1994 Washington State Directory of Biomass Energy Facilities

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1994 Washington State Directory of Biomass Energy Facilities

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Introduction

This is the fourth edition of the Washington Directory of Biomass Energy Facilities, the first edition was published in 1987. The purpose of this directory is to provide a listing of and basic information about known biomass producers and users within the state to help demonstrate the importance of biomass energy in fueling our state's energy needs. In 1992 (latest statistical year), estimates show that the industrial sector in Washington consumed nearly 128 trillion Btu of electricity, nearly 49.5 trillion Btu of petroleum, over 82.2 trillion Btu of natural gas, and over 4.2 trillion Btu of coal. Facilities listed in this directory generated approximately 114 trillion Btu of biomass energy -- 93 trillion were consumed from waste wood and spent chemicals. In the total industrial energy picture, wood residues and chemical cooking liquors placed second only to electricity.

This directory is divided into four main sections biogas production, biomass combustion, ethanol production, and solid fuel processing facilities. Each section contains maps and tables summarizing the information for each type of biomass. Provided in the back of the directory for reference are a conversion table, a table of abbreviations, a glossary, and an index.

Chapter 1 deals with biogas production from both landfills and sewage treatment plants in the state. Biogas produced from garbage and sewage can be scrubbed and used to generate electricity. At the present time, biogas collected at landfills is being flared on-site, however four landfills are investigating the feasibility of gas recovery for energy. Landfill biogas accounted for approximately 6 percent of the total biomass reported. Sewage treatment biogas accounted for 0.6 percent. Biogas generated from sewage treatment plants is primarily used for space and process heat, only one facility presently scrubs and sells methane. Together, landfill and sewage treatment plant biogas represented over 6.6 percent of the total biomass reported.

Chapter 2 provides information on biomass combustion facilities in the state. It is divided into chemical recovery, municipal solid waste and wood combustion facilities.

Wood combustion facilities use hog fuel (waste wood such as sawdust, planer shavings, bark, stumps, brush, left over wood chunks, wood pellets, clean urban wood waste, etc.) to generate power for their industrial needs. Much of hog fuel is generated by lumber mills and pulp and paper mills as a result of the manufacturing processes, some is generated from waste wood processors and purchased. Wood combustion facilities generated the greatest amount of energy, accounting for 51 percent of the total biomass reported.

Spent chemicals (cooking liquors) and lignins have high Btu value and are generated as a by-product of the pulp and paper mills. They are recovered from the digesters in the pulp making process and burned in recovery furnaces to produce steam. Their reuse helps to maintain environmental cleanliness. They are the second largest source of biomass energy reported in this directory, accounting for 31 percent of the total.

As landfill seepage threatens our water supply and pollutes our soils, municipal solid waste combustion is becoming a more environmentally appropriate way to deal with trash that is not recycled. Waste-to-energy plants reduce the amount of garbage sent to landfills and generate electricity to supply thousands of homes. Energy supplied from municipal solid waste combustion accounted for 4 percent of the total reported.

The third Chapter focuses on ethanol production. Ethanol fuels have been used as fuel extenders for the past ten years. Since the fall of 1992, ethanol has been used as a fuel additive to help reduce carbon monoxide emissions from motor vehicles. Ethanol accounts for .6 percent of biomass resources reported in this directory.

Listed in Chapter 4 are solid fuel processing facilities. We have included two categories, waste wood processors and wood pellet processors. The majority of this waste wood comes from clean construction debris and land clearing from construction sites. It is processed into hog fuel and includes stumps, bark, etc. Waste wood processing accounted for 6 percent of the total reported. Wood pellets are generated primarily from waste generated from sawmills. They accounted for nearly 1.5 percent of the total reported.

Summary

In 1992, Washington's industrial sector consumed nearly 357 trillion Btu (British thermal units) of energy, of that, nearly 128 trillion Btu were from electricity; close to 136 trillion Btu was from fossil fuel -- natural gas, petroleum, and coal; and 93 trillion was from biomass (wood residues and recovered chemical cooking liquors). Biomass supplied close to 41 percent of the industrial fuel used in Washington State. Table 1 shows the gross energy equivalent of the average plant output for facilities listed in this directory -- together they produced approximately 114 trillion Btu. The greatest portion produced and used by industry was from wood residues and chemical recovery (93 trillion Btu). Table 2, shows the megawatt capacity and average megawatt output of biomass energy facilities. When combined, biomass facilities have capacity to supply over 309 megawatts of electricity and are generating over 241 average megawatts from biomass -- that is a sizable contribution towards meeting our state's energy needs.

Table 1

Washington State Biomass Energy Production Comparison for 1987, 1989, 1991, and 1993

Type of Biomass	1987 Billion Btu	1989 Billion Btu	1991 Billion Btu	1993 Billion Btu	Percent of Total 1993
Ethanol Production	600	798	939	672	0.6%
Landfill Biogas Production	NA	NA	5,071	6,488	6%
Municipal Solid Waste Combustion	300	1,845	4,624	4,285	4%
Sewage Treatment Biogas Production	600	810	648	701	0.6%
Spent Chemical Cooking Liquors	NA	NA	34,506	35,148	31%
Waste Wood Combustion	57,496	58,834	58,935	58,218	51%
Waste Wood Processing	NA	NA	7,326	7,148	6%
Wood Pellet Processing	<1	2,321	2,510	1,735	1.5%
Total	58,996	64,608	114,559	114,395	

Table 2

1993 Electric Capacity and Average Output of Biomass Energy Facilities

Type of Biomass	Megawatt Capacity	Average Megawatt Output
Municipal Solid Waste Combustion		
Recomp of Washington	2.0	2.0
Skagit County Resource Recovery	2.5	2.5
Spokane Trash-to-Energy	26.0	26.0
Tacoma Steam Plant No. 2*	43.0	29.0
Sub Total	73.5	59.5
Waste Wood Combustion		
Longview Fibre Co.	30.0	13.0
Omak Wood Products	7.5	7.5
Port Townsend Paper	18.5	6.1
Rayonier, Inc.	12.0	1.6
Vaagen Brothers -- Colville	4.0	4.0
Weyerhaeuser Co. -- Cosmopolis	15.0	11.0
Weyerhaeuser Co. -- Longview	30.0	30.0
Washington Water Power Company	48.0	50.3
Sub Total	165.0	123.5
Sewage Treatment Plants		
Metro West Point	1.3	1.1
Spokane	.3	.3
Sub Total	1.6	1.4
Spent Chemical Cooking Liquors		
Longview Fibre Co.	60.0	48.0
Weyerhaeuser Paper Co. -- Longview	8.9	8.9
Sub Total	68.9	56.9
Grand Total	309	241.3

*Facility uses a combination of refuse derived fuel, hog fuel and coal to generate electricity.

Figure 1 shows the names of counties in the state of Washington. Please refer to this map when necessary for the location of counties.

Figure 1
Washington State Counties

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Chapter 1

Biogas Production

Landfills

Sewage Treatment

Landfills

Figure 2

1993 Washington State Landfill Biogas Output

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 3
1993 Washington State Landfill Biogas Production
Sorted by Estimated Volume of Biogas

Landfill	County	Estimated Vol. of Biogas (million cubic feet/year)	Gross Energy Equivalent ¹ (million Btu/year)	End Use
Cedar Hills	King	3,784	2,270,400	Flared, investigating gas recovery
Cathcart	Snohomish	1,708	1,024,800	Flared
Tacoma	Pierce	1,261	756,600	Flared, investigating gas recovery
Kent Highlands	King	867	520,744	Flared, investigating gas recovery
Hawks Prairie	Thurston	862	517,200	Flared
Leichener	Clark	683	409,800	Flared
Olympic View	Kitsap	526	315,600	Flared
Midway	King	372	223,200	Flared
Cowlitz County	Cowlitz	263	157,800	Flared
Centralia	Lewis	146	87,600	Flared
Hansville	Kitsap	116	69,379	Flared
Hobart	King	84	50,458	Flared
Cedarville	Whatcom	47	28,200	Flared, investigating gas recovery
Aberdeen	Grays Harbor	23 ⁴	13,786	Flared
Mason County	Mason	21 ²	12,384	Flared
Hidden Valley	Pierce	18	11,038	Flared
Roosevelt Regional	Klickitat	16 ³	9,600	Flared
Purdy	Pierce	16	9,461	Flared
Hoquim	Grays Harbor	NA	NA	Flared
Enumclaw	King	NA	NA	Flared
Total		10,813	6,488,050	

¹ Energy Equivalent based of 600 Btu per standard cubic foot of Landfill Gas

² Where in place tonnage was not given, WSEO estimated Depth (feet) x area (acres) x 645 tons per acre = tons of waste, the tons of waste was then multiplied by 80 scf/ton (low case annual LFG production)

³ Where in place tonnage was given, WSEO estimated 80 scf/ton (low case annual LFG production)

⁴ 800 pounds per cubic yard of refuse

Landfills

Aberdeen Landfill

4201 Olympic Hwy. E.
Aberdeen, WA 98520
Phone: (206) 533-1251
Contact Person: Delroy Cox

Start of operation: 1968
Closure date: 1993
Area (total acres): 27
Acres banked:
In place tonnage: 718 thousand cubic yards
Average depth (feet): 55
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): Unknown
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Cathcart Landfill

Public Works, Solid Waste Div.
2930 Wetmore Ave.
Everett, WA 98201
Phone: (206) 388-6495
Contact Person: Ken Moser

Start of operation: 1980, flare 1989
Closure date: 1992
Area (total acres): 200 acres
Acres banked: 56
In place tonnage: 3,258,989
Average depth (feet): 110
Annual waste vol. (tons): None
Vol. of gas flared (scf/min.): 3,250
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Cedar Hills

King County Solid Waste Div.
400 Yesler Way, Room 600
Seattle, WA 98104
Phone: (206) 296-4437
Contact Person: Ed Henderson

Start of operation: 1964
Closure date: 2022
(continued on next column)

Area (total acres): 900
Acres banked: 200
In place tonnage: 20.031 million tons
Average depth (feet): 150
Annual waste vol. (tons): 900,000 +/-
Vol. of gas flared (scf/min.): 7,200
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None
* Note: Investigating gas recovery

Cedarville Landfill

Whatcom Co. Solid Waste Division
5256 NW Drive
Bellingham, WA 98226
Phone: (206) 676-7695
Contact Person: Bob Jurica

Start of operation: 1981
Closure date: 1990
Area (total acres): 9
Acres banked:
In place tonnage: 250,000 tons
Average depth (feet): 50
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 80 - 100.
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None
*Note: Investigating gas recovery

Centralia Landfill

P.O. Box 609
Centralia, WA 98531
Phone: (206) 736-1954
Contact Person: Lee First

Start of operation: 1958, flare fall '90
Closure date: 1993, 4/94 summer cap
Area (total acres): 80
Acres banked:
In place tonnage:
Average depth (feet): 25
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 278 avg @ 45% methane
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Cowlitz County Landfill

Public Works Department
207 4th Ave. N.
Kelso, WA 98626
Phone: (206) 577-3125
Contact Person: Don Olson

Start of operation: 1975
Closure date: 1992 (site "A" closed,
site "B" continues to operate)
Area (total acres): 50
Acres banked: 35 acres
In place tonnage: 950 thousand tons
Average depth (feet): 25
Annual waste vol. (tons): N/A for site "A"
Vol. of gas flared (scf/min.): 500 at 55% methane
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Enumclaw Landfill

King County Solid Waste Div.
400 Yesler Way, Room 600
Seattle, WA 98104
Phone: (206) 296-4437
Contact Person: Ed Henderson

Start of operation: 1958
Closure date: 1993
Area (total acres): 25
Acres banked:
In place tonnage: Unknown
Average depth (feet): 50
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 750 @ 8 hrs/day
39 % methane
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Hansville Landfill

614 Division Street
Port Orchard, WA 98366
Phone: (206) 876-7121
Contact Person: Paul Dour

Start of operation: 1962
Closure date: 1989
Area (total acres): 60
Acres banked:

(continued on next column)

In place tonnage: 1 million cubic yards
Average depth (feet): 40
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 220
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Hawks Prairie Landfill

Dept. of Public Works
2000 Lakeridge Dr. SW
Olympia, WA 98502
Phone: (206) 786-5136
Contact Person: Jeff Størnhaugen

Start of operation:
Closure date: 1997
Area (total acres): 110
Acres banked: Closed/unlined areas 50 acres,
active area 15 acres, future /reserve 20 acres,
buffer areas 25 acres
In place tonnage:
Average depth (feet): 60
Annual waste vol. (tons): 117,879
Vol. of gas flared (scf/min.): 1,640
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None
Note: Feasibility of energy recovery being investigated
in 1994.

Hidden Valley Landfill

P.O. Box 73057
17925 Meridian St. E.
Puyallup, WA 98373
Phone: (206) 847-7555
Contact Person: Jim Crandall

Start of operation: 1959
Closure date: March 1996 (approximately)
Area (total acres): 72
Acres banked: 65
In place tonnage: Unknown
Average depth (feet): 110
Annual waste vol. (tons): 430,000 (approximately)
Vol. of gas flared (scf/min.): 35
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Hobart Landfill

King County Solid Waste Div.
400 Yesler Way, Room 600
Seattle, WA 98104
Phone: (206) 296-4422
Contact Person: Victor O. Okereke

Start of operation: 1958
Closure date: 1994
Area (total acres): 35
Acres banked: 15 acres (area w/final cover)
In place tonnage: Not available
Average depth (feet): 60
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 160 currently, 500 in '94
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Hoquiam Landfill

609 8th Street
Hoquiam, WA 98550
Phone: (206) 532-5700
Contact Person: Fran Eide

Start of operation: 1976
Closure date: 1990
Area (total acres): 50
Acres banked:
In place tonnage: Unknown
Average depth (feet):
Annual waste vol. (tons): None
Vol. of gas flared (scf/min.): Unknown
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Kent Highlands

505 Dexter Horton Bldg.
710 Second Avenue
Seattle, WA 98104-1713
Phone: (206) 684-7686
Contact Person: Martha Burke

Start of operation: 1968
Closure date: 1986
(continued on next column)

Area (total acres): 100
Acres banked: 60
In place tonnage: 5 million tons
Average depth (feet): 95
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 1,650
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None
*Note: Investigating gas recovery

Leichner Landfill

9411 NE 94th
Vancouver, WA 98662
Phone: (206) 892-5370
Contact Person: Jay McCuistion

Start of operation: 1939
Closure date: 1991
Area (total acres): 80
Acres banked: 80 acres
In place tonnage: 5.75 million tons
Average depth (feet): 38
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 1,300
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Mason County Landfill

Dept. of Community Development
P.O. Box 578
Shelton, WA 98584
Phone: (206) 427-5271
Contact Person: Paul Johnston

Start of operation: 1971
Closure date: 1993
Area (total acres): 8
Acres banked:
In place tonnage: Unknown
Average depth (feet): 50
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): Unknown
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Midway Landfill

505 Dexter Horton Bldg.
710 Second Avenue
Seattle, WA 98104-1713
Phone: (206) 684-7693
Contact Person: Jeff Neuner

Start of operation: 1966
Closure date: 1983 waste - 1991 construction
Area (total acres): 60
Acres banked: 40
In place tonnage: 3 million tons
Average depth (feet): 115
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 707
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Olympic View Sanitary Landfill

512 Sheldon Blvd.
Bremerton, WA 98310
Phone: (206) 674-2331
Contact Person: Lee Wilson

Start of operation: 1960
Closure date: 2004
Area (total acres): 250
Acres banked: 65
In place tonnage: Unknown
Average depth (feet): 100
Annual waste vol. (tons): 200,000
Vol. of gas flared (scf/min.): 1,000
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Purdy Landfill

P.O. Box 73057
17925 Meridian St. E.
Puyallup, WA 98373
Phone: (206) 847-7555
Contact Person: Jim Crandall

Start of operation: 1956
Closure date: 1990

(continued on next column)

Area (total acres): 24
Acres banked: 11
In place tonnage: Unknown
Average depth (feet): 80
Annual waste vol. (tons):
Vol. of gas flared (scf/min.): 30
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Roosevelt Regional Landfill

P.O. Box 358
Roosevelt, WA 99356
Phone: (509) 374-5641
Contact Person: Rick Morck

Start of operation: 1990
Closure date: 2030
Area (total acres): 915
Acres banked: 72
In place tonnage: 200 thousand tons
Average depth (feet): 180
Annual waste vol. (tons): 1.5 million
Vol. of gas flared (scf/min.): None
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Tacoma Landfill

3510 S. Mullen
Tacoma, WA 98409
Phone: (206) 591-5543
Contact Person: Walt Forslund

Start of operation: 1960
Closure date: 2014
Area (total acres): 240
Acres banked: 130
In place tonnage: 5 million
Average depth (feet): 50
Annual waste vol. (tons): 55,300
Vol. of gas flared (scf/min.): 2,400 @ 41 % methane
Vol. of gas used to gen. electricity on-site: None
Vol. of gas scrubbed & sold to gas utility: None

Landfill Biogas Production Listing Changes from 1992 Edition

No new facilities added or deleted.

Sewage Treatment

Figure 3

1993 Washington State Sewage Treatment Plant Biogas

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 4

1993 Washington State Sewage Treatment Plant Biogas Production

Sorted by Biogas Output

Sewage Treatment Plant	County	Average Biogas Output ¹ (Million SCF/Year)	Gross Energy Equivalent (Million Btu/Year)	End Use
Metro West Point	King	300	180,000	Space & process heat, electricity
Renton	King	185	111,000	Pipeline gas
Tacoma STP-1	Pierce	120	72,000	Space & process heat
Spokane	Spokane	80	48,000	Space & process heat, air conditioning
Port Orchard	Kitsap	55	33,000	Space & process heat
Chambers Creek	Pierce	52	31,200	Space & process heat
LOTT	Thurston	42	25,200	Process heat, back-up electricity
Newport	Pend Oreille	30	18,000	Process heat
Des Moines Creek	King	22	13,200	Space & process heat
Central Kitsap	Kitsap	23	13,800	Space & process heat
Ellensburg	Kittitas	21	12,600	Process heat
Pasco	Franklin	18	10,800	Space & process heat
Metro Alki	King	15	9,000	Space & process heat
Salmon Creek	King	15	9,000	Space & process heat, excess flared
Miller Creek	King	15	9,000	Space & process heat, excess flared
Wenatchee	Chelan	15	9,000	Process heat
Mount Vernon	Skagit	15	9,000	Space & process heat
Redondo	King	14	8,400	Space & process heat
Bremerton	Kitsap	14 ²	8,400	Process heat, back-up electricity
Chehalis	Lewis	13	7,800	Process heat
Puyallup	Pierce	10	6,000	Space & process heat
Walla Walla	Walla Walla	9	5,400	Process heat
Chelan	Chelan	8	4,800	Flared
Pullman	Whitman	7	4,200	Space and process heat
Oak Harbor	Island	8	4,800	Process heat
Prosser	Benton	8	4,800	Process heat
Rainier State School	Pierce	8	4,800	Process heat
Douglas County	Douglas	8	4,800	Process heat
Richland	Benton	8	4,800	Space & process heat
Sunnyside	Yakima	8	4,800	Process heat
Toppenish	Yakima	8	4,800	Process heat
Centralia	Lewis	5	3,000	Space & process heat, excess flared
Port Angeles	Clallam	5	3,000	Process heat
Tacoma STP-3	Pierce	2	1,200	Space & process heat
College Place	Walla Walla	2	1,200	Space & process heat
Dayton	Columbia	1	600	Flared
Total		1,169	701,400	

¹Energy equivalent based on 600 Btu per standard cubic foot of biogas²Calculated by WSEO

Sewage Treatment Plants

Bremerton Wastewater Treatment Plant

1600 Oyster Bay Ave.
Bremerton, WA 98310
Phone: (206) 479-4646
Contact: Tom Warner

Plant design capacity:

Sewage (MGD): 15
Electrical generation (MW): 140 kW

Average plant output:

Biogas (scf):
Electrical generation (MW): 70 kWh

End use(s): Process heat, heating digesters, standby power

Central Kitsap Wastewater Treatment Plant

12350 State Highway 303 NE
Poulsbo, WA 98370
Phone: (206) 876-7197
Contact: Ralph DeClements

Plant design capacity:

Sewage (MGD): 4.8
Electrical generation (MW): None

Average plant output:

Biogas (scf): 22.6673 million per year
Electrical generation (MW): None

End use(s): Space and process heat

Centralia Wastewater Treatment Plant

1401 W Mellen Street
Centralia, WA 98531
Phone: (206) 736-2853
Contact: Denise Lahmann, Administrator, or Ron Davis, Manager

Plant design capacity:

Sewage (MGD): 4.3
Electrical generation (MW): Standby generator 250 kW
three phase, 277/480 volts

Average plant output:

Biogas (standard cubic feet): 5 million per year (anaerobic digestion)

Electrical generation (MW): None

End use(s): Space and process heat; excess flared in summer.

Chambers Creek Wastewater Treatment Plant

10311 Chamber Creek Road W.
Tacoma, WA 98467-1040
Phone: (206) 565-3013
Contact: Larry McCaffrey

Plant design capacity:

Sewage (MGD): 18
Electrical generation (MW): None

Average plant output: 12.16 MGD

Biogas (scf): 51.5 million per year
Electrical generation (MW): None

End use(s): Space and process heat, heat digesters

Chehalis Wastewater Treatment Plant

1191 NW Shoreline Drive
Chehalis, WA 98532
Phone: (206) 748-7187
Contact: Bill Pounds

Plant design capacity:

Sewage (MGD): 4.0 (average dry weather)
Electrical generation (MW): None

Average plant output:

Biogas (scf): Less than 15 million per year
Electrical generation (MW): None

End use(s): Process heat

Chelan Wastewater Treatment Plant

S Robinson Street
Chelan, WA 98816
Phone: (509) 682-2211
Contact: Howard Merchant

Plant design capacity:

Sewage (MGD): 1.2 (new R.B.C. plant)

Electrical generation (MW): None

Average plant output: Unknown

Biogas (scf): Less than 10 million per year

Electrical generation (MW): None

End use(s): Flared

College Place Wastewater Treatment Plant

1880 Owens Rd.
Walla Walla, WA 99362-8115
Phone: (509) 525-0510, ext. 33
Contact: Al Rader

Plant design capacity:

Sewage (MGD): 1 dry, 2.55 wet

Electrical generation (MW): 48 k Portable propane generator (back-up)

Average plant output:

Biogas (scf): 3.3

Electrical generation (MW): None

End use(s): Boiler, heat building

Dayton Wastewater Treatment Plant

Route 1, Box 19A
Dayton, WA 99328
Phone: (509) 382-2937
Contact: Charles D. Lowe

Plant design capacity:

Sewage (MGD): 0.60

Electrical generation (MW): None

Average plant output:

Biogas (scf): 886,220 per year

Electrical generation (MW): None

End use(s): flared

Des Moines Creek Wastewater Treatment Plant

P.O. Box 3487
Kent, WA 98032-0209
Phone: (206) 824-2760
Contact: Clint Read, Superintendent

Plant design capacity:

Sewage (MGD): 6.0

Electrical generation (MW): None

Average plant output:

Biogas (scf): 21.713 million

Electrical generation (MW): None

End use(s): Space and process heat

Douglas County Sewer District

P.O. Box 7129
East Wenatchee, WA 98801
Phone: (509) 884-2484
Contact: Roger C. Ray

Plant design capacity:

Sewage (MGD): 1.6

Electrical generation (MW): None

Average plant output: 1 MGD

Biogas (scf): Less than 10 million per year

Electrical generation (MW): None

End use(s): Process heat

Ellensburg Wastewater Treatment Plant

Route 2, Box 13
Ellensburg, WA 98926
Phone: (509) 962-7277
Contact: Rick Bollinger

Plant design capacity:

Sewage (MGD): 15

Electrical generation (MW): None

Average plant output:

Biogas (scf): 21 million per year

Electrical generation (MW): None

End use(s): Process heat and digester mixing

LOTT Wastewater Treatment Plant

500 N Adams Street
Olympia, WA 98507
Phone: (206) 753-8386
Contact: Tom Kolby

Plant design capacity:

Sewage (MGD): 22

Electrical generation (MW): Back-up

Average plant output:

Biogas (scf): 42.3 million per year

Electrical generation (MW): 1,726,807 kWh

End use(s): Power generation and process heat

Metro Alki Wastewater Treatment Plant

3380 Beach Drive SW
Seattle, WA 98116
Phone: (206) 684-2412
Contact: Dick Finger

Plant design capacity:

Sewage (MGD): 15

Electrical generation (MW): None

Average plant output:

Biogas (scf): 40,000 per day, 14.6 million per year

Electrical generation (MW): None

End use(s): Space and process heat

Metro West Point Wastewater Treatment Plant

1400 Utah St. W.
Seattle, WA 98199
Phone: (206) 684-1807
Contact: Gordon Gabrielson

Plant design capacity:

Sewage (MGD): 125

Electrical generation (MW): Gas production is no longer adequate to power three 1.3 MW generator. Gas production should be adequate again in 1996.

Average plant output:

Biogas (scf): 300 million/year.

Electrical generation (MW): 1.1

End use(s): Space and process heat, electricity, equipment drives. Biogas also fuels influent pump engine = 500 kW

**Miller Creek Sewage Treatment Plant
Southwest Suburban Sewer District**

1015 SW 174th Street
Seattle, WA 98166
Phone: (206) 244-2202
Contact: Clay Long

Plant design capacity:

Sewage (MGD): 6.4 (peak month)

Electrical generation (MW): None

Average plant output:

Biogas (scf): 50,000/day, 1.6 million per mo.

Electrical generation (MW): None

End use(s): Space and process heat, excess flared off

Mount Vernon Sewer Department

1401 Britt Road
Mount Vernon, WA 98273
Phone: (206) 336-6219
Contact: Chuck Saunders

Plant design capacity:

Sewage (MGD): 4 average wet weather flow

Electrical generation (MW): None

Average plant output:

Biogas (scf): 15 million/year

Electrical generation (MW): None

End use(s): Space heat and process heat

Newport Wastewater Treatment Plant

S. 200 Washington Street
Newport, WA 99156
Phone: (509) 447-5611
Contact: Raymond D. King

Plant design capacity:

Sewage (MGD): 0.5

Electrical generation (MW): None

Average plant output:

Biogas (scf): 1.2 million per year

Electrical generation (MW): None

End use(s): Process heat

Oak Harbor Wastewater Treatment Plant

3075 - 300 Avenue W
Oak Harbor, WA 98277
Phone: (206) 679-5551, ext. 230
Contact: Jim Croft

Plant design capacity:

Sewage (MGD): .7

Electrical generation (MW): None

Average plant output:

Biogas (scf): 1.4 million per year

Electrical generation (MW): None

End use(s): Process heating. Digested sludge is used as fertilizer.

Pasco Wastewater Treatment Plant

1015 S. Grey Street
P.O. Box 293
Pasco, WA 99301
Phone: (509) 545-3463
Contact: Harold Posthuma

Plant design capacity:

Sewage (MGD): 4.25

Electrical generation (MW): None

Average plant output:

Biogas (scf): 50,000 per day

Electrical generation (MW): None

End use(s): Space and process heat

Port Angeles Wastewater Treatment Plant

1509 E Columbia Street
Port Angeles, WA 98362
Phone: (206) 451-0411, ext. 165
Contact: Jim Abernathy

Plant design capacity:

Sewage (MGD): 3.2

Electrical generation (MW): None

Average plant output:

Biogas (scf): 6.2 million per year

Electrical generation (MW): None

End use(s): Process heat

Port Orchard/Kitsap County Sewer District No.5

1165 Beach Drive
Port Orchard, WA 98366
Phone: (206) 895-2440
Contact: Douglas W. Martin, Plant Manager

Plant design capacity:

Sewage (MGD): 2.8

Electrical generation (MW): None

Average plant output:

Biogas (scf): 50-60 million per year

Electrical generation (MW): None

End use(s): Space and process heat, digester mixing

Prosser Wastewater Treatment Plant

Box 271
Prosser, WA 99350
Phone: (509) 786-1101
Contact: Greg Pietz

Plant design capacity:

Sewage (MGD): 1.5 (wastewater)

Electrical generation (MW): None

Average plant output:

Biogas (scf): Less than 10 million per year

Electrical generation (MW): None

End use(s): Process heat

Pullman Wastewater Treatment Plant

P.O. Box 249
Pullman, WA 99163
Phone: (509) 334-4555, ext. 233
Contact: Patrick J. Wiltzius

Plant design capacity:

Sewage (MGD): 4.3

Electrical generation (MW): None

Average plant output:

Biogas (scf): 6.9 million (per 1993 year)

Electrical generation (MW): None

End use(s): Space and process heat

Puyallup Pollution Control Facility

2028 River Road
Puyallup, WA 98373
Phone: (206) 841-5511
Contact: B. Michael Webb

Plant design capacity:

Sewage (MGD): 10.7

Electrical generation (MW): None

Average plant output:

Biogas (scf): 10 million per year

Electrical generation (MW): None

End use(s): Space and process heat. Sludge is used as compost mixed with saw-dust and used by nurseries for flowering plants and trees.

Rainier State School Sewage Treatment Plant

P.O. Box 600
Buckley, WA 98321
Phone: (206) 829-1734, ext. 3042
Contact: Roy Campbell

Plant design capacity:

Sewage (MGD): .15

Electrical generation (MW): None

Average plant output:

Biogas (scf): .15

Electrical generation (MW): None

End use(s): Heating the digester, supple-mented w/natural gas

Redondo Wastewater Treatment Plant

515 S 288th Street
Redondo, WA 98054
Phone: (206) 839-7441
Contact: Lee Schumacher

Plant design capacity:

Sewage (MGD): 4.32 average annual, 13.80 peak hydraulic, and 5.47 average wet weather

Electrical generation (MW): None

Average plant output:

Biogas (scf): 14.287 million per year

Electrical generation (MW): None

End use(s): Space and process heat. Excess flared.

Renton Wastewater Treatment Plant

1200 Monster Road SW
Renton, WA 98055
Phone: (206) 684-2412
Contact: Dick Finger, Process Control Supervisor

Plant design capacity:

Sewage (MGD): 72

Electrical generation (MW): None

Average plant output:

Biogas (scf): 506,000 per day

Electrical generation (MW): None

End use(s): Pipeline gas

Richland Wastewater Treatment Plant

P.O. Box 190
Richland, WA 99352
Phone: (509) 943-7481
Contact: Roy Carlson

Plant design capacity:

Sewage (MGD): 8.9 average flow

Electrical generation (MW): 95 kW, May-October

Average plant output:

Biogas (scf): 21,000 per day

Electrical generation (MW): None

End use(s): Space and process heat

**Salmon Creek Wastewater Treatment Plant
Southwest Suburban Sewer District**

12550 Shorewood Drive SW
Seattle, WA 98146
Phone: (206) 243-7770
Contact: John Mutton

Plant design capacity:

Sewage (MGD): 5.8 (peak month)

Electrical generation (MW): None

Average plant output:

Biogas (scf): 42,000 per day

Electrical generation (MW): None

End use(s): Process and building heat, excess flared off

Spokane Wastewater Treatment Plant

4401 N. A.L White Parkway
Spokane, WA 99205
Phone: (509) 625-4600
Contact: Bob Darilek

Plant design capacity:

Sewage (MGD): 44,000,000

Electrical generation (MW): 300 kW

Average plant output:

Biogas (scf): 80 million

Electrical generation (MW): .3 MW

End use(s): Space and process heat, air conditioning,
absorption chiller

Sunnyside Wastewater Treatment Plant

818 E. Edison Avenue
Sunnyside, WA 98944
Phone: (509) 837-5206
Contact: Charles Kennedy

Plant design capacity:

Sewage (MGD): 3

Electrical generation (MW): None

Average plant output:

Biogas (scf): Less than 10 million per year

Electrical generation (MW): None

End use(s): Process heat

Tacoma Wastewater Treatment Plant-1

2201 Portland Avenue
Tacoma, WA 98421
Phone: (206) 591-2014, ext. 4301
Contact: Charles Montgomery

Plant design capacity:

Sewage (MGD): 28

Electrical generation (MW): None

Average plant output:

Biogas (scf): 120 million per year

Electrical generation (MW): None

End use(s): Space and process heat,
hot water, autos

Tacoma Wastewater Treatment Plant-3

4002 Waterview Street
Tacoma, WA 98507
Phone: (206) 591-2014 ext. 4301
Contact: Charles Montgomery

Plant design capacity:

Sewage (MGD): Less than 10

Electrical generation (MW): None

Average plant output:

Biogas (scf): 2 million per year

Electrical generation (MW): None

End use(s): Space and process heat -60% of TP-3 now
processed at TP-1.

Toppenish Wastewater Treatment Plant

City Hall
21 West 1st Street
Toppenish, WA 98948
Phone: (509) 865-4089
Contact: Ed Martindale

Plant design capacity:

Sewage (MGD): 1.35

Electrical generation (MW): None

Average plant output:

Biogas (scf): Less than 10 million per year

Electrical generation (MW): None

End use(s): Process heat

Walla Walla Wastewater Treatment Plant

571 Hatch Street
Walla Walla, WA 99362
Phone: (509) 527-4509
Contact: Al Proudy

Plant design capacity:

Sewage (MGD): 10.8 dry flow, 15.00 wet flow

Electrical generation (MW): None

Average plant output:

Biogas (scf): 25,000 per day

Electrical generation (MW): None

End use(s): Process heat

Wenatchee Water Pollution Control

201 N Worthen Street

P.O. Box 519

Wenatchee, WA 98801

Phone: (509) 663-8416

Contact: Tom Hardie

Plant design capacity:

Sewage (MGD): 5

Electrical generation (MW): None

Average plant output:

Biogas (scf): 15 million + per year

Electrical generation (MW): None

End use(s): Space and process heat

Sewage Treatment Plant Listing Changes from 1992 Edition

Deleted

Cause

County

McCleary Sewage Treatment Facility

Unable to contact facility

Mason

Added

County

College Place Wastewater Treatment Facility

Walla Walla

Chapter 2

Biomass Combustion

Chemical Recovery
Municipal Solid Waste
Waste Wood Combustion

Chemical Recovery

○ Solids Burned - tons/year (thousands)

Figure 4

**1993 Washington State
Solids Burned at Chemical Recovery Facilities**

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 5

1993 Washington State Chemical Recovery Facilities

Sorted by Solids Burned

Facility Name	County	Solids Burned (tons/year)	Gross Energy Equivalent ¹ (million Btu/year)	End Use
James River	Clark	874,200	11,364,600	Process steam
Longview Fibre Company	Cowlitz	759,900	9,878,700	Process steam, heating, cogenerated electricity (48 MW)
Weyerhaeuser Paper Co.	Cowlitz	603,000	7,839,000	Process steam, cogenerated electricity (8.9 MW)
Scott Paper	Snohomish	210,000	2,730,000	Process steam
Simpson Tacoma Kraft	Pierce	136,199	1,770,587	Process steam
Weyerhaeuser Company	Grays Harbor	120,400 ²	1,565,200	Process steam, cogenerated electricity (11 MW)
Total		2,703,699	35,148,087	

¹Energy equivalent calculated at 13 million Btu per ton of solids burned²WSEO estimate, figure based on average steam output and psig

Chemical Recovery Facilities

James River

NE 4th and Adams Street
Camas, WA 98607
Phone: (206) 834-8161
Contact: W. W. Vautzfelden

Type of chemicals recovered: Spent sulfite liquor
Solids burned/yr (tons): 176,100
End use(s): Process steam
Supplemental fuel used: Natural gas
Plant design capacity: One
Steam: 263,000 lbs/hr @ 400 psig
Electric generation: N/A
Average output:
Steam: 224,000 lbs/hr @ 400 psig
Electric generation: N/A
Type of furnace: Chemical recovery
Manufacturer: B & W
Type of pollution control: Wet scrubber

Also, for James River

Type of chemicals recovered: Spent kraft pulping liquor
Solids burned/yr (tons): 698,100
End use(s): Process steam
Supplemental fuel used: Natural gas and oil
Plant design capacity: Two boilers
Steam: #3 - 343,000 lbs/hr @ 600 psig
#4 - 453,000 lb/hr @ 400 psig
Electric generation: None
Average output: Steam: 730,000 lbs @ 400 psig
Electric generation: None
Type of furnace: Chemical recovery
Manufacturer: Both boilers - Combustion Engineering
Type of pollution control: ESP and wet scrubbers

Longview Fibre Company

P.O. Box 3000
Longview, WA 98632
Phone: (206) 425-1550
Contact: R.W. Williams

Type of chemicals recovered: Spent sulfate liquor
Solids Burned/yr (tons): 759,900 (1993)
End use(s): Process steam, cogenerated electricity
(continued on next column)

Supplemental fuel used: None
Plant design capacity (number of boilers): Five
boilers (#14-400 tons, #15-700 tons, #18-710 tons,
#19-1650 tons, #22-1850 tons)
Steam: #14 164,500, #15-316,000, #18-367,000,
#19-579,800, #22-622,000 all boilers @ 800 psig
Electric generation: 60 MW
Average output: (1991) 8,780,896,000 lbs of steam
Steam: 1,202,698 lbs/hr @ 806 psig
Electric generation: 48 MW (1991)
Type of furnace: #14-#19 Dual Drum,
#22 Single Drum
Manufacturer: All-Combustion Engineering
Type of pollution control: #14-#19 wet bottom
electrostatic precipitators, #22 dry bottom
electrostatic precipitator,
#15 is equipped with a scrubber after its precipitator

Scott Paper

2600 Federal Avenue
Everett, WA 98220
Phone: (206) 259-7333
Contact: Alex M. Hood

Type of chemicals recovered: Spent sulfite liquor
Solids burned/yr (tons): 210,000
End use(s): Process steam
Supplemental fuel used: Natural Gas
Plant design capacity: 1 boiler
Steam: Operating 381,000 lbs/hr max 300 psig
- 520 F; design 340,000 lbs/hr max 825 psig -
750 F
Electric generation (MW): 0
Average output:
Steam: 320,000 lbs/hr
@ 300 psig at 520 F
Electric generation: None
Type of furnace: 2 Pass
Manufacturer: B & W
Type of pollution control: All in series:
1) Cooling tower with wet scrubber,
2) NH₃ absorption tower,
3) Dyna-Wave caustic scrubber, and
4) Demisters.

Simpson Tacoma Kraft Company

801 Portland Avenue
Tacoma, WA 98421
Phone: (206) 572-2150
Contact: David McEntee

Type of chemicals recovered: Spent sulfite liquor
Solids burned/yr (tons): 746,298 lbs/day
End use(s): Process steam
Supplemental fuel used: Bunker C fuel oil
Plant design capacity: 2 boilers
Steam: 590,000 lbs/hr @ 425 psig
Electric generation (MW): None
Average output:
Steam: 550,000 lbs/hr @ 425 psig
Electric generation (MW): None
Type of furnace: 2 drum natural circulation
Manufacturer: Combustion engineering
Type of pollution control: ESP/ESP & wet scrubbers

Weyerhaeuser Company

P.O. Box 1000
Cosmopolis, WA 98537
Phone: (206) 532-7110
Contact: Paul W. Kelso

Type of chemicals recovered: Spent sulfite liquor
Solids burned/yr (tons):
End use(s): Electricity and process steam
Supplemental fuel used: No. 6 fuel oil
Plant design capacity (number of boilers): 3
Steam: 348,000 lbs/hr @ 825 psig
Electric generation: 15 MW
Average output:
Steam: 25,000 lbs/hr @ 825 psig
Electric generation: 11 MW
Type of furnace: 2 with firebrick furnace,
1 with water cooled furnace
Manufacturer: Babcock & Wilcox Co.
Type of pollution control: Packed towers

Weyerhaeuser Paper Company

P.O. Box 188
Longview, WA 98632
Phone: (206) 425-2150 Ext. 5486
Contact: Jeff Inman

Type of chemicals recovered: Sulfate and neutral Sulfite
spent cooking liquors
Solids burned/yr (tons): 603,000 tons
End uses(s): Process steam, heating, electricity
generation
Supplemental fuel used: No. 6 Fuel Oil
Plant design capacity: One boiler
Steam: 619,000 lb/hr @ 700 psig
and 730F
Electric Generation: 8.9 MW
Average output:
Steam: 507,000 lb/hr @ 600 psig
and 720F
Electric Generation: 8.9 MW
Type of Furnace: Tomlinson, two drum, membrane wall,
low-odor
Manufacturer: Babcock and Wilcox Co.
Type of Pollution Control: Dry bottom electro static
precipitator
* Making changes in chemical recovery - expect increases
in 1995.

Chemical Recovery Facilities Listing Changes from 1992 Edition

No facilities added or deleted.

Municipal Solid Waste

○ MSW Combustion - tons/year (thousands)

Figure 5

1993 Washington State Municipal Solid Waste Combustion

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 6

1993 Municipal Solid Waste Combustion

Sorted by Annual Municipal Solid Waste (MSW) Consumption

Facility Name	County	Annual MSW Consumption (Tons/Year)	Gross Energy Equivalent ¹ (Million Btu/Year)	End Uses
Spokane Trash-to-Energy	Spokane	293,000	2,930,000	Supply electricity to PSP&L
Skagit Co. Resource Recovery	Skagit	50,000	500,000	Supply electricity to PSP&L
Tacoma Steam Plant #2	Pierce	49,000	637,000 ²	Supply electricity to PSP&L
Recomp of Washington, Inc.	Whatcom	36,500	365,000	Electricity, steam for mushroom plant
Total		428,500	4,432,000	

¹Energy equivalent based on 10 million Btu per ton of municipal solid waste²Energy equivalent based on 13 million Btu per ton of refuse derived fuel

Municipal Solid Waste Combustion Facilities

Recomp of Washington, Inc.

1524 Slater Road
Ferndale, WA 98248
Phone: (206) 676-0660
Contact: Frank Moscone, President

Type of biomass fuel: Municipal solid waste
Source of fuel: City of Bellingham and Whatcom Co.
Annual MSW fuel consumed: 36,500
End use(s): Electricity, steam for mushroom plant
Plant design capacity: 100 tons per day
Heat (million Btu/hr):
Steam: 25,000 lbs/hr @ 400 psig
Electrical Generation (MW): 2.0
Average plant output:
Heat (million Btu/hr):
Steam: 25,000 lbs/hr @ 400 psig
Electrical Generation (MW): 2.0
Type of combustor/furnace: Modular Starved Air
Manufacturer: Consumat
Type of boiler: Water tube, verticle
Boiler manufacturer:
Type of pollution control: Scrubber baghouse

Skagit County Resource Recovery Facility

1200 W Ovenell Road
Mount Vernon, WA 98273
Phone: (206) 336-9400
Contact: Donald King

Type of MSW fuel: Municipal solid waste
Source of fuel: Skagit County
Annual biomass fuel consumed: 50,000 tons
End use(s): Provide electricity to Puget Power
Plant design capacity: 178 tons per day
Heat (million Btu/hr): 1600
Steam: 40,000 lbs/hr @ 450 psig
Electrical Generation (MW): 2.5
Average plant output: 14 tons per day
Heat (million Btu/hr):
Steam: 40,000 lbs/hr @ 450 psig
Electrical Generation (MW): 2.5
Type of combustor/furnace: Rotary Kiln
Manufacturer: Tecnitalia
Type of boiler: Water Tube
Boiler manufacturer: Zurn
Type of pollution control: Acid gas scrubber & baghouse

Spokane Trash-to-Energy Facility

W. 808 Spokane Falls Blvd
Spokane, WA 99201
Phone: (509) 456-7403
Contact: Damon Taam

Type of biomass fuel: Municipal Solid Waste
Source of fuel: Spokane County
Annual biomass consumed: 293,000 tons/yr
End use(s): Supply electric power to PSP&L, Inc.
Plant design capacity: 800 tons/day
Heat (million Btu/hr): 250 million Btu
Steam: 230,000 lb/hr @ 900 psig/830°F
Electrical Generation (MW): 26 MW
Average plant output:
Heat (million Btu/hr):
Steam: 230,000 lbs @ 900 psig/830°F
Electrical Generation: 26 MW - 4 MW used in plant, 22 MW sold to PSP&L
Type of combustion/furnace: Von Roll reciprocating
Manufacturer: Wheelabrator
Type of boiler: Waterwall Boiler
Manufacturer: Babcock & Wilcox
Type of pollution control: Dry scrubbers, fabric filters, & de NOx

Tacoma Steam Plant No. 2

Tacoma City Light
P. O. Box 11007
Tacoma, WA 98411
Phone: (206) 383-9601
Contact: Mark Gamble

Type of biomass fuel: RDF, hog fuel & coal
Source of fuel: City of Tacoma
Annual MSW fuel consumed: 49,000 tons (1993)
End use(s): Electricity
Plant design capacity: 300 tons RDF/day
Heat (million Btu/hr): 831 RDF/wood/coal
Steam: 528,000 lbs/hr @ 382 psig
Electrical Generation (MW): 43 MW net
Average plant output: 108 tons RDF/day (5 day week)
Heat (million Btu/hr):
Steam: 400,000 lbs/hr @ 382 psig
Electrical Generation (MW): 29 MW
Type of combustor/furnace: Fluidized bed
Manufacturer: Energy Products of Idaho
Type of boiler: 3 Drum Sterling
Boiler manufacturer: Puget Sound Boiler
Type of pollution control: Limestone in bed, baghouses

Municipal Solid Waste Facilities Listing Changes from 1992 Edition

No additions or deletions.

Waste Wood Combustion

1993 Washington State Waste Wood Combustion

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 7

1993 Waste Wood Combustion

Sorted by Annual Waste Wood Consumption

Facility Name	County	Annual Waste Wood Consumption (BDTs/Yr)	Gross Energy Equivalent ¹ (Million Btu/Yr)	End Uses
Weyerhaeuser	Cowlitz	500,000	8,500,000	Process steam & heat
Washington Water Power	Stevens	350,000	5,950,000	Electric generation
Tacoma Steam Plant No. 2	Pierce	247,940	4,214,980	Electric generation
Omak Wood Products	Okanogan	210,240	3,574,080	Electric gen., proc. steam & heat
Simpson Tacoma Kraft	Pierce	174,000	2,958,000	Process steam & heat
Scott Paper	Snohomish	168,000	2,856,000	Process steam & heat
Georgia-Pacific	Whatcom	157,000	2,669,000	Process steam & heat
Boise Cascade	Pierce	153,973	2,617,541	Process steam & heat
Longview Fibre	Cowlitz	130,296	2,215,032	Process steam & heat
Boise Cascade	Yakima	118,000	2,006,000	Process heat
Boise Cascade	Stevens	113,399	1,927,783	Process steam & heat
James River	Clark	104,000	1,768,000	Electric gen., proc. steam & heat
Rayonier	Clallam	98,573	1,675,741	Process steam & heat
Simpson Timber	Mason	89,000	1,513,000	Process steam & heat
Boise Cascade	Walla Walla	88,176	1,498,992	Process steam & heat
Weyerhaeuser	Grays Harbor	80,000	1,360,000	Electric gen., proc. steam & heat
Weyerhaeuser	King	78,939 ²	1,341,963	Process steam & heat
Port Townsend Paper	Jefferson	64,217	1,091,689	Electric gen., proc. steam & heat
Daishowa America	Clallam	63,600	1,081,200	Process steam & heat
Fort Vancouver Plywood	Clark	38,500	654,500	Process steam & heat
Summit Timber Power House	Snohomish	36,500	620,500	Process steam
Colville Indian Precision Pine	Okanogan	28,560	485,520	Process steam & heat
K-Ply	Clallam	24,000	408,000	Process steam & heat
Plum Creek Manufacturing	Stevens	23,937	406,929	Process steam & heat
Weyerhaeuser	Pacific	23,091 ²	392,547	Process steam & heat
Simpson Door	Grays Harbor	21,600	367,200	Process steam & heat
Vaagen Brothers Lumber	Ferry	21,000	357,000	Process steam & heat
W.I. Forest Products	Spokane	19,332 ²	328,644	Process steam & heat
GN Plywood	Whatcom	19,200	326,400	Process steam & heat
Hardel Mutual Plywood	Thurston	17,977 ²	305,609	Process steam & heat
Vaagen Brothers Lumber	Stevens	17,885	304,045	Process steam & heat
Cowlitz Stud	Lewis	16,647 ²	282,999	Process steam & heat
Buffelen Woodworking	Pierce	15,573 ²	264,741	Process steam & heat
Morton Forest	Lewis	13,722	233,274	Process steam & heat
Goodyear-Nelson	Skagit	12,351	209,967	Process steam & heat
Northwest Hardwoods	Snohomish	11,277 ²	191,709	Process steam & heat
Guy Bennett Lumber	Asotin	11,242	191,114	Process steam & heat
Allen Logging	Clallam	10,752	182,784	Process steam & heat
Jeld-Wen Fiber of WA	Yakima	8,750	148,750	Process steam & heat
Shelton Corrections Center	Mason	7,975	135,575	Process steam & heat
Jeld-Wen of Everett	Snohomish	7,000	119,000	Process steam & heat
Vaagen Brothers Lumber	Pend Oreille	6,643	112,931	Process steam & heat

Table 7

1993 Waste Wood Combustion (continued)

Sorted by Annual Wood Consumption

Facility Name	County	Annual Wood Consumption (BDTs/Yr)	Gross Energy Equivalent ¹ (Million Btu/Yr)	End Uses
Louisiana Pacific	Walla Walla	6,563	111,571	Process steam & heat
West Coast Forest Products	Snohomish	4,720	80,240	Process heat
Strauser Manufacturing	Walla Walla	3,000	51,000	Process steam & heat
Layman's Lumber	Yakima	2,100	35,700	Process steam & heat
DeGoede Bulb Farms	Lewis	1,625 ²	27,625	Greenhouse heating
Washington State Penitentiary	Walla Walla	1,600	27,200	Process steam & heat
Western State Hospital	Pierce	875	14,875	Back-up fuel
Kinnear of Washington	Lewis	770	13,090	Process steam & heat
Oeser Company, The	Whatcom	280	4,760	Process steam & heat
Fred Tebb & Sons	Pierce	153	2,601	Process steam & heat
WA Soldiers Home & Colony	Pierce	100	1,700	Back-up fuel
Coastcraft	Pierce	NA	NA	Process steam & heat
Smith Street Mill	Snohomish	NA	NA	Process heat
Total		3,424,653	58,218,931	

NA - Information not available

¹Energy equivalent calculated at 17 million Btu per ton of biomass wood consumed²Estimated by the Washington State Energy Office

Forest Products Industry Facilities

Allen Logging Company

HC 80, Box 736
Forks, WA 98331
Phone: (206) 374-6000
Contact: Gerry Lane

Type of business: Lumber and veneer
Type of biomass fuel: Mill residue
Source of fuel: In-house
Annual biomass fuel consumed: 15,360 green tons
Back-up fuel: None
End use(s): Kiln dryers
Plant design capacity:

Heat (Million Btu/hr):
Steam: 10,000 lbs/hr @ 110 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 7,500 lbs/hr @ 110 psig
Electrical generation (MW): None

Type of combustor/furnace: Fuel cell
Manufacturer: Wellons
Type of boiler: Erie water tube - modified VL
Boiler manufacturer: Erie
Type of pollution control: Multicone
Reason for using wood fuel: Cost, availability

Boise Cascade Corp. - Kettle Falls Lumber -- Steam Boiler

S. 110 Boise Road
Kettle Falls, WA 99141
Phone: (509) 738-6421
Contact: Rod Smith

Type of business: Lumber
Type of biomass fuel: Hog fuel, planer shavings & sawdust
Source of fuel: In-house
Annual biomass fuel consumed: 57,451 green tons
Back-up fuel: None
End use(s): Dry kilns and unit heaters
Plant design capacity:

Heat (Million Btu/hr):
Steam: 50,000 lbs/hr @ 125 psig
Electrical generation (MW):

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 35,700 lbs/hr @ 125 psig
Electrical generation (MW):

Type of combustor/furnace: 3 Cell Cyclo-Blast
Manufacturer: Wellons
Type of boiler: Water tube
Boiler manufacturer: Nebraska Boiler Company
Type of pollution control: Dry type mechanical
Multicone collector
Reason for using wood fuel: Economics

Boise Cascade Corp. - Kettle Falls Plywood -- Fluid Bed Burners

S. 110 Boise Road
Kettle Falls, WA 99141
Phone: (509) 738-6421
Contact: Rod Smith

Type of business: Plywood
Type of biomass fuel: Hog fuel, sawdust
Source of fuel: In-house
Annual biomass fuel consumed: 120,000 green tons
Back-up fuel: None
End use(s): Plywood veneer dryers (direct heat source)
Plant design capacity:

Heat (Million Btu/hr): 160
Steam:
Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr): 120
Steam:
Electrical generation (MW):

Type of combustor/furnace: Fluid bed
Manufacturer: Energy Products of Idaho (E.P.I.)
Type of boiler: None
Boiler manufacturer:
Type of pollution control: 6" Multicone collector
& wet scrubber
Reason for using wood fuel: Economics

Boise Cascade Corp. - Kettle Falls Lumber & Sm. Log Mill - Steam Boiler

S. 110 Boise Road
Kettle Falls, WA 99141
Phone: (509) 738-6421
Contact: Rod Smith

Type of business: Lumber & plywood
Type of biomass fuel: Hog fuel, sawdust & plywood trim
Source of fuel: In-house
Annual biomass fuel consumed: 24,674 dry tons
Back-up fuel: None
End use(s): Steam vats, plywood hot press, unit heaters
Plant design capacity:
Heat (Million Btu/hr):
Steam: 60,000 lbs/hr @ 125 psig
Electrical generation (MW):
Average plant output:
Heat (Million Btu/hr):
Steam: 28,640 lbs/hr @ 125 psig
Electrical generation (MW):
Type of combustor/furnace: field erected,
stationary water cooled grate
Manufacturer: Riley Stoker Corporation
Type of boiler: Water tube, type
Boiler manufacturer: Riley Stoker Corporation
Type of pollution control: Dry type 9" mechanical
multicone collector + EGB (electrical gravel bed)
Reason for using wood fuel: Economics

Boise Cascade Corporation

4302 Chamber Creek Road
Steilacoom, WA 98388
Phone: (206) 588-2115
Contact: Darrell Lantz

Type of business: Pulp and paper
Type of biomass fuel: Hog fuel
Source of fuel: Various lumber companies (all Purchased)
Annual biomass fuel consumed: 153,973 BDTs hogged fuel
plus 17,472 tons sludge primary clarifier
Back-up fuel: Industrial #6 oil
End use(s): Process steam, dryers

(continued on next column)

Plant design capacity: No. 5 hogged fuel boiler
Heat (Million Btu/hr): None
Steam: 150,000 lbs/hr @ 140 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr):
Steam: 120,000 lbs/hr @ 140 psig
Electrical generation (MW): None
Type of combustor/furnace:
Manufacturer: Kipper & Sons
Type of boiler: Traveling grate, water wall
Boiler manufacturer: Kipper & Sons
Type of pollution control: Multicone collectors/fly ash
re injection, AER POL high energy wet scrubber
Reason for using wood fuel: Cost/availability vs. fossil fuel.
Also, firm is equipped with a Cascade (Bacho design)
fuel dryer utilizing flue gas.

Boise Cascade Corporation

P.O. Box 500
Wallula, WA 99363
Phone: (509) 547-2411
Contact: Greg Buxton, Energy Engineer

Type of business: Pulp and paperboard
Type of biomass fuel: Hog fuel
Source of fuel: Purchased
Annual biomass fuel consumed: 73,480 BDUs
Back-up fuel: Natural gas
End use(s): Process steam, dryers
Plant design capacity: 1 Hog fuel boiler
Heat (Million Btu/hr): 193
Steam: 201,000 lbs/hr @ 250 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 172
Steam: 179,000 lbs/hr @ 250 psig
Electrical generation (MW): None
Type of combustor/furnace: Sterling type, pin hole grate
Manufacturer: Kipper
Type of boiler: Sterling type pinhole grate
Boiler manufacturer: Kipper
Type of pollution control: Mechanical, multicone scrubber,
Riley venturi-rod wet scrubber
Reason for using wood fuel: Economics

Boise Cascade Corporation

P.O. Box 51
Yakima, WA 98901
Phone: (509) 453-3131
Contact: Dick Godfrey

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 118,000 dry tons
Back-up fuel: None
End use(s): Dry kilns, dryers
Plant design capacity:

Heat (Million Btu/hr):
Steam: 200,000 lbs/hr @ 250 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 150,000 lbs/hr @ 250 psig
Electrical generation (MW):

Type of combustor/furnace: 3 Dutch ovens,
1 spreader stoker

Manufacturer:

Type of boiler: Water tube

Boiler manufacturer:

Type of pollution control: Multicone and wet scrubber

Reason for using wood fuel: Economics

Buffelen Woodworking

P.O. Box 1383
Tacoma, WA 98481
Phone: (206) 627-1191
Contact: Bill Jones

Type of business: Door
Type of biomass fuel: Mill residue
Source of fuel: In-house
Annual biomass fuel consumed:
Back-up fuel: Propane
End use(s): Dry kiln
Plant design capacity:

Heat (Million Btu/hr):
Steam: 55,000 lbs/hr @ _____ psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr):

Steam: 25,000 lbs/hr @ _____ psig

Electrical generation (MW):

Type of combustor/furnace:

Manufacturer:

Type of boiler: Water tube

Boiler manufacturer: Riley Stoker

Type of pollution control: Wet scrubber

Reason for using wood fuel: Cost, availability

Coastcraft, Inc. (Kroon, Inc.)*

1002 E Street
Tacoma, WA 98421
Phone: (206) 272-1154
Contact: Paul Kroon, Owner

Type of business: Woodwork, windows, doors

Type of biomass fuel: Mill residues, sawdust

Source of fuel: In-house

Annual biomass fuel consumed:

Back-up fuel: None

End use(s): Dry kiln & heating

Plant design capacity:

Heat (Million Btu/hr):

Steam: 500 lbs/hr @ _____ psig

Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr):

Steam: _____ lbs/hr @ _____ psig

Electrical generation (MW):

Type of combustor/furnace:

Manufacturer:

Type of boiler: Fire tube

Boiler manufacturer:

Type of pollution control: None

Reason for using wood fuel: By-product

*1991 Data

Colville Indian Precision Pine Co.

P.O. Box 3293
Omak, Washington 98841
Phone: (509) 826-1921
Contact: Ron Holen

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 28,560 BDTs
Back-up fuel: None
End use(s): Dry kilns
Plant design capacity:

Heat (Million Btu/hr):
Steam: 40,000 lbs/hr @ 100 psig
Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr):
Steam: 30,000 lbs/hr @ 100 psig
Electrical generation (MW):

Type of combustor/furnace:

Manufacturer: Wellons
Type of boiler: 2'20,000 lb/hr. hog fuel fired single cells
Boiler manufacturer: Wellons hog fuel fired
Type of pollution control: Dry scrubber
Reason for using wood fuel: Economics

Cowlitz Stud Company*

P.O. Box 219
Randle, WA 98377
Phone: (206) 497-5030
Contact: Lloyd Cook or Charlie Allen

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed:
Back-up fuel: None
End use(s): Dry kilns
Plant design capacity:

Heat (Million Btu/hr):
Steam : 25,000 lbs/hr (Randle)
40,000 lbs/hr (Morton) @ 300 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 16,250 lbs/hr (Randle); 26,000 lbs/hr (Morton)
both @ 300 psig
Electrical generation (MW): None

Type of combustor/furnace:

Manufacturer:
Type of boiler: Water tube and fire tube
Boiler manufacturer: Seattle
Type of pollution control: Water scrubber
Reason for using wood fuel: Economics
*1991 data

Daishowa America

P.O. Box 271
Port Angeles, WA 98362
Phone: (206) 457-4474
Contact: J. Boyd

Type of business: Pulp and paperboard
Type of biomass fuel: Hog fuel
Source of fuel: Purchased
Annual biomass fuel consumed: 53,000 BDUs
Back-up fuel: No. 6 fuel oil
End use(s): Process steam, drying
Plant design capacity: 1 Hog fuel boiler
Heat (Million Btu/hr):
Steam: 105,000 lbs/hr @ 255 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 75,000 lbs/hr @ 255 psig
Electrical generation (MW): None

Type of combustor/furnace: Spreader stoker
Manufacturer: Combustion Engineering
Type of boiler: Model VU-40
Boiler manufacturer: Combustion Engineering
Type of pollution control: Venturi Scrubber
Reason for using wood fuel: Economics

Fort Vancouver Plywood

P.O. Box 289
Vancouver WA 98660
Phone: (206) 694-3368
Contact: Duane Graves

Type of business: Plywood
Type of biomass fuel: Hog fuel, sawdust
Source of fuel: In-house and purchased
Annual biomass fuel consumed: 35,000 units
Back-up fuel: None
End use(s): Process heat
Plant design capacity:

Heat (Million Btu/hr):
Steam: 75,000 lbs/hr @ 300 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 45,000 lbs/hr @ 290 psig
Electrical generation (MW): None

Type of combustor/furnace: None
Manufacturer:
Type of boiler: Hog fuel fired, water tube
Boiler manufacturer: Kipper & Sons
Type of pollution control: Wet scrubber
Reason for using wood fuel: By-product of manufacturing

Fred Tebb & Sons, Incorporated

1906 Marc Street
Tacoma, WA 98421
Phone: (206) 272-4107
Contact: Marlene DeMarco

Type of business: Remanufacture of lumber products
Type of biomass fuel: Sawdust
Source of fuel: In-house
Annual biomass fuel consumed: 219 tons
Back-up fuel: Natural gas, oil
End use(s): Drying of lumber
Plant design capacity:

Heat (Million Btu/hr):
Steam: 15,000 lbs/hr @ 10 psig
Electrical generation (MW):

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 15,000 lbs/hr @ 10 psig
Electrical generation (MW):

Type of combustor/furnace: Oil, gas, wood
Manufacturer: Rayburn
Type of boiler: Fire tube
Boiler manufacturer: Cleaver
Type of pollution control: Baghouse
Reason for using wood fuel: Economics

Georgia-Pacific Corporation

P.O. Box 1236
Bellingham, WA 98227
Phone: (206) 733-4410
Contact: E. H. Dahlgren

Type of business: Pulp and paper
Type of biomass fuel:
Hog fuel Source of fuel: Purchased & generated
Annual biomass fuel consumed: 157,000 bone dry tons
Back-up fuel: Natural gas/No. 6 oil
End use(s): Process steam, drying
Plant design capacity:

Heat (Million Btu/hr): 232
Steam: 220,000 lbs/hr @ 200 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr): 185
Steam: 175,000 lbs/hr @ 175 psig
Electrical generation (MW): None

Type of Combustion/Furnace: Dutch oven boilers
Manufacturer: Babcock & Wilcox
Type of boiler: Sterling Boiler
Manufacturer: Babcock & Wilcox
Type of pollution control: Baghouse
Reason for using wood fuel: Economics

**Goodyear Nelson Hardwood
Lumber Company, Inc.**

1215 Highway 9 S
Sedro Woolley, WA 98284
Phone: (206) 856-0816
Contact: Rod Remington

Type of business: Hardwood lumber
Type of biomass fuel: Hog fuel and shavings
Source of fuel: Western hardwood residue and surfacing
Annual biomass fuel consumed: 12,351 BDTs/yr
Back-up fuel:
End use(s): Steam for dry kilns
Plant design capacity:

Heat (Million Btu/hr):
Steam: 25,000 lbs/hr @ 110 psig
Electrical generation (MW): N/A

Average plant output:

Heat (Million Btu/hr):
Steam: 19,500 lbs/hr @ 110 psig
Electrical generation (MW): None

Type of combustor/furnace: Auto mini-stoker system
Manufacturer: G&S Retrofit
Type of boiler: Fire tube
Boiler manufacturer: Brownell
Type of pollution control: Brescove Regenerative Collector
Reason for using wood fuel: Availability

GN Plywood Inc.

(formerly Mt. Baker Plywood)
P.O. Box 997
Bellingham, WA 98225
Phone: (206) 733-3960
Contact: Tim Shannon

Type of business: Plywood
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 19,200 BDTs/yr
Back-up fuel: Natural gas
End use(s): Drying and pressing
Plant design capacity:

Heat (Million Btu/hr):
Steam: 35,000 lbs/hr @ 1,700 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 31,500 lbs/hr @ 225 psig
Electrical generation (MW):

Type of combustor/furnace: Dutch oven
Manufacturer: Kipper
Type of boiler:
Boiler manufacturer:
Type of pollution control: Multi cyclone ash collector
Reason for using wood fuel: Economics

Guy Bennett Lumber Co.

1785 Elm Street
Clarkston, WA 99403
Phone: (509) 758-5558
Contact: Don Fairley

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 11,242 BDTs/yr
Back-up fuel: None
End use(s): Heat for dry kilns
Plant design capacity:

Heat (Million Btu/hr): 22,425,000
Steam: 19,500 lbs/hr @ 100 psig
Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr): 2,070,000
Steam: 8,000 lbs/hr @ 100 psig
Electrical generation (MW):

Type of combustor/furnace: Water tube
Manufacturer: Kipper
Type of boiler: Water tube
Boiler manufacturer: Kipper
Type of pollution control: Multicone & electric precipitator
Reason for using wood fuel: Generated during manufacturing

Hardel Mutual Plywood*

1210 West Bay Drive
Olympia, WA 98502
Phone: (206) 754-6030
Contact: Emanuel Piliaris

Type of business: Plywood
Type of biomass fuel: Sander dust & hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 17,977 BDTs
Back-up fuel: Natural gas
End use(s): Dryers and presses
Plant design capacity:

Heat (Million Btu/hr): 38.87
Steam: 28,000 lbs/hr @ 225 psig
Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr)
Steam: 25,000 lbs/hr @ _____ psig
Electrical generation (MW): N/A

Type of combustor/furnace: Suspension burner
Manufacturer: Coen
Type of boiler: Fire tube
Boiler manufacturer: Pacific Marion
Type of pollution control: Joy Multicone
Reason for using wood fuel: It is by far the most cost effective choice: waste wood means free fuel.
*1991 Data

James River

NE Fourth & Adams Street
Camas, WA 98607
Phone: (206) 834-8161
Contact: W. W. Vautzeldfen

Type of business: Pulp and paperboard
Type of biomass fuel: Hog fuel & mill residue
Source of fuel: Purchased
Annual biomass fuel consumed: 104,000
Back-up fuel: Gas/oil
End use(s): Process steam, dryers
Plant design capacity:

Heat (Million Btu/hr):
Steam: 240,000 lbs/hr @ 600 psig
Electrical generation (MW): 0

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 200,000 lbs/hr @ 400 psig
Electrical generation (MW): 0

Type of combustor/furnace: Water cooled vibrating grate
Manufacturer: Foster Wheeler
Type of boiler: Conventional water wall
Boiler manufacturer:
Type of pollution control: Electrostatic precipitator
Reason for using wood fuel: Available waste/low cost
*Note: Installing electrical generation, on -line in 1995.

Jeld-Wen of Everett

300 W Marine Drive
Everett, WA 98201
Phone: (206) 259-9292, ext. 123
Contact: Randy Cox

Type of business: Wood remanufacturing/lumber drying
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 10,000 tons/year
Back-up fuel: Natural Gas
End use(s): Dry kiln and slicer tank
Plant design capacity:

Heat (Million Btu/hr):
Steam: 55,000 lbs/hr @ 125 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 15,000 lbs/hr @ 125 psig
Electrical generation (MW): None

Type of combustor/furnace:
Manufacturer:
Type of boiler: Water tube
Boiler manufacturer: Wyatt Kipper
Type of pollution control: Multi-clone
Reason for using wood fuel: Economics

Jeld-Wen Fiber of Washington

Corner of Wesley & Fort Roads
White Swan, WA 98952
Phone: (509) 874-2255
Contact: Tom Wilson

Type of business: Fiberboard doorskins
Type of biomass fuel: Wood
Source of fuel: Plant waste
Annual biomass fuel consumed: 10,000 - 15,000 tons
Back-up fuel:

End use(s): Plant space heat, process heat

Plant design capacity:

Heat (Million Btu/hr):
Steam: 30,000 lbs/hr @ 200 psig
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 13,000 - 17,000 lbs/hr @ 200 psig
Electrical generation (MW): None

Type of combustor/furnace: 2 cell forced draft

Manufacturer: Wellons

Type of boiler: Water tube

Boiler manufacturer: Nebraska

Type of pollution control: Mechanical, multi-cone scrubber

Reason for using wood fuel: Availability of wood waste

Kinnear of Washington

2001 Industrial Drive
Centralia, WA 98531
Phone: (206) 736-7651
Contact: Greg Penley

Type of business: Wood parts for overhead garage doors

Type of biomass fuel: Mill residues

Source of fuel: In-house

Annual biomass fuel consumed: 1,100 tons

Back-up fuel: None

End use(s): Drying lumber

Plant design capacity:

Heat (Million Btu/hr): Unknown
Steam: 10,300 lbs/hr @ 100 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr): Unknown

Steam: 8,250 lbs/hr @ 80 psig

Electrical generation (MW): None

Type of combustor/furnace: Firebox

Manufacturer: Frye Shaving Feeder

Type of boiler: Fire tube

Boiler manufacturer: Kewanee #590

Type of pollution control: Wet scrubber

Reason for using wood fuel: Available/low cost

K-Ply, Inc.

439 Marine Drive
Port Angeles, WA 98362
Phone: (206) 457-4421
Contact: Dave Mackey

Type of business: Plywood

Type of biomass fuel: In-house

Source of fuel: Bark, veneer trim, plywood trim

Annual biomass fuel consumed: 24,000 BDTs (estimate)

Back-up fuel: None

End use(s): Drying, veneer

Plant design capacity:

Heat (Million Btu/hr):
Steam: 50,000 lbs/hr @ 240 psig
(2 boilers 25,000 hr ea.)
Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):
Steam: 40,000 lbs/hr @ 240 psig
Electrical generation (MW): None

Type of combustor/furnace:

Manufacturer: Riley

Type of boiler:

Boiler manufacturer: Riley

Type of pollution control: Wet E.S.P.

Reason for using wood fuel: Availability

Layman's Lumber Company

11160 Highway 12
Naches, WA 98937
Phone: (509) 653-2221
Contact: George Layman

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 3,000 tons
Back-up fuel:
End use(s): Dry kilns
Plant design capacity:
Heat (Million Btu/hr):
Steam: 17,250 lbs/hr @ 15 psig
Electrical generation (MW):
Average plant output:
Heat (Million Btu/hr):
Steam: 15,000 lbs/hr @ 15 psig
Electrical generation (MW):
Type of combustor/furnace:
Manufacturer: Wellons
Type of boiler: Fire tube
Boiler manufacturer:
Type of pollution control: Recycle
Reason for using wood fuel:

Longview Fibre Company

P.O. Box 3000
Longview, WA 98632
Phone: (206) 425-1550
Contact: R. W. Williams

Type of business: Pulp and paperboard
Type of biomass fuel: Hog fuel
Source of fuel: Purchased
Annual biomass fuel consumed: 130,296 dry tons
Back-up fuel: Fuel oil, natural gas
End use(s): Process steam, dryers
Plant design capacity: 3 Hog fuel boilers
Heat (Million Btu/hr): 1,160
Steam: 850,000 lbs/hr @ 800 psig
(2 boilers @ 275,000, 1 boiler @ 300,000)
Electrical generation (MW): 30 (hog fuel portion)

(continued on next column)

Average plant output: Calendar 1993 (hog fuel 27% fuel used in above boilers)
Heat (Million Btu/hr): 153 (hog fuel portion)
696 total
Steam: 113,645 lbs/hr @ 800 psig
(hog fuel portion)
Electrical generation (MW): 13 (hog fuel portion)
Type of combustor/furnace: N/A
Manufacturer: N/A
Type of boiler: 2 Dutch ovens, 1 Stoker- Traveling Grate
Boiler manufacturer: 2 Babcock & Wilson,
1 Combustion Engineering
Type of pollution control: Multicone & wet scrubbers
Reason for using wood fuel: Lowest cost fuel

Louisiana Pacific Company

P.O. Box 1575
Walla Walla, WA 98362
Phone: (509) 529-0200
Contact: Jerry Doherty

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 6,563 BDTs
Back-up fuel:
End use(s): Dry kilns
Plant design capacity:
Heat (Million Btu/hr): 21,000,000
Steam: 20 to 25,000 lbs/hr @ _____ psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 14,060,000
Steam: 13,400 lbs/hr @ _____ psig
Electrical generation (MW): None
Type of combustor/furnace:
Manufacturer: Seattle Boiler Works
Type of boiler: Dutch oven 84-20 hrt 125 lbs.
Boiler manufacturer: Seattle Boiler Works
Type of pollution control: Proper fuel & air ratio
Reason for using wood fuel: Cost

Morton Forest Products

Priest Road
P.O. Box I
Morton, Washington 98356
Phone: (206) 496-6666
Contact: Don Schroeder

Type of business: Lumber, veneer
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 11,435 dry-units
Back-up fuel: None
End use(s): Dry kilns, hot water vats
Plant design capacity: 20,000
Heat (Million Btu/hr): 23.1
Steam: 20,000 lbs/hr @ 125 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 21.2
Steam: 18,333 lbs/hr @ 125 psig
Electrical generation (MW): None
Type of combustor/furnace: Dutch oven
Manufacturer: Zinda
Type of boiler: Double drum, water tube, type RO
Boiler manufacturer: Riley
Type of pollution control: Ash separator,
Lear Sigler Monitor
Reason for using wood fuel: Economics

Northwest Hardwoods

20015 - 67th NE
(mailing - P.O. Box 7)
Arlington, WA 98223
Phone: (206) 435-8502
Contact: Dennis Thompson

Type of business: Lumber
Type of biomass fuel: Sander dust
Source of fuel: In-house
Annual biomass fuel consumed: Unknown
Back-up fuel: Natural gas
End use(s): Dry kilns
Plant design capacity:
Heat (Million Btu/hr):
Steam: 18,000 lbs/hr @ 22 psig
Electrical generation (MW):

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 18,000 lbs/hr @ 22 psig
Electrical generation (MW):
Type of combustor/furnace:
Manufacturer:
Type of boiler: Fire tube
Boiler manufacturer: Cleaver Brooks
Type of pollution control: 3 cell bag house
Reason for using wood fuel: It is produced in our lumber finishing process

Oeser Company, The

730 Marine Drive
Bellingham, WA 98225
Phone: (206) 734-1480
Contact: Ronald S. Durbin, Plant Manager

Type of business: Wood treating
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 400 tons (est.)
Back-up fuel: Natural gas
End use(s): Steam heat for treating processes
Plant design capacity:
Heat (Million Btu/hr): 250 - 400 bhp
Steam: _____ lbs/hr @ 120 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 150 bhp
Steam: _____ lbs/hr @ 120 psig
Electrical generation (MW): None
Type of Combustor Furnace: Dutch oven
Manufacturer: Constructed on sight by plant personnel
Type of boiler: Water tube
Boiler manufacturer: Sterling
Type of pollution control: Visual at stack/mix w/natural gas
Reason for using wood fuel: It is a manufacturing by-product, economical, a reliable supply, and otherwise wasted if not used for fuel

Omak Wood Products, Incorporated

Route 2, Box 54
Omak, WA 98841
Phone: (509) 826-1460, ext. 238
Contact: Jerry Gregerson

Type of business: Lumber and plywood
Type of biomass fuel: Hog fuel, sawdust
Source of fuel: In-house & purchased
Annual biomass fuel consumed: 175,200 dry units
Back-up fuel: Natural gas
End use(s): Dry kilns and veneer presses, power generation
Plant design capacity:

Heat (Million Btu/hr):
Steam: 240,000 lbs/hr @ 675 psig
Electrical generation (MW): 7.5

Average plant output:

Heat (Million Btu/hr):
Steam: 160,000 lbs/hr @ 600 psig
Electrical generation (MW): 7.5

Type of combustor/furnace: 2 air suspension type burners
Manufacturer: Riley Boiler
Type of boiler: Water tube
Boiler manufacturer: Riley Stoker, 2 units
Type of pollution control: Wet scrubber
Reason for using wood fuel: By-product of production, disposes production residues.

Plum Creek Manufacturing, L.P. Inc.

Arden Lumber Operations
634 Highway 395 S
Colville, WA 99114
Phone: (509) 684-7738
Contact: John Chopot

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house, sawmill
Annual biomass fuel consumed: 23,937 BDTs
Back-up fuel: Natural gas
End use(s): Dry kilns, space heat
Plant design capacity:

Heat (Million Btu/hr):
Steam: 40,000 lbs/hr @ 150 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: 32,000 lbs/hr @ 125 psig
Electrical generation (MW): None

Type of Combustion/Furnace:**Manufacturer:**

Type of boiler: Single cell
Boiler manufacturer: Kipper & Son
Type of pollution control: Electrostatic precipitator
Reason for using wood fuel: Availability, cost

Port Townsend Paper

P.O. Box 3170
Port Townsend, WA 98368
Phone: (206) 385-3170 ext. 202
Contact: Bruce McComas

Type of business: Pulp and paper
Type of biomass fuel: Hog fuel
Source of fuel: Purchased
Annual biomass fuel consumed: 64,217 dry tons
Back-up fuel: Residual oil
End use(s): Process steam and dryers
Plant design capacity: 2 Hog fuel

Heat (Million Btu/hr):
Steam: 250,000 lbs/hr @ 600 psig
Electrical generation (MW): 18.5

Average plant output:

Heat (Million Btu/hr):
Steam: 133,000 lbs/hr @ 400 psig
Electrical generation (MW): 6.1

Type of combustor/furnace:**Manufacturer: Combustion Engineering****Type of boiler: VU 40****Boiler manufacturer:**

Type of pollution control: Mechanical collectors,
plus wet scrubbers

Reason for using wood fuel: Cost

Rayonier, Incorporated

(formerly ITT Rayonier)

700 N. Ennis Street

Port Angeles, WA 98362-0030

Phone: (206) 457-3391

Contact: Don C. Robertson

Type of business: Pulp

Type of biomass fuel: Hog fuel, primary & sec. sludge mix

Source of fuel: In-house and purchased and produced

Annual biomass fuel consumed: 89,425 BDTs (metric)

Back-up fuel: fuel oil

End use(s): Process steam, dryers

Plant design capacity:

Heat (Million Btu/hr): 290

Steam: 200,000 lbs/hr @ 425 psig

Electrical generation (MW): 12.0

Average plant output:

Heat (Million Btu/hr): 254

Steam: _____ lbs/hr @ 425 psig

Electrical generation (MW): 1.6

Type of combustor/furnace: Hog fuel

Manufacturer: Burnstead-Woolford

Type of boiler: Pin hole stationary grate

Boiler manufacturer: Riley

Type of pollution control: Barron Cinder collectors and
combustion power gravel scrubbers

Reason for using wood fuel: By-product of pulp production

Average plant output:

Heat (Million Btu/hr): 820

Steam: 650,000 lbs/hr @ 225 & 300 psig

Electrical generation (MW): None

Type of combustor/furnace: Dutch oven

Manufacturer: Puget Sound Machinery Depot, B&W
Modification

Type of boiler: 4 drum Stirling

Boiler manufacturer: Same as above

Type of pollution control: Baghouse

Reason for using wood fuel: Economics

Simpson Door Company

McCleary Operations

McCleary, WA 98557

Phone: (206) 495-3291

Contact: Robert K. Horton

Type of business: Doors

Type of biomass fuel: Mill residue

Source of fuel: In-house

Annual biomass fuel consumed: 18,000 dry units

Back-up fuel: Purchased hog fuel

End use(s): Steam for wood drying and heating

Plant design capacity:

Heat (Million Btu/hr): N/A

Steam 45,000 lbs/hr @ 250 psig

Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr): N/A

Steam: 25,000 lbs/hr @ 150 psig

Electrical generation (MW): None

Type of combustor/furnace: Dutch oven

Manufacturer: Batenhauser

Type of boiler: Water tube - 3 pass

Boiler manufacturer: Batenhauser

Type of pollution control: All dry fuel - baghouses
on fuel handling

Reason for using wood fuel: By product of
manufacturing doors

Scott Paper

2600 Federal Avenue

Everett, WA 98220

Phone: (206) 259-7333

Contact: Alex M. Hood

Type of business: Pulp and paper

Type of biomass fuel: Hog fuel

Source of fuel: Purchased and in-house

Annual biomass fuel consumed: 140,000 units

Back-up fuel: #6 oil

End use(s): Process steam, drying

Plant design capacity: 11 boilers (5 are hog fuel)

Heat (Million Btu/hr):

Steam: 5 @ 50,000 lbs/hr @ 225 psig

(hog fuel), 1 @ 120,000 lbs/hr,

3 @ 150,000 lbs/hr,

1 @ 380,000 lbs/hr

Electrical generation (MW): None

(continued on next column)

Simpson Tacoma Kraft Company

801 Portland Avenue
Tacoma, WA 98421
Phone: (206) 572-2150 or 596-0257
Contact: David McEntee

Type of business: Pulp and paper
Type of biomass fuel: Hog fuel
Source of fuel: Purchased
Annual biomass fuel consumed: 174,000 BDTs
Back-up fuel: Bunker C & natural gas
End use(s): Process steam, dryers
Plant design capacity: 1 Hog fuel
Heat (Million Btu/hr): 254
Steam: 225,000 lbs/hr @ 425 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 231,000
Steam: 205,000 lbs/hr @ 425 psig
Electrical generation (MW): None
Type of combustor/furnace: Distributor/Detroit
Hydro-Grate
Manufacturer: Detroit, Stoker
Type of boiler: 2 drum natural circulation
Boiler manufacturer: Riley
Type of pollution control: Electro static precipitator
Reason for using wood fuel: Economics

Simpson Timber Company

Waterfront Street
Shelton, WA 98584
Phone: (206) 426-3381
Contact: Jenny Soehnlein

Type of business: Lumber and Plywood
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 89,000 BDTs
Back-up fuel: None
End use(s): Drying, lumber and plywood veneers
Plant design capacity: 6 fuel cells
Heat (Million Btu/hr): 140 approx.
Steam: 140,000 lbs/hr @ 300 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr): 130 approx.
Steam: 125,000 lbs/hr @ 300 psig
Electrical generation (MW): None
Type of combustor/furnace: Fuel cell
Manufacturer: Wellons
Type of boiler: Water tube
Boiler manufacturer: Wellons
Type of pollution control: Two stage combustion plus multi-cones and electrostatic precipitators
Reason for using wood fuel: Lowest cost, in-house fuel

Smith Street Mill, Incorporated*

3600 Smith Street
Everett, WA 98201
Phone: (206) 252-7179
Contact: Bob Buse

Type of business: Alder sawmill and planning mill
Type of biomass fuel: Alder sawdust and dry shavings
Source of fuel: Sawmill
Annual biomass fuel consumed:
Back-up fuel: None
End use(s): Heat dry kilns
Plant design capacity:
Heat (Million Btu/hr):
Steam: _____ lbs/hr @ 15 psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr):
Steam: _____ lbs/hr @ 15 psig
Electrical generation (MW): None
Type of combustor/furnace: Dutch oven
Manufacturer: In-house
Type of boiler: Low pressure, 2015 lbs.
Boiler manufacturer: Brownell
Type of pollution control:
Reason for using wood fuel: Economics
*1991 Data

Strauser Manufacturing Company

3301 E. Isaacs
Walla Walla, Washington 99362
Phone: (509) 529-6284
Contact: Beverly Strauser

Type of business: Wood products mfg.
Type of biomass fuel: Hogfuel, sawdust, shavings
Back-up fuel:
Source of fuel: In-house
Annual biomass fuel consumed: 3,000 dry tons
End use(s): Space and process heat
Plant design capacity:
Heat (Million Btu/hr):
Steam: 6,000 lbs/hr @ 250 psig
Electrical generation (MW):
Average plant output:
Heat (Million Btu/hr):
Steam: 4,800 lbs @ _____ psig
Electrical generation (MW):
Type of combustor/furnace: Suspension gasifier
Combustor/furnace manufacturer:
Type of boiler: 250 hp Cleaver Brooks
Boiler manufacturer:
Type of pollution control: Flash collector
Reason for Use: Economics

Summit Timber Power House

29917 Bennittville Store Road
Darrington, WA 98241
Phone: (206) 259-4185, ext. 121
Contact: Ed McDaniel, Power House Sup.

Type of business: Wood products
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 36,500 dry tons
Back-up fuel: Bunker C Fossil (oil)
End use(s):
Plant design capacity:
Heat (Million Btu/hr):
Steam: 45,000 lbs/hr @ 150 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr):
Steam: lbs/hr @ _____ psig
Electrical generation (MW): None
Type of combustor/furnace:
Combustor/Furnace manufacturer: Puget Sound Boiler
Type of boiler: Water tube
Boiler manufacturer:
Type of pollution control: Breslove Separator
Reason for using wood fuel: Cost, incinerate wood waste

Tacoma Steam Plant No. 2

Tacoma City Light
P.O. Box 11007
Tacoma, WA 98411
Phone: (206) 502-8324
Contact: Barbara Serr

Type of business: Electric power generation
Type of biomass fuel: Hog fuel, RDF, and coal
Source of fuel: Local area
Annual biomass fuel consumed: 354,200 tons
Back-up fuel: Coal
End use(s): Electricity
Plant design capacity: 820 tons per day
Heat (Million Btu/hr): 831 RDF/wood/coal
Steam:
Electrical generation: 43 MW
Average plant output: 820 tons per day
Heat (Million Btu/hr):
Steam:
Electrical generation: 43 MW
Type of Combustion/Furnace: Fluidized bed
Manufacturer: Energy Products of Idaho
Type of boiler:
Boiler manufacturer:
Type of pollution control: Limestone in bed, baghouses
Reason for using wood fuel: Economics

Vaagen Brothers Lumber Company
(formerly San Poil Lumber Company)

P.O. Box 357
Republic, WA 99166
Phone: (509) 775-3346
Contact: Dave Scott

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 25,000 units
Back-up fuel:

End use(s): Dry kiln

Plant design capacity:

Heat (Million Btu/hr):

Steam: 50,000 lbs/hr @ 150 psig

Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr):

Steam: 30,000 lbs/hr @ 150 psig

Electrical generation (MW):

Type of combustor/furnace: 1D-FD

Manufacturer: Wellons

Type of boiler: Woodwaste fired (bark, etc.)

Boiler manufacturer: Nebraska

Type of pollution control: 8 - 10 CO2 Multicone collector

Reason for using wood fuel: Availability

Vaagen Brothers Lumber, Incorporated

565 W Fifth
Colville, WA 99114
Phone: (509) 684-5071
Contact: Gene Sackman, Supt.

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house
Annual biomass fuel consumed: 25,550 tons
Back-up fuel: No

End use(s): Dry kilns, generator

Plant design capacity:

Heat (Million Btu/hr):

Steam: 60,000 lbs/hr @ 510 psig

Electrical generation (MW): 4,000 kW

(continued on next column)

Average plant output:

Heat (Million Btu/hr):

Steam: 60,000 lbs/hr @ 510 psig

Electrical generation (MW): 4,000 kW

Type of combustor/furnace: Fuel cell 4 cells

Manufacturer: Wellons

Type of boiler: Water tube

Boiler manufacturer: Nebraska

Type of pollution control: Multicones

Reason for using wood fuel: Economics

Vaagen Brothers Lumber, Inc.

P.O. Box 257
Ione, WA 99139
Phone: (509) 442-3511
Contact: Don Curry, Plant Manager

Type of business: Lumber

Type of biomass fuel: Hog fuel

Source of fuel: In-house

Annual biomass fuel consumed: 9,490 tons

Back-up fuel:

End use(s): Dry kilns

Plant design capacity:

Heat (Million Btu/hr): 12.5

Steam: 40,000 lbs/hr @ 150 psig

Electrical generation (MW):

Average plant output:

Heat (Million Btu/hr):

Steam: 30,000 lbs/hr @ 150 psig

Electrical generation (MW):

Type of combustor/furnace: Radiant furn. heating surface

Manufacturer: Wellons

Type of boiler: Water tube

Boiler manufacturer: Nebraska Boiler Company

Type of pollution control: Multicones

Reason for using wood fuel: Cost efficient

W.I. Forest Products*

(also, Crown - Pacific Inland)

2302 E Mallon

Spokane, WA 99202

Phone: (509) 534-1561

Contact: Tom Landwehr

Type of business: Lumber

Type of biomass fuel: Hog fuel

Source of fuel: In-house

Annual biomass fuel consumed: Unknown

Back-up fuel: Natural gas

End use(s): Dry kilns

Plant design capacity:

Heat (Million Btu/hr):

Steam: 30,000 lbs/hr @ 125 psig

Electrical generation (MW): None

Average plant output:

Heat (Million Btu/hr):

Steam: 30,000 lbs/hr @ 125 psig

Electrical generation (MW): None

Type of combustor/furnace:

Manufacturer: Combustion Engineering

Type of boiler: Sterling 3-drum water tube

Boiler manufacturer: Combustion Engineering

Type of pollution control: Mechanical Fabricators baghouse

Reason for using wood fuel: Inexpensive, readily available

*1991 data

West Coast Forest Products, Inc.

19406 68th Drive NE

P.O. Box 365

Arlington, WA 98223

Phone: (206) 435-2175

Contact: Jim Reece or Gary Erickson

Type of business: Lumber remanufacturer

Type of biomass fuel: Shavings

Source of fuel: Planer

Annual biomass fuel consumed: 4,720 Dry tons

Back-up fuel: None

End use(s): Dry kilns

Plant design capacity:

Heat (Million Btu/hr): 22.5

Steam: _____ lbs/hr @ _____ psig

Electrical generation (MW): N/A

(continued on next column)

Average plant output:

Heat (Million Btu/hr):

Steam: _____ lbs/hr @ 100 psig

Electrical generation (MW): None

Type of combustor/furnace:

Manufacturer:

Type of boiler: Fire tube

Boiler manufacturer: Titusville

Type of pollution control: Mikropul Baghouse

Reason for using wood fuel: Cost and availability

Weyerhaeuser Company

P.O. Box 1000

Cosmopolis, WA 98537

Phone: (206) 532-7110

Contact: Paul W. Kelso, P&R Manager

Type of business: Pulp

Type of biomass fuel: Hog fuel

Source of fuel: Purchased & in-house generated

Annual biomass fuel consumed: 80,000 BDTs

Back-up fuel: No. 6 fuel oil

End use(s): Process steam

Plant design capacity:

Heat (Million Btu/hr): 220

Steam: 160,000 lbs/hr @ 850 psig

Electrical generation (MW): 15.0

Average plant output:

Heat (Million Btu/hr): 138

Steam: 100,000 lbs/hr @ 850 psig

Electrical generation (MW): 11

Type of combustor/furnace: Fixed, water cooled,
pin hole grate

Manufacturer: Babcox & Wilcox

Type of boiler: Two Drum Sterling

Boiler manufacturer: Babcox & Wilcox

Type of pollution control: Venturi wet scrubber
& multicones

Reason for using wood fuel: By-product of company, cost

Weyerhaeuser Company

P.O. Box 188
Longview, WA 98632
Phone: (206) 425-2150, ext. 5486
Contact: Jeff Inman

Type of business: Pulp and paperboard
Type of biomass fuel: Hog fuel, clarifier & newsprint sludges
Source of fuel: Purchased and in-house
Annual biomass fuel consumed: 500,000 BDTs
Back-up fuel: Coal, oil, natural gas
End use(s): Process steam, dryers
Plant design capacity: 7 Hog fuel
Heat (Million Btu/hr): 1,180
Steam: 550,000 lbs/hr @ 1,250 psi & 300,000 lbs/hr @ 300 psi
Electrical generation (MW): 30 (hog fuel portion of total)
Average plant output:
Heat (Million Btu/hr): 1,000
Steam: 500,000 lbs/hr @ 1,250 psi & 200,000 lbs/hr @ 300 psi
Electrical generation (MW): 30
Type of combustor/furnace:
Manufacturer: 6 Erie City, 1 Foster Wheeler
Type of boiler: Erie City Fixed Grate, Foster Wheeler Traveling Grate
Boiler manufacturer:
Type of pollution control: Wet scrubber, electrostatic precipitator
Reason for using wood fuel: By-product of company mills

Weyerhaeuser Company

51 Ellis Street
Raymond, WA 98577
Phone: (206) 942-2442
Contact: Jerry Dillayou, Plant Engineer

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house and purchased
Annual biomass fuel consumed:
Back-up fuel: Propane used to preheat on cold start-up
End use(s): Dry kilns
Plant design capacity:
Heat (Million Btu/hr): 70,000,000 (reduced to 55 MM Btu/hr)
Steam: 50,000 lbs/hr @ 200 psig
Electrical generation (MW): None

(continued on next column)

Average plant output:

Heat (Million Btu/hr): 40,000,000 est.
Steam: 40,000 lbs/hr @ 200 psig
Electrical generation (MW): None
Type of combustor/furnace:
Manufacturer: EPI 18 ft. dia. fluid bed burner (reduced to 16 ft. dia.) built in 1974
Type of boiler: Combustion Engineering water tube boiler
Boiler manufacturer:
Type of pollution control: Zurn multiclone
Reason for using wood fuel: Cost residual of lumber plant operation

Weyerhaeuser Company

7001 - 396th Street SE
Snoqualmie Falls, WA 98065
Phone: (206) 888-2511
Contact: Don MacBean, Powerhouse Manager

Type of business: Lumber
Type of biomass fuel: Hog fuel
Source of fuel: In-house and purchased
Annual biomass fuel consumed:
Back-up fuel: None
End use(s): Dry kilns
Plant design capacity: 2 boilers, 270,000 ppH. saturated Steam total
Heat (Million Btu/hr):
Steam: 270,000 lbs/hr @ ____ psig
Electrical generation (MW): None
Average plant output:
Heat (Million Btu/hr): 247,800 Btu both boilers
Steam: 128,000 lbs/hr @ ____ psig (both boilers)
Electrical generation (MW): None
Type of combustor/furnace: Dutch oven and spreader stocker
Manufacturer: One 1969 F.E. Riley 250 lbs sat. Steam 150,000 ppH, one 1930 F.E., PSMD-155 lb sat. steam 120,000 ppH
Type of boiler: Water tube
Boiler manufacturer: Riley
Type of pollution control: AirPol, Inc. Venturi, Wet scrubber
Reason for using wood fuel: By-product

OTHER WOOD COMBUSTION FACILITIES

DeGoede Bulb Farms

409 Mossyrock Road, W
Mossyrock, WA 98564
Phone: (206) 983-3773
Contact: Bob DeGoede

Type of Business: Greenhouse and nursery
Type of Biomass Fuel: Mill residue
Source of Fuel: Purchased
Annual Biomass Fuel Consumed: Approx. 65 truck loads (45' vans)
Back-up Fuel: Propane forced air unit heaters
End Use(s): Greenhouse heating
Plant Design Capacity:
Heat (million Btu/hr): 4,500,000 (depending on fuel moisture content)
Steam (lb/hr @ psig): N/A
Electrical Generation (MW): N/A

Average Plant Output:
Heat (million Btu/hr): 3,000,000 Btu/hr
Steam (lb/hr @ ___ psig): N/A
Electrical Generation (MW): N/A
Type of Combustor/Furnace: Bio-Combustor (gasification process)
Manufacturer: Bio-Mass Burner
Type of Boiler: Hot water - 210°F
Boiler Manufacturer: Vaagen Timber Products
Type of Pollution Control: Gasification/cyclone
Reason for Using Wood Fuel: Less cost

Shelton Corrections Center

P.O. Box 900
Shelton, WA 98584
Phone: (206) 426-443, ext 269
Contact: Charlie Hicks

Type of Business: State institution
Type of Biomass Fuel: Wood pellets
Source of Fuel: Purchased from Manke Lumber
Annual Biomass Fuel Consumed: 7,974.5 bdt
Back-up Fuel: none
End Use(s): Space heat, laundry, kitchen
Plant Design Capacity: 3 boiler
Heat (million Btu/hr):
Steam: 60,000 lb/hr @ 110 psig
Electrical Generation (MW): None
(continued on next column)

Average Plant Output:

Heat (million Btu/hr):
Steam: 16,165 lb/hr @ 110 psig
Electrical Generation (MW): None
Type of Combustor/Furnace: stoker
Manufacturer: Babcock and Wilcox
Type of Boiler: Water tube
Boiler Manufacturer: C.C. Moore & Co. Engineers
Type of Pollution Control: multiclones
Reason for Using Wood Fuel: Emissions problems with coal.

Washington Soldiers Home & Colony

P.O. Box 500
Orting, WA 98360
Phone: (206) 593-2045
Contact: Robert Boyce

Type of Business: Service
Type of Biomass Fuel: Wood pellets
Source of Fuel: Purchased
Annual Biomass Fuel Consumed: 100 bdt (back-up)
Back-up Fuel: Biomass (natural gas - primary fuel)
End Use(s): Space heat and hot water
Plant Design Capacity:
Heat (million Btu/hr):
Steam: 24,500 lbs/hr @ 100 psig
Electrical Generation (MW): None
Average Plant Output:
Heat (million Btu/hr):
Steam: 3,000 lbs/hr
Electrical Generation (MW): none
Type of Combustor/Furnace: Spreader-Stoker
Manufacturer: Wyatt & Kipper and ONB Tri-Fuel
Type of Boiler: Water tube and fire tube
Boiler Manufacturer:
Type of Pollution Control: Cyclone
Reason for Using Wood Fuel: Natural gas curtailment

Washington State Penitentiary

P.O. Box 520
Walla Walla, WA 99362
Phone: (509) 525-3610
Contact: Joe Waiblinger, Plant Mgr.

Type of Business: State Penitentiary
Type of Biomass Fuel: Wood Pellets (back-up fuel)
Source of Fuel: Purchased, Lignetics of Idaho
Annual Biomass Fuel Consumed: 1,600 dry tons
Back-up Fuel: Natural gas (primary fuel)
End Use(s): space heat, laundry, kitchen
Plant Design Capacity: 3 boilers
Heat (million Btu/hr):
Steam (lb/hr @ 125 psig): 75,000
Electrical Generation (MW): None
Average Plant Output:
Heat (million Btu/hr)
Steam (lb/hr @ 125 psig): 32,000 Oct. - Apr;
10,000 May - Sept.
Electrical Generation (MW): None
Type of Combustor/Furnace: Spreader stoker
with pad type grates
Manufacturer: Hoffman Combustion Engineering
Type of Boiler: D type water tube
Boiler Manufacturer: Wyatt Kipper
Type of Pollution Control: Multi-clones
Reason for Using Wood Fuel: Back-up fuel source for
interruptable gas. Emissions problems with coal.

Washington Water Power Company

Kettle Falls, WA 99141
Phone: (509) 738-2449
Contact: Dale Snyder

Type of Business: Electric Utility
Type of Biomass Fuel: Hog fuel
Source of Fuel: Purchased mill residue
Annual Biomass Fuel Consumed: 500,000 green tons
Back-up Fuel: Natural gas
End Use(s): Electrical generation
Plant Design Capacity:
Heat (million Btu/hr): N/A
Steam (lb/hr @ 1,500 psig): 415,000
Electrical Generation (MW): 48 gross
Average Plant Output:
Heat (million Btu/hr): N/A
Steam (lb/hr @ 1,525 psig): 435,000
Electrical Generation (MW): 50.3
(continued on next column)

Type of Combustor/Furnace: Spreader stoker,
moving grate
Manufacturer: Combustion Engineering
Type of Boiler: Water tube Boiler
Manufacturer: Combustion Engineering
Type of Pollution Control: ESP and mechanical
collector
Reason for Using Wood Fuel: Availability

Western State Hospital

P.O. Box 94999
Fort Steilacoom, WA 98494
Phone: (206) 756-2519
Contact: Ronald Hansen

Type of Business: State Hospital
Type of Biomass Fuel: Wood Pellets
Source of Fuel: Purchased, Eureka Pellet Mills
Annual Biomass Fuel Consumed: 750 - 1,000 bds
Back-up Fuel: Natural gas
End Use(s): Back-up fuel
Plant Design Capacity: 3 boilers
Heat (million Btu/hr):
Steam (lb/hr @ 110 psig): 23,000;
60,000; 210,000
Electrical Generation (MW): None
Average Plant Output:
Heat (million Btu/hr):
Steam (lb/hr @ 110 psig): 23,000;
60,000; 210,000
Electrical Generation (MW): None
Type of Combustor/Furnace: Stoker feed peletized
Manufacturer: Hoffman
Type of Boiler: Water tube
Boiler Manufacturer: Garet & Shater; Wyatt-Kipper;
Puget Sound Machine
Type of Pollution Control: Oxygen & CO2 monitor
Reason for Using Wood Fuel: Emissions problems with
coal

Waste Wood Combustion Facilities Listing Changes from 1992 Edition

Name Changes

County

New Name

Old Name

GN Plywood Inc.
Rayonier, Incorporated
Vaagen Brothers Lumber Co.
Crown - Pacific Inland
Kroon, Inc.

Mt. Baker Plywood
ITT Rayonier, Inc.
San Poil Lumber Company
Also using, W.I. Forest Products
Also using, Coastcraft, Inc.

Whatcom
Clallam
Ferry
Spokane
Pierce

Additions

No new additions.

Deletions

Cause

County

ITT Rayonier, Inc. - Grays Harbor	Division closed. Boilers sold to Grays Harbor Paper. L.P.
Pacific Wood Treating	Out of business
Puget Sound Plywood	Out of business
Stevenson Co-Ply, Incorporated	Out of business

Grays Harbor

Clark
Pierce
Skamania

Chapter 3

Ethanol Production

Ethanol

Figure 7

1993 Washington State Ethanol Production

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 8

1993 Ethanol Production

Sorted by Average Ethanol Output

Facility Name	County	Average Ethanol Output (Gallons/Year)	Gross Energy Equivalent ¹ (Million Btu/Year)	End Uses
Georgia Pacific	Whatcom	7,000,000	630,000	Sold
Pabst Brewing Company	Thurston	470,000	42,300	Sold
NW Agri-Products, Inc. ²	Grant	0	0	
Total		7,470,000	672,300	

¹ Energy equivalent based on 90,000 Btu per gallon of ethanol.² Facility is capable of producing 1,000,000 gallons/year, but it did not run in '93. Facility will run sometime in '94.

Ethanol Production Facilities

Georgia-Pacific Corporation

P.O. Box 1236
Bellingham, WA 98225
Phone: (206) 733-4410
Contact: Jan Draut

Type of business: Pulp paper, chemicals
Type of feedstock: Spent pulping liquor
Source of feedstock: Plant
Plant design capacity (gallons/year):
7,000,000 @ 190 proof
(3,000,000 @ 200 proof)
Average plant output (gallons/year):
7,000,000 @ 190 proof,
(3,000,000 @ 200 proof)

NW Agri-Products, Inc.

716 Road NE
Moses Lake, WA 98837
Phone: (509) 762-2818
Contact: Ray Thacker

Type of business: Produce ethanol
Type of feedstock: Potatoes and grain
Source of feedstock: Local processing plants and elevators
Plant design capacity (gallons/year):
1 million @ 200 proof
Average plant output (gallons/year): None
*Did not run in 1993 - hope to start in the spring of 1994

Pabst Brewing Company

P.O. Box 947 1
Olympia, WA 98507
Phone: (206) 754-5010 or 754-5323
Contact: Paul Knight/Paul DeCou

Type of business: Beer
Type of feedstock: Spillage, tank wash outs
Source of feedstock: Plant
Plant design capacity (gallons/year):
1,000,000 @ 200 proof
Average plant output (gallons/year):
470,000 @ 200 proof

Ethanol Production Facilities Listing Changes from 1992 Edition

Name Changes

<u>Old</u>	<u>New</u>	<u>County</u>
Olympia Brewing Company	Pabst Brewing Company	Thurston

No additions or deletions.

Chapter 4

Solid Fuel Processing

Waste Wood

Wood Pellets

Waste Wood

Figure 8

1993 Washington State Waste Wood Processing

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

Table 9

1993 Washington State Waste Wood Processing

Facilities Sorted by Average Plant Output

Facility Name	County	Average Plant Output ¹ (bone dry tons/year)	Gross Energy Equivalent ² (million Btu/year)	End Uses
Recovery 1, Inc.	Pierce	120,000	2,040,000	Hog fuel
N. Mason Fiber Co.	Mason	84,000	1,428,000	Hog fuel
Horizon Wood Recycling	King	78,000	1,326,000	Hog fuel
D4 Care	Snohomish	72,800	1,237,600	Hog fuel
Redmoor Resource Reduction	King	27,600	469,200	Hog fuel
H&H Wood Recyclers, Inc.	Clark	27,300	464,100	Hog fuel
Cedar Grove	King	10,000	170,000	Hog fuel
Rainier Wood Recyclers	King	480	8,160	Hog fuel
Frontier Shavings	Pierce	182	3,094	Hog fuel
EGH Recycling	Grays Harbor	72	1,224	Hog fuel, fire wood
Lloyd Enterprises	King	30	510	Hog fuel
Total		420,464	7,147,888	

¹Includes all end uses (e.g. hog fuel, compost, mulch)²Energy equivalent based on 17 million Btu per ton of waste wood

Note: Unless otherwise given, assumed 5 day work week when quantities provided on a per day basis.

Waste Wood Facilities

Cedar Grove

54 South Dawson
Seattle, WA 98134
Phone: (206) 764-1236
Contact: Jan Ellen

Business: Process wood waste for hog fuel
Type of feedstock: Land clearing debris, brush, pallets
crating, construction waste
Source of feedstock: 50 mile radius
Plant design capacity: 10,000 tons per year
Average plant output: 10,000 tons per year
Type of products: Hog fuel
Product storage capacity: 100,000 tons

D4 Care Construction Recycling Enterprises

3900 180th Place SW
Linwood, WA 98037
Phone: (206) 774-3740
Contact: Doug Irwin

Business: Process wood waste for hog fuel
Type of feedstock: Brush, clean construction
debris, pallets
Source of feedstock: Mobile (U.S. & Canada)
Plant design capacity: 169 tons per hour
Average plant output: 104,000 green tons/year
Type of products: Hog fuel
Product storage capacity: 50,000 tons

EGH Recycling

P.O. Box 757
Elma, WA 98541
Phone: (206) 482-4651
Contact: Richard Idohl or Jerry Goodwin

Business: Process wood waste for hog fuel
Type of feedstock: Clean unpainted wood and pallet stock
mill waste
Source of feedstock: Local mills
Plant design capacity: 12 tons per month (currently,
expected to increase)
Average plant output: 5 - 7 dry tons per month
Type of products: Hog fuel, pallet stock, firewood, pallet
feed
Product storage capacity: 30 - 45 yards in-house

Frontier Shavings, Inc

20410 70th St E. (mailing address)
Bonneylake, WA 98390
Levee Rd. N. (location)
Puyallup, WA
Phone: (206) 922-0376
Contact: Mike Johnson

Business: Process wood waste for hog fuel
Type of feedstock: Clean wood debris, stumps & brush
Source of feedstock: 50-70 mile radius
Plant design capacity: 10,000 -15,000 yards grind
Average plant output: 500 yards
Type of products: Hog fuel
Product storage capacity: 10,000 -15,000 yards

H & H Wood Recyclers, Inc.

P.O. Box 1855
Battle Ground, WA 98604
Phone: (206) 892-2805
Contact: Richard Henker

Business: Process wood waste for hog fuel
Type of feedstock: Dry wood products, untreated wood
Source of feedstock: General Public & construction
contractors
Plant design capacity: 75 to 100 dry units per day
Average plant output: 75 to 100 dry units per day
Type of products: Hog fuel
Product storage capacity: Unlimited

Horizon Wood Recycling, Inc.

P.O. Box 1093
Woodinville, WA 98076
Phone: (206) 827-8761
Contact: Chris Nicholls

Business: Process wood waste for hog fuel
Type of feedstock: Clean wood, construction
debris, pallets
Source of feedstock: Local
Plant design capacity: 500 tons per day
Average plant output: 300 tons per day
Type of products: Chips
Product storage capacity: 8,000 tons

Lloyd Enterprises

P.O. Box 3889
Federal Way, WA 98063
Contact: Gary Cooper
Phone: (206) 874-6692

Business: Process wood waste for hog fuel
Type of feedstock: Stumps, brush, yard waste
Source of feedstock: Mobile, and 50 mile radius
Plant design capacity: Unlimited
Average plant output: 15,000 yards per year
Type of products: Hog fuel, compost
Product storage capacity: Unlimited, 143 acres

North Mason Fiber Co.

Belfair Area Urban
and Commercial Waste
431 NE Log Yard Road
Belfair, WA 98528
Contact: Bob Dressel
Phone: (206) 275-0228

Business: Process wood waste for hog fuel
Type of feedstock: Clean wood debris only. Land
clearing and wood waste
Source of feedstock: Western Washington
Plant design capacity: 600 tons per day
Average plant output: 120,000 tons annually
Type of products: Hog fuel and pulp and paper chips
Product storage capacity: Everything is hauled, 5 acres of
storage

Rainier Wood Recyclers

27529 Covington Way SE
Kent, WA 98042
Contact: Tony Bennett
Phone: (206) 630-3565

Business: Process wood waste for hog fuel
Type of feedstock: Brush and stumps, clean industrial
wood waste
Source of feedstock: Local businesses, on-site grinders
Plant design capacity: 40,000 yards mo.
Average plant output: 20,000 yards mo.
Type of products: Hog fuel, screened hog fuel
Product storage capacity: 40,000 yards

Recovery 1, Inc.

1630 E. 18th St.
Tacoma, WA 98421
Contact: Dave Newbauer
Phone: (206) 627-1180

Business: Process wood waste for hog fuel
Type of feedstock: Demolition debris, stumps, pallets
Source of feedstock: Contractors, land clearing, pallet
rebuilding
Plant design capacity: 120,000 BDTs per year
Average plant output: 60 tons per hour
Type of products: Hog fuel, pulp chips, particle board
Product storage capacity: 2,5000 yards raw, 2,500 yards
processed

Redmoor Resource Recovery, Inc.

P.O. Box 3545
Redmond, WA 98073
Contact: Steve McFall
Phone: (206) 885-9416

Business: Process wood waste for hog fuel
Type of feedstock: 70% used lumber, pallets, crates 30%
stumps
Source of feedstock: Local businesses and contractors
Plant design capacity: 72,000 tons per year
Average plant output: 27,600 tons per year
Type of products: Boiler Fuel
Product storage capacity: Manufacture what is ordered.

Waste Wood Processing Facilities Listing Changes from 1992 Edition

Additions

Cedar Grove
D4 Care
Frontier Shavings
Lloyd Enterprises
North Mason Fiber Co.
Recovery 1, Inc.

County

King
Snohomish
King
King
Mason
Pierce

Deletions

McHugh Recycling
Northwest Wood Recycling
Portside Recycling
Waste Reduction, Inc.

Cause

Went out of business.
See, Rainier Wood Recyclers
Out of business
Out of business

County

Thurston
King
Pierce
Thuston

Name Changes

Old

Horizon Trucking & Excavation, Inc.

New

Horizon Wood Recycling

County

King

Wood Pellets

○ Wood pellets- bone dry tons/year

Figure 9

1993 Washington State Wood Pellet Processing

Source: WSEO, 1994 Washington State Directory of Biomass Energy Facilities

IN - Inactive

Table 10

1993 Wood Pellet Processing

Sorted by Average Plant Output

Facility Name	County	Average Plant Output (BDT/Yr)	Gross Energy Equivalent ¹ (Million Btu)	End Uses
Spokane Pres-To-Logs	Spokane	36,000	612,000	1/4" Diameter wood pellets, 8# logs
Manke Lumber Company	Pierce	30,000	510,000	Wood pellets
Kaaland Mill	Skagit	9,360	159,120	Wood pellets
CD Pellet Company	Okanogan	9,000	153,000	Wood pellets
Seattle-Tacoma Box Co.	King	6,200	105,400	Wood pellets
Simmons Densified Fuels	Yakima	6,000	102,000	1/4" Diameter wood pellets
Wood Pellet Company	Grays Harbor	5,475	93,075	1/4" Diameter wood pellets
Johnson Pellet Mills, Inc.	Snohomish	inactive	inactive	1/4" Diameter wood pellets
MJM Pellet Mills	Okanogan	inactive	inactive	Wood pellets, kitty litter
Total		102,035	1,734,595	

¹Energy equivalent based on 17 million Btu per ton of wood pellets

Wood Pellets

CD Pellet Company

P. O. Box 3185
Omak, WA 98841
Phone: (509) 826- 2059
Contact: Cherie Moomaw

Type of Feedstock: Planner shavings
Source of Feedstock: Local mill
Plant Design Capacity: 9,000 tons per year
Average Plant Output: 9,000 tons per year
Type of Products: Wood pellets
Product Storage Capacity: 3,000 tons

Johnson Pellet Mills, Inc.

P.O. Box 41
Sultan, WA 98294
Phone: (206) 793-3133
Contact: Stan Johnson, Sr.

Type of Feedstock: Fir and Hemlock
Source of Feedstock:
Plant Design Capacity: 14,000
Average Plant Output:
Type of Products: 1/4" wood pellets
Product Storage Capacity: 600 tons
*Note: Plant is inactive, plans to reopen in near future.

Kaaland Mill

P.O. Box 533
Hamilton, WA 98255
Phone: (206) 826-4344
Contact: Don Kaaland

Type of Feedstock: Fir & cedar shavings and sawdust
Source of Feedstock: In-house, purchase
Plant Design Capacity: 60 tons per day
Average plant output: 60 tons per day, 3 days/week
Type of Products: Wood pellets
Product Storage Capacity: 500 tons

MJM Pellet Mill

Rt. 1 Box 104
Brewster, WA 98812
Phone: (509) 689-3188
Contact: Mathew Michaels

Type of Feedstock: Planner shavings
Source of Feedstock: No source of feedstock
Plant Design Capacity: 20 tons per day
Average Plant Output:
Type of Products: Wood pellets, kitty litter
Product Storage Capacity: 100 tons
*Note: Plant is not operating at this time due to lack of feedstock.

Manke Lumber Company

1717 Marine View Drive
Tacoma, Washington 98422
Phone: (206) 572-6252
Contact: Milton Farvour

Type of Feedstock: Sawdust and Shavings
Source of Feedstock: Local mills
Plant Design Capacity: 240 tons/day x 312 days/year =
74,880 tons/year
Average Plant Output: 10 tons/hr @ 20 hrs x 200 day
per yr = 30,000 tons/yr.
Type of Products: Pellets
Product Storage Capacity: 7,500 tons

Seattle-Tacoma Box Co.

23400 71st Place S.
Kent, WA 98032
Phone: (206) 854-9700
Contact: Tom Nist

Type of Feedstock: Fir, Spruce, Pine
Source of Feedstock: In-house & purchased
Plant Design Capacity: 7,000 tons/yr
Average Plant Output: 6,200 tons/yr
Type of Products: Premium Wood Pellets
Product Storage Capacity: 2,500 tons

Wood Pellet Company

P.O. Box 307
Oakville, WA 98568
Phone: (206) 273-6982
Contact: Dick Rathvon

Type of Feedstock: Mill shavings and sawdust
Source of Feedstock: Local mills
Plant Design Capacity: 24 tons per day
Average Plant Output: 15 tons per day
Type of Products: 1/4" pellets, bagged
Product Storage Capacity: 200 tons

Simmons Densified Fuels, Inc.

2318 S. First
Yakima, WA 98903
Phone: (509) 453-6008
Contact: Dave or Ron Simmons

Type of Feedstock: Dry sawdust & shavings
Source of Feedstock: Local cutstock plants
Plant Design Capacity: 84 tons/day,
30,000 tons/yr
Average Plant Output: 30 tons/day,
6,000 tons/yr
Type of Products: 1/4" diameter wood pellets
Product Storage Capacity: 1,000 tons

Spokane Pres-To-Logs

P.O. Box 787
Otis Orchards, WA 99027
Phone: (509) 924-2807
Contact: Dave Armstrong

Type of Feedstock: Dry Planner Shavings
Source of Feedstock: Local mills
Plant Design Capacity: 20,000 tons/yr pellets,
20,000 tons/yr logs
Average Plant Output: 18,000 tons/yr pellets,
18,000 ton/yr logs
Type of Products: 1/4" diameter 1" long pellets
(bulk and bags) 8# logs
Product Storage Capacity: 4,000 tons

Wood Pellet Processing Facilities Listing Changes from 1992 Edition

<u>Deletions</u>	<u>Cause</u>	<u>County</u>
Panorama Wood Products Pope and Talbot, Inc.	No longer producing pellets. Out of business.	Stevens Kitsap

Conversion Table

Conversion Table

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
Bone Dry Ton	1.1023	bone dry ton
Bone Dry Unit	1.2	bone dry ton
Green Ton	(1 - moisture content)	bone dry ton
One Gallon Ethanol	84,610	Btu
One Pound Bone Dry Hog Fuel	8,500	Btu
One Pound MSW	5,000	Btu
One ton	2,000	Pounds
Unit	1.1	Bone Dry Tons

Table of Abbreviations

Table of Abbreviations

BDMT	- bone dry metric ton
BDT	- bone dry ton
BDTs	- bone dry tons
BDT/yr	- bone dry ton per year
BDU	- bone dry unit
bhp	- boiler horse power
Btu	- British thermal unit
hp	- horse power
kW	- kilowatt
kWh	- kilowatt-hour
lb/hr	- pound per hour
lbs/hr	- pounds per hour
MGD	- million gallons per day
MSW	- municipal solid waste
MW	- electric capacity, megawatts
MWh	- electric production, megawatt-hour
psi	- pounds per square inch
psig	- pounds per square inch, guage
RDF	- refuse derived fuel
scf	- standard cubic feet
STP	- sewage treatment plant
WWTF	- waste water treatment facility

Glossary

GLOSSARY*

Anaerobic: Pertaining to the absence of free oxygen.

Anaerobic digestion: A biochemical degradation process that converts complex organic materials to methane and other by-products.

Bioenergy: The conversion of the complex carbohydrates in organic matter into energy, either by using it directly as a fuel or by processing it into liquids and gases that are more efficient.

Biogas: A combustible gas derived from decomposing biological waste.

Biomass: Any organic matter which is available to be used as a fuel on a renewable basis including forest residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residue, aquatic plants, and municipal wastes.

Biomass fuel: Any liquid, solid, or gaseous fuel produced by conversion from biomass.

Boiler horsepower: An arbitrary unit in the English system of measure for the equivalent of 33,480 Btu gross output or evaporation of 34.5 pounds of water per hour at 212°F.

Bone dry (oven dry): Having zero percent moisture content. Wood heated in an oven at a constant temperature of 212°F. or above until its weight stabilizes.

Bone dry unit (BDU): A quantity of wood residue which weighs 2,400 pounds at zero percent moisture content.

British Thermal Unit (Btu): The amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

Capacity: The maximum instantaneous output of a resource, often expressed in kilowatts or megawatts.

Chips: Woody material cut into short, thin wafers, used as a raw material for pulping, fiberboard, or for energy use.

Chip vans: Special construction bottom dump trucks (grain trucks) or conventional tractor-trailer vans used for hauling pulp chips, mill residues, hog fuel, and other biomass of smaller piece sizes.

Cogeneration: The technology of producing electric energy and forms of useful energy (thermal or mechanical) for industrial, commercial, heating, or cooling purposes, through the sequential use of an energy source.

Combustion: A chemical process, especially oxidation, accompanied by the production of heat and light.

Cord: A stack of wood consisting of 128 cubic feet with standard dimensions of 4' x 4' x 8', including air space and bark; typically 1.2 bone dry tons per cord.

Cubic Foot (CF): 12" x 12" x 12" or 1' x 1' x 1'.

Digester: A vessel in which carbon containing biomass is reacted in water in absence of air to produce biogas.

Dry ton: 2,000 pounds of material dried to a constant weight.

Dutch oven furnace: One of the earliest types of furnaces that is a large, rectangular box, lined on the sides and top with fire brick (refractory) that is commonly used for wood firing. Heat is stored in the refractory and radiated to the conical fuel pile in the center of the furnace.

Ethanol: Ethyl alcohol produced by fermentation and distillation.

Feedstock: Any material which is converted to another form or product.

Fly ash: Small ash particles carried in suspension in combustion gases.

Forest residues: Wasted and unutilized wood in the forest, including logging residue, rough, rotten, and dead trees, and annual mortality.

Fossil fuel: A solid, liquid, or gaseous fuel material formed in the ground by chemical and physical changes in plant and animal residues under high temperature and pressure.

Fuel-cell furnace: A variation of the Dutch oven design, that usually incorporates a primary and secondary combustion chamber. The primary is a vertical refractory-lined cylinder with a grate at the bottom in which combustion is partially completed. Combustion is completed in the secondary cell.

Fuel handling system: The delivered wood fuel is unloaded from vans or trucks and transported to a storage pile or bin. From storage, the wood fuel is conveyed mechanically or pneumatically to the energy conversion system.

Gasification: A chemical or heat process used to convert a feedstock to a gaseous form.

Gasifier: A device for converting solid fuel into gaseous fuel. In biomass systems, the process is referred to as pyrolytic distillation. See pyrolysis.

Green ton: 2,000 pounds of undried material, e.g., wood residue including moisture content.

Hogged (hog) fuel: Wood waste such as sawdust, planer shavings, and wood chunks normally used for fuel purposes.

Horsepower: Electrical: A measure of time rate of mechanical energy output. The term is usually applied to electric motors to describe maximum output. 1 electrical horsepower = 0.746 kilowatts = 2,545 British thermal units per hour. Also see Boiler Horsepower.

Kilowatt: 1,000 watts, a measure of electrical power.

Logging residues: The unused portions of saw timber and pole timber trees cut or dilled during the harvesting process.

Megawatt (MW): An electrical generation unit of one million watts or 1,000 kilowatts.

Methane: An odorless, colorless, flammable gas that is the primary constituent of natural gas.

MGD: Million gallons per day.

Mill residue: Wood and bark residues produced in processing lumber.

Moisture content, dry basis (MCDB): Expressed as a percentage of the weight of the oven-dry wood.

$MCWB = (\text{weight wet sample} - \text{weight dry sample}) / \text{weight dry sample} \times 100$

Moisture content, wet basis (MCWB): Expressed as a percentage of the weight of the wood as received.

$(\text{weight wet sample} - \text{weight dry sample}) / \text{weight wet sample} \times 100$

Moisture content (MC): The moisture content is the amount of water contained in the fuel.

Oven dry: See bone dry.

Oven dry ton (ODT): An amount of wood that weighs 2,000 pounds at zero percent moisture content.

Pounds: Pound mass = A unit of mass equal to 0.454 kilograms.

Pound of steam: One pound mass of water converted to steam.

Power conversion factors (rate of flow of energy): Watts = 3.413 British thermal units per hour; kilowatts = 1,000 watts = 1.341 horsepower = 3,413 British thermal units per hour; horsepower = 745.7 watts, etc.

Psi: Pounds of pressure per square inch.

Psig: Pounds/force per square inch gauge.

Pyrolysis: A process of burning at less than stoichiometric conditions involving the physical and chemical decomposition of solid organic matter by action of heat in the absence of oxygen.

RDF: Refuse-derived fuel; the combustible portion of solid waste that has been processed to remove heavier, noncombustible materials.

Renewable energy resource: Any energy resource which has recently originated in the sun, including direct and indirect solar radiation and intermediate solar energy forms such as wind, ocean thermal gradients, ocean currents and waves, hydropower, photovoltaic energy products of photosynthetic processes, organic wastes, and others.

Saturated steam: Steam at the temperature which corresponds to its boiling temperature at the pressure.

SCF: Standard cubic foot.

SCFM: Standard cubic foot per minute.

Scrubber: A device in which combustible or stack gas is cleaned by the spraying of water.

Spreader stoker furnace: Fuel is automatically or mechanically spread across the furnace. A portion is suspension burned, but large pieces fall on a grate.

Steam Turbine: A device for converting energy of high-pressure steam (produced in a boiler) into mechanical power which can then be used to generate electricity.

Turbine: A machine for converting heat energy in steam or high temperature gas into mechanical energy as the high velocity flow of steam or gases passes through successive rows of radial blades fastened to a central shaft.

Unit: 200 cubic feet, bulk measure, used to measure hog fuel, pulp chips, etc. Contains varying amounts of solid material depending on the amount of compaction. It is now more customary to weigh material, correct for moisture, and calculate the number of bone dry tons.

Watt: The common base unit of power in the metric system. 1 kilowatt = 1,000 watts; 1 kWh (kilowatt hour) = the amount of power consumed for one hour. 1 megawatt = 1,000,000 watts.

*Excerpted from: Pacific Northwest and Alaska Bioenergy Program Glossary (1985), and the Department of Energy Biomass Energy Project Development Guidebook.

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