3	2	4	5
Op & Maintenance Costs (annual)	\$570-\$665 K annually	Not provided	Not provided	\$375-\$750k	\$820 K
Relative Score	5	2	2	4	3
Electricity value	2.5 MW @ \$199 MWhr	2.5 MW @ \$199 MWhr	2.5 MW @ \$199 MWhr	2.5 MW @ \$199 MWhr	1.25 MW @ \$199 MWhr
Relative Score	5	5	5	5	3



Technology Company Selection Matrix (cont'd)

Marketable products (assume low biochar market rate of \$250 /ton with 24K BDT of feedstock)	Biochar (10% feedstock) - \$725K yearly	Biochar (5% feedstock) - \$363K yearly	Biochar (10% feedstock) - \$725K yearly	Biochar (10% feedstock) - \$725K yearly	5,000 tons biochar - \$1.25 MM
Relative Score	3	1	3	3	5
Operating Requirements (per shift)	1 operator/shift, 1 yard operator/ shift + mgmt. + admin staff	1 operator/shift, 1 yard operator/ shift + mgmt. + admin staff	2-3 staff per day, 2 staff per night shift	1 operator/shift, 1 yard operator/ shift + mgmt. + admin staff	1 operator/shift, 1 yard operator/ shift + mgmt. + admin staff
Relative Score	4	4	2	4	4
Site Requirements (station) acres	1	1	1	.5-1	1
Relative Score	4	4	4	5	4
Site Requirements (feedstock) acres	3	3	3	3	2
Relative Score	4	4	4	4	5
Environmental Considerations	Gasification w/ combustion of syngas to electricity via ORC. Control of NOX emissions via SCR PM emissions minimal	Direct combustion emissions controlled by Selective Non-Catalytic Reduction (for NOx). PM control via multi clone and baghouse.	Gasification electricity produced by internal combustion engine gensets. BACT available for all air emissions	Direct combustion emissions controlled by Selective Non-Catalytic Reduction (for NOx). PM control via multi clone and baghouse.	No combustion of solid fuel. Electricity produced by combustion of syngas via ORC
Relative Score	4	3	5	3	4
ORC Experience	Yes	No	No	Yes	Yes
Relative Score	5	0	0	5	5
Design Services	Yes	Yes	Yes	Yes	Yes
Design /Build	Yes	Yes	Yes	Yes	Yes
Design/Build/Operate	Yes	Yes	Yes	Yes	Yes
Relative Score	5	5	5	5	5
TOTAL	48	41	43	57	48



Developing Community-Scale Bioenergy Systems for California

**Matt Summers, Ph.D.
Chief Operating Officer**

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Woodland, CA

October 2024

Company Purpose

What we do – Develop and supply bio-energy, bio-fuel and bio-products technology for communities: particularly agriculture, forest and municipal sectors

Why we do it – Biomass is continuously generated from agriculture, forest and urban land management. Utilization of this surplus biomass creates revenue, jobs, and reduces carbon footprint

Where we do it – Our focus is on California. Maintains facilities including Engineering R&D Center and Workshop in Woodland, CA

The Company: Who We Are

- West Biofuels, LLC was formed in 2007
- We are project managers, engineers, constructors, and researchers pushing the future of biomass technology
- Operations managed by Dr. Matthew Summers
- Intellectual property for advanced energy technologies
- Strategic technical partnerships with Albemarle, Solagen, CAW, Turboden, Best Research, and many others
- Ongoing R&D partnerships with Universities and National Labs
- Pilot demonstration facility in Woodland, California
- Licensed Engineer and General Engineering Contractor
- EPC for commercial bioenergy projects

West Biofuels 3 MW Bioenergy Facilities



Williams, CA – Rice Hulls



Burney, CA – Forest Wood

In Planning & Pre-development

- **Mariposa, CA**
- **Grass Valley, CA**
- **Biggs, CA**

Woodland R&D Facility

