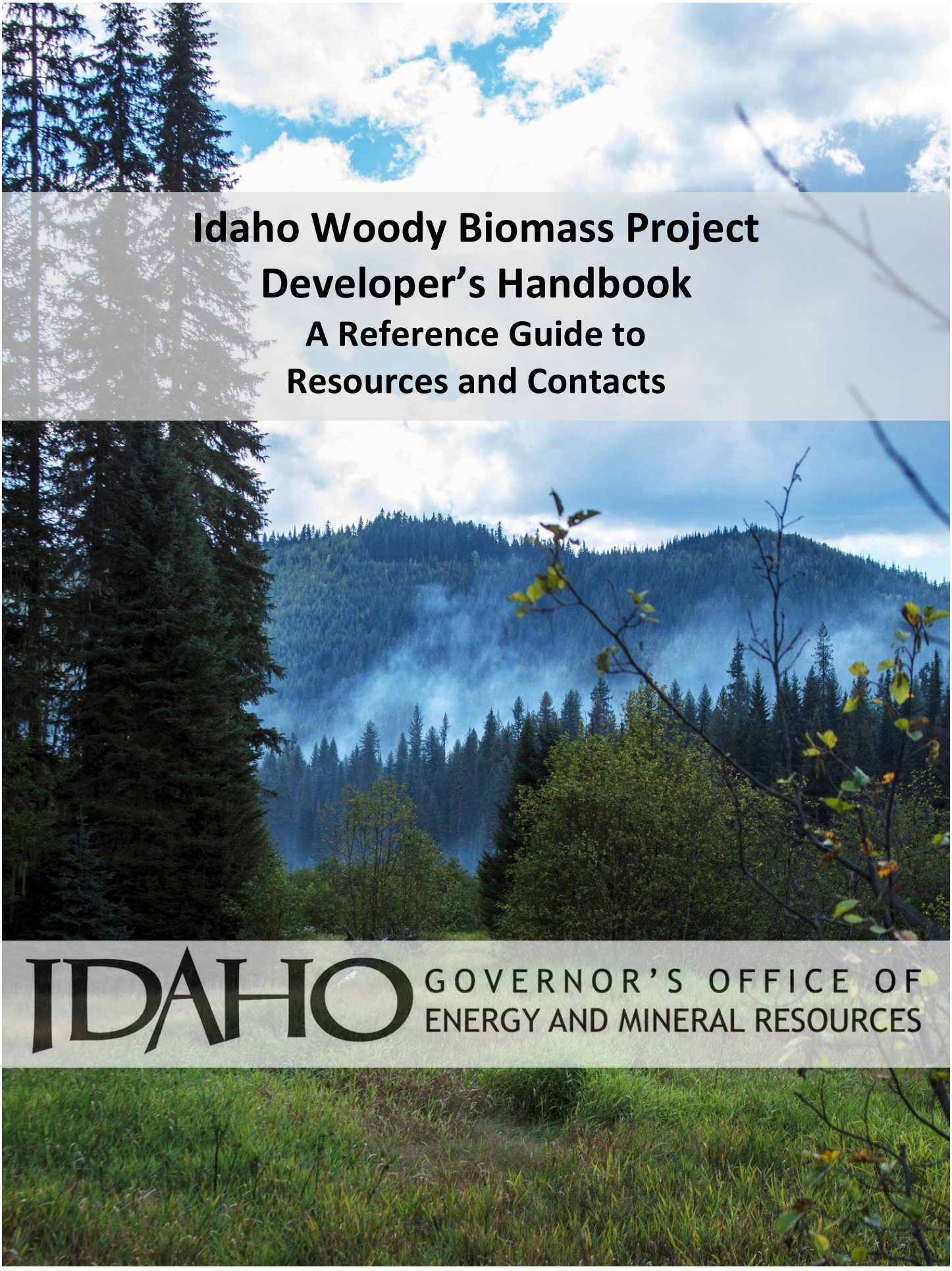

Idaho Woody Biomass Project Developer's Handbook

A Reference Guide to Resources and Contacts

IDAHO GOVERNOR'S OFFICE OF ENERGY AND MINERAL RESOURCES

About

Report prepared by Sustainable Northwest for the Idaho Statewide Wood Energy Team.

This guidebook aims to inform project developers interested in the potential for small diameter timber and biomass utilization in Idaho. The goal of this publication is to offer a checklist of questions to consider for projects in Idaho. As a publication of the Idaho Office of Energy and Mineral Resources, this guidebook complements many online resources listed throughout the text.

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Sustainable Northwest

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Cover Image U.S. Department of Agriculture

The Tower Fire in the Coleville and Idaho Panhandle National Forests in Idaho began on Aug. 11, 2015 and has consumed an estimated 26,083 acres. The fire was caused by lightning. USFS photo. https://www.flickr.com/photos/usdagov/20818232604/

Images 1-3: Wisewood Energy

Images 4-15: Marcus Kauffman, Biomass Resource Specialist, Oregon Department of Forestry

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Disclaimer

Containerized Biomass in Clearwater County, Idaho

Images: Wisewood Energy

1. An aging oil boiler system at the Pierce Community Center and rising costs of keeping the indoor pool heated prompted the Pierce Recreation District to look for opportunities to upgrade the building's infrastructure. With funding from the Forest Service Secure Rural Schools and Community Self Determination Act, the Idaho Department of Commerce, and the Northwest Farm Credit Service, the District broke ground on a new pellet-fired biomass boiler in 2016. **2.** The system includes two pellet-fired boilers and storage for about 20 tons of pellets in a single 40-foot shipping container. Installing boiler equipment and wood storage in one or two shipping containers reduces on-site construction costs and makes implementing small biomass systems more feasible for remote locations with limited access to construction services. Two-thirds of the container is used for pellet storage. Pellets will be pneumatically conveyed to the two boilers. **3.** Three hatches are located on the top of the container for easy fueling access. Most of the biomass system was assembled off-site and delivered to the facility for final interconnections.

About Biomass

Idaho has more than 16.7 million acres of non-reserved timberlands, with 72.8% managed by the U.S. Forest Service. Many of Idaho's rural communities depend on the forest products industry and see biomass utilization as a strategy to provide jobs, restore forest health, and reduce the risk of wildfire.

'Biomass' refers to many different materials. The U.S. Forest Service's definition includes "the by-product of management, restoration, and hazardous fuel reduction treatments, including trees and woody plants (i.e., limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment)." This guidebook focuses on uses for non-merchantable timber.

Who is a good candidate for biomass?

- Entrepreneurs and project developers with experience working in forest operations or manufacturing; strong local connections with industry, government, and community groups; skilled at accounting and finance, business planning and strategy, and communications and marketing.
- Institutions with a significant heating and electricity demand, including hotels, resorts, schools, hospitals, and other public facilities.
- Customers outside of natural gas service areas, or those primarily heating with propane.
- Local residents concerned about forest health and wildfire risk reduction.

Goals and Benefits of Biomass

1. Revitalize rural communities by providing local employment, cost-savings, and domestic energy options;
2. Provide useful wood products and, as a by-product, renewable energy feedstocks that help reduce air pollution, fossil fuel emissions, and landfill disposal burdens; and
3. Restore forest health, increase resilience to wildfires, and improve wildlife habitat.

Box 1. Biomass Project Resources

The U.S. Forest Service, state agencies and nonprofits have compiled a significant number of publications and resources. These are highlighted in text boxes throughout this guide.

Idaho Governor's Office of Energy and Mineral Resources' website on bioenergy, biomass & State Wood Energy Team (SWET).
Available at: https://oemr.idaho.gov/sources/re/bioenergy/

Community Biomass Manual
Volume 1: Thermal Wood Energy (2014)
Volume 2: Alaska, Where Woody Biomass Can Work (2015)
Volume 3: How Wood Energy is Revitalizing Rural Alaska (2016)
Volume 4: Enterprise Development for Integrated Wood Manufacturing (2017)
https://www.fs.fed.us/pnw/research/biomass-bioenergy.shtml

Product Types and Considerations

Examples of biomass products range from minimally processed cordwood to manufactured wood pellets. **Cordwood** – commonly split and sold as firewood – is often purchased by local buyers who heat with wood and are interested in a clean-burning, pest-free product. **Wood chips** from logs form the bulk of inputs to pulp and paper manufacturing, but also can be used as a fuel source for industrial-scale furnaces and institutional boilers. Compressed **pellets** are a manufactured- product and offer a uniform, high-energy-dense option for use in commercial and residential boilers. **Biochar** – produced in a process similar to charcoal – has emerging applications as a soil amendment for improved soil fertility and carbon sequestration. Other small-diameter products might include **posts & poles**, hops **trellises**, and **fencing**.

Is Biomass an Option?

- What is the tree species mix grown in my region and what products are suited to the physical qualities of their wood?
- What physical properties such as moisture content, ash content, and ease of storage are needed for each type of product (i.e. cordwood vs. pellets)?
- What other companies operate nearby and what products are competitors (or complements) to their products lines?
- Have you contacted local fuel suppliers to confirm quality, cost, and delivery obligations?
- How much branding and marketing are required to differentiate your product?
- How far will products ship to market and what are the transportation options?
- What manufacturing equipment and quality control are required for each product line?
- What is the availability of local workers, workforce training, and skills?

Box 2. Biomass Project Resources

Biomass Thermal Energy Council (BTEC).
Resource center, policy issues, and news
http://www.biomassthermal.org

Biomass Energy Resource Center.
55 Case Studies of Community-Scale Biomass Systems in the US, Canada, and Europe.
http://www.biomasscenter.org/

Woody Biomass Desk Guide and Toolkit.
http://www.nacdnet.org/wp-content/uploads/2016/06/Woody-Biomass-Desk-Guide-and-Toolkit.compressed.pdf

Map of existing biomass pellet facilities.
http://biomassmagazine.com/plants/map/pellet/

Biomass Products

Images M. Kauffman.

4. A deck of low-grade logs provides fuel for the Darby School District biomass system. Local forest landowners donate logs. The District pays for the haul and chips up the material - lowering their fuel costs. Darby, Montana. **5.** Bundled firewood awaits shipment at Tule Creek Forest Products in Hayfork, CA. Located in frequent-fire country, Tule Creek takes advantage of burnt and fire-salvaged logs for their raw material. **6.** An employee sorts peeled poles into bins at Parma Post and Pole in Parma, ID. Parma Post and Pole operates a highly integrated operation that includes a post and pole treatment facility, two small sawmills and a furniture plant.

7. Manufacturing scrap and forest residuals co-mingle at Biomass One in Medford, OR. The 30 MW facility combusts over 250,000 tons of material per year making it one of the largest waste to energy facilities in Oregon. **8.** Large chunks and chips of ponderosa pine fuel the Harney Community Energy system in Burns, OR. The new district energy system supplies multiple facilities with stable low-cost heat made from minimally-processed forest biomass. **9.** Energy in the palm of your hand. Small biomass heat systems often perform best with predictable moisture content, consistent size and minimal fines.

Harvesting & Resource Availability

The two greatest constraints on Idaho's forest products industry – timber supply and haul distance – apply to biomass as well. A good rule of thumb is that a project needs a 10-year supply or stewardship agreement to be commercially viable. In addition, timberlands that provide supply should be a maximum haul distance of 50-75 miles. Facility design, product lines, and operating structure also play a significant role in the viability of a project. Many developers are now considering more diverse and complex enterprises to utilize material efficiently and increase operating margins. One example is the Integrated Biomass Resources in Enterprise, Oregon. Instead of focusing on individual products, an integrated biomass campus and log sort yard is able to take mixed loads of small-diameter timber from pre-commercial or restoration thinnings and produce a variety of products according to their highest commercial value.

Supply Considerations

- What is your feedstock supply area (FSA)? If your supply is originating from public lands, are harvest projections and stewardship programs of sufficient size and length in place? How will you obtain contracts?
- Is your project appropriately sized for the available long-term woody biomass supply? Are there other agricultural or orchard operations nearby? What product substitutes might compete for biomass?
- Have you considered resource sustainability, forest planning goals, community development plans, and other social factors that will help gather broader political support and minimize conflict?

Box 3. Supply Resources

See also, the U.S. Forest Service's Forest Inventory and Analysis (FIA) report on Idaho's Forest Products Industry.
Available at: https://www.fs.fed.us/rm/pubs_series/rmrs/rb/rmrs_rb019.pdf

USDA logging costs software.
https://www.fs.usda.gov/detail/r6/landmanagement/resourcemanagement/?cid=fsbdev2_027048

Stewardship Contracting on Federal Public Lands.
Stewardship contracting case studies, programmatic review, and white papers
http://www.pinchot.org/gp/Stewardship_Contracting

Contacts

Idaho Department of Lands. Land board, leasing, forestry, and other resources related to contracting opportunities. https://www.idl.idaho.gov

United States Department of Agriculture.
Forest Service - Northern Region 1 (Northern Idaho and Montana)
Forest Service - Mountain Region 4 (Central and Southern Idaho)
http://www.idahoforests.org/foresthq.htm

Building Type & Heating Demands

Biomass as a fuel source offers a cost-competitive source of heat and power when compared to fuel oil and propane. Engineering studies of potential pilot projects across Idaho have found payback periods of 10-years or less for institutional-scale combined heat and power (CHP) applications, but projects vary greatly.

- Are you concerned about the impact of current or future energy costs on your business?
- Are you concerned about power reliability? Do you have an emergency generator?
- What is the HVAC system? Central heating or cooling plant?
- Do you anticipate a facility expansion or new construction within the next 3-5 years?
- Do you have adequate space for the equipment and for fuel storage? Does your system have a reliable source of backup heat, in case there is a disruption of fuel supply?

Generating Electricity

Idaho has some of the lowest electricity prices in the nation, with an average cost of 9.6¢/kWh for residential and 5.85¢/kWh for industrial customers in February 2017, however combined heat and power (CHP) systems can be competitive under certain circumstances. Idaho does not have a state-mandated net metering policy, but individual utilities have adopted similar policies for residential and small commercial projects, up to 25kW in size. Commercial or industrial customers may be eligible for net metering up to 100kW. Systems exceeding these caps sell power at the avoided cost rate

- What is the current and predicted energy price in your region?
- Energy demand – will the facility offset existing demand under a net metering agreement? Will the project deliver power under a Power Purchase Agreement? Have you discussed acceptable terms with the purchaser and the utility?
- Electrical transmission line capacity –Check with the local utility if pre-feasibility studies are required.

Box 4. Resources

Biomass Thermal Factsheets and case studies.
http://www.biomassthermal.org/
Idaho Energy Primer.
https://oemr.idaho.gov/wp-content/uploads/2016/08/2016.03.01_Idaho_Energy_Primer.pdf
EPA's Combined Heat and Power Partnership. (www.epa.gov/chp)
Average Electricity Prices by State.
https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a

Contacts

Rocky Mountain Power (PacifiCorp).
https://www.rockymountainpower.net/env/nmcg/nm/re.html
Avista.
https://www.avistautilities.com/services/electricity/interconnection/pages/default.aspx
Idaho Power.
Scott Gates and Patti Best 208-388-2559
netmetering@idahopower.com

Biomass Energy Technologies

Images M. Kauffman.

10. A stout augur delivers fuel at the Harney Community Energy system in Burns, Oregon. Robust conveyance equipment costs more but suffers fewer breakdowns and allows use of wider variety of fuels. **11.** Biomass boiler and emission control equipment at Integrated Biomass Resources in Wallowa, Oregon. IBR uses biomass to lowers their energy costs and raises the value of their commercial firewood products. **12.** Roll-off truck bins hold the biomass fuel supply at Harney Community Energy in Burns, Oregon. The bins are significantly less expensive than below-grade storage and can be transported to forested sites for easy loading.

13. A view into the combustion chamber at Harney Community Energy system in Burns, Oregon. The two-stage system drives of the gases and combusts them in the upper chamber, creating a very clean and efficient burn. **14.** Many larger process heat users, such as dry kilns, use steam. High pressure steam can be used for co-generation: creating electricity and heat. **15.** Boiler in a box. The wood pellet boiler at Grant County Regional Airport in John Day, Oregon is containerized to save space and speed installation.

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Permitting & Environmental Concerns

Permit requirements will vary depending on the scale of the operation – from minimal building code and electrical requirements for boiler installations to full-scale land use planning requirements for integrated biomass manufacturing facilities. Hiring an full-service engineering and planning firm can help streamline the project development process and ensure compliance.

- Comprehensive plan – has your community engaged in long-range planning or visioning to help coordinate future development?
- Zoning – have you identified a site that can accommodate industrial uses?
- Access – transportation needs include good roads, gates, and access controls.
- Where have wood products manufacturing facilities been built in the past and how can you co-locate with other businesses?
- Water use and discharge permits – will the facility require any water use or discharge permits, special waste disposal variances?
- Site assessment – have industrial facilities been located here before? Will a Phase I environmental assessment be required to screen for contamination? (i.e. for asbestos, lead paint, oil tanks)?

Air Quality

Any new woody biomass facility (large or small – thermal or electric generation) will emit certain air pollutants and will require an air quality Permit to Construct (PTC) or exemption from Idaho DEQ. The permitting process can take 3-4 months for small projects and up to 1 year for larger projects. DEQ has a streamlined permit application process and recommends any woody biomass developer to follow these initial steps:

- Read "Air Quality Permits – Applicant and DEQ Responsibilities" document located at DEQ's website: http://www.deq.idaho.gov/media/656219-applicant-deq-responsibilities.pdf
- Call the Air Quality Permitting Hotline at 1-877-5PERMIT (1.877.573.7648) to ask questions and schedule a pre-application meeting.
- Need to contract with a qualified environmental engineer for the permitting requirements of your project? https://www.deq.idaho.gov/media/1118830/hazardous-waste-comprehensive-contractors-list.pdf
- Are there air quality concerns in your region that may require additional consideration?

Box 5. Additional Resources

Idaho Division of Building Safety. https://dbs.idaho.gov/ (permitting and code requirements)

Phase I Environmental Assessment Guide. http://dnr.wi.gov/files/pdf/pubs/am/am465.pdf

Financing

Financing can be the most challenging aspect of a project. Lenders are typically requiring borrowers to purchase all-new equipment and make substantial down payments. Terms of debt beyond 15 years are rare and these may require 20-year power purchase agreements. The fuel supply, sources, contracts and financial viability of the suppliers will be substantially scrutinized and verified. However, there are number of federal tax credits and financing subsidies that can assist in the financial worthiness of the project. One significant benefit of biomass-based products is that they can utilize small-diameter logs, low-grade species or growth, and waste stream, meaning that inputs can be cheap. Ultimately, the business will run most profitably by selling a diversified bundle of low- to high-value products.

- Have you developed an investment-grade pro-forma and business plan with which to apply for financing?
- Have you identified several qualified lenders?
- Have you determined the type of financing – equity, investor-based, debt, bonds, etc.?
- Have you identified and secured the appropriate down payment – of at least 20%?
- Have you identified any potential state or federal grant programs?
- Can you utilize tax credits as part of the state or federal-based incentives package?

Box 6. Financing Resources

Wood Energy Financial Calculator, Handbooks, State Policy Database, and Useful Links. http://woodenergyproject.com

Wood-Based Entrepreneurs Toolkit. 2006-2017. Oregon Wood Innovation Center. Available at http://owic.oregonstate.edu/publications

Biomass Enterprise Economic Model. Version 2.2.0. Dec 19, 2016. http://owic.oregonstate.edu/biomass-enterprise-economic-model

U.S. Department of Energy Database of State Incentives for Renewables and Efficiency. www.dsire.gov

USDA Rural Development. Grants, loans, and technical assistance. https://www.rd.usda.gov

USDA Small Business Innovation Research Program (SBIR). https://nifa.usda.gov/program/small-business-innovation-research-program-sbir

Conclusion

Forest products have long been a central part of the state's economy, and local project developers enjoy access to expansive forest resources, skilled workers, and business-friendly policies. Biomass works for rural communities by providing local employment, cost-savings, and domestic energy options - while also creating economic incentives for forest stewardship, fire risk reduction, and improve wildlife habitat.

How many checklist questions have you answered with certainty?

Section ("go ahead" ☑ or "needs additional review" ☒)		
Product Types and Considerations		
Harvesting and Resource Availability		
Building Type & Heating Demands and Generating Electricity		
Permitting & Environmental Concerns and Air Quality		
Financing		

Additional resources listed throughout the text can help fill in technical details and offer a series of potential contacts. Reaching out to successful project developers, technology providers, and agency staff is highly recommended.

Box 7. Case Studies and Press

Case Study: Quillayute Valley School District Biomass Boiler: A story about the biomass boiler switch out project at the Forks Middle School and Forks High School in Forks, Washington. Produced in 2016.

Oregon Biomass Heat Case Studies: A showcase of five biomass heat projects that were installed in public facilities across the state of Oregon in 2010 and 2011.

Wallowa Resources. Non-profit dedicated to sustainable resource management – helped found Integrated Biomass Resources (IBR).
http://www.wallowaresources.org/index.php/what-we-do/community-development/biomass-campus

Box 8. Contacts

Idaho Governor's Office of Energy and Mineral Resources. Resources, links, and contacts helpful for biomass and renewable energy project development (https://oemr.idaho.gov)

Idaho Department of Commerce. Resources for starting a business, finding incentives and financing, understanding the tax code, property and market research. (http://commerce.idaho.gov).

University of Idaho Extension Forestry. Programming, publications, and resources on Idaho Forest Issues. (https://www.uidaho.edu/extension/forestry)

Boise National Forest - Thomas Barnett, a March 2013 graduate of the Centennial Job Corps Civilian Conservation Center, works on building slash piles to help thin unwanted forest fuels on the Boise National Forest in 2012. Recently hired by the forest, Barnett will start work as part of fire crew in May and put his newly minted wildland firefighting skills to work as he pursues a career in firefighting. *Photo Credit: U.S. Forest Service photo/ Michael Delaney Available at: https://www.flickr.com/photos/usdagov/8734946971/*