RENEWABLE ENERGY ADVISORY COUNCIL
Notes from meeting on September 12, 2012

Attending from the council:
Glenn Montgomery, OSEIA
Matt Hale, Oregon Department of Energy
Dick Wanderscheid, Bonneville Environmental Foundation
Jason Busch, OWET
Suzanne Leta Liou
Juliet Johnson, OPUC
Megan Decker, RNP
Bruce Barney, PGE
Bruce Griswold, Pacific Power

Attending from Energy Trust:
Kacia Brockman
Chris Dearth
Sue Fletcher
Betsy Kauffman
Peter West
Sue Meyer Sample
Jed Jorgensen
Shelly Carlton
Dave McClelland
Thad Roth

Others attending:
John Reynolds, Energy Trust board member
Alisa Dunlap, Pacific Power
Mark Kendall, Energy Trust board member
Lauren Shapton, PGE

1. Welcome and introductions

Betsy Kauffman called the meeting to order at 9:30 a.m. No adjustments to the notes were suggested. The notes were approved. The meeting agenda and presentation materials are available on Energy Trust's website at www.energytrust.org/About/public-meetings/REACouncil.aspx.

Betsy announced that Thor Hinckley is no longer on the council and has been replaced by Bruce Barney. Thor made great contributions to the council. He is out of town and Betsy will thank him for his service. Lauren Shapton of PGE introduced Bruce and said that he has been working on solar for years and this change allows both Thor and Bruce to take on new responsibilities.

Bruce said that he has been with PGE for 11-12 years primarily in project management in dispatchable standby generation. He has knowledge in interconnections, is involved in net metering and feed-in tariff installations, and has a 3-kW system at home.

2. 2013-14 budget themes

Thad Roth presented the 2013-2014 budget themes. The discussion today is not about numbers, which will come later in the budget process. Today the presentation is on budget themes, status of activity for 2012 and the calendar for the budget process. Energy Trust staff are waiting for revenue forecasts from the utilities by the end of the week. The importance of today is to give a sense of how staff is thinking about 2013 and how will the program adjust to meet challenges. Thad said he is looking for council feedback today.

Thad will be covering challenging market fundamentals, how they affect Energy Trust and how staff will respond to those challenges and build a market for distributed renewables in Oregon.

He will cover technologies, market opportunities, the effort to develop markets and the competitive process for incentives.

These themes represent a continuation of the strategy Energy Trust has been deploying for the last two years. Not all of these challenges affect technologies the same way.

The challenging market fundamentals called out:

1. Federal incentives: Production Tax Credit has a year-end expiration date. This is important to remember. The fall election might also be an impact. At a minimum there will be a gap in timing. The U.S. Department of Agriculture has had a significant energy component in its budget and has supported rural projects. Those incentives are also being reduced. That impacts a number of the technologies that Energy Trust supports.
2. State incentive reductions: New versions of these programs are in place with permanent or temporary rules. Budgets are dramatically reduced. That hole creates a challenge for Energy Trust, and is a funding gap Energy Trust incentives cannot fill. There are still targeted programs available. There is a Biomass Producer or Collector tax credit that still exists without a cap. It supports woody biomass and other biofuels and helps fill the gap there.

Matt Hale: The next auction for the renewable development grant is about to be issued by the Department of Revenue. The credits will be sold in $500 chunks. The lowest bid accepted will be $475. Announcement of this auction will be coming shortly. It is not a pass through but a grant. Also, $250,000 per project is the cap.

3. Low wholesale/avoided cost rates: Conditions are challenging in the wholesale energy market. Energy is cheap right now and is expected to stay that way.
4. Near-term Renewable Portfolio Standard requirements: In Oregon, RPS requirements are met through 2018-2020. Even in Washington it looks in hand through 2016.
5. Energy Trust budget plateau: In the past Energy Trust has had carry-forward budget. Those funds have been distributed to projects. Now Energy Trust has a $14.5 million budget. These numbers approximately translate to $8 million in PGE territory and $6 million in Pacific Power territory.

The question is how does Energy Trust continue to grow its portfolio given these conditions? Thad said this is what the council will be talking about today.

Energy Trust's portfolio approach allows the program to support a variety of technologies, biomass, geothermal, small wind, hydro and solar. Energy Trust staff has followed this approach for several years, and has discussed this approach in the past at council meeting. The overall feedback has been to support a full range of technologies and staff plans to continue this portfolio approach in the 2013 budget. It allows Energy Trust to respond to market changes, does not require picking a winning technology and allows staff to work statewide most effectively. It also helps meet generation goals through management of the portfolio. Energy Trust is working with the Oregon Public Utility Commission to reestablish performance measures for the renewable energy sector. The conversation with the OPUC will address annual funding and support of generation goals given changes in tax credits. Staff expects results of these conversations by the end of the year.

Right now, Energy Trust responds to the market and meets it where it is prepared to develop. Fifty percent or more of Energy Trust incentives have gone to net-metered projects or smaller projects. That will continue with solar but that will also happen more on the custom side.

Because of budget constraints Energy Trust will not be able to support as many larger projects, and the avoided-cost rates make developing qualifying facilities more challenging. Think of a small waste water treatment plant, $1.5 to $2 million project cost, 200-kW nameplate capacity, as a good example of a custom project Energy Trust can support moving forward. Energy Trust will see bigger projects but they will be fewer and farther between. It is also more likely that there will be projects on the public side.

As expected in a tough market, Energy Trust will need more marketing and outreach. Staff hasn't been doing much marketing recently but anticipates a need now. Staff also expects to need to do research to identify opportunities and determine which projects to pursue. They see an opportunity to document performance to create replicable models. Examples here include biogas plants and wastewater treatment plants.

Energy Trust has always provided development assistance, and has done this in biomass, hydro and geothermal. Currently Energy Trust co-funds and caps that assistance at $40,000. The benefit is that Energy Trust gets in early, gets to understand the development group and gets an inside track on the project. What staff is proposing is to significantly expand the amount of assistance to projects and work done in this area.

In the last five years, this type of assistance has averaged around $20,000 per project. Staff is considering going as high as $150,000. This is tentative and the amount has not been determined. Energy Trust might not be able to provide incentives on these projects but can help projects get to the point of development. Staff thinks that Energy Trust is in a unique circumstance to assist. Staff is knowledgeable and can be effective in terms of directing these projects. The concept would be to add additional funds to offer an enhanced development assistance fund. It would be a competitive process. Energy Trust can create a real opportunity for strong projects.

Staff is proposing to continue the competitive process for incentives. Energy Trust is in the second round for Pacific Power. Pacific Power is where there has the greatest constraint and greatest demand. Staff thinks that this process has improved the quality of projects seen, and they plan to expand to PGE projects.

Glenn: Can you give an example of development opportunities that might not otherwise pursue projects without intervention?
Thad: For certain types of technologies developers are choosing to leave the state. Providing regular resources might create demand where it might not have been. There are not small pools of funding to access in the development phase. There will be a development plan connected to these funds. Think about it as a mini construction loan in the way it is distributed. The project would accomplish certain milestones and a predetermined funding amount would be distributed.
Matt: I would add that Oregon Community Renewable Energy Feasibility Funds are fully subscribed.

Glenn: When you look at your budget, do you see other projects declining and a need for this?
Thad: Yes, we see the pipeline declining. But we see that with our budget constraint we cannot make up that loss. This development assistance fund concept was first introduced in 2010 to the council. We are now here based on current market conditions and we need to make some changes.

Mark: The number of countervailing issues that you have identified, the OPUC metrics will take these into account?
Thad: We are having those conversations right now.

Juliet: We are really in the beginning stages of that conversation. We understand these factors. We are interested in going past just a generation goal and considering other measures.

Thad: It is a tough market right now. It is the reality. You focus on the opportunities and continue to build with good strong projects.

Thad discussed what the program has accomplished:

- Biopower
  - 6 projects to complete, 1 project delayed till Q1 2013
  - 1 project funded
  - 2 projects mothballed
- Hydropower
  - 3 projects completed
  - 3 projects funded, 2 will complete in 2012
  - 2 projects abandoned
  - Demand for development assistance declined
- Geothermal
  - 0 projects to complete
  - 1 project funded
  - Demand for development assistance exceeded forecast
- Wind
  - 2 projects to complete, 1 project delayed until 2013
  - All planned program development activities have been completed

The program did have two biopower projects that didn't move forward for a couple of reasons.

Glenn: The results that are labeled as "projects to complete," are those from prior years?
Thad: Yes.

Bruce: Can you frame these results in terms of generation?
Thad: 2.5 MW of biomass. The two that didn't move forward would have been 400 kW. They are projects that might come back.
Jed: The hydro projects are 1.1 MW, 12 kW and 25 kW. Of the two that are going to complete, one is 10 kW and one is adding 110 MW hours to their system. There is a 250-kW project that will complete next spring.
Betsy: The geothermal at OIT is a 1.5-MW project.
Chris: The small wind program is uncertain, because turbines haven't always done what they say they will do. We have worked with a multi-state advisory on standards. Our pipeline has diminished, but we have increased incentives and are seeing business pick up. There has been a lull in this area.

Mark: You said those biomass projects might come back. Would more robust pro forma have helped?
Thad: No. The projects were facing challenges locally that weren't happening in other states so they shifted their focus to projects outside of Oregon. They might reapply under a competitive process.

Thad moved the discussion to solar, and that the challenge on the Pacific Power side, in particular, is fewer resources.

Kacia: 2012 has been a transition year going from a larger budget to a smaller budget. We have aggressively managed demand through incentive reductions. Activity is at a level that we can support. It is a balancing act however. Things have slowed down considerably. We have heard that from the Oregon Department of Energy, too. We are thinking of doing some marketing and awareness building. We had a lot of activity in Q1 and Q2 and are well positioned for 2013 and 2014. We have been able to fund a couple of large utility-scale projects, which are on track. We have paid out $7.5 million in our standard program, $1.75 million to the Baldock utility-scale project, we have $3 million more reserved for pipeline projects, and anticipate paying an additional $5.6 million to two more utility-scale projects before year-end. We still have the Renewable Energy Tax Credit so it is a strong market still for residential solar.

Peter: Do we have a feed-in tariff market number? Can we put this in a broader context?
Kacia: The feed-in tariff supports a comparable level of activity. It has created more commercial activity than residential since there isn't a state tax credit to be applied. Contractors have used it to sell larger commercial projects.

Thad outlined the budget calendar:

- Sept. 12 – Budget Themes Presentation to the council
- Oct. 24 – Draft 2013-14 Budget Presentation to the council
- Nov. 28 – Final 2013-14 Budget Presentation to the council
- Dec. 14 – Board approval of 2013-14 budget

Peter: The comment period is tight, so please take note and keep that in mind.

3. Wave power update
Jason Busch of the Oregon Wave Energy Trust presented and is the executive director.

Jason: I have been at OWET for three years and we have been pushing for the last six years for wave energy development in Oregon. One New York Times article has pushed things forward, and we are finally getting some traction. The Pacific Marine Energy Center grid connected test site. We are fortunate to have a test site in Oregon. We have the best weather for this technology and have received the lion share of federal dollars to test technology. There is no tidal testing in Oregon. That is happening in Washington and Alaska. There is a mobile ocean test berth in Newport. We have the equipment to test devices, including a wave tank. We can also test mid-stage technology in Newport.

Betsy: How deep is the tank?
Jason: Six feet. You can emulate a 100-year storm in it. It is a very useful tool and we are lucky to have it. We can use it to test readiness of technology. It is about moving technology through the commercialization cycle.

Jason said there are a variety of technologies are being tested in Oregon and/or built by Oregon companies and deployed elsewhere.

a. Ocean Power Technologies will be in the water soon. The same model that will be deployed in Oregon has been deployed in Scotland. For Oregon they have removed all of the hydraulic fluids. The goal is to eliminate any potential contamination problems if something goes wrong. OPT has spent a lot of time coming up with a system that doesn't need this fluid.
b. Ocean Sentinel is a device that monitors the output of a wave power machine and relays data back to shore. Wave Energy Technology New Zealand is now connected to the Ocean

Sentinel. It has a three-point anchoring system and is producing electricity. Anchors have been a nightmare for the industry and costly.

c. Atmocean is another system reliant on a system of floats. This device moves water at high pressure back to shore to be pushed through a Pelton Turbine.

John: Is there a navigation hazard with this technology?
Jason: Yes, boats will have to avoid this area. This is a long-term concern of fisherman. The fishing industry likes single leg mooring because there is less chance for entanglement. But single leg moorings have safety concerns. Safety will always have to be a concern as well as other impacts.

Jason: I personally don't think that Atmocean will be deployed in Oregon. Our goal is to track the industry and build knowledge but we know not everything will be placed here. We are going to focus on the larger utility-scale options. There are a whole host of technologies being tested; not all are appropriate for placement here. We think for Oregon that we can absorb 500 MW onto the grid without any transmission upgrades.

d. Columbia Power Technologies is an Oregon based company that has a device in the Puget Sound.
e. Principal Power has been pushing hard on a creative development that would generate power off of Coos Bay and be tied to the LNG facility. LNG would purchase the wind power generated as well. They have a device deployed in Portugal.
f. Oregon Renewable Power Company is deploying technology in Maine this summer.
g. Verdant Power has a device in the East River in New York. These had problems with blades breaking off and they are creating new blades.

Jason: The Pacific Marine Energy Center is the next big issue. We think that the federal government will pick Oregon as a grid-connected test center. We believe that we have secured first round funding of $25 million. We hope the Department of Energy will cover most of the costs. We had to get a $4 million match. We want to be prepared for the next round of DOE funding. We are in the siting process now. Newport, Reedsport, Coos Bay and Camp Rilea are options for siting.

Juliet: How did you get the matching funds?
Jason: A variety of sources including PGE, DOE, OWET and NMREC.

Jason: The Territorial Sea Plan is a plan is to identify a handful of sites in Oregon for ocean energy. The state and Governor's office is engaged in the plan's development. We want to get it to LCDC for approval in November 2012. Goal 19 applies to the marine environment. It protects the environment and fishing interests. The plan's goal is to find sites to accommodate a handful of technologies. This plan would offer a clear path forward. We would be one of the first states to address wave energy in planning. At the end of the day this will be stepping on some fishing industry toes. My goal is to minimize the scope of the Territorial Sea Plan and to allow us to revisit the plan in seven to 10 years. We want to finish this in 2012 and make sure that we have sites identified for the next 10-15 years.

Jason: The UK is still the leader in wave energy but the U.S. is a follower. The U.S. budget is far smaller. We are really testing in earnest in the U.S. and Oregon is the leader in the U.S. We have started seeing interest in equity partners. There is limited applicability in the U.S. of the technology but worldwide it is huge.

Jason said they have a conference coming up on September 26 and 27 at the Doubletree in Portland.

Glenn: Where is the Pelamis?
Jason: Larger companies continue to invest in it but it is a very fragile technology. The company has expressed recent interest in coming to Oregon.

Betsy: The OPT buoy goes in when?
Jason: Very soon. We will need a good weather window to deploy.

Mark: What are the challenges to being competitive for federal funding and to securing match funding?
Jason: There are huge challenges. It will always be tough. But wave energy has a role to play in distributed generation. Worldwide populations along the coasts make this sector viable.

Mark: If you need $25 million how do you get a $12 million match?
Jason: We are putting together a consortium of ownership for PMEC. We would like to see PGE, Lockheed Martin, Chevron and others come to the table. We hope DOE will fund much of it and we will have to come up with $4 million or $5 million.

4. Fall competitive process
Thad presented and said there was an email sent to council members on August 29 on the fall competitive process in Pacific Power territory. In January 2012 staff conducted the first competitive process. This is the second iteration of that process. Eligible projects will match the criteria established in January. Projects must need $150,000 or more in incentives and begin construction before November 15, 2013. Energy Trust has $2.8 million for allocation to this process. Staff wants it to surface projects. The review process will be the same. Projects that make it through this process will be presented at the November council meeting and go to the board in December. Staff has already have received some interest.

Jason: Is it consecutive competitive rounds?
Thad: There will be another opportunity, probably in Q2 2013. For this release the allocation will all be contained in this round. We will at least do this once a year if not more.

Betsy: The application is not online. Interested parties need to request an application. Send anyone you know who is interested our way.

5. Update on solar water heating cost effectiveness
Fred Gordon, Director of Planning and Evaluation presented and said Energy Trust has an investment challenge with solar water heating, which is an efficiency measure. This issue goes across a range of measures. This challenge and discussion of it is about 2013 programs.

Fred: In 2011 we had a total of 145 total solar water heating systems installed. Solar water heating is an energy-efficiency measure under Energy Trust's enabling legislation. These volume numbers include gas and electrically heated pools and hot water in both residential and commercial sites. These volumes probably represent well under 1 percent of our gas energy efficiency program. It could grow. We are not experiencing a cost-effectiveness issue with the electric systems yet.

Suzanne: Is one of the reasons why this is a low volume offer because of gas prices?
Fred: We created a plan eight years ago to try to make solar water heating cost effective. It hasn't happened. It is small-scale effort at this point. Solar electric has done well over this time.
Peter: You have a competing technology that has plunged in price. That market has changed. Solar water heating has bumped up cost-wise or stayed steady over that time.

Fred: Solar electric is also a renewable offer which means it isn't subject to the cost-effectiveness test.

Fred: Efficiency must cost less than gas and electricity over the system's life. There are two tests. The first is the societal test, with benefits to the utility and participant together. The second is the utility system test, with benefits to the utility system. The primary investment test for energy-efficiency investments used by the OPUC is all benefits to the utility and participant over total combined costs to participant and Energy Trust. For solar water heating a proxy is included for non-energy benefits, what the customer pays, net of tax credits, minus three years of energy bill savings. The investment test excludes costs and benefits that are not directly tied to the utility or participant such as jobs. We can use a proxy to support a measure that is not meeting the societal test because large, clear, hard-to-quantify, non-energy benefits have not been factored in. Solar water heating fits these criteria. The role of the OPUC is support the ratepayer, so they cannot include job creation as a benefit.

Kacia: The utility test determines how much we pay in incentives and the societal test determines if we can offer an incentive.

Fred: What has changed? In order to say that this measure is cost effective, system costs must go down. They haven't, they've gone up. Plus, while we don't know exactly what will happen with load forecasts and costs, gas prices have gone down significantly.

Fred presented the 2011 program averages for commercial and residential solar water heating showing the costs, incentives, savings, non-energy benefits, present value of energy benefits to utility, and utility and societal tests. [Slide 8 in presentation.]

Fred: We ran through the numbers and compared savings to the cost. The non-energy benefits have been supporting the measure in the test. At this point, for home domestic hot water systems, the proxy for non-energy benefits is covering 85 percent of the costs, and the value of energy savings to the utility system can't cover the other 15 percent. Solar water heating system costs would have to go down dramatically to pass the test.

Fred: We have had seen some recent innovation that could increase savings per dollar invested, a lower-cost thermosiphon system. Rob Del Mar has also reviewed our system requirement to reduce installation costs. We think that we can knock 10-15 percent off of the system cost. But with the proxy supporting the measure, lower cost will not help the measure pass the societal test. Without the proxy, costs per therm saved would need to go down by more than 85 percent and this is not realistic.

Fred shared language from the OPUC rule UM-551 that allows exceptions to the societal test. [Slide 10 in presentation.] The exceptions include: produces significant non-quantifiable, non-energy benefits, will increase market acceptance and is expected to lead to reduced cost of the measure, consistency with other demand-side management programs in the region, increases participation in a cost-effective program, measures cannot be changed frequently and the measure will be cost effective during the period, included in a pilot or research project, or required by law or consistent with Commission policy and/or direction.

Fred addressed some reasons why several exceptions do not apply and pilots have to be pointed to cost effectiveness. He said staff is considering a variety of options for these measure and welcomes council feedback.

The options are:

- Discontinue solar water heating for gas systems in 2013
- Request a transition period, $4.70/therm in 2013, $3 in 2014, then end program
- Request an exception from the OPUC to continue for two years. Arguments include:
    - Cost-effectiveness rule might change
    - Legislature could decide to make solar water heating a renewable energy technology
    - Avoided-cost forecast could change
    - These arguments do not stem from the exception categories listed in UM-551 except for "OPUC direction"

Fred: If we continue, to pass the utility system test, the incentive can be no more than approximately $4.70/therm. Program design options could help. We could cap the overall cost/therm. We could target high-volume business water users, or we could consider tankless systems or other cost innovations. The ideal spot in the market is people that need a constant source of hot water. We haven't seen those customers coming to our doors.

Fred: Energy Trust has other energy-efficiency measures with issues related to the cost-effectiveness test. We are looking at this in the context of other appeals to the OPUC. This question of solar water heating is tied to a more complex one. We are open to feedback on these options and considerations.

Mark: I am wondering if it could be packaged with other conservation measures?
Fred: The logic we have used today is that you need a reason to bundle. It is when we have a really good case that you get more cost-effective savings It's difficult to argue that we can use solar water heating to promote other measures because it is not driving a very large market.
Kacia: You also get diminishing returns if you have solar and efficient water heaters at the same site; each saves less than it would by itself.

Mark: Are we seeing a trend with solar electric and heat pump water heaters?
Fred: We just approved scaling up heat pump water heaters to 200 installs. Depending on how it goes, we may market those more heavily in 2013.

Peter: Does OSEIA have a strategy around solar hot water?
Glenn: No.

Juliet: I am intrigued with bundling, is that an option?
Fred: We need volume to make it work. It is hard to use bundling to promote other more cost-effective measures without volume.

Dick: How much is the thermosiphon system?
Dave: I have heard between $4,000-$5,000.

6. Public comment
There was no public comment.

7. Meeting adjournment
Betsy thanked all council members for their participation and adjourned the meeting at 12:00 p.m. The next full council meeting is October 24, 2012.

2013 Budget Themes
RAC Meeting
September 12, 2012

EnergyTrust of Oregon

Agenda

- Budget themes for 2013
- Status of program activity for 2012
- Calendar for budget process

2013 RE Budget Themes

- Challenging market fundamentals
- Continue to support a portfolio of technologies
- Following market opportunities
- Increased effort and activity required to develop markets
- Continue the competitive process for incentives

Challenging market fundamentals

- Expiring federal incentives and reduced support
- Significantly reduced state incentives
- Low wholesale/avoided cost rates
- Near term RPS requirements met (no compliance REC market)
- Energy Trust budget plateau

RE Portfolio Approach

Continue to support a full range of technologies

- Allows flexibility in responding to market opportunities
- Allows the market to choose winning technologies
- Supports a diversity of technical solutions and geography
- Maximizes our effectiveness at meeting generation goals through management of the portfolio

Following market opportunities

- Behind the meter
- Smaller projects
- Public projects versus private projects

Increased effort/activity to develop projects

- Increase development assistance
- Increase marketing and outreach for all technologies
- Document performance of replicable models:
  - ag biogas plants
  - wastewater treatment plants

Continue the competitive process for incentives

- Utilize competitive process for incentives in Pacific Power projects
  - Allows us to manage budget plateau
  - Improve timeliness and quality of projects
- Transition to PGE projects
- Implement competitive approach to awarding development assistance
  - Budget additional develop assistance dollars
  - Attract developers that might otherwise not pursue projects

Program Status for 2012 - Custom

- Biopower –
  - 6 projects to complete, 1 project delayed till Q1 2013
  - 1 project funded
  - 2 projects mothballed
- Hydro –
  - 3 projects to complete
  - 3 projects funded
  - 2 projects abandoned
  - Demand for development assistance declined
- Geothermal –
  - 0 projects to complete
  - 1 Project funded
  - Demand for development assistance exceeded forecast
- Wind –
  - 2 projects to complete, 1 project delayed until 2013
  - All planned program development activities have been completed

Program Status for 2012 - Solar

- Lower average incentive in 2012 ($0.95/W vs $1.32/W in 2011)
- Very strong Q 1 and Q2: 726 PV applications received YTD, 375 applications in first half of 2011
- Slower Q3: about 200 PV applications projected compared to 492 application in Q3, 2011
- Stepped incentive reductions have slowed activity to match budget constraints
- Likely to extend current incentive rates through end of 2012 and have smaller reductions in 2013

Budget Calendar

- Sept. 12 – RAC Budget Themes Presentation
- Oct. 24 – RAC Draft 2013-14 Budget Presentation
- Nov. 28 – RAC Final 2013-14 Budget Presentation
- Dec. 14 – Board Approval 2013-14 Budget

Oregon Wave Energy Trust

Community, Innovation, Economy & Environment

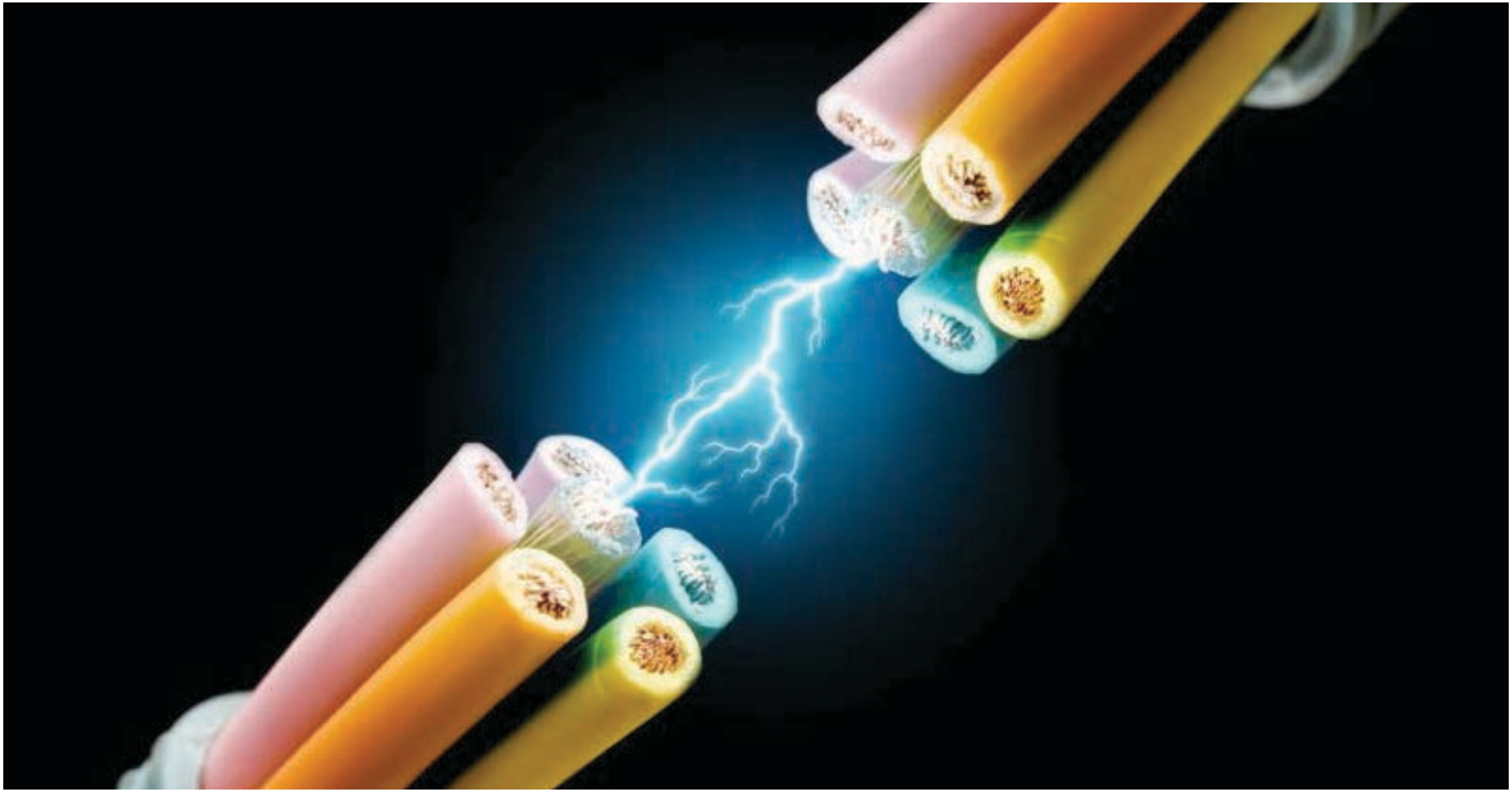
OregonWaveEnergy TRUST

The Technologies

Diversity: power take off, siting, size

OregonWaveEnergy

OregonWaveEnergy



OregonWaveEnergy

OregonWaveEnergy

OregonWaveEnergy

The End

Traction!

- Steel in the Water
- PMEC – grid connected test site
- Territorial Sea Plan

Northwest National Marine Renewable Energy Center

- Oregon State University – Wave Energy
- University of Washington – Tidal Energy
- Technology
    - Survivability & Reliability
    - Wave Forecasting
    - Device and Array Optimization
- Environmental Effects
    - Physical, Ecological
- Human Dimensions
    - Social/Economic
    - Marine Spatial Planning
    - Community Engagement
- Mobile Ocean Test Berth

NNMREC

NNMREC

OregonWaveEnergy

Steel in the Water

- Newport In Water Test Site
  - Ocean Sentinel
  - Northwest Energy Innovations
  - Not Grid Connected
  - 1 square mile
  - Just north of Yaquina Head north of Newport
  - Mid to later stage technologies
- Ocean Power Technologies
- Atmocean


R/V PACIFIC STORM


ENTERPRISE


ENTERPRISE


ENTERPRISE

Ocean Power Technologies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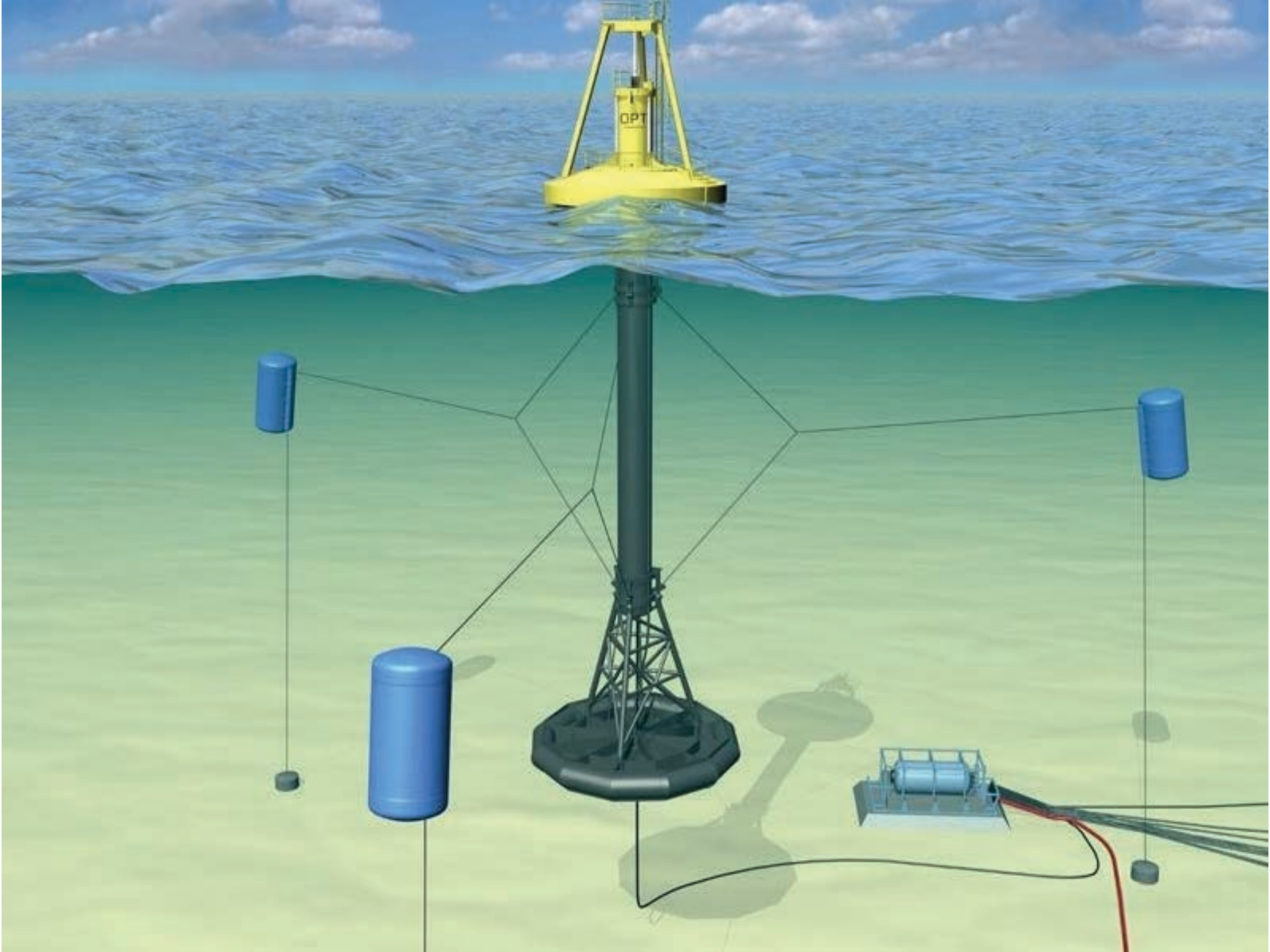
3
M
3
OPT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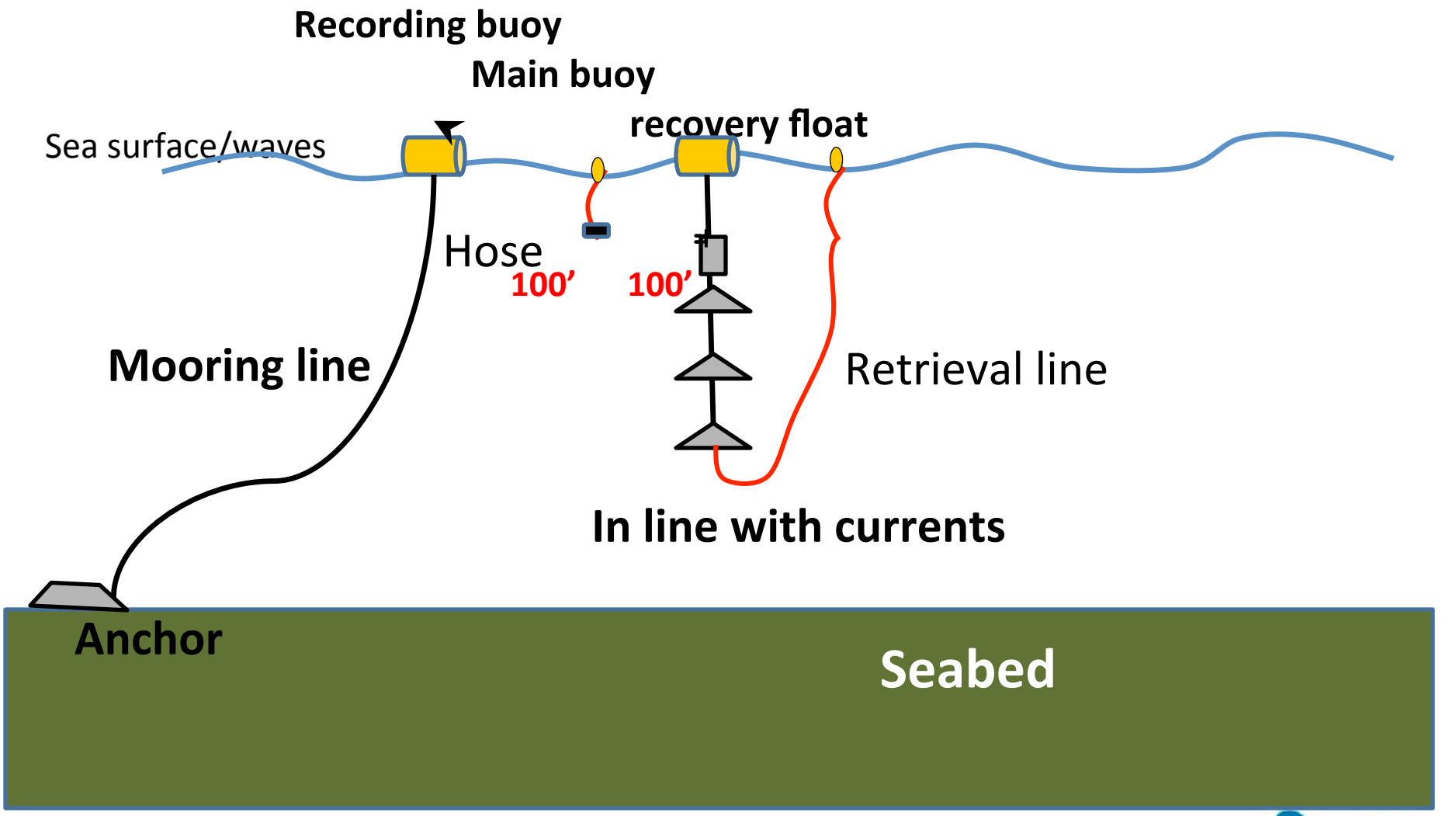
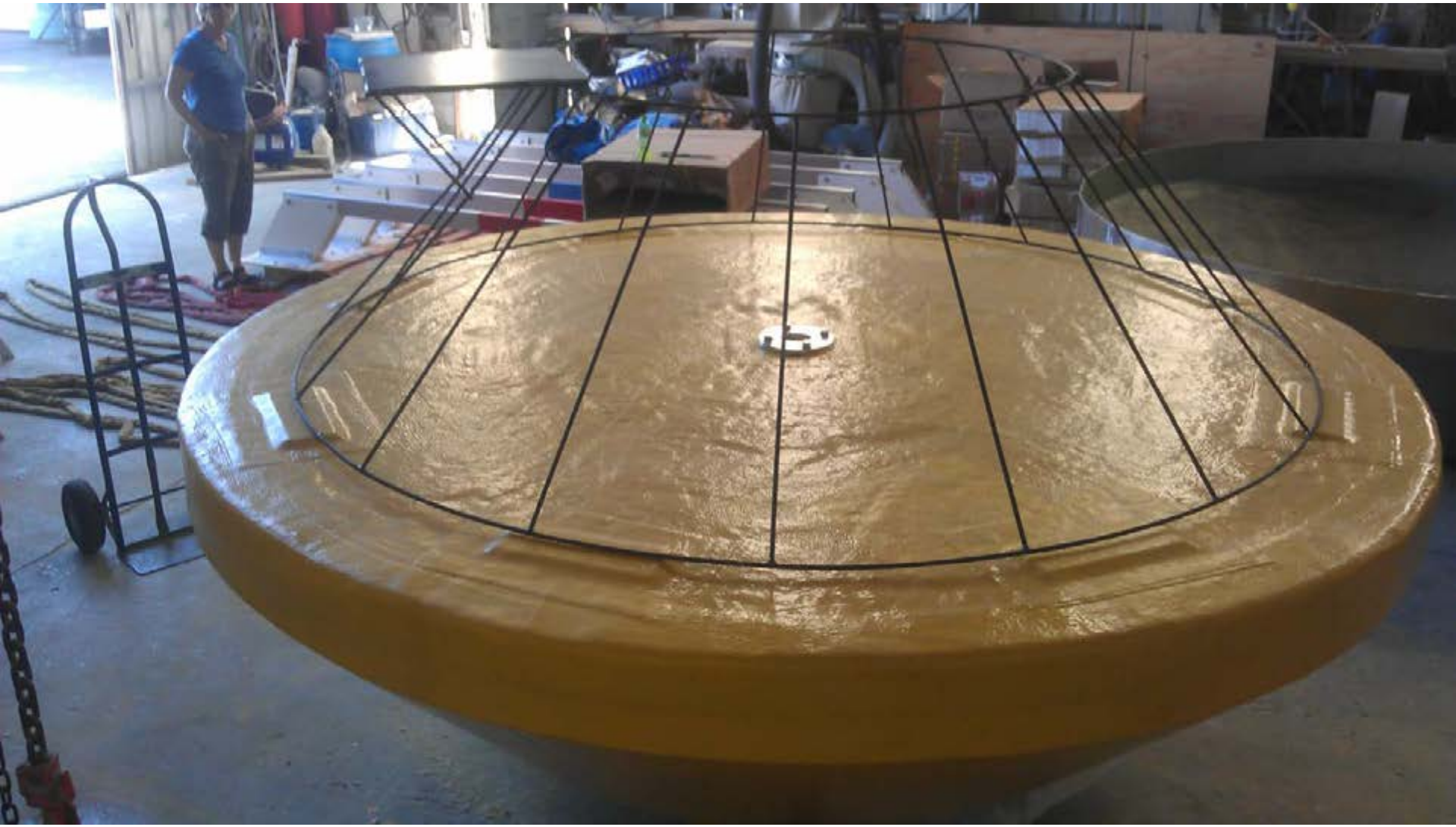
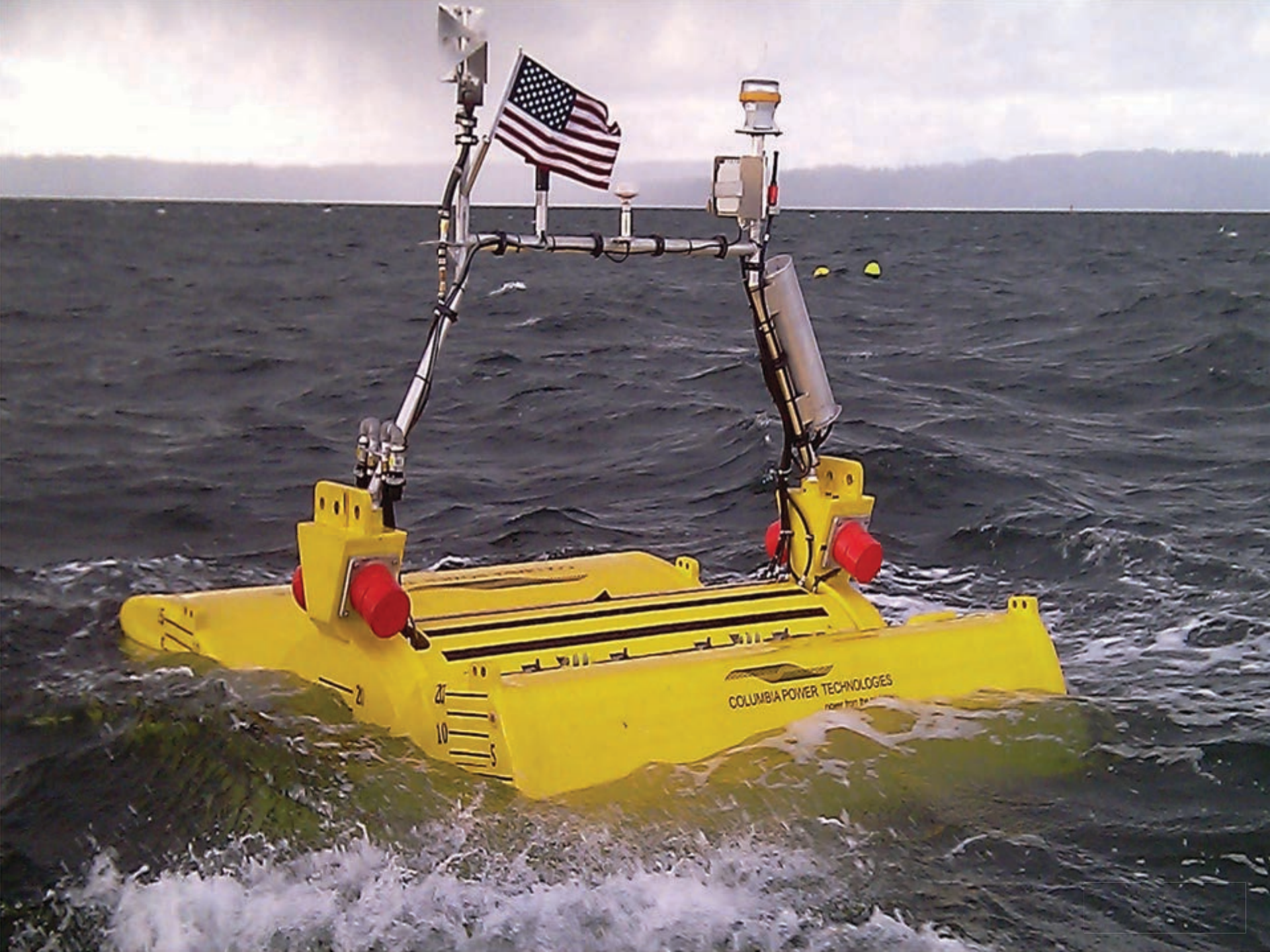

Recording buoy
Main buoy
recovery float
Sea surface/waves
Hose
100'
100'
Mooring line
Retrieval line
In line with currents
Anchor
Seabed




COLUMBIA POWER TECHNOLOGIES

Ocean Renewable Power Company

Verdant Power – East River, NY

Pacific Marine Energy Center

- Grid Connected
- National test site for late stage technologies
- ~$25 Million
- Visitor Center
- Shoreside facilities
- 10 to 20 year lifespan
- Currently doing pre-engineering plans and site selection

Territorial Sea Plan

- State Process
- Final stages
- LCDC to approve in Nov. 2012
- “Handful of sites”
- Accommodate diversity of technologies
- Minimize impacts on existing users
- Minimize scope of the Plan
- Revisit in 7 to 10 years

General Observations

- UK is the leader, but U.S. is a fast follower
- U.S. budget small in comparison
- About to begin testing in earnest in the U.S.
- Oregon leads the country in ocean energy development
- Starting to get interest from strategic partners and VC
- Limited applicability in U.S., but worldwide….

Questions?

Jason Busch

Executive Director

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Solar Water Heat Cost-Effectiveness

Presentation to Renewable Energy Advisory Council

September 11, 2012

Energy Trust of Oregon

This Presentation/Discussion Will:

- Review what cost-effectiveness is
- Describe key drivers of cost-effectiveness changes
- Describe the issues with gas cost-effectiveness
  - at a measure and program level
- Discuss options for a possible proposal to the PUC to allow solar DHW to continue
- Solicit feedback re: proposal
- Refer CAC members to PUC process for final disposition

Solar DHW Program Activity in 2011

145 total systems:

- 29 gas heated pools
  - 6 commercial
- 44 gas heated domestic hot water,
  - 19 commercial
- 68 electric heated domestic hot water
- 4 electrically heated pools

Cost-Effectiveness- Context

1. Solar Water Heat is an efficiency measure under Energy Trust's enabling legislation.
2. PUC rule UM-551: Efficiency must cost less than gas and electricity over the system's life.

   - societal test: to utility and participant together

   - utility system test: to utility system

Societal Test

- *The primary investment test for efficiency investments used by Oregon PUC. Societal BC=*

All benefits to utility and participant

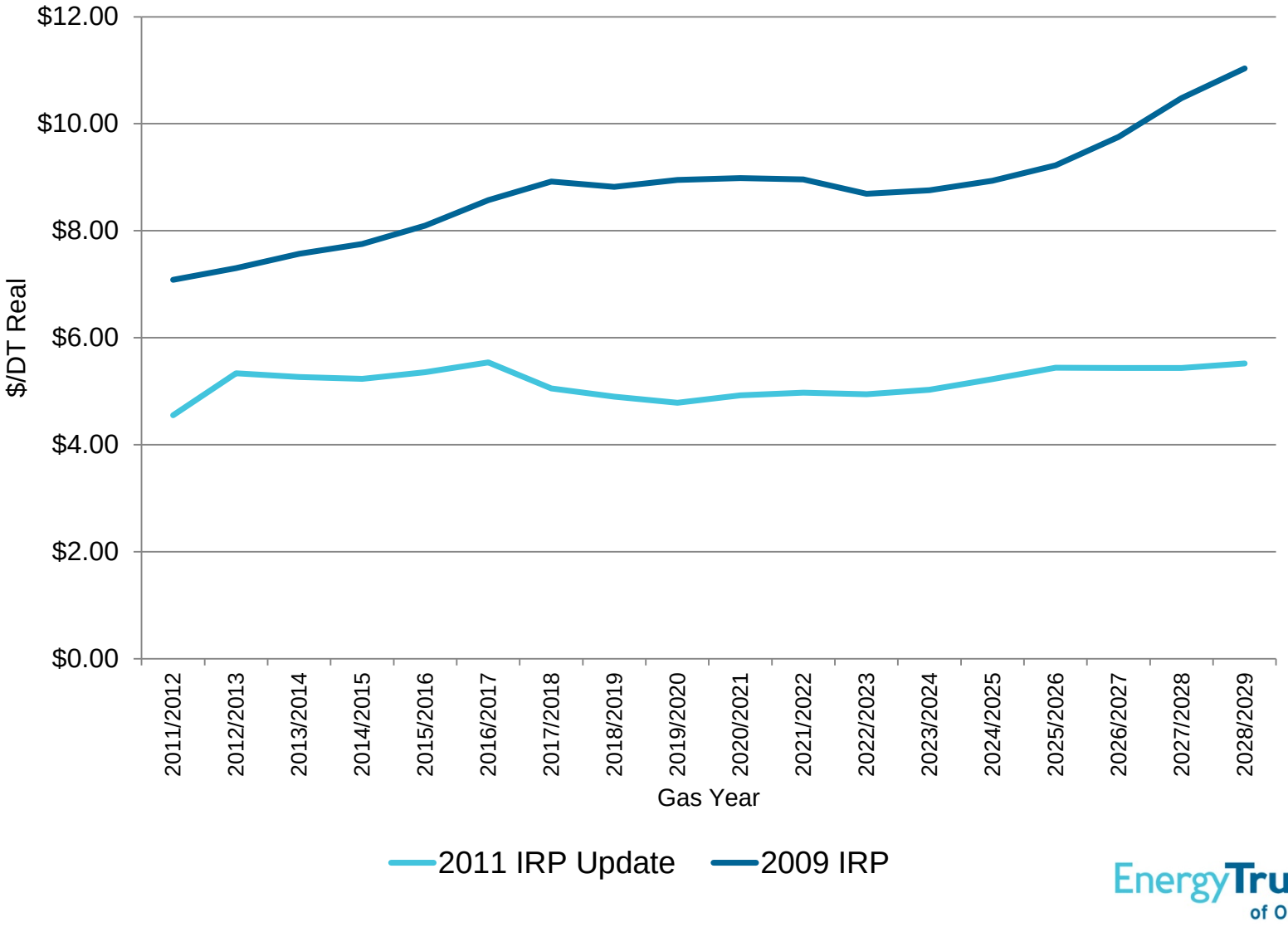
Total combined costs to participant and Energy Trust

- Future carbon compliance costs are part of avoided cost
- For solar DHW, a proxy is included for non-energy benefits- what the customer pays, net of tax credits, minus three years of energy bill savings.
- Excludes Oregon economic costs and benefits that are not to the utility system or participant (e.g., jobs)

What's Changed

1. Solar WH costs/therm have trended up where the program was justified under an assumption of decreasing costs over time.
2. *Long Term* forecasts of gas costs over the next 20 years, the cost that solar thermal, have decreased by approximately 45%

Avoided Cost Comparison



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Cost-Effectiveness

	2011 Program Averages:						
	Cost	**Incentive**	**Savings (therms)**	**Non-Energy Benefits**	**Present Value of Energy Benefits to Utility**	**Utility B/C**	**Societal B/C**
Commercial DHW	$92,547	$8,878	**1536**	$78,528	$7,592	.86	.93
Pool	$7,565	$1,277	**737**	$3,822	$3,487	2.73	.97
Residential DHW	$7,276	$742	**115**	$6,149	$569	.77	.92
Pool	$3,828	$826	**492**	$1,355	$2329	2.82	.96

Recent Developments

- Qualification of a lower-cost thermosyphon system
- Review of technical requirements to simplify installation

BUT

- With measure supported by the proxy, lowering cost will not help the measure pass the societal test.

  Why? Proxy bases non-energy value on what the customer pays- as the cost decreases, the imputed value of non-energy benefits decreases equally.

Oregon PUC rule UM-551 Allows Exceptions to Societal Test Where:

- ..produces **significant non-quantifiable non energy benefits.** ….the incentive payment should be set at no greater than the cost effective limit (defined as present value of avoided costs plus 10%) less the perceived value of bill savings, e.g. two years of bill savings
- …**will increase market acceptance and is expected to lead to reduced cost** of the measure
- …**consistency with other DSM program in the region**
- **...increase participation in a cost effective program**
- The package of measures **cannot be changed frequently and the measure will be cost effective** during the period….offered
- ….included in a **pilot or research project intended to be offered to a limited number of customers**
- …**required by law or consistent with Commission policy and/or direction**

Options:

1. Discontinue solar DHW for gas systems in 2013.
2. Request a transition period. $4.70/therm in 2013, $3 in 2014, then end program.
3. Request an exception from PUC to continue for two years. Arguments:
   - Cost-effectiveness rule might change.
   - Legislature could decide to make solar DHW a renewable.
   - Avoided cost forecast could change.

   These arguments do not stem from the exception categories listed in UM-551 except for "PUC direction"

If we continue- to pass utility system test incentive can be no more than approximately $4.70/therm.

Program Design Options

(won't produce positive societal B/C but may improve ratepayer value)

- Cap on overall cost/therm
- Target high-volume business water users
- Consider tankless systems and other cost innovations.

Context for Appeals

Context: Energy Trust has requested exception based on UM-551 for weatherization. Exceptions may be requested for aspects of all gas programs other than industrial.

Questions and Discussion

- Is an exception important?
- Are the arguments clear and the best available?