Northwest CHP Application Center

Combined Heat and Power for the states of
Alaska, Idaho, Montana, Oregon and Washington
in cooperation with the U.S. Department of Energy

Biopower CHP: A Great Duo, Homework Required

David Sjoding
Northwest Clean Energy Application Center

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Hmm – Maybe it's a "Great Quad"?

Lets count:

- **Steam from boiler**
- **Power generation**
- **Carbon credits**
- **Baseload renewable power**

Some history

Forest products:

- **– 1980s – Some mills installed CHP**
- **– Gave a competitive advantage through the years – Control of power costs**
- **– Many mills did not install CHP**

Anaerobic digestion

- **– 1970 to 1990s – Failure rate of 50%**

Conclusion – Homework required

And then

Energy price increases:

- **– 2001-2002 “Perfect Storm”**
- **– CA deregulation, northwest drought**
- **– Natural gas prices higher & volatile (the gas bubble was over)**
- **– Energy costs killing out our industrial base**

Anaerobic digestion

- **– R&D to fix the technology - $5 million at WSU**

Now – The time has come

Biopower CHP:

- **– WA Stimulus (ARRA): 120 MW funded ($30.5 million) & 201 MW under development**
- **– MT Stimulus (ARRA): 8 Technical studies funded**
- **– AK Renewable Energy Fund: $125 million Round 1 & 2 with 20 CHP projects; RFP for Round 3 has closed ($50 million)**
- **– OR: 50% BETC, SELP loans includes renewable CHP, the "Unwritten Policy"**

Anaerobic digestion

- **– Dairy Digesters: 9 revenue streams**

Homework I

Utilities:

- **We have a checkerboard of attitudes**
- **Varies by state and within states**
- **Depends on laws, policy, utility regulations**
- **A key report: Distributed Generation in Oregon: Overview, Regulatory Barriers and Recommendations** http://chpcenternw.org/NwChpDocs/DistGenInOregon_Overview_RegBarriers_Reccomendations.pdf
- **Standby Rates for Customer-Sited Resources from EPA CHP Partnership**
- **Need a good Power Purchase Agreement – 10 years plus**

Homework II

Environmental:

- **– Burning slash piles or to the mill?**
- **– Beyond Waste or to the landfill?**
- **– Output-Based Emissions or Input-Based** http://chpcenternw.org/Library.aspx#environment
- **– A number of air emissions studies under way**

Homework III

Climate change:

- **– Can you sell carbon credits and renewable energy credits?**
- **– Yes, if you have a methane/fossil energy reduction pathway – Did you turn off the fossil energy boiler or shut down dairy lagoon**
- **– State laws can be unclear**
- **– Value not to be missed – Even if bundled**
- **– Selling Carbon Offsets from your Clean Energy Project http://www.chpcenternw.org/NwChpDocs/SellingCarbonOffsets.pdf**

Hog fuel prices – It's not the free fuel it used to be - IV

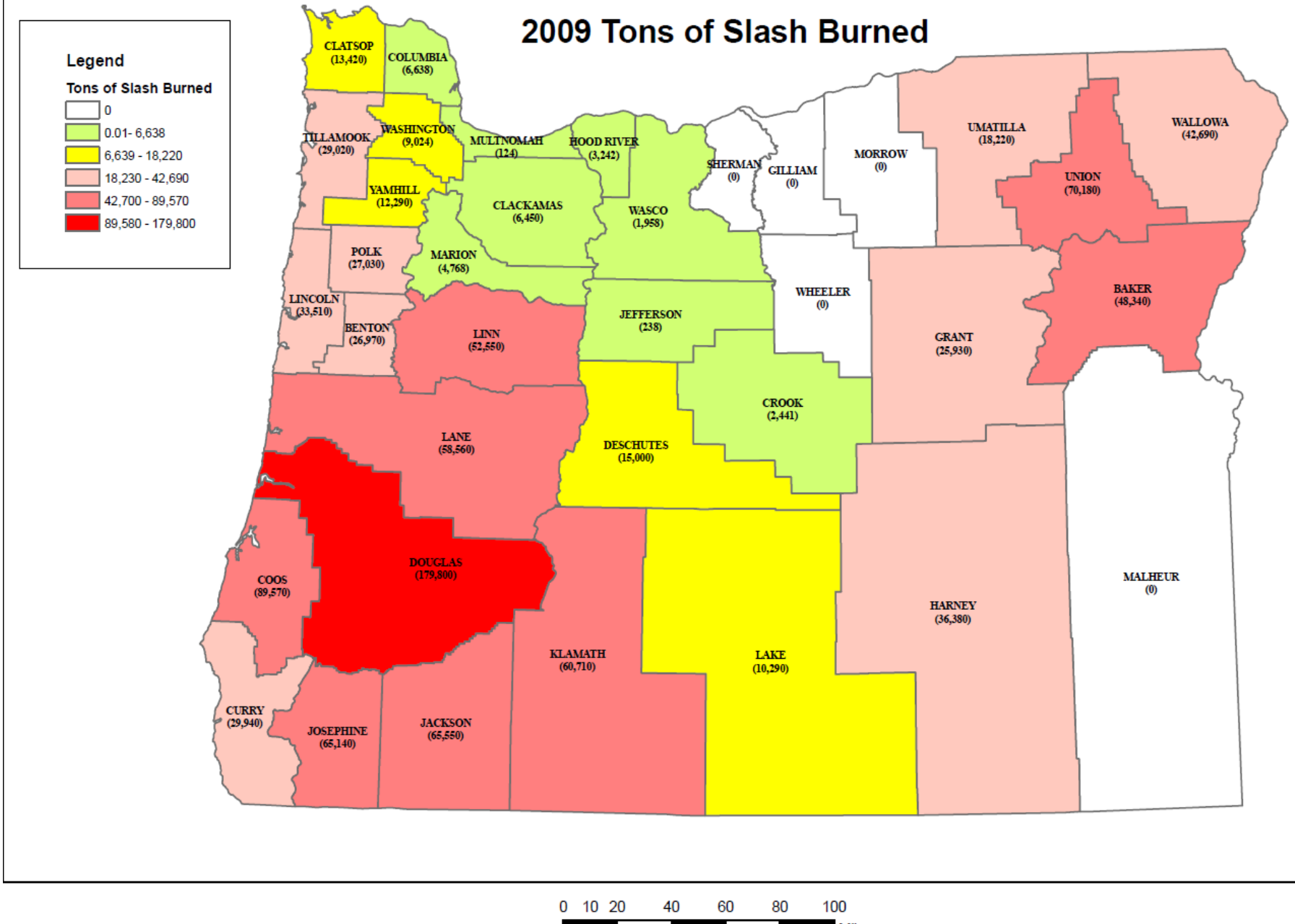
An investment grade study of supply is needed or you own it:

- **Who else is moving forward?**
- **WA Olympic Peninsula example**
- **How local is it?**

We need to maximize what we have

- **Slash is moving to the mills**
- **BCAP and tax incentives**

2009 Tons of Slash Burned



Bioenergy Policy choices

Which policy tectonic plate will win? Do we maximize

- Biofuel production – 36 BGY? – Get out of middle east
- Biopower CHP production – RPS/RES -
- Pellets and torrefaction cubes for Asia and Europe
- Biochar – Carbon negative and healthy soils
- Maximize rural economic development – Which end use yields the most rural jobs, And, who owns?
- Sustainability is an overriding key value – Right?
- What about compost and beauty bark?

Moisture – The target

- **Major efficiency gains to reduce moisture content of the fuel**
- **Biomass Drying and Dewatering for Clean Heat and Power**

http://www.chpcenternw.org/NwChpDocs/BiomassDryingAndDewateringForCleanHeatAndPower.pdf

Solution: Efficiency gains: Getting more out of the fuel

- **CHP itself is an efficiency gain over standalone power generation**
- **What about the mill's waste heat?**
- **Survey it – Can it be recycled?**
- **We have plans for this waste heat**
- **A number of old and newer technologies**

Fuel Drying

Why?

- **Significantly improves the efficiency of the boiler or gasifier.**
- **For boiler:**
  - **5% to 15% improvements in efficiency**

    (Boiler is not an efficient dryer, so dry fuel before boiler.)
  - **50% to 60% more steam production**
- **Improves combustion**
- **Reduces air emissions**

The Key is Heat Recovery

Heat recovery is key to a cost effective dryer project.

- **Recover flue gas of power boiler or gasifier.**
- **Recover heat from other waste heat sources**
- **Recover heat from dryer exhaust.**

Conclusion

- **Economic advantage – Make your own power on-site or sell it/wheel it**
- **Long-term feedstock supply is crucial**
- **Use the feedstock efficiently**
- **BIOMASS CHP – A WINNER!**

Northwest Clean Energy Application Center

About the Center

- A multi-state effort – AK, ID, MT, OR & WA
  - WSU Extension Energy Program serves as lead
  - 100 plus Regional CHP projects totaling over 1,300 MWc
  - 94% industrial projects
  - Technical assistance information, reports and case studies
  - Problem solving & trouble shooting
  - Website www.chpcenternw.org
  - Support of regional & state CHP initiatives

US DOE Clean Energy Application Centers

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