



Deer Lake, Washington

For the Good of the Earth

A case study in wood waste diversion toward clean, renewable energy

As local and regional sawmills have closed or have added systems to efficiently burn their wood waste for kilns or energy generation, Avista has diversified its sources of “hog fuel”, ensuring a steady stream of materials continue to generate renewable energy. One such example project was completed in Deer Lake, Washington in 2007-2008.

In this beautiful lake country, 250-acres of forest land were earmarked as a hazardous fuel reduction site to be thinned by the Washington Department of Natural Resources (DNR). DNR planned to burn slash piles on site, but after learning more about the Kettle Falls plant, they agreed to let Avista chip and remove the wood slash piles, burning them to generate renewable energy. All in all, the wood slash weighed 1,203 tons (2,406,000 pounds), more than twice what was originally calculated. If these slash piles had been burned on site, it would have emitted 404,200 pounds of carbon. Avista reduced those emissions by 398,799 pounds—emitting only 5,401 pounds.

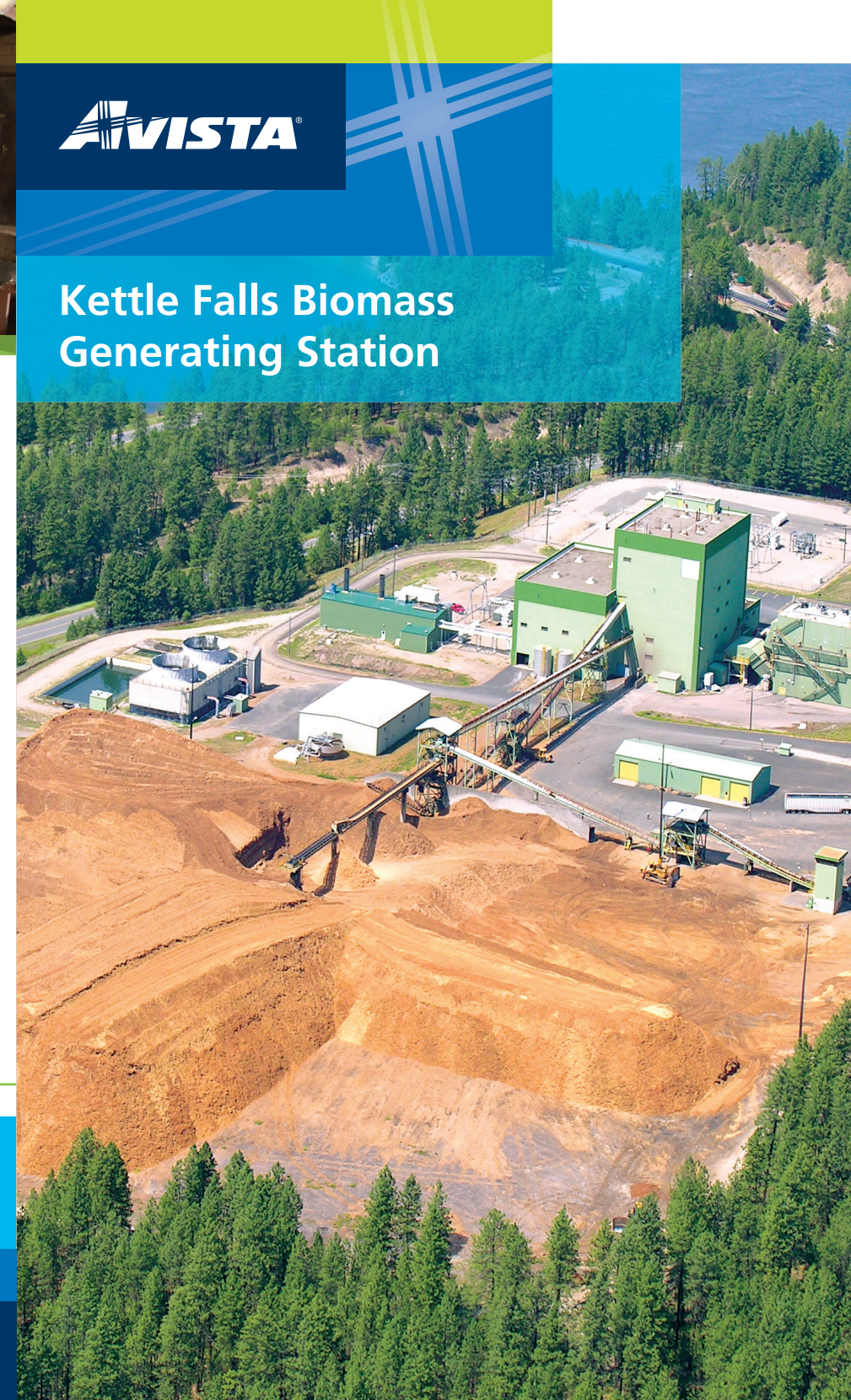
In addition, the Kettle Falls plant reduced particulate emissions by 30,252 pounds—allowing only 62.55 pounds to be emitted. This process generated electricity for 37,500 homes for almost 18 hours. Publicity around this project helped build new interest in biomass energy, resulting in five new contracts with fuel-providers for Avista. DNR was also able to benefit from the opportunity and discover better, cleaner and more efficient ways to remove wood slash. By allowing projects like Deer Lake to occur on their lands, State and Federal government can save money in fire suppression costs, reduce carbon emissions, improve forest health, create jobs and participate in the generation of renewable energy.



Kettle Falls Biomass Generating Station

Kettle Falls at a Glance

- The biomass plant generates 53 MW of electricity with additional 8 MW generated from on-site gas-fire combustion turbine. That’s enough combined energy to serve the homes of about 46,000 Avista customers.
- The plant employs about 30 full-time local Avista employees, with more than 75 additional workers employed through contractors
- An average of 50 semi-truck loads of wood waste are unloaded each day the plant is in operation. Trucks are unloaded by tipping the 30-ton trailer to a 63 degree angle as the wood waste slides into a receiving bin.



Connect With Us

Mailing Address: 1411 E. Mission, PO Box 3727

Spokane, WA 99220-3727

Toll-free: (800) 227-9187

Web Site: www.avistautilities.com

E-mail: AskAvista@AvistaUtilities.com





Legacy of Innovation

Turning wood waste from sawmills into renewable, dependable energy has been the job of Avista's Kettle Falls Generating Station since 1983. Located in Kettle Falls, Wash., the biomass plant is the first utility-owned electric generating station of its kind constructed in the United States for the sole purpose of producing electricity from wood waste.

The Kettle Falls plant was built in the heart of logging territory to take advantage of the plentiful wood waste produced by numerous sawmills. Today cleaning equipment removes

99 percent of particulates (that's the smoke you see such as from a campfire) before the exhaust leaves the plant's stack. This significantly improves the environment through reduced carbon emissions. The white plume that may be seen is created when the hot flue gas exits the stack and contacts the cold ambient air. The flue gas condenses into steam just as you can see your own breath on a cold day.

The award winning plant combined with Avista's legacy hydro power projects has contributed to Avista being one of the lowest emitters of CO₂ among the nation's energy producers, making the company among the greenest utilities in the country.



Decades ago, sawmills would burn their own waste in large wigwam burners, generating a consistent blue haze every morning before the fires heated up.

Major Plant Awards

- 2001** Association of Washington Businesses Environmental Excellence for Clean-up
- 2000** Power Plant of the Year, Power Magazine
- 1998** Outstanding Achievement Award for Conservation, U.S. Forest Service
- 1985** Environmental Excellence Award, State of Washington
- 1984** Energy Conservation Award, Power Magazine

From Biomass to Power

Energy that is stored in green plants and other organic matter is referred to as biomass. Biomass facilities burn wood, agricultural wastes and/or methane gas from landfills to spin a turbine that generates electricity. Using biomass in this way helps reduce the amount of material that goes to landfills; reduces the amount of greenhouse gases that would otherwise be released into the atmosphere; and provides economic opportunities for domestic, rural economies.



Control Room

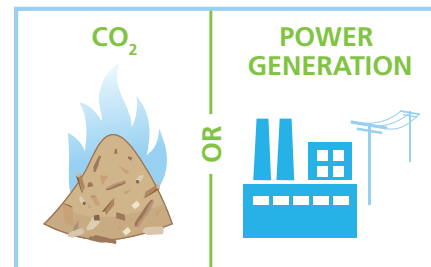
Avista's focus has centered on wood waste of various types. Wood waste – called hog fuel – is fed into a seven-story furnace/boiler and burned, creating heat. The boiler walls are made up of rows and rows of pipes filled with a closed loop of water, super-heated by the burning

hog fuel. The optimal burning temperature is 2,000 degrees, resulting in a steam temperature of 950 degrees. The steam drives a turbine which turns a generator, creating electricity.

About 1,600 tons of wood waste a day is used at the plant when it is in full operation – an amount of fuel that could easily fill over 50 fully loaded semi-trucks. As part of the process, the plant removes 99 percent of particulates from flue gas before it leaves the stack (0.052 pounds of particulate is released per ton of fuel burned).

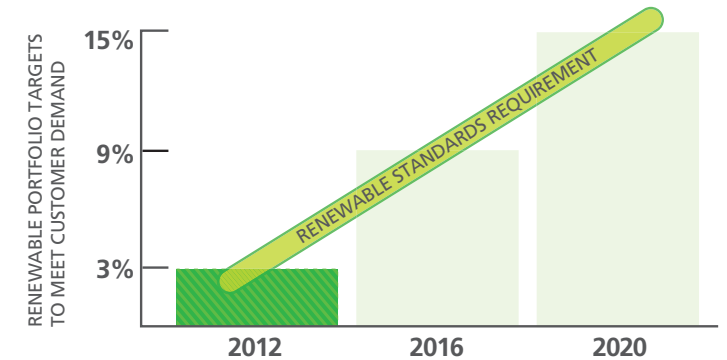
Compare

- Open burning of 1,000 tons of slash – that's leftover limbs, tops and chunks of wood
 - ▶ 335,999 estimated pounds of carbon and 25,200 pounds of particulates emitted (California Licensed Foresters Association)
- Burning 1,000 tons of wood waste at Kettle Falls plant to generate renewable energy
 - ▶ 4,490 pounds of carbon and 52 pounds of particulates emitted



Renewable Portfolio Standards

Beginning in 2016, energy generated from biomass at Kettle Falls will help Avista meet the renewable portfolio standards in Washington state's Energy Independence Act., along with upgrades to Avista's legacy hydropower projects and purchased wind power. The Act requires that electric utilities in Washington state with at least 25,000 customers use eligible renewable resources, renewable energy credits or a combination of both meet annual targets of:



Biomass is an important part of Avista's diverse energy portfolio. The recognition that the energy generated at Kettle Falls is renewable energy helps us continue to provide reliable, responsible energy while meeting mandates and being good stewards of our customers' energy dollars and the environment.