Key Sections for Letter of Intent

Allen Family Philanthropies: Accelerating Natural Climate Solutions

Wildfire Mitigation Pathway

1. Problem Statement / Relevance

Wildfire mitigation in the western United States faces a critical economic barrier: the high cost of removing hazardous fuels without viable solutions for restoration biomass. This severely constrains the pace and scale of this urgent Natural Climate Solutions pathway. The U.S. Forest Service estimates 63 million acres of National Forest System lands are at high risk of catastrophic wildfire and require restoration thinning. Oregon alone has 6.6 million acres of fire-adapted forests needing treatments, generating substantial biomass volumes (Oregon Forest Resources Institute, 2019). This material is primarily disposed through pile burning, releasing significant greenhouse gases while capturing no carbon value. In 2022, 85 pile burns in the Deschutes National Forest produced 61,413 metric tonnes of CO_2 and 250 metric tonnes of PM2.5 (Axlund et al., 2025). These disposal pathways create negative climate impacts, public health burdens, and economic costs to Central Oregon's visitor-driven economy.

This project addresses three interconnected barriers:

Markets Barrier: Land managers conducting essential fuel reduction treatments lack viable solutions for the biomass byproducts. While biochar production from these treatment residues could generate carbon removal credits (~ $150 per tonne CO_2e), high verification costs, complex certification requirements, and lack of aggregation mechanisms prevent landowners and county-scale operations from accessing carbon markets. Between 4 and 18 million tonnes of non-merchantable woody biomass are generated annually from western U.S. forest restoration projects, representing enormous untapped carbon sequestration potential currently released as smoke (Elias et al., 2022).

Knowledge Barrier: Three critical knowledge gaps impede implementation. First, practitioners lack local comparative data on technologies for managing restoration biomass —including cost-benefit analyses on operational requirements and equipment types for converting treatment residues to biochar across diverse feedstocks. Second, the county requires additional capacity to align with scientific standards for credit-worthiness. Third, many potential end-users remain unaware of beneficial use-cases for biochar.

Finance Barrier: High upfront costs of fuel reduction treatments ($850–$1300 per acre in Deschutes County) limit treatment pace and scale. Biomass disposal represents a significant portion of these costs, yet no county-scale infrastructure exists to manage treatment residues beneficially and generate offsetting revenue. Without mechanisms to monetize restoration byproducts, land managers lack financial pathways to accelerate fire mitigation work.

Central Oregon's fire-prone forests generate substantial treatment residues, with Deschutes County administering more fuels reduction work than any other Oregon community. Yet, the region lacks operational pathways to convert this material into revenue-generating, climate-beneficial products. The relevance extends across climate, ecological, and community dimensions. Accelerating forest fire management reduces catastrophic wildfire risk, protecting communities, biodiversity, air quality, and potentially stabilizing insurance markets. Converting prescribed fuel reduction residues to stable biochar represents permanent carbon sequestration (multi-centennial to millennial timescales) rather than immediate atmospheric. Strategic application improves soil health, water retention, and crop productivity while sequestering additional carbon. Our project tests whether integrated solutions can overcome barriers to forest fire management, simultaneously creating economically viable pathways for landscape-scale fuel reduction while avoiding emissions from treatment byproducts.

2. Solution / Activities

We propose integrated science and technology solutions to accelerate forest fire management by addressing critical disposal barriers. Our approach transforms

unavoidable fuel reduction byproducts from costly liabilities into revenue-generating opportunities through beneficial biomass management. These solutions will integrate within Deschutes County's existing Community Wildfire Defense Grant program, which is initiating fuel reduction treatments:

Carbon Market Access Infrastructure: The project will develop a model for biomass management to attract catalytic capital that enables scaling to fund future treatments. Working with carbon registry partners, we will develop streamlined Monitoring, Reporting, and Verification (MRV) protocols for biochar produced from fuel reduction treatment residues – including standardized documentation with GPS-tagged feedstock sourcing, production quality monitoring, and application verification. This approach will reduce transaction costs and enable aggregation across multiple small landowners implementing fuel treatments.

Comparative Technology Assessment: The project will conduct field trials comparing technologies for converting fuel reduction byproducts – air curtain burners, mobile pyrolysis units, and alternative systems – on 600-700 acres of County forest land plus partner lands including private forestland, ranches, and public forests. For each technology, we will document capital and operating costs, stakeholder education and engagement, production rates, biochar quality, feedstock flexibility across treatment types, and operational constraints. The project will quantify lifecycle carbon benefits per ton of treatment residues and per dollar invested in fuel reduction and will train partners on equipment operation and safety.

Multi-Benefit End-Use Evaluation: The project will test beneficial uses of biochar from fuel reduction treatments in ecological restoration (e.g., degraded land rehabilitation, riparian buffers) and community infrastructure (e.g., stormwater management, erosion control). For each application, we will assess ecological effectiveness, economic viability, and community value, in partnership with Deschutes Soil and Water Conservation District and Oregon State University Extension.

Stakeholder Engagement and Investment Package: The project will test and evaluate engagement models and identify adoption barriers for fuel reduction implementation across the diverse spectrum of landowners and managers including: County agencies, private landowners, agricultural producers, BLM, USFS, and fire

districts. We will synthesize data into an investment-ready 'Western Biomass Blueprint' demonstrating per-acre economics that can enable county-wide restoration financing. This blueprint provides the validated economic models, risk mitigation analysis, multi-stakeholder collaboration, and operational templates required to structure municipal financing mechanisms for landscape-scale replication with diverse land owner types.
Timeline: Year 1—Develop MRV protocols; establish baseline measurements; initiate technology trials; begin stakeholder engagement strategy development and testing. Year 2—Refine protocols based on field data; test beneficial end uses; conduct market analysis; develop economic models and blueprint for biomass management. Year 3—Finalize investment-ready package; validate financial models; document adoption pathways; disseminate findings to other counties and state agencies; initiate investor outreach.

3. Success / Impact

Investment-Ready Package: A comprehensive package designed to attract catalytic capital for landscape-scale replication, synthesizing technology performance data, validated economic models, proven MRV protocols, market analysis, and risk mitigation into a blueprint demonstrating how beneficial biomass management shifts wildfire mitigation economics. The package provides investors and municipal bond underwriters with deployment pathways at county, multi-county, and regional scales, establishing the data foundation for infrastructure-backed financing targeting Oregon's 6.6 million acres of fire-adapted forests. The model will have replication potential across fire-prone western states.
Operational Economics and Scale Requirements: Cost-benefit analysis documenting capital requirements, operating costs, operational efficiency, and revenue potential for each technology. Economic models demonstrate how carbon revenue and end-product sales offset disposal costs, generating positive returns. Analysis identifies economies of scale thresholds, break-even points, and optimal configurations, including sensitivity analyses for supply variability, price fluctuations, and regulatory scenarios.
MRV Standards Alignment: An operational plan ensuring credit-worthy MRV protocols. Working with registry partners, we will develop standardized documentation

including GPS-tagged feedstock sourcing from fire-risk areas, production monitoring, and application verification. Protocols will be submitted for registry approval with implementation guidance enabling county operations to meet certification. This approach reduces transaction costs and enables credit aggregation across small landowners.

Market Assessment: Analysis of labor opportunities and quantification of costs, price points, and distribution pathways for carbon credits and biochar applications. Carbon market analysis documents credit pricing, transaction volumes, buyer preferences, and growth projections. End-use evaluation will analyze demand for agricultural soil amendment, ecological restoration, stormwater management, and other applications. The assessment will identify optimal technology-end use pairings maximizing climate impact and economic returns.

Quantified Climate Impact: 600-700+ acres treated through fuel reduction operations, processing an estimated 5,850–17,550 bone-dry tonnes of treatment residues (10–30 BDT/acre range). Lifecycle carbon accounting will quantify metric tonnes CO_2e permanently sequestered, providing verified climate impact metrics per tonne of feedstock and per dollar invested in beneficial byproduct management.

Risk Mitigation and Bankability: De-risking analysis addresses investor concerns including feedstock supply reliability, equipment performance, regulatory compliance, market stability, and stakeholder adoption. Performance data from treated acres across diverse ownership types demonstrates operational viability. Documentation of partnership frameworks and multi-jurisdictional coordination reduces implementation risk, enhancing project bankability.

Systems-Level Impact: Success means demonstrating that beneficial biomass management can transform wildfire mitigation from subsidy-dependent cost center into a viable practice generating measurable climate benefits and attracting private capital. The investment package enables catalytic capital deployment for landscape-scale fuel reduction acceleration across fire-prone western forests, where treatment pace lags behind need due to disposal economics. It provides the operational blueprints for regional implementation.

Scalability is a core objective. In Year 2 we will create a county-to-county template for information sharing and multi-jurisdictional coordination. Jackson County (Southern Oregon) has already expressed interest. The Western Biomass Blueprint will provide a replicable pathway across Oregon's 36 counties and into neighboring states facing identical disposal barriers. Insights from Jackson County's focus on catalytic capital structuring offer pathways to scale beyond grant funding by leveraging municipal credit to attract institutional capital.

4. Description of Existing Project