

Renewable Energy in Washington

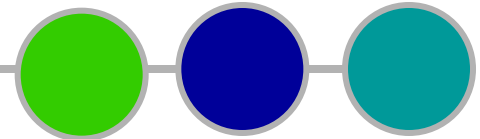
David Sjoding
Renewable Energy Specialist

25x'25 Roundtable
September 24, 2009

Renewable Energy Introduction

The Washington is renewable energy rich

- Wind
- Geothermal
- Solar
- Hydropower
- Ocean wave/tidal
- Bioenergy



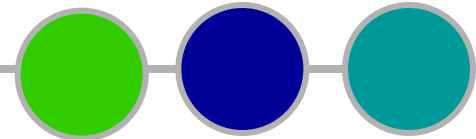
The Context

Over 300 agricultural crops!

- A blessing – Can grow anything in the Columbia Basin
- Tough to get on the same page – 24 Commodity groups

Renewable energy

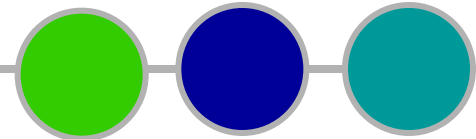
- A rural economic opportunity
- Protection from rising fossil fuel prices
- Keeps energy dollars local/in-state
- Energy independence
- Environmental improvements
- Long history of multi-state cooperation



Renewable Energy Perspectives

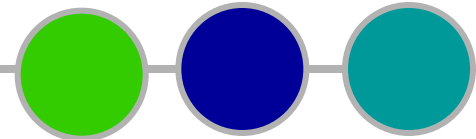
Implementation time is here

- 25 years of research and development pays off
- More RDD&D is needed. The state and its universities have seriously stepped in to fill some gaps
- Multi-state coordination – Since 1983
- Resolving technical and permitting issues
- Funding opportunities and tax incentives



Lessons Learned

- Klickitat County – Non-site specific renewables EIS
 - “Saved the family Farm for a generation” – Dana Peck
- \$13 to 14 Billion petrodollar drain
 - We hit \$3.00/gallon and crossed a political continental divide in our state
- Can we keep these funds in-state?
- “Washington grown, Washington owned”
 - Governor Gregoire – Working Lands Initiative
 - Page directly from Minnesota
- All biomass is local – Transportation costs
- Look for multiple revenue streams
- Sell, not buy – Harsh lesson from power costs of 2002



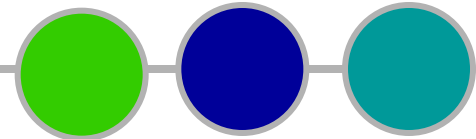
Hydropower

Current status

- Provides a core of cheap regional power
- Washington uses 66 – 70 % hydropower
- How close is WA to meeting the 25x'25 Vision?
- Major economic base
- Huge offset to fossil energy
- We trade hydropower with power from Southwest
- Hydropower & fish biological opinion - Derating

Future

- Low-impact and run of the river
- Turbine redesigns



Wind

Washington ranks fifth

- 1,504 MW current installed capacity
- Maxing out our hydro storage capacity
- Transmission & lower cost systems integration options

Wind mapping

- From gold rush to web-based information (AWS Truewind)
- Needed: Updated wind maps with zoom-in capability

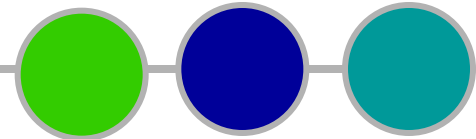
Off shore wind

- Huge resource – Equals many Grand Coulee Dams
- Deep water – Technology is developing

Property taxes and jobs

Energy Facility Site Evaluation Council

- One stop state level permitting



Geothermal – Exploration Needed

Washington Geothermal Status and Roadmap - Draft

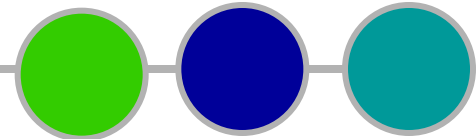
- www.energy.wsu.edu/projects/renewables/geothermal.cfm

Low Temperature

- Washington has a lot of low temperature geothermal – Especially in the Columbia Basin
- Ground Source Heat Pumps and geoexchange

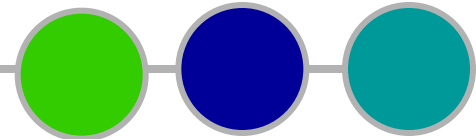
High Temperature – Base load power - Cascades

- Washington is mainly unexplored
- Snohomish PUD – IRP includes – In site specific exploration phase
- BLM/USFS Programmatic EIS is complete
- U.S. Forest Service lands permitting needed
- Least explored of the Western States



Solar

- Forks, WA – Temperate rain forest
 - Germany – World leader in solar installations
 - Forks has better solar insolation than much of Germany
 - Production incentives - \$.15/kWh to \$.54/kWh
 - Off-grid – the least cost choice with high energy efficiency
 - Zero Energy Homes
 - Northwest Solar Center
- www.energy.wsu.edu/projects/renewables/geothermal.cfm

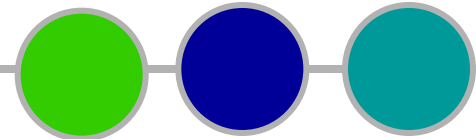


Ocean Wave/Tidal

The no longer forgotten renewable resource

- Ocean wave energy is best from the 45 to 60 degrees latitude - Washington
- Snohomish PUD has 7 tidal sites and up to 100 aMW under analysis with FERC preliminary permits
- Northwest National Marine Renewable Energy Center – Joint OSU & University of Washington

<http://depts.washington.edu/nmrec/>



Bioenergy

Biopower/CHP & Co-products

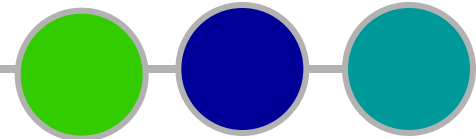
- Anaerobic Digestion
- Pulp & Paper/Forest Products
- I-937 RPS & EPS

Biofuels & Co-products

- RFS goal
- Agronomy work underway

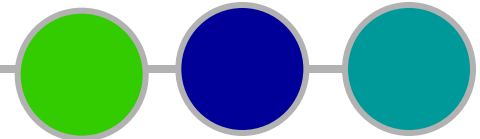
Bioproducts

Strategic Guidance - Analysis



Bioenergy Focus

- National – Research, development and demonstration effort
- Regional activity
- Unique fit among renewables
- Opportunity knocks



Biofuels

Ethanol

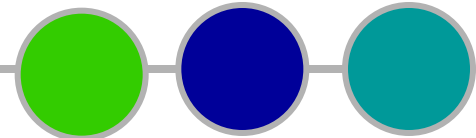
- Two WA production facilities closed (paper mill & brewery)
- Washington has a cellulosic ethanol and algae focus
- University of Washington – Steam explosion for wood
- Boeing & WSU for algae

Biodiesel

- A Northwest advantage – Oilseeds
- Several biodiesel facilities with very different business models
- State funded agronomy at WSU

BioOil/Biochar/Gasification

- Projects under development & research



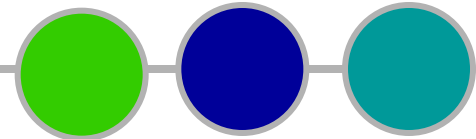
Biopower/CHP

Anaerobic digestion

- 5 dairy digesters on-line - No technical failures
- Economics require multiple revenue streams – Co-digestion
- WSU has over \$5 million in research (mainly nutrient recovery)

Pulp & paper/forest products mills

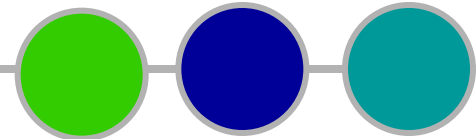
- Simpson Tacoma Kraft mill latest on-line at 60 MWc
- Energy production - A mill survival strategy
- Kudos to Oregon on its tax and grant incentives
- Due to feedstock competition prefer CHP systems
- “Avoid interfering with the current working area for forest biomass collection surrounding an existing fixed location biomass energy production site” – Chapter 163, Laws of 2009



Feedstock Competition & Policy Competition

The search is on for that low value organic waste

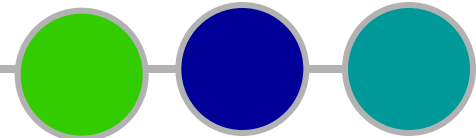
- **The price is rising**
- **Do you own/control the supply?**
- **Can the supply be increased? Certainly – Not a zero sum game – we have a ways to go**
- **Energy crop agronomy is needed**
- **Policies are increasing the competition**



Bioenergy Policy choices

Which policy tectonic plate will win? Do we maximize

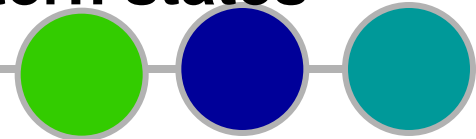
- **Biofuel production – 36 or 60 BGY? – Get out of middle east**
- **Biopower production – Renewable electricity standards**
- **Pellets and torrefaction cubes for Asia and Europe – Kyoto**
- **Biochar – Carbon negative and healthy soils**
- **Maximize rural economic development – Which end use yields the most rural jobs, And, who owns?**
- **Or, are we trading one set of green jobs for another? – The forest products/pulp & paper industry can be helped or hurt**
- **Sustainability is an overriding key value – Right?**
- **What about compost and beauty bark?**



Feedstocks – State based inventories with analysis are essential – A path forward

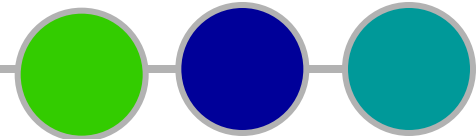
Important for long-term direction and vision

- **Can it really make any difference? Why?**
- **Policy guidance – A strategic foundation stone**
- **Inclusive focus (meticulous counting of all feedstocks)**
- **Funding for research and implementation**
- **Data collection is hard and detailed**
- **A very long track record of national and broad regional inventories undercounting western states**



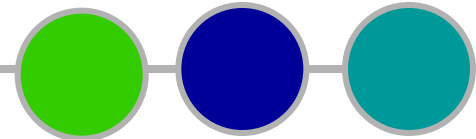
Washington Biomass Inventory and Bioenergy Assessment

- Very strong inventory and assessment with feedstock characterization
- 44 sustainable feedstocks inventoried
- 16.4 million dry tons of underutilized biomass
- 1,700 MWc of potential power
- Growing energy crops would be additional
- www.pacificbiomass.org has an interactive map and database at county level
- Better forest data would add 3 to 13 million more tons sustainable



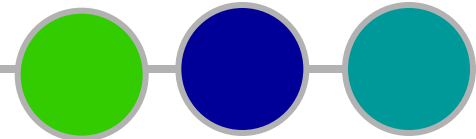
An Economic Development Tool - Biomass Inventory and Bioenergy Assessment

- Project developers get a very quick, detailed and inclusive look at the county level of all biomass opportunities – Answers the “How much?” question
- The second question with diverse feedstocks is “What are the chemical characteristics of each feedstock?”
- Report: Biomass Inventory Technology and Economics Assessment, Report 1. Characteristics of Biomass
http://www.ecy.wa.gov/climatechange/2008CATdocs/IWG/bw/071108_bitea.pdf
- Is there below county level data? – This is where the state hands off to the developer



Concluding thoughts – Examples

- **Spokane's organic waste – Where does it go?**
- **Logging slash – Out of the woods to the mill**
- **Brown grease pre-processing?**
- **Cheap feedstocks will fade**
- **Remember: All biomass is local – Scale for local projects/feedstock supply**
- **The economics will be very interesting**



Pacific Regional Biomass Energy Partnership

Alaska, Hawai'i, Idaho, Oregon, Montana, and Washington



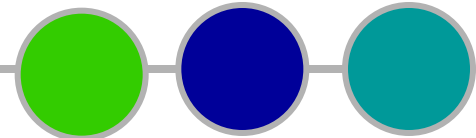
Pacific Region – A six state-based team of AK, HI, ID, MT, OR & WA www.pacificbiomass.org

\$Over \$100 Million in biennial state funds

Functions as a team since 1983

Taken together: A “Complete Program” – Near, mid and long term research; development; demonstration; deployment; policy analysis & legislation; information; outreach

Strong ties to USDA.





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



Northwest CHP Applications Center

- **A multi-state effort – AK, ID, MT, OR & WA**
 - **WSU Extension Energy Program serves as lead**
 - **98 Regional CHP projects total 1,218 MWc**
 - **Combination of industrial and agriculture projects**
 - **Technical assistance information, reports and case studies**
 - **Problem solving & trouble shooting**
 - **Support of regional & state CHP initiatives**
 - **www.chpcenter.org**

Largest Extension-Based Energy Program in the Country

Staff of 77

Engineers

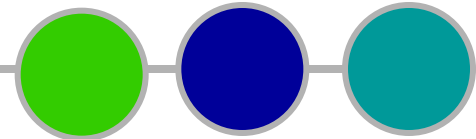
Energy specialists

Scientists

Web and graphics

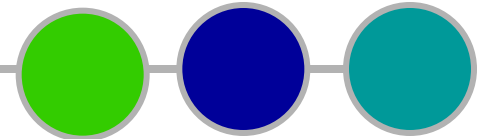
Other professionals

\$6-7 million annual budget



Technical Expertise

- Energy efficiency engineering
- Building sciences and standards
- Renewable resources
- District heating/utilities and distributed generation/combined heat & power
- Federal Energy Management Program support
- Climate change
- Agricultural Energy
- Energy supply and consumption data
- Program research and evaluation



Outreach and Implementation

- One-on-one technical consultations and audits
- Education and training
- Clearinghouse services
- Publication research, development and distribution
- Energy library
- Website development and maintenance
- Software development, distribution and support
- Resource Efficiency Management
- Industries of the Future outreach
- Participation on regional and national advisory and technical committees

