

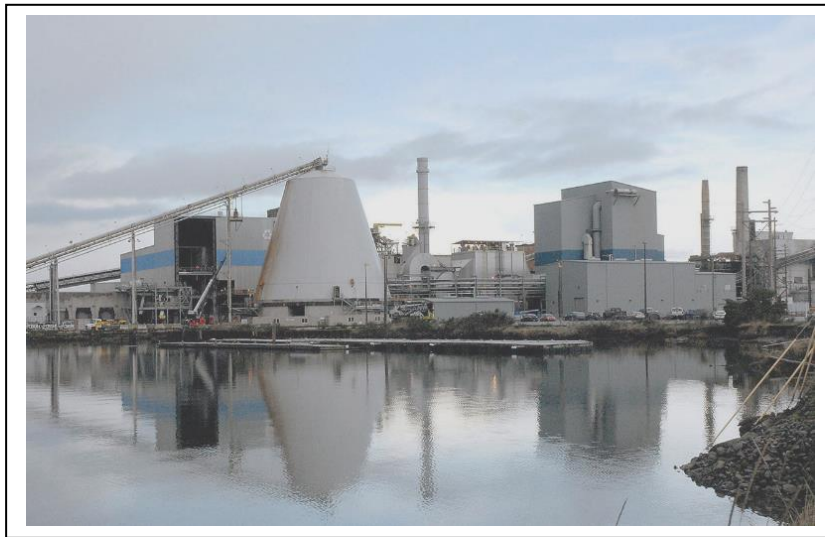


CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

McKinley Paper Mill

Port Angeles, Washington

9.5 MW Biomass-Fired CHP Project



The McKinley Paper Mill in Port Angeles, Washington.
Photo courtesy National Public Energy

Quick Facts

LOCATION: Port Angeles, Washington

MARKET SECTOR: Forest Products

FACILITY SIZE: 9.5 MW

EQUIPMENT: One 225,000 lbs/hour steam boiler with a 20 MW nameplate rated steam turbine/generator

FUEL: Mill residues

USE OF THERMAL ENERGY: Steam is available at 45-psig and 150-psig for mill processes

YEARLY ENERGY GENERATION: about 9.5 MW average output

CHP IN OPERATION SINCE: 2012 to 2017; restart in 2020

Original CHP Project Description

Daishowa Paper of Japan purchased the Port Angeles, WA integrated pulp and paper mill from Crown Zellerbach in 1988 and later merged with Nippon Paper Industries. In 2011, Nippon Paper Industries began construction of a \$91 million 20 MW biomass-fueled combined heat and power (CHP) facility. A steam boiler and auxiliaries were installed to produce up to 225,000 lbs/hour of steam at the superheated conditions of 945-psig and 900°F. Steam was routed through a 20 MW extraction/condensing steam turbine with exhaust steam available at 150 and 45-psig for mill processes. The mill produced about 840 air-dried tons of telephone directory paper, bible paper, newsprint, paper bags, butcher paper, and bright paper daily. Forest industry waste obtained from local timber operations was used as fuel, including slash, thinnings, tree tops and limbs, and mill generated bark and sawdust. Fuel moisture content ranged from 45% to 55%.

CHP Re-emerges

Due to intense competition and dwindling demand for its paper products, Nippon Paper closed the Port Angeles mill in April, 2017, putting 150 employees out of work. The biomass powerplant operated a few more months. The mill, including the CHP facility, was later sold for \$20.6 million to McKinley Paper, a subsidiary of the Mexican-owned paper company Bio Pappel. McKinley Paper has since spent approximately \$6.1 million for site improvements to retool the plant and to obtain new air quality and city permits. Upgrades include a new pulper and two new paper machines that will use 100% recycled cardboard to produce up to 250,000 tons per year of corrugated fluting for box liners as well as heavyweight bag-grades of brown paper. The recycle pulp plant will no longer bleach pulp, eliminating the discharge of organochlorines into the environment. Electrical energy loads at the recycle pulp mill will decrease significantly to approximately 30 MW average compared to the 54 MW average consumed by Nippon Paper.

Focus on Value-Added Products

When repurposing the mill from its original purpose—making paper for telephone books—to its new purpose of using recycled cardboard for the production of boxing/shipping materials, McKinley Paper aims to reduce energy and water consumption and landfill disposal in the region. The company's sustainability model is to produce paper without cutting trees and thus become a net capturer of CO₂. The CHP system will continue to produce green energy while the plant is modified to improve efficiency (including freight transport), minimize costs, and convert its paper production into more value-added products. Electrical generation from the CHP project is likely to be sold to utility companies as "green power," assuming power marketing agreements are reached.



The recycle mill occupies a 16.2 acre site in Port Angeles

Biomass Power System Details

CHP assets that were acquired include a fuel management area, steam boiler, the steam turbine/generator, condenser, electrical substation and transformer, process controls, and emissions control systems. Because of the high rainfall in the Northwest, a silo is used to store up to 1,100 tons of biomass. Isolating the biomass feedstock from the weather provides a more consistent and uniform fuel for both handling and combustion purposes. Biomass is metered and then moved by screw conveyors to air-swept distributors that place the fuel onto a vibrating grate system. The distributors are designed to promote efficient combustion by maintaining a consistent fuel and ash bed. Steam boiler efficiency is boosted as it is equipped with a combustion air preheater and a feedwater economizer. Both primary and secondary combustion air is pre-heated by the boiler's exhaust gas to a temperature of 509°F.

Emissions Control Requirements

The original FSE Energy steam boiler is designed with extended residence time in the combustion chamber to allow for staged combustion, which reduces carbon monoxide and particulate matter emissions. A post-combustion ammonia-based injection system allows for selective non-catalytic reduction of NO_x. A four-cell electrostatic precipitator is installed to ensure compliance with particulate emissions standards.

Jobs and Economic Development

The CHP system returned to operation in March 2020 at a reduced power output of 9.5 MW. The CHP system improves the bottom line for its thermal host and contributes to the local economy. The City of Port Angeles received approximately \$500,000 annually in utility taxes and electric fees when Nippon Paper operated the mill. When the mill is restarted, it will again generate a substantial amount of city revenue. The mill will also benefit the local economy through providing about 150 jobs, with wages ranging from \$15.10 for entry-level labor positions to \$38 per hour for specialized journeyman jobs.

"I'm hoping people will like what they are doing... they are making the cogeneration boiler more efficient and reducing the amount of effluent in the wastewater pond..." "They are doing some really good things in terms of using all recycled materials."

— Fran McNair, Olympic Region Clean Air Agency (ORCAA)

For More Information

U.S. DOE Northwest TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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Date produced: 2020

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