



Could biomass fuel Boardman?

Why is PGE considering biomass for Boardman?

Portland General Electric is committed to being our customers' trusted energy partner, which means we want to help meet Oregon's growing energy needs in a reliable, cost-effective and increasingly sustainable way.

As part of that focus, environmental specialists, researchers and engineers from PGE are studying a number of alternative renewable energy solutions aimed at reducing our environmental footprint. One option involves the potential to use biomass as an alternative fuel for the Boardman Power Plant, which will end its use of coal for fuel at the end of 2020.

If re-use of Boardman's boiler and generating equipment proves to be practical, the Boardman Plant could become the largest biomass-fueled

generating facility in the United States and the nation's largest single "baseload" renewable power plant. Baseload generators can be counted on for power all day, every day. The output from most renewable energy facilities is highly variable, depending – for example – on wind conditions or sunlight.

Is the company ready to move forward?

Although we've been studying this idea for several years, it is a very complex effort. Any plan to use biomass to power Boardman will require entirely new permits from the Oregon Energy Facilities Siting Council and Oregon Department of Environmental Quality, retrofits to assure the facility would continue to comply with all applicable environmental standards, and the support of the Oregon Public Utility Commission.

Under OPUC resource planning guidelines, PGE is required to consider all available resources as it develops long-term strategies to meet customers' electricity needs, and the OPUC will play a key role in determining whether a biomass option is a good choice compared to other alternatives.

PGE has also committed to work with a broad range of customer and stakeholder groups to develop and consider low-carbon resource options as part of our integrated resource planning process. Depending on market developments and the results of our ongoing research, Biomass at Boardman could eventually be competitive in this process.

What issues need to be resolved?

In addition to regulatory requirements, there are significant operational challenges to overcome before a Boardman biomass option can be seriously considered.

PGE will need as much as 8,000 tons of biomass fuel every day the generator is operating. To assure it will be cost-effective and environmentally sustainable, we also need to evaluate the feasibility and impact of acquiring and transporting fuel stock to the power plant.

There are many potential sources of biomass, so PGE has studied possible options with the help of the agricultural extension service at Oregon State University as well as researchers from Washington State University, Portland State University and the University of Washington.

PGE has also collaborated with various partner organizations, growers and vendors to see if suitable supplies of fuel can be reliably produced or procured.

(Continued on reverse)



Plant Details

Capacity

- 580 megawatts (net)

Fuel required

- 8,000 tons per day, depending on power output
- Potential biomass sources include agricultural and forest wastes

Workforce

- Nearly 100 FTE, plus maintenance and outage contractors

Could biomass fuel Boardman, continued

What sources of biomass are being considered?

PGE is evaluating many possibilities. The importance of a reliable power supply for our customers means that if a conversion moves forward we will likely need a mix of biomass sources, which could include a variety of materials suitable for processing to create fuel for Boardman. With the help of researchers at Washington State University, PGE has lab-tested dozens of potential fuel stocks, including agricultural and forest wastes.



As part of this effort, PGE also worked with the OSU agricultural extension service and local growers over several years to develop test plots of potential energy crops in the Boardman area. The company worked closely with the Oregon Department of Agriculture, the Oregon State Weed Board and Morrow and Umatilla County officials to ensure test acreage was closely monitored and a control plan was in place to limit the crop to cultivated fields in cases where invasiveness could be a concern. This effort yielded valuable information and experience, but has now been discontinued in favor of obtaining fuel from third-party vendors for biomass test-burns at the plant.

What's torrefaction?

Because the raw pellets commonly used in domestic wood stoves and co-firing power plants don't work well with Boardman's equipment, the biomass we use will need to be "torrefied" – roasted in a process similar to that used to make charcoal. The end result is a dry, brittle material that can be pulverized and used for fuel at Boardman with minimal changes to the existing plant equipment.

What's next?

PGE conducted a co-firing test burn at Boardman in November 2015, using a 1-10 ratio of torrefied biomass to coal, to confirm the fuel burns appropriately and can be delivered to the boiler using the plant's conveyors, silos, pulverizers and other equipment.

Now, we're working with an outside vendor to secure enough torrefied biomass to conduct another test burn, this time using 100 percent biomass – and no coal – to power the plant for the equivalent of a full 24 hour day. This test is expected to provide valuable information about how the boiler will perform using biomass and what emissions will be produced. If the results are promising we'll likely conduct further test burns over the next few years.

Oregon's energy future

PGE is supporting research into new technologies to expand the energy choices available to serve Oregonians. Exploring a renewable, sustainably produced and harvested, carbon-neutral biomass option is part of this effort. We are also pursuing smart grid technologies that can help improve energy efficiency and integrate variable renewable power sources into PGE's and the region's power systems.

In addition, we were part of the diverse group of organizations that joined together during the 2016 session of the Oregon Legislature to support adoption of the Oregon Clean Electricity Plan, which requires us to serve 50 percent of our customers' electricity needs with qualifying renewable resources by 2040 and eliminate coal from our customers' resource mix by 2035.



We're taking these actions because we know there is no silver bullet when it comes to Oregon's energy future. A sustainable solution will require a diverse, increasingly renewable mix of resources with different strengths – a solution that could include a renewably-powered Boardman Power Plant.



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