RENEWABLE ENERGY ADVISORY COUNCIL
Notes from meeting on August 10, 2011

Attending from the council:
Jason Busch, Oregon Wave Energy Trust
Robert Grott, Northwest Environmental Business Council
Thor Hinckley, Portland General Electric
Juliet Johnson, Oregon Public Utility Commission
Dick Wanderscheid, Bonneville Environmental Foundation
Tashiana Wangler, Pacific Power

Attending from Energy Trust:
Doug Boleyn
Pete Catching
Amber Cole
Hannah Hacker
Jed Jorgensen
Betsy Kauffman
Elaine Prause
Thad Roth
Lizzie Rubado
Sue Meyer Sample
Adam Shick
John Volkman
Peter West

Others attending:
Joe Eberhardt, PGE
Dan Enloe, Energy Trust Board of Directors
Theresa Gibney, Corvallis Energy Sustainability Coalition
Matt Hale, Oregon Department of Energy
Ben Henson, Renewable Energy Solutions
Matt Jacobs, member of the public
John Reynolds, Energy Trust Board of Directors
Rebecca Sherman, Oregon Department of Energy

1. Welcome and introductions
Betsy Kauffman called the meeting to order at 9:32 a.m. She referenced the handouts available listing the remaining council meetings for the year. The September meeting will include a presentation from Jason Busch. June meeting notes and the agenda were approved.

2. Legislative wrap-up and implications for Energy Trust
Elaine presented on HB 3672 impacts on Energy Trust renewable energy programs in 2012 and beyond. A brief summary of the changes was given, including

- Extension of final certification deadline to Dec 31, 2016, for projects that have Business Energy Tax Credit pre-certifications by July 1, 2011
- The Biomass Collector Tax Credit extended with no cap
- Small changes to Residential Energy Tax Credits for renewable energy, such as the ability for the Oregon Department of Energy to adjust rates depending on the market
- The Business Energy Tax Credit replaced with three income tax credits, undergoing rulemaking this fall: renewable, conservation, transportation. Renewables capped at $1.5M (previously $150 million) and 35 megawatts

Solar residential tax credit impacts: Possible bubble of activity, incentive changes will be held off until more is known and the program plans to commit all available funding in 2011 for both utilities, though it may need to pull from commercial. Elaine showed a table of 2011 available residential solar funding and commitments as of July 1, 2011; including, $7.68 million funding and $7.65 million forecasted to be spent for 0.52 aMW.

Wind residential tax credit impacts: Left unchanged, still no cap. Program sees a small budget impact and will continue with current incentive levels.

Commercial impacts grouped into three categories:

1) Projects with a Business Energy Tax Credit precertification and Energy Trust incentive commitment
    - $3.9 million incentives, 2.4 aMW Pacific Power
    - $7 million incentives, 1.0 aMW PGE
    - About 40 percent of sector budget
    - Plus more than $100,000 added development assistance and staff time
2) Projects with a Business Energy Tax Credit precertification and eligible for Energy Trust incentive but still in review
    - Tier 1 standard projects, approximately 85 not yet Energy Trust
        - Tight to manage Pacific Power budget (+$1 million), solar budget in particular, forecast $100,000 over budget
        - PGE (+$3 million), forecast $100,000 under budget
    - Custom projects: 5 each in Pacific Power and PGE territories
    - $6.1 million, 7.5 aMW
3) Projects without a Business Energy Tax Credit and interested in Energy Trust incentives
    - $2.5 million incentives, 1.0 aMW Pacific Power
    - $1.35 million incentives, 0.76 aMW PGE

    Elaine showed a tabled of proposed custom commitments for each utility, those with and without Business Energy Tax Credits. Expect $1 million overspending in Pacific Power territory if all 8 projects complete. Expect $2.2 million carry over in PGE territory.

In summary, residential side comes down to a potential bubble of solar activity, though the program thinks it will be manageable. Commercial side, may see a bubble in solar, too, but still manageable with no incentive changes. For the custom projects with a Business Energy Tax Credit and Energy Trust incentive, the program needs to commit additional staff time and additional limited dollars to ensure completion.

Theresa: What happens to the credit for a project, with a Business Energy Tax Credit, that does not move forward? Matt Hale: The money will not be redistributed.

Dick: Do we know what ODOE is thinking, will they change the solar rate? Matt: Rulemaking for the Residential Energy Tax Credit will occur after the Business Energy Tax Credit rulemaking. The department will be working with Energy Trust as part of that process.

Post Business Energy Tax Credit outlook

Elaine presented a table showing project types, project details, incentives paid for project types in the past and what incentives would potentially be for a similar project with no Business Energy Tax Credit. Looking forward, the table indicated five project types in Pacific Power territory and three project types in PGE territory that would claim 50 percent of 2012 utility revenues or greater. The table also indicated non-Business Energy Tax Credit project types that would exceed incentive per aMW for residential solar, which is currently the highest water mark for programs.

Overall, the sector can do something for all technologies but wants to do a targeted approach within technologies. Early stage project and market support for non-solar projects and project incentives for smaller capacity projects. Maintaining solar market activity but focus shifting mainly to residential. Less available funding than 2011, more constrained.

- Pacific Power
    - Expect no carryover

  - Solar budget 30 percent smaller, shifting to residential projects
  - Target smaller custom projects for all technologies
- PGE
  - Estimate $2 million to $3 million carryover
  - Solar as lead technology with residential focus
  - Target commercial solar projects that can proceed without a BETC

Juliet: $11.5 million reduction for next year? Elaine: over time we have been using up carryover we've built from previous years. 2012 total activity budget is $14 million (estimated revenues, no carryover). 2011 is $25.5 million, but large portion is carryover.

Juliet: Are you thinking about closing the Business Energy Tax Credit gap with incentives? Elaine: We went through the exercise to see how large the gap is. We won't try to close the gap for every project but may consider it on a case-by-case basis. Peter: The exercise was to see how large the gap was, and we're going to have to help close that gap in some cases to move projects forward. Juliet: Are you increasing incentives? Elaine: Not for standard projects (solar and wind) at this time. For custom projects, each project goes through a custom analysis and going forward we will go through this same process but will include further in-depth analysis of a particular project's gap and weighing that against what's in the pipeline. We could see increased incentives.

Jason: Are you moving toward financing smaller projects? Elaine: That's a trade off, we could support more, smaller projects, or we could support a handful of large projects. Leaving the question of what our role is in the market.

Tashiana: Have you broken down your budget by customer type (residential, commercial, government, nonprofit)? Elaine: We haven't done that but the bulk is commercial. Tashiana: It may help so you're not faced with picking winners or losers but are instead looking at where the demand is and responding.

Theresa: During the legislation, the question was raised as to whether the combined Energy Trust incentives and Business Energy Tax Credits were resulting in returns on investment that were inappropriately high. The Oregon Department of Energy commissioned a study showing estimates of returns on investments. I would support a move to supporting smaller projects to ensure those returns aren't seen again, even though Energy Trust is not subject to the legislation.

Rebecca: Energy Trust staff has been effective in early market support, from the department's perspective this is very helpful, that work is crucial. Betsy: And the trend will be to increase early stage assistance in 2012 and beyond.

3. Hydro projects

Jed presented, referring to the project briefing papers prepared for the council. For projects under a $500,000 incentive, approval from the council is not needed but staff likes to present and gather feedback about the projects (and would like feedback on the format in how projects are presented). For projects receiving an incentive greater than $500,000, where board approval is needed, the board likes to hear the council's recommendations. All projects presented to the council go through a rigorous internal review.

Klamath Irrigation District, 1.1 MW

The project is at the convergence of several irrigation canals on the Klamath Irrigation District, at the site of a former 625 kW project that was operating 25 years ago before it burned and was

removed. Warm Springs Hydro LLC, a third-party Oregon developer with extensive hydro experience brought the project to Energy Trust and will own and operate it. This project does not require any penstock or piping (lowering project costs), and is taking water from all the canals and putting it through the remaining structure from the original system. The developer is leasing the rights to develop the project from the district for 25 years, and after that, they will split the rights 50/50 with the district for an additional 25 years. The project is under the jurisdiction of the Bureau of Reclamation for permitting, instead of the Federal Energy Regulatory Commission. The district had to apply for a Lease of Power Privilege, which results in an annual fee to the Bureau.

The developer has an agreement signed with the district assuring site control, the Lease of Power Privilege is expected to be signed by the end of this month, and the permitting is underway with the Bureau (Energy Trust is providing $40,000 in development assistance for this cost). The state water right is subservient to an existing water right already set for the district. The county still needs to grant a conditional use permit, though it's expected that will be granted in September.

About 50 percent of the design is complete, and the Bureau is the final stop for approval of the design. The interconnection agreement has been signed with Pacific Power and the project will be a qualifying facility. Because a project existed there in the past, interconnection costs are slightly less than average. The Power Purchase Agreement with Pacific Power is in draft form.

Developers expect the project to be complete April 2012, which is crucial to getting the project online before the irrigation season begins.

Two studies were completed on this project to determine water volume for the project, an historical water flow study and a study on how the district could change pumping regimes and move water through its canals to increase flow. Looking at the flows, staff thinks it's possible to hit 3,500 MWh each year if water delivery is sufficient. Predicting water availability is difficult and the staff is assuming, in the analysis, that there will be at least one no-water year. Looking at cash reserves, the project is predicted to survive a no-water year.

This will be about a $2.5 million project, cheaper because no penstock is needed and a Kaplan turbine (Chinese) will be used, which the developer has also used in previous projects. The rest of the costs are standard. The developer is taking advantage of federal depreciation and investment tax credit. They also have a pass-through Business Energy Tax Credit of $328,000. Remainder of funds will come from a $600,000 loan from the district. The district receives revenue from the lease fee and 5 percent interest on the loan.

Project analysis was conducted for a 20-year term, 12 percent discount rate (which is a low rate for a private equity project and aligns with developer's goals). Using the mid-case analysis (assuming a no-water year in Year 3), the above-market cost is $490,000, returning 7.4 percent of the developer's equity and would bring the payback to Year 11.

Energy Trust proposed, and the developer accepted, a $490,000 incentive split in two payments with 84 percent of RECs over 20 years, balancing the developer's appetite for RECs and an incentive. This increases the project's IRR to 12 percent, bringing payback to Year 8. For Energy Trust, the generation will be $1.23 million per aMW, which falls in the middle of project costs for hydro projects.

Dan: Why does this project get an incentive above the program's average ($0.88 million per aMW)? Jed: The average is skewed by Juniper Ridge, the cheapest hydro project we have

done which included significant environmental grants and benefits. This project is strictly a private equity investment. And Energy Trust is entering the project at a fairly low-risk time, after the developer's faced high-risk conditions in the past 2.5 years.

Dan expressed concern with the rate of return the developer will receive. Jed clarified the project would receive a 7 percent return with no Energy Trust investment, and an 11 percent return with the proposed Energy Trust investment, and a simple payback of 8 years. Peter mentioned this is only marginally better than the rate of return allowed to a utility, plus the average is skewed by a very cheap project. Peter also noted that efficiency projects typically pay back in 3 years or less.

[Editorial Note: After the RAC meeting Peter noticed that the rate of return calculated and presented to the RAC was incorrect. Peter calculates the overall rate of return on the project to be 9.45%]

Ben Henson agreed that a 7% return would not be viable for a private equity project.

Elaine added that Energy Trust does a survey every year to see rates of return projects receive across the technology spectrum and the average was 15 percent.

Dick: What is the positive risk? If they generate more than 3,500 MWh do we get more RECs? Jed: The project would benefit if that was the case, which is pretty typical for our projects. We like to set a floor for the projects and additional returns flow to the project owners.

Jed clarified the Bureau lease is for 40 years and the Energy Trust incentive is split into two payments to provide security that the project is operating at sufficient levels. Another option is for the project to hold a letter of credit for the incentive but this brings additional costs. Also, the $11/REC was determined by taking the percentage of above-market costs we are contributing (84 percent) and the levelized cost of RECs at that percentage. We typically pay more than market (which is currently at about $8/levelized REC).

Jason: Have you ever looked at the rate of return with a project using a U.S. made turbine? Jed: Swallley and Juniper Ridge used U.S. turbines. Returns are largely dependent on the efficiency of the turbine compared to its overall cost. Many Chinese turbines are comparable, in terms of efficiency, to a US turbine.

Three Sisters Irrigation District, 800 kW

This is a project that will generate about 3,100 MWh, and will be a Pacific Power qualifying facility. This is a municipal-owned project on Whychus Creek (which for 100 years would run dry as a result of the district's activity). The district has gone through extensive water conservation activities, half of the district is piped, benefiting stream habitat and wildlife. The district wants the project to stay cash positive so they can pipe additional canals. The last portion of penstock piping was paid through a $2 million DEQ loan and the district will use energy revenues to pay back the loan.

The district opted for one turbine that runs at maximum efficiency for the majority of the irrigation season. The project is located in Central Electric Co-op territory, but the co-op was not interested in purchasing the power. Instead, the power will be wheeled from CEC to a Bonneville substation where Pacific Power also connects to. The wheeling charge is expensive and has driven the project's capacity and economics. Also, as a nonprofit, the district is unable to use federal tax credits and depreciation. The project was unable to secure a Business Energy Tax Credit due to the need to decrease the project size to account for the wheeling costs. The

project will win a Bureau of Reclamation WaterSMART grant contingent on proving financial stability by the end of August.

The district has complete site control but permitting work (FERC, state expedited water rights, county conditional use permit) has not begun. Final design is pending based on securing financing. Wheeling will cost about $59,000 per year to move the power to the Bonneville substation, plus another $9,000 for Bonneville moving the power to Pacific Power. Interconnection costs are based on engineering estimates and the district initiated power purchase agreement discussions with Pacific Power. Also, because of wheeling, they will have to schedule their power on a daily basis, resulting in administrative time. The WaterSMART grant is at risk and the district needs to present to the Bureau at the end of August.

The district has senior water rights and has plenty of resource. Staff looked at 45 years of flow records and low-flow years dropped 10-20 percent at the most.

Project costs are approximately $2.23 million, plus approximately $200,000 in annual operating costs. The project is expected to come on line in 2013.

The project was analyzed on a 20-year term and the above-market costs came out to $1.25 million, paid back at 23 years at a -6 percent IRR, wheeling fee dragging down the project's performance. Energy Trust proposed four incentive payments: $700,000 in Year 1 and $100,000 for the following three years. This brings payback to Year 18 and IRR to 2 percent. Even though small, the IRR is acceptable to the district as they want to stay cash positive. RECs will be 69 percent – all of the output for 14 years. The cost to Energy Trust would be $2.8 million per aMW, still low and within the range the program expected to pay this year.

There is a small risk with the resource (water variability) and if the district must, they will put an assessment on their members during a bad water year.

Steve Anderson of Evergreen Energy conducted a third-party assessment of the project. He saw the assessment similar to Energy Trust's assessment but sees a little more risk in increasing costs.

For paying the incentive, $600,000 will come from Other Renewables budget and $400,000 from the Biopower budget. This leaves $150,000 in the Other Renewables budget for project assistance for remainder of year.

Rebecca: What criteria are used when determining at what point an Energy Trust incentive is committed? Jed: In this case it is largely driven by the pending WaterSMART grant. In addition, money that is committed goes back into the budget for any project that does not operate.

John: Why is the wheeling fee so high? Jed: The wheeling fee was determined by CEC, which worked with FERC. Peter mentioned we've worked with two large wind projects with Pacific Power where power was wheeled.

Jed clarified this is one of the first hydro projects that does not have a Business Energy Tax Credit, though a project last year started without a Business Energy Tax Credit even though it did receive one in the end.

Jason: Are these two projects what consist of the hydro pipeline? Jed: We aren't competing these two projects, though we may have to compete projects next year. There is a large pipeline of hydro projects, none of which is close to being ready for our assistance. Jason: It would be

helpful to have a list of all completed projects and projects in the pipeline. Tashiana: And to also know how the projects fit into larger sector and organization goals.

Tashiana: Is it usual to fund a project not in Pacific Power territory? Jed: It's not typical. Betsy: Our requirement is that the power be sold to Pacific Power or PGE, not that they are located in the service territories.

Robert: There is a great societal value in districts piping their canals. Would Energy Trust consider providing production incentives instead of lump-sum payments? Jed: We've done it both ways, and there are 1-2 biopower projects that are on a production incentive. Overall, we can work with the developer and be flexible on how we structure the payments.

Jason: What provisions does Energy Trust have to compare projects where one has IRR and the other has environmental benefits? Jed: The statute says to pay above-market costs for qualifying projects that are generating energy for our customers.

Next steps, the project will be presented to the board and we are looking for the council's endorsement on this project. Tashiana expressed she is not supportive of the project at this time as the project isn't in their service territory, it's financing isn't all tied up and is pulling budget from another program (Biopower). Peter said if it is the interest of the utilities to require projects be located within their service territories, that is a policy or criteria that will have to be considered and approved by the board. The Oregon Department of Energy strongly supports the project, for both the generation as well as the habitat restoration aspects; also, Energy Trust is the only entity that can step in and secure the WaterSMART grant.

Editorial Note: Following the RAC meeting ODOE submitted their quote for the record. It follows:

> *"The Department of Energy supports Energy Trust staff's proposal to fund the Three Sisters Irrigation District project. We concur with other RAC members that Energy Trust deserves substantial credit for supporting a project that goes beyond simple electricity benefits to public-purpose charge customers. This project enriches the Sisters community, avoids assessing rural irrigation customers, and pays for unique environmental benefits on a stream that is regionally important for steelhead restoration. Our Department believes that these benefits cascade to all Oregonians.*
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> *Wychus Creek is the focus of steelhead reintroduction in the Deschutes basin. Many other programs conduct habitat restoration, which is wonderful, but only Three Sisters Irrigation District can put more water in the stream. They are proposing to do just that by piping up their network, but they can only maintain the costs if they have a revenue source – the hydropower project.*
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> *Energy Trust is in a position to be the white knight, offering a critical incentive in time to leverage federal funds from Bureau of Reclamation. No other funder can make this offer. If Energy Trust does not offer its support at this moment, the project will face significant financing barriers. Energy Trust's offer also ensures that the District does not have to choose between the hydropower project and imposing a levy on its members and customers.*
>
> *If the Three Sisters hydropower project meets Energy Trust's metrics, the Department is fully supportive of the incentive and commends staff for developing such a valuable proposal."*

4. Biopower projects
Thad Roth presented, referring to the project briefing papers prepared for the council, and said he would largely focus on the energy component of each project even though both have other non-energy benefits.

Thad first provided an update on the TMF Biofuels project brought to the council June 22, before it was known the Biomass Producer Collector Tax Credit was to be changed and extended by the Oregon Legislature. Because of that, the project was reevaluated because the tax credit benefit would be equivalent or greater than the Energy Trust incentive, allowing Energy Trust to make another offer to the project. However, the project elected to take the tax credit instead of the incentive. The project would have been a $2,5 million incentive. Thad is also communicating with another dairy biomass project owner and will have more information in the coming months.

Wallowa Resources, 100 kW
Wallowa County Integrated Biomass Energy Center, IBEC, will install a woody biomass, gas-fired boiler and integrate two ORC generators to produce energy and deliver heat to co-located companies at the Wallowa County Wood Products Campus. This will be the first such system in Oregon (even though other similar systems are in Oregon, they do not generate electricity).

The resource is coming from the Wood Products Campus. The project will be net-metered to Pacific Power. Wallowa Resources Community Solutions is the primary project owner within the IBEC, and their main motivation is economic development utilizing a natural resource base in the county with a focus on renewable energy. Ben added its goal is to bring back forest industry jobs that were lost and to create an energy economy. Thad said the end goal is jobs. For Energy Trust, this project meets our goals of supporting projects that expand forest biomass residues. Most woody biomass projects are greater than 20 MW or out of our program reach due to the capital cost of the projects. This smaller project is an opportunity to see if there is a different way that we can participate in woody biomass projects.

In 2009, Energy Trust co-funded a feasibility study to look at feedstock availability. There's about 60,000 green tons of fuel available, a significant amount of resource for the project. The co-located businesses on the campus will be providing the feedstock and benefiting from the generation. Using the feedstock on-site removes transportation costs, creating a synergy between the companies located there.

The benefit of gasification (with a solid fuel) is creating a gas that can be cleaned up, resulting in less particulates when the gas is combusted. Attached to the system is an ORC generator (works by a fluid you apply heat to and the vapor drives gears that drive the generator) developed by Electratherm. The system converts woody biomass into hot water.

Even though we haven't worked with this type of technology, the ORC was used in the Klamath Falls geothermal project we helped fund and has been available for more than 50 years.

The total project cost is $1.25 million. The project received federal ARRA funding of $500,000, which went through the Oregon Department of Energy. In addition, as a for-profit owner that is under the umbrella of a non-profit they are taking advantage of a federal tax credit, accelerated depreciation and a Business Energy Tax Credit pass-through. With the federal funds, project cost goes down to $400,000 and the project owner will not need long-term debt financing. In the end, Energy Trust calculates project cost at $375,000.

The modular system will be operated by Integrated Biomass Resources, and they bring extensive boiler experience. Revenues include selling electricity and heat to the local businesses. If purchasers move, the system can be moved to supply the energy to other identified loads.

Looked at on a 15-year horizon, the project had an above-market cost of $116,000, with an incentive of $70,000, bringing the rate of return to 10 percent. Cost to Energy Trust is $950,000 per aMW and 55 percent of RECs will go to Energy Trust.

Jason: What about air permits? Ben: Emissions fall lower than required for permitting. Thad: Plus, the combustion is the gas, not the fuel, making it a very clean project.

Thad clarified this project, even though small, will help us determine how to scale such a project in the future.

City of Pendleton, 195 kW
One of the most successful partners in biomass is wastewater treatment facilitates. In Oregon, there are 28 wastewater treatment facilities that use anaerobic digestion, only nine utilizing the methane for electricity generation. The Pacific Northwest is an exception to a country-wide practice where the methane is instead flared.

The City of Pendleton is proposing to replace its methane/natural gas boiler with three micro-turbines to generate electricity and offset energy use by helping to heat the facility (a net-metered project with Pacific Power), a total of 130 kW generation with Capstone micro-turbines. The city will install a receiving facility for low solids content organics and FOG (fats, oils and grease) to increase methane production through co-digestion with the biosolids.

This project will demonstrate the opportunity to generate electricity at a smaller wastewater treatment facility and determine the viability of diverting low solids organics from the solid waste stream to capture embedded energy, improve environmental disposal of challenging waste streams and reduce wastewater collection system maintenance costs.

Kennedy Jenks conducted a feasibility study in 2009 to determine methane production and feedstock analysis. Starting in 2012, expect 130 kW generation with existing wastewater treatment process plus another 200 kW from FOG and other biosolids. However, the city was unable to secure contracts with the resource providers and instead of installing two large turbines, will be installing three smaller ones. In the end, it is a conservative decision.

Micro-turbines are modular, meaning you can add additional units as you need to. The challenge for the city will be in the gas cleaning; they have contracted with Capstone to operate the turbines for the first five years to gain experience in their operations and maintenance.

The receiving facility will be heated to maintain appropriate temperature to allow for optimal mixing of the resource.

The cost is higher than other projects, and twice as expensive as the Revolution Energy Systems project last year. Drivers: this is more than an energy project; this is a waste management project in addition to an energy project. The city has put in place capacity and assets that they expect won't be fully utilized for the next 10-15 years. The overcapacity, as well as additional equipment installed that are not essential to generating energy, are driving costs up.

Financing: $900,000 pass-through Business Energy Tax Credit, grants and low cost financing for non-energy capital investments. The energy project is part of a larger capital improvement plan ($15.8 million). A successful project from the city's perspective is that the project needs to pay for itself in 20 years.

At a 25 year term and return on investment at 8 percent, the above-market cost is $1.6 million. The program is proposing a $450,000 incentive because overall we're trying to manage our budget to match the goals of the project. With the Business Energy Tax Credit and the $450,000 Energy Trust incentive, that meets the city's expectations and brings the project within a 17 year payback. Plus, if the city adds additional engines, as they plan to do, the payback will be even better.

Robert: This is a great project that utilizes existing capital to make energy versus installing new capital. Is Capstone doing the gas cleaning? Thad: We will look into this, most likely it is.

Robert: Risk with Capstone, expensive but really the only product out there? Peter: In all contracts, we have a claw back provision in case they are not generating.

5. Public comment
There was no public comment.

6. Meeting adjournment
Betsy thanked all council members for their participation and adjourned the meeting at 12:26 p.m. The next full council meeting is September 14, 2011.