

Woody Biomass for Energy

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Seneca

Who we are

Seneca Family of Companies

- Seneca Sawmill Company
 - 4 Sawmills producing lumber
- Seneca Jones Timber Company
 - Supplying Sawmills with timber
- Seneca Sustainable Energy
 - Using Sawmill residuals and woods biomass for Energy



Seneca Sustainable Energy

□ What:

- 18.8 MW renewable energy facility (wood biomass)
- Cogen . generating power and thermal energy from a single fuel source (wood biomass)
 - Steam . existing dry kilns
 - Steam . power generation
 - 100% of output to the grid
- Provide annual energy needs for 13,000 homes

Seneca Sustainable Energy

□ Why:

- Logical extension of our business
- Help decrease reliance on fossil fuels
- Renewable energy is supported by both the State and Federal Governments
- Renewable Portfolio Standards (RPS)
 - Oregon . 25% by 2025
- Firm source of renewable power
 - Non-firm . solar & wind

Seneca Sustainable Energy

□ Why continued:

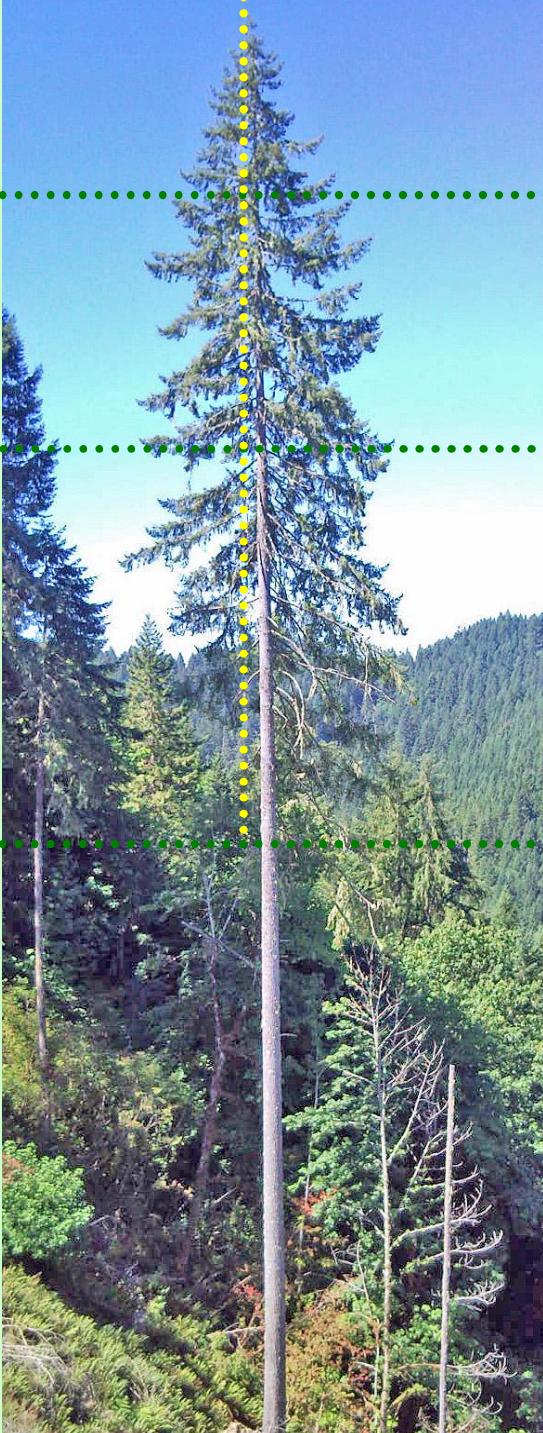
- Discontinue use of natural gas (fossil fuel) at our existing dry kilns
 - Provide the capability to dry larger percentage of our lumber in the future
- Ability to supply 100% of our raw material needs internally
- Full tree utilization at one site õ ..

**Biomass
- Cogen -**



100% Total Tree Utilization

*Seneca Sawmill Company
Seneca Jones Timber Company
Seneca Sustainable Energy*



**1" Whole
Log Chipper**

3.5" Hew Saw

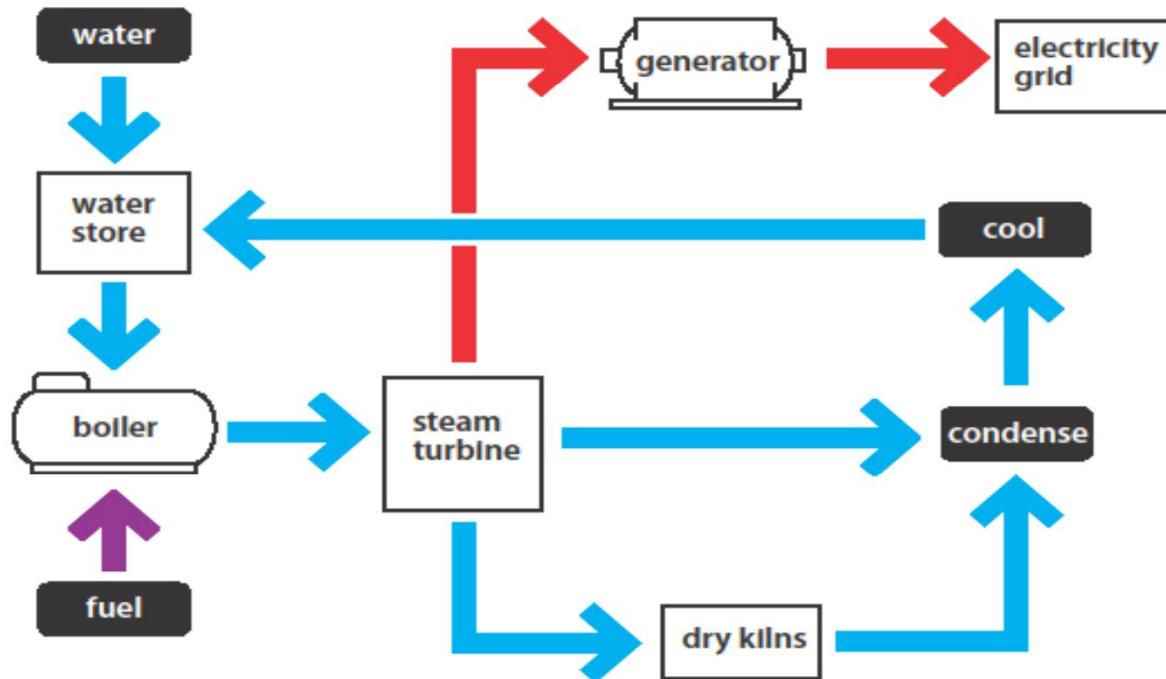
7" Stud Mill

**12" Dimension Mill
- Mill A -**

Cogen 101

Seneca Sustainable Energy Process Flow

January 2009



Seneca Site Location



Startup 2011

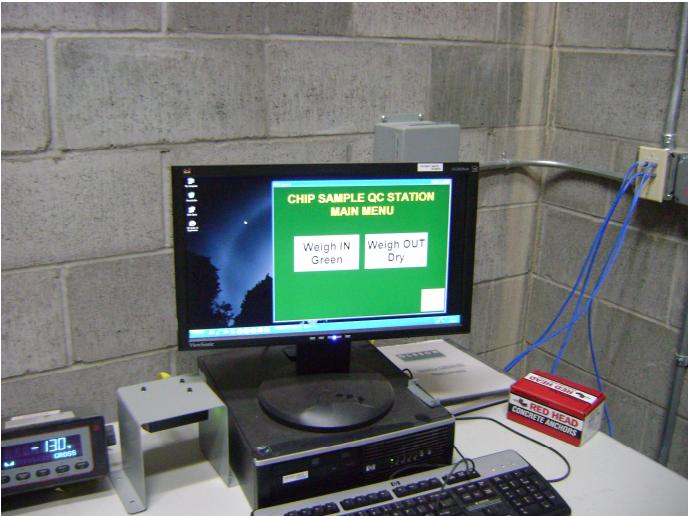


Fuel Handling





Fuel Sampling and Payment



Fuel Variables:

- “ MC%
- “ Quality
- “ Consistency
- “ Payment

“Dry % = BDT





Fuel Storage and Reclaiming



Pile grooming.....



Groomed pile ready for reclaiming



Control Room



Fuel Needs:

- 135,000 BDT\$ annually
- Acceptable fuel (wood biomass)
 - Bark, sawdust, shavings, chips, and forest biomass
 - Unacceptable fuel . treated, painted, resins or glues (ply-trim, MFD/OSB/particleboard)
- Fuel specifications:
 - 5+ from woods
 - 3+ after screening/re-hogging
 - Free of non-combustible material . dirt, rocks, metals

Fuel Needs:

Payment:

- Fuel to be purchased on a BDT basis
- Every load to be tested for MC% and quality
 - Automated sampling process

□ Value:

- Based on market conditions
- Dry content
 - Seasoned fuel
- Quality
 - Collection method

Wood Energy

Higher heating values, BTU/oven-dry pound

	Wood BTU/lb	Bark BTU/lb
Douglas-fir	8,943	9,890
Western Hemlock	8,373	9332
Ponderosa Pine	9,120	9,616
White Fir	8,150	--
Lodgepole Pine	8,600	10,071
Bigleaf Maple	8,405	--
Oregon White Oak	8,110	--
Red Alder	8,000	8,885
Western Red Cedar	9,700	8,700

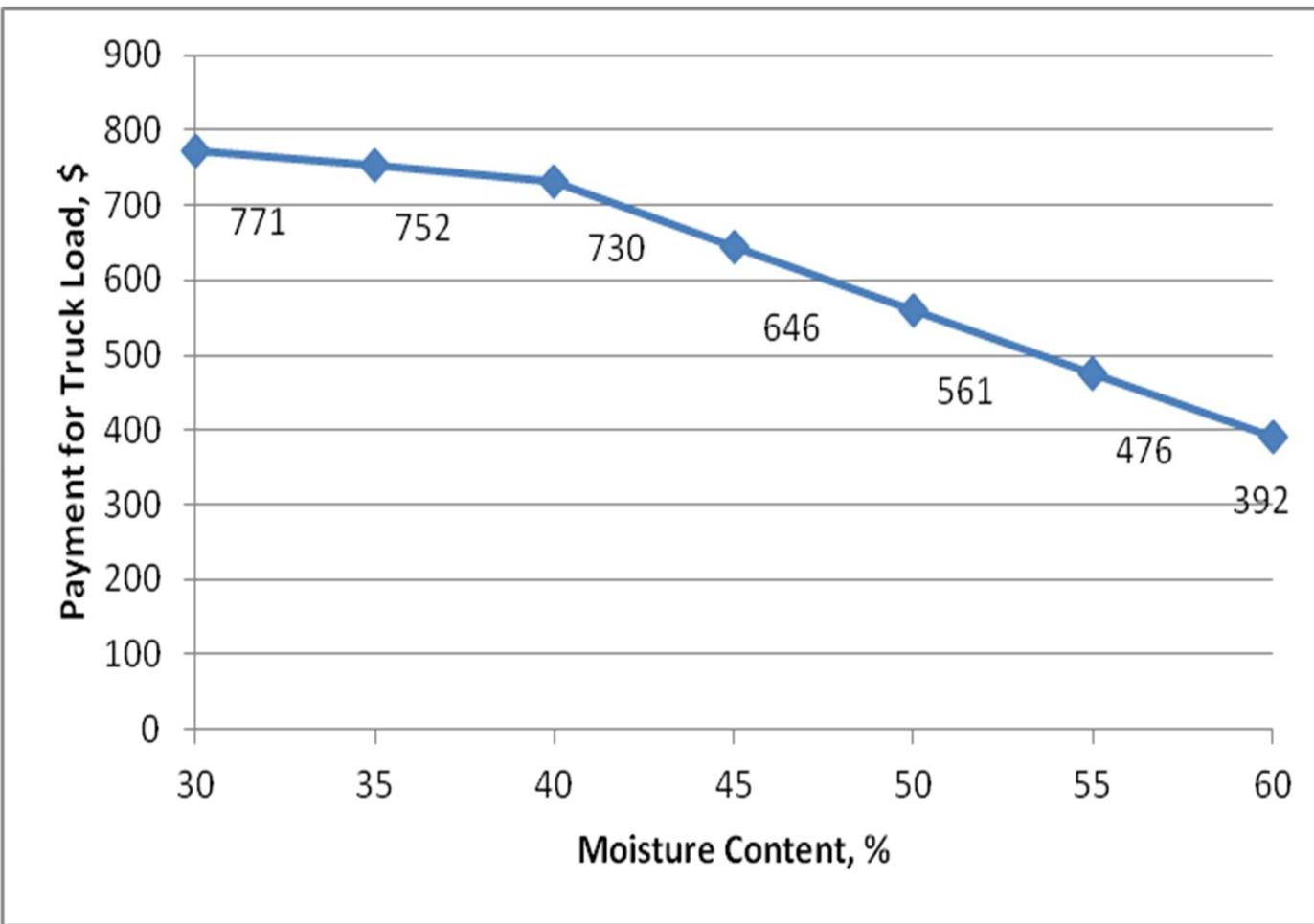
Wood Energy

Moisture Content	Dry Fraction	Green Tons	Dry Tons	MW-hr
wet basis	wet Basis	Per MW-hr	Per MW-hr	Per Dry Ton (BDT)
0	1.00	0.80	0.80	1.243
13	0.87	0.95	0.83	1.206
30	0.70	1.26	0.88	1.135
35	0.65	1.39	0.90	1.108
40	0.60	1.55	0.93	1.075
45	0.55	1.75	0.96	1.037
50	0.50	2.02	1.01	0.991
55	0.45	2.38	1.07	0.935
60	0.40	2.89	1.16	0.865

Biomass Pricing \$

Moisture Content	Dry Fraction	Price \$/BDT	Price \$/GT
wet basis	wet basis		
30.0	0.70	\$45.40	\$31.80
35.0	0.65	\$44.30	\$28.80
40.0	0.60	\$43.00	\$25.80
45.0	0.55	\$41.50	\$22.80
50.0	0.50	\$39.60	\$19.80
55.0	0.45	\$37.40	\$16.80
60.0	0.40	\$34.60	\$13.80

Biomass Pricing \$



Forest Biomass – It's an Opportunity!



Things to Consider

□ Existing Markets

- Find markets in your area
- Research payment options and fuel specifications

□ Contractors

- Find contractors that have markets for fuel
- Make sure contractors are aware of fuel specifications

□ Agreements

- Make sure all agreements are made in writing ahead of time
- Permit all jobs accordingly

Removing Forest Biomass

❑ Collection Methods

- In Unit Collection
- Centralized Collection Sites

❑ Grinding and Hauling

- Centralized Sites
- In Unit

❑ Transportation

- Distance
- Woods Challenges

Forest Biomass – In Unit Collection

Accumulation and forwarding















Road side forwarding











Landing Slash Collection, Grinding & Loading



Forest Biomass – In Unit Chipping

Bruks Chipper





JUL 27 2010



JUL 27 2010



JUL 27 2010



JUL 31 2010

Central Collection / Grinding Site



Large accumulation area



- ” Access constraints
- ” Delivery methods
 - ” Roll-off bin
 - ” Dump truck
 - ” Gondola

Moving Biomass



Landing Piles to be hauled to Site



Excavator Loading Trucks





Trucks Dumping at Site









Excavator Piling Material









Piles Removed from Unit



Benefits

□ Reduction in Costs

- Reduce piling and covering costs
- Reduce associated burning costs and registration fees

□ Other Benefits

- Remove hazardous fuels
- Reduce open burning emissions
- Create energy



Potential impacts

- Increased compaction
- Loss of growing space
 - Piles not removed before planting
- Increased Fire Risk



Grinding and Hauling

Centralized site maximizes efficiency

















Grinding in the woods



Grinding





Transportation - Challenges



Transportation - Challenges



Logging and Processing









04/09/2008



Forest Biomass – Quality

Things to Consider

- Clean up

- There will always be an element of clean up.

- Timing

- The demand for fuel is greater in Winter.
 - Clean up is easier in Summer.

- Types of fuel

- Biomass with larger chunks will stay drier
 - Needles, duff and or organics will hold moisture in Winter









Contaminated Site





Green Material



Biomass Not Utilized



Incentives

Oregon Department of Energy
Tax Credit

\$10 per Bone Dry ton to qualifying
facilities

Review

- Not all units are biomass candidates
 - Market limitations
 - Transportation
- Biomass can reduce Silviculture costs, but will most likely not generate income.

