Agenda

Renewable Energy Advisory Council
Wednesday, March 15, 2017: 9:30 a.m. – 11:30 a.m.
http://www.energytrust.org/about/public-meetings/renewable-energy-advisory-council-meetings/
Energy Trust conference room Kilowatt
421 SW Oak St., Suite 300
Portland, Oregon 97204

9:30 **Welcome, introductions** **Information**

- Review agenda

9:35 **Solar wrap-up of 2016 and a brief look ahead** **Information and feedback**

- Staff will present results and market trends for solar from 2016 and discuss some expectations for 2017.

10:15 **Solar plan for Oregon from OSEIA** **Information**

- Jeff Bissonnette from the Oregon Solar Energy Industries Association will present the organization's solar plan for the state.

10:45 **Break**

10:55 **Underwriting and risk analysis for renewable projects** **Information**

- Matt Mylet, Vice-President and Relationship Manager from Beneficial State Bank will discuss how he analyzes project finances from a lending perspective. Matt has long history in energy project lending and the banking industry.

11:30 **Update on the legislative session** **Information**

- Staff will provide an update on energy-related activity at the state legislature.

11:50 **Public comment**

12:00 **Adjourn**

Our next meeting is Wednesday, May 3, 2017. You can view this agenda and meeting notes at: http://www.energytrust.org/about/public-meetings/renewable-energy-advisory-council-meetings/ If you have comments on meeting notes, please alert Betsy Kauffman at betsy.kauffman@energytrust.org.

Renewable Energy Advisory Council Meeting Notes

February 8, 2017

Attending from the council:
Erik Anderson, Pacific Power
Bruce Barney, Portland General Electric
Jason Busch, Oregon Wave Energy Trust
Suzanne Leta-Liou, SunPower
Les Perkins, Farmers Irrigation District
Frank Vignola, Solar Monitoring, University of Oregon
Dick Wanderscheid, Bonneville Environmental Foundation
Peter Weisberg, The Climate Trust

Attending from Energy Trust:
Michael Colgrove
Jeni Hall
Mia Hart
Jed Jorgensen
Betsy Kauffman
Dave McClelland
Dave Moldal
Joshua Reed
Thad Roth
Lizzie Rubado
Kenji Spielman
Mariet Steenkamp
Peter West
Lily Xu

Others attending:
Caroline Moore, Pacific Power
Jason Zappe, Portland General Electric
Matt Krumenauer, Oregon Torrefaction
John Reynolds, Energy Trust board
Alan Meyer, Energy Trust board

1. Welcome, introductions and updates
Betsy Kauffman convened the meeting at 9:00 a.m. The agenda, notes and presentation materials are available on Energy Trust's website at: https://www.energytrust.org/about/public-meetings/renewable-energy-advisory-council-meetings/.

2. **PGE tests of torrefied biomass at the Boardman Power Plant**
Matt Krumenauer presented on Oregon Torrefaction's work with Portland General Electric at the Boardman Power Plant to evaluate the economic, environmental and technical feasibility of fueling the coal plant with biomass after its scheduled closure in 2020. Torrefaction is a process that converts plant or woody biomass to a high-grade solid biofuel. The process involves a thermo-chemical treatment of biomass between 200 and 300 degrees Celsius to form a coal-like substance, ground and densified to produce pellets.

Energy produced per pound of biomass depends on the type of material, time and temperature. Longer roasting creates a higher energy density product. Torrefied biomass burns a little better than coal due to its lower moisture content. Over the past year, Oregon Torrefaction has delivered nearly 5,000 tons of torrefied biomass to PGE's Boardman Power Plant and completed four test burns.

Bruce Barney: The biomass used at the Boardman plant is mostly softwoods. Can you use hardwoods?
Matt Krumenauer: Yes, you can use both. Hardwoods have a higher cellulous content, but are not as prominent in our region. Poplars could be an option.

Dave Moldal: Is there a fire risk associated with torrefied biomass?
Matt Krumenauer: There is a risk, but it's manageable. There were a couple instances of smoldering so we created new operational procedures to monitor the temperature profile of the fuel pile.

Peter West: Are nitrogen oxide emissions comparable to coal?
Matt Krumenauer: That's unknown at this time. Any type of combustion will emit nitrogen oxide, but we will need to perform a stack test on a 100 percent biomass burn to monitor emissions.

Betsy Kauffman: What are the next steps for testing at Boardman?
Matt Krumenauer: PGE will conduct a 100 percent biomass test burn, monitor the performance and gather data. In the longer term, additional testing is necessary to fully evaluate viability, examine the economics for fuel procurement, delivery and performance, and perform a life cycle assessment.

Dave Modal: Are there any similar models running outside of Oregon?
Matt Krumenauer: Other companies are watching our test with Portland General Electric. A few other utilities have completed co-firing tests, including Minnesota Power, Capital Power and PacifiCorp in Utah, but nothing at this scale. PGE wants to use 100 percent biomass or nothing.

Erik Anderson: Have you done an analysis on how much local biomass is available?
Matt Krumenauer: Sourcing woody biomass feedstock is the biggest cost and will drive the cost of fuel. We're analyzing this issue now, which is not 100 percent woody biomass. It could be cost effective to transport biomass from other states.

Suzanne Leta-Liou: Is Energy Trust funding any part of this project?
Jed Jorgensen: Energy Trust provided some Project Development Assistance to examine if this technology could have a role in small combined heat and power applications, not for Boardman.

3. Energy Trust's work on hydropower and biopower

Jed summarized 2016 efforts in the Other Renewables program. One 11-kilowatt hydroelectric project reached commercial operation. Energy Trust received seven competitive applications, approved a hydroelectric project and is still reviewing two biogas projects. Staff committed funding for two small wind projects totaling 20 kilowatts. The program also supported 49 projects with Project Development Assistance, including 27 Irrigation Modernization projects and is expecting results from Irrigation Modernization assessments soon. The program's generation forecast in 2017 is expected from small wind, and there's a high demand for Project Development Assistance, especially related to Irrigation Modernization.

Dave Moldal summarized 2016 efforts for biopower and provided an overview of the current biogas market. This year, the value proposition for biogas projects for large breweries is becoming more convincing and the Portland area is exploring how to handle post-commercial food waste with anaerobic digestion or composting. For the first time, staff is performing project evaluations for a hydroelectric and biogas project to examine their performance, above-market costs, and operations and maintenance issues.

Peter West: When do you expect the irrigation projects that received Project Development Assistance to come online?
Jed Jorgensen: We expect applications late this year or 2018. Then we would work with districts on how to phase the opportunities available to them.

Erik Anderson: What are the primary funding sources for irrigation modernization?
Jed Jorgensen: Funding opportunities are subject to the project benefits. Funding support for water savings benefits can come from Bureau of Reclamation and Oregon Watershed Enhancement Board. Funding for the energy-efficiency benefits could come from Energy Trust and USDA Rural Energy for America Program grants. There are additional funding possibilities related to locally sensitive environmental benefits that may be achieved within certain areas.

Alan Meyer: What's the conversion rate from projects that receive Project Development Assistance to installation? And how do funding opportunities fit in that conversion?
Jed Jorgensen: We don't know the conversion rate yet. We're looking at how costs will change over time. We expect the assessment process to become less expensive per district as we learn and implement operational efficiencies. We are also expecting irrigation districts to bring more funding to the table over time, and are looking at how to ramp down our level of assistance while maintaining participation.
Bruce Barney: I'm concerned about the amount of Project Development Assistance Energy Trust is providing, but it sounds like you're actively trying to balance how much support you're providing.
Betsy Kauffman: If we don't provide Project Development Assistance, we won't have project installations. It is also a high-priority performance metric for the Oregon Public Utility Commission. We believe this is the right time to be providing this support, and these multi-benefit projects bring multiple possibilities for additional funding sources that can produce a better result.

Erik Anderson: Can Energy Trust participate in pipeline injections for biogas?
Betsy Kauffman: No, we can fund only projects that generate electricity.

Bruce Barney: Why did the Tillamook project come offline?
Dave Moldal: This was not an Energy Trust project; they received federal funds. The project collapsed due to manure transport costs.
Peter Weisberg: Some have said it's still economically feasible and that they're looking at other options.

John Reynolds: Can you provide an update on JC-Biomethane?
Dave Moldal: They are consistently generating electricity at about 800 megawatt hours per month. The challenges with processing post-commercial food waste feedstock have been reduced, but there are still some challenges.

4. Preliminary 2016 results

Betsy Kauffman provided an overview of 2016 preliminary annual results for renewable energy programs and energy efficiency programs. Results reflect the best available data at this time, and may shift after the release of the annual report to the Oregon Public Utility Commission in April.

Suzanne Leta-Liou: Why were the two custom solar projects delayed?
Dave McClelland: SolarCity is the owner of one of the projects and during the acquisition by Tesla, all projects were delayed. The second project completed installation and is working through final contracting items that are expected to clear up this quarter.

Suzanne Leta-Liou: Did standard solar exceed goal for both residential and commercial?
Dave McClelland: There was a drop in third-party owned residential systems in the second half of the year. Sunrun and SolarCity stopped offering the third-party model, part of a trend seen across the US. There was a 30 percent increase in customer-owned systems following the

fallout, which was able to fill the market gap. 2016 was also a big year for commercial projects with 8-9 megawatts of new generation.

John Reynolds: Were we under goal for renewables in 2015?
Betsy Kauffman: No, we exceeded goal in 2015. Our annual goals are a forecast of potential generation within a given year, based on budget available. Annual goals are separate from our 2015-2019 Strategic Plan goals and Oregon Public Utility Commission performance measures.

Alan Meyer: Why was Pacific Power 148 percent of goal in standard solar?
Dave McClelland: We completed more projects than forecasted in residential and commercial standard solar. There were also some commercial projects that shifted from 2015 to 2016.

5. Discussion and feedback about budget presentations
Betsy asked for feedback from members about how they would like to be involved in our annual budget development process. Members split into small groups to discuss and share back.

Erik Anderson: I heard some concern around the potential of above-market costs of different technologies. Energy Trust provides Project Development Assistance early and each of those projects could meet above-market cost requirements. Taking a look at overall above-market costs across technologies would be helpful in shaping the budget.

Bruce Barney: I'd like a better frame of reference for how these decisions are made and to see data on generation by project cost and technology.
John Reynolds: I agree about having decisions more visible, especially those with ancillary benefits.
Betsy Kauffman: We've always had a portfolio approach for renewables. Solar used to be more expensive, but we continued to offer services and incentives for market benefit.

Frank Vignola: There's a lot of input and background that council members can't see from Energy Trust staff. I'd like clarity around the type of feedback you're seeking and the role of council members in budget decisions. The council can provide advice on specific projects, but we can't advise on the bigger picture because we don't have the information and background into what goes into making those decisions.

Jason Busch: I'd like clarification around expectations of members. I don't need to understand all aspects of the budget as the board of directors fills that role and approves the budget.

Dick Wanderscheid: The budget process is transparent and has been improved greatly in the last five years. It would be nice to see a larger range than one or two years to see if there are long-term trends, such as a rolling average.

Peter Weisberg: I'd like staff to present more information on strategic decisions related to budget allocation and ask council members for feedback on the approach.

Alan Meyer: I like when there's explanation and context around the external factors considered in decisions. We're doing that already, but I'd like to see it more consistently.
Jed Jorgensen: We currently present the budget in an annual context, but it might be better to show that in the larger context of the Strategic Plan.

Bruce Barney: In the budget presentations, it would be nice to see tables with other graphical interpretations of the data to show the same information differently. I like the current level of exposure we have to the energy-efficiency budget to show a high-level view.

6. Update on wave energy in Oregon and Department of Energy grant

Jason Busch, Oregon Wave Energy Trust, summarized the types of marine hydrokinetic energy technologies and provided examples of where marine projects were deployed, including wave, tidal, ocean current, river hydrokinetic, ocean thermal exchange and floating wind generation. Oregon's focus is on wave energy due to the state's coastal geography. Wave energy is predictable, inexhaustible, close to populations and has low integration costs relative to solar and wind.

In 2016, the U.S. Department of Energy awarded $40 million for the Pacific Marine Energy Center, a wave energy test facility proposed to be built six miles off the coast of Newport. The facility is supported by Oregon State University and different companies can use the facility to test their technologies. Another $4.2 million is being sought from partners to fulfill needed funding. The Oregon Wave Energy Trust is still trying to understand if there are implications for the Department of Energy award given the new administration. Historically there has been bipartisan support from Congress for Department of Energy research and development.

John Reynolds: Does Energy Trust have a role in wave energy if we're limited to sub-20-megawatt projects?
Jason Busch: Over the next 10 years, we expect wave energy will be accessible beyond commercial projects. These large and innovative technologies take a phased approach. It will need collaboration and support from a variety of players to accept wave energy before commercial viability. Oregon National Guard's Camp Rilea will have a smaller-scale project for shallow water tests.

Dave Moldal: What is the water depth at the test facility and how will you chose which companies get to use or lease the limited testing locations?
Jason Busch: The water is 60-80 meters deep. Selection is first come, first served and the Northwest National Marine Renewable Energy Center will use its discretion if there's a conflict.

7. Public comment

There was no additional public comment.

8. Meeting adjournment

The next scheduled meeting of the Renewable Energy Advisory Council is on Wednesday, March 15, 2017, at 9:30 a.m.

The Oregon Solar Plan

A Blueprint for Oregon's Solar Future

OSEIA
Oregon Solar Energy Industries Association

What is the Oregon Solar Plan?

- An outline of the solar status in Oregon
- An exploration of how much solar could have in 10 years
- Some thoughts on how to get there
- A mid-term platform to drive conversations around solar

OSEIA
Oregon Solar Energy Industries Association

The Oregon Solar Plan outlines a path

- Solar can provide 10 percent of Oregon's electricity….
- …in 10 years…
- …with enough generation to power the equivalent of 500,000 Oregon homes.

OSEIA
Oregon Solar Energy Industries Association

How much solar does Oregon have today?

- Fall 2016 – 226 MW installed
  - 54 MW residential
  - 55 MW commercial
  - 117 MW utility scale

OSEIA
Oregon Solar Energy Industries Association

Solar-Related Jobs in Oregon

- According to the Solar Foundation Solar Jobs Census (Feb. 2017): 4,500 jobs

OSEIA
Oregon Solar Energy Industries Association

What's Helped to Date?

- A consistent set of effective policies:
  - Net Metering
  - Residential Energy Tax Credit (RETC)
  - Property Tax Exemption
  - Utility Ratepayer Incentives (such as ETO)
  - Federal Tax Incentives
  - PURPA

OSEIA
Oregon Solar Energy Industries Association

What's the Blueprint?

- Keep the policies that work
- Fill in the policy gaps
  - Send the market signal that Oregon is a stable place for solar businesses
- Grow Oregon's solar workforce
  - Approximately 8,000 solar workers needed by 2027
- Coordinate Oregon's land use and energy policies
- Examine transmission issues

OSEIA
Oregon Solar Energy Industries Association

Stay Tuned!

OSEIA
Oregon Solar Energy Industries Association

Solar program updates

RAC Meeting

March 15th, 2017

Energy Trust of Oregon

2016 program results

2016 results:

1,750 solar electric systems

21 MW installed

$11 million incentives paid

1,566 customer leads to allies

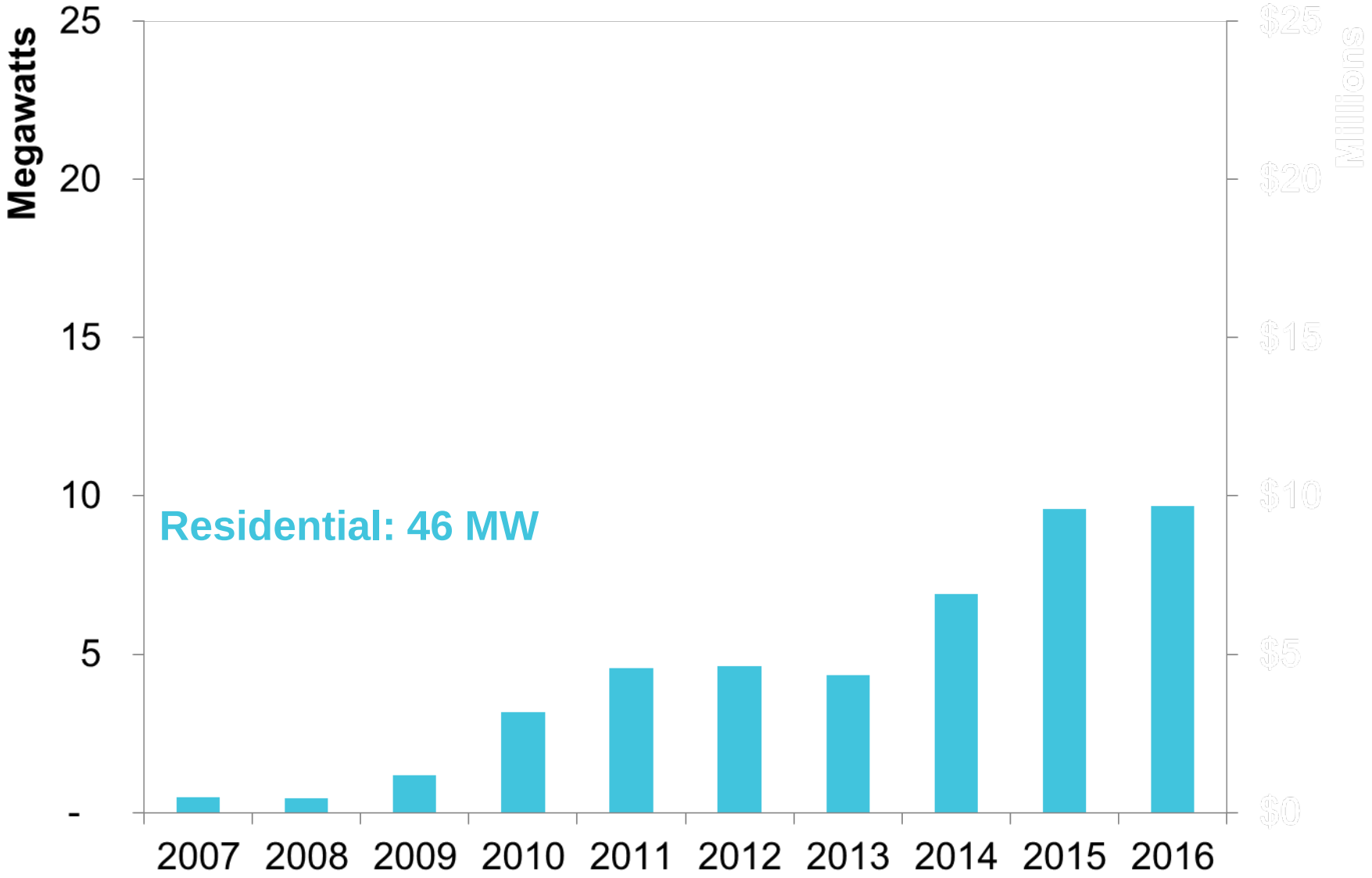
Program to date:

11,000 solar electric systems

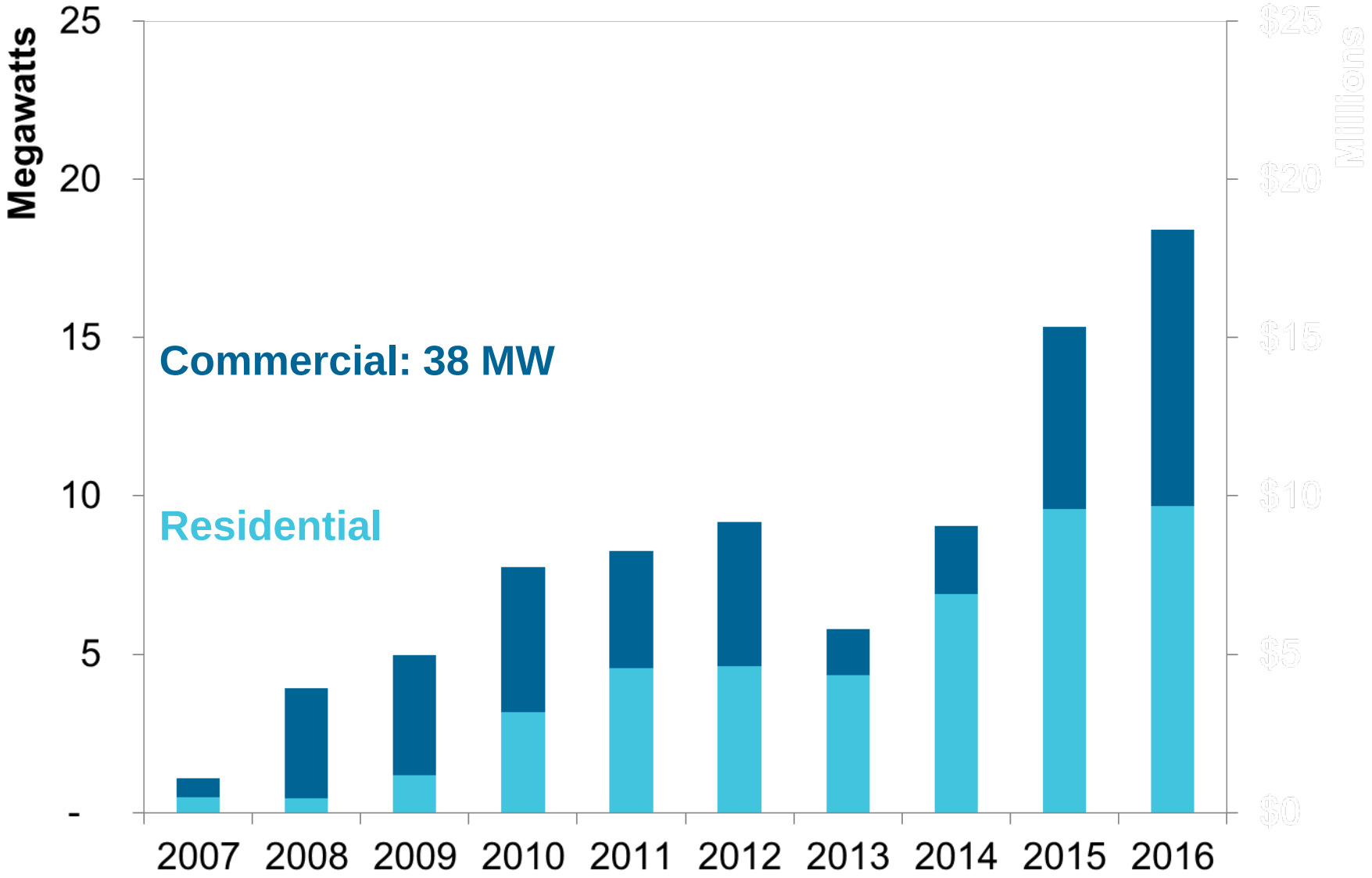
105 MW installed

$99 million incentives paid

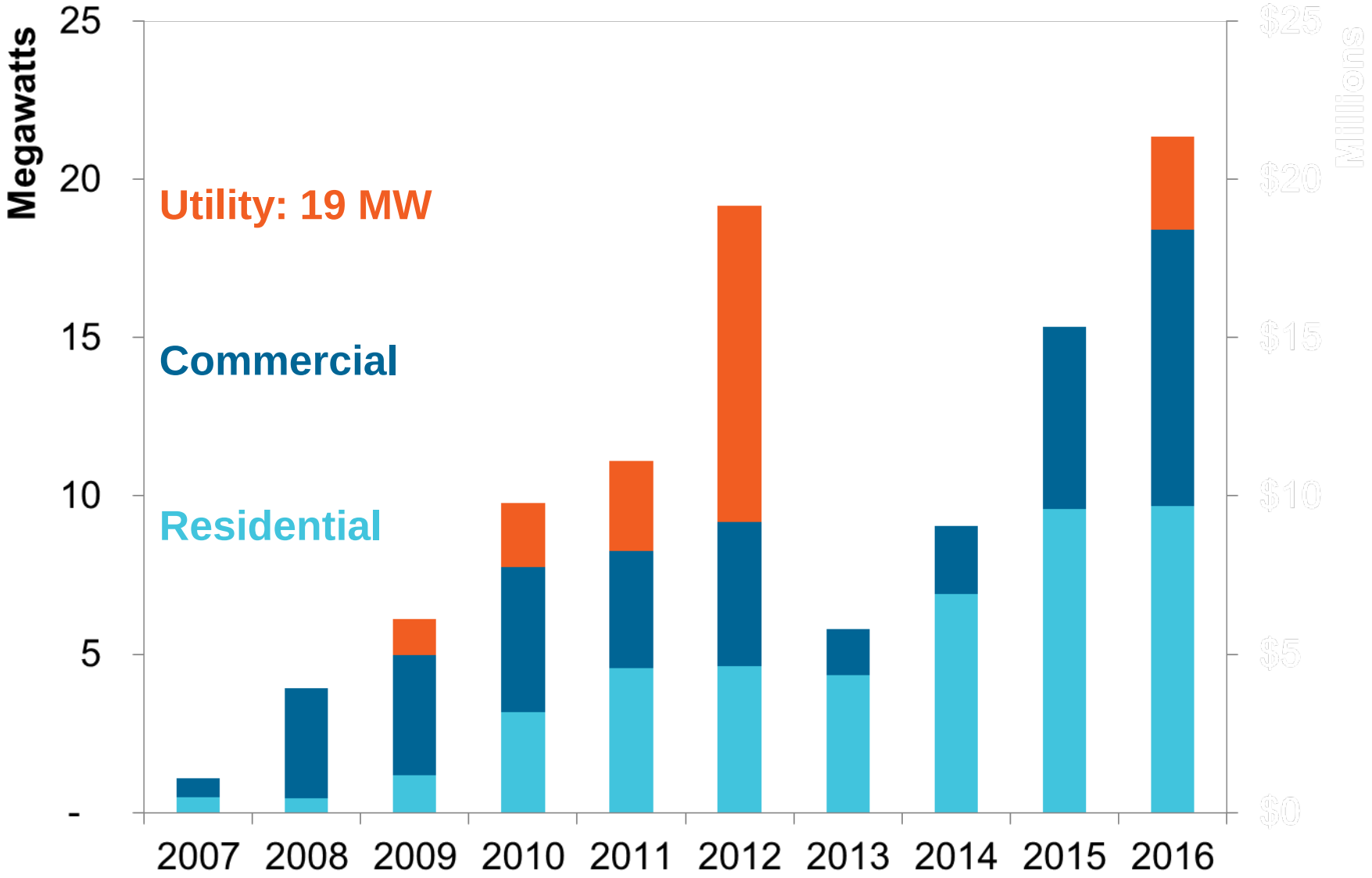
Energy Trust solar installations



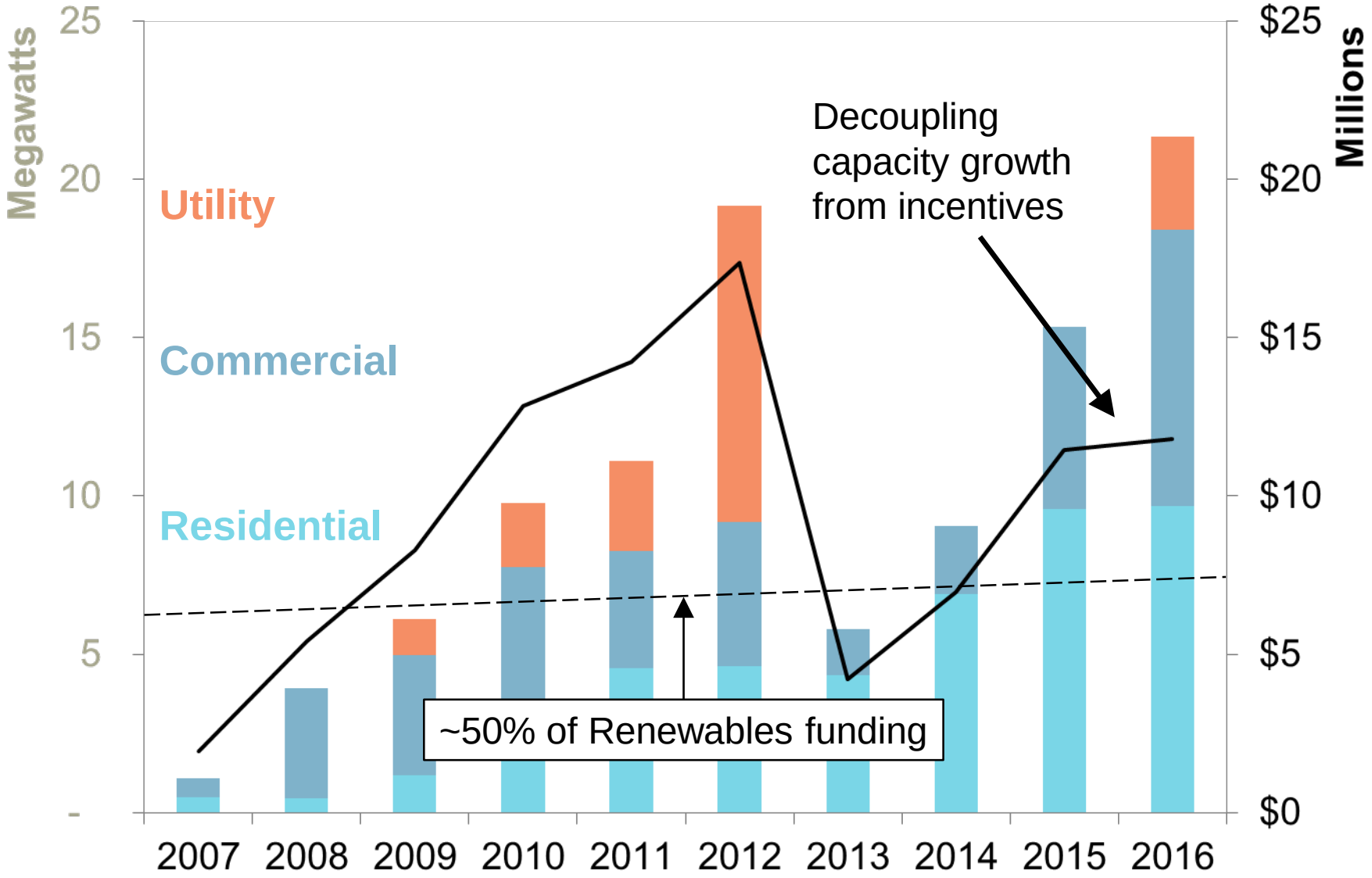
Energy Trust solar installations



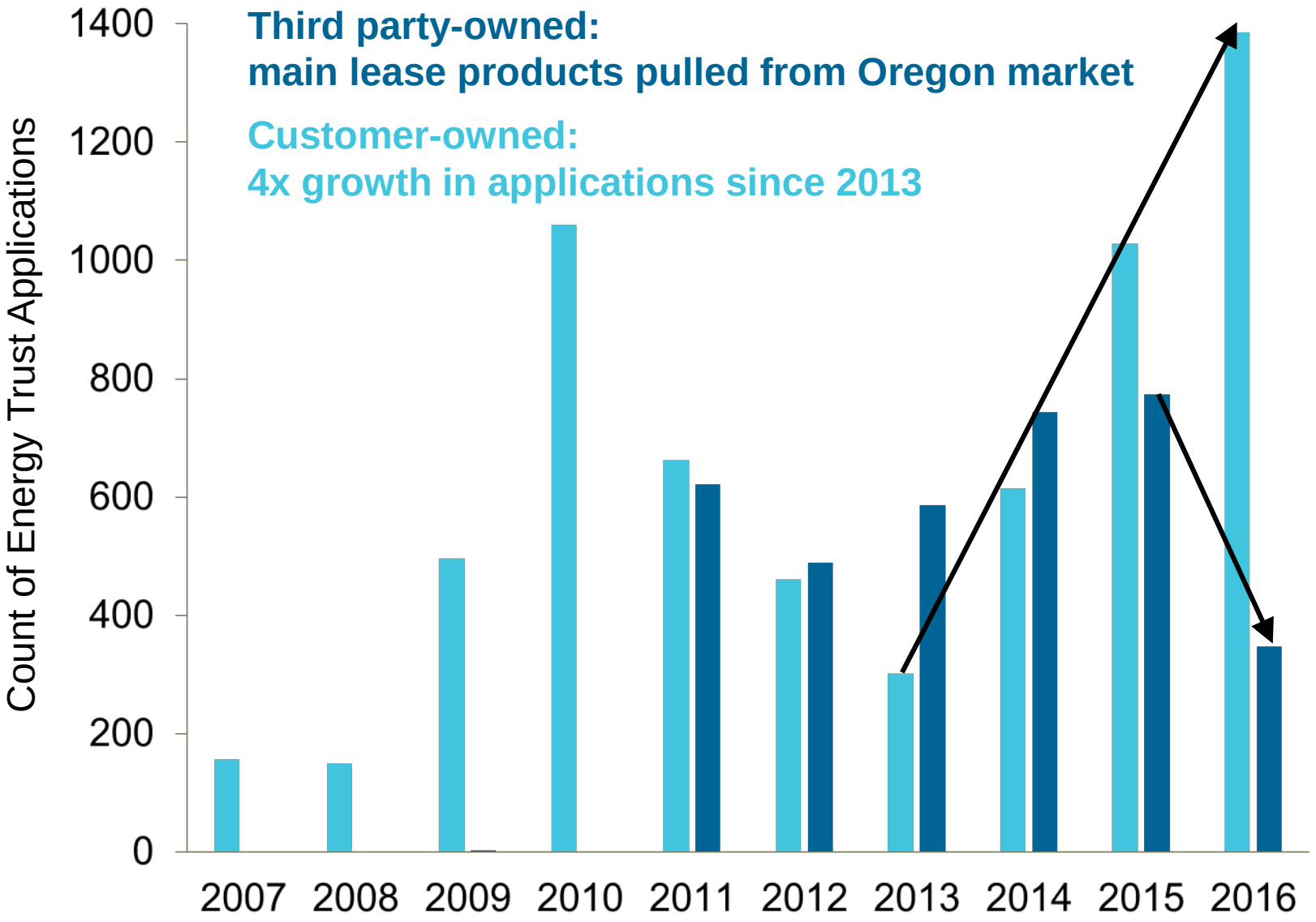
Energy Trust solar installations



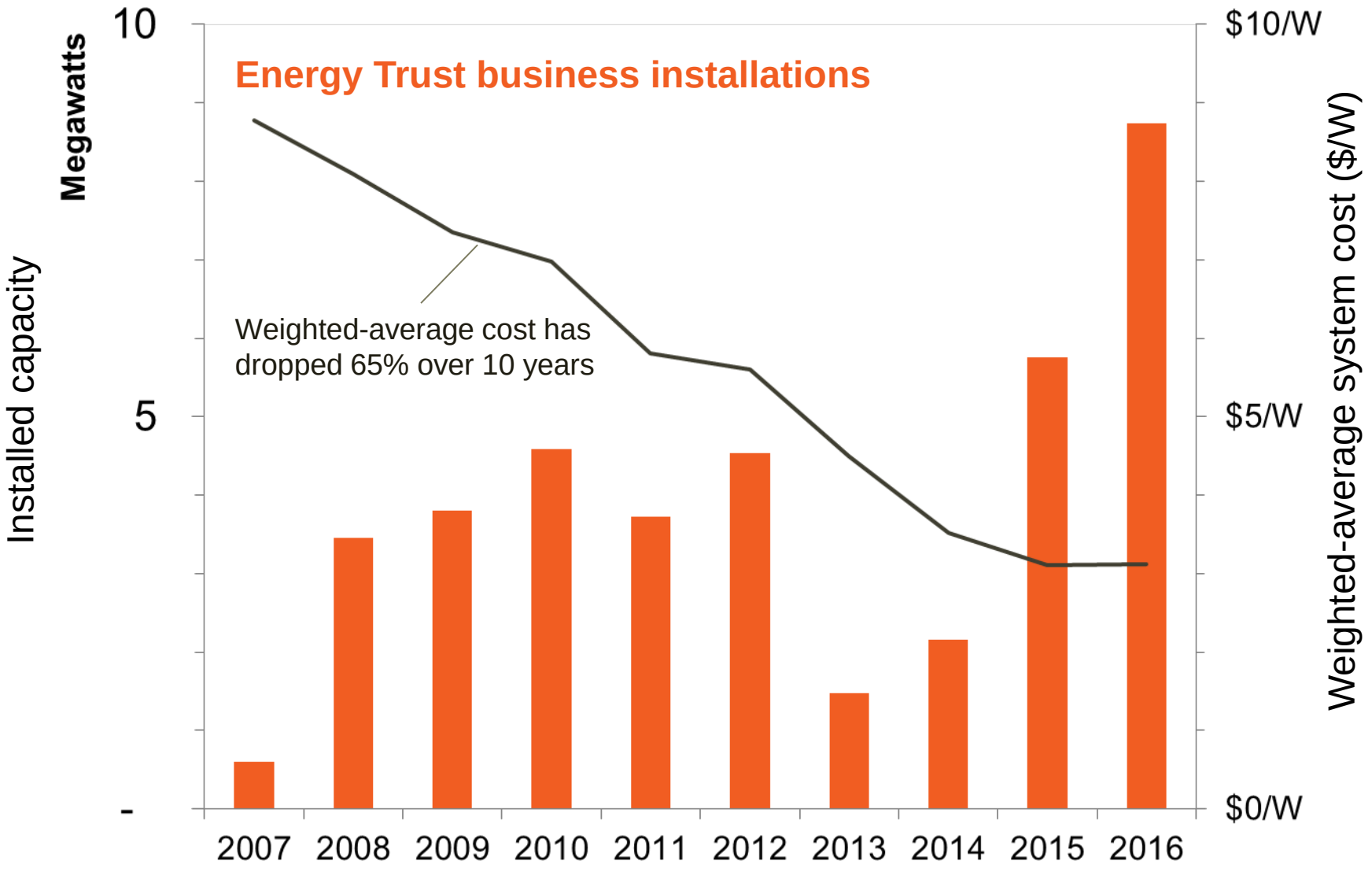
Energy Trust solar incentives



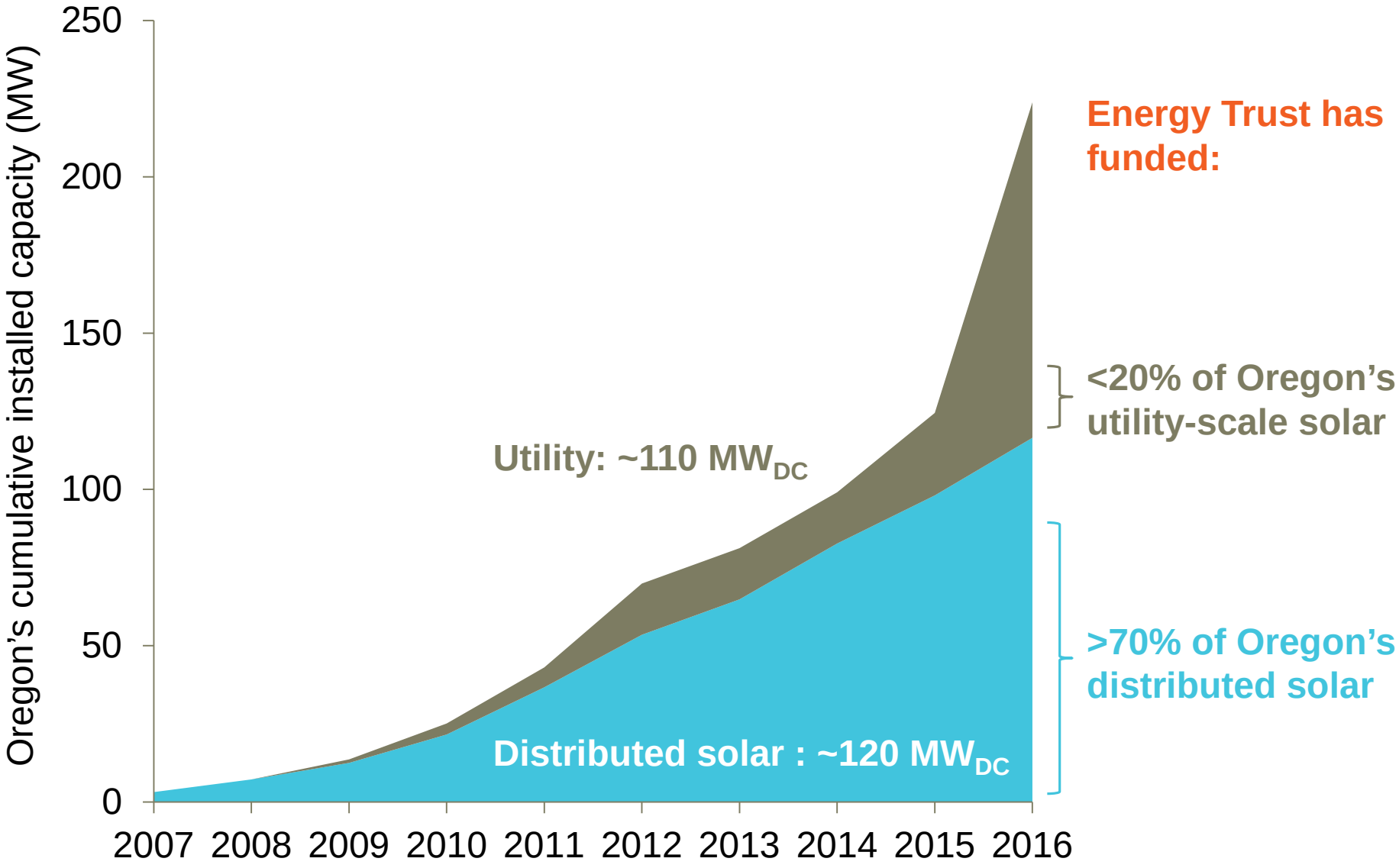
Changes in Oregon's residential market



Growth in commercial installations



Big jump in Oregon's utility-scale solar

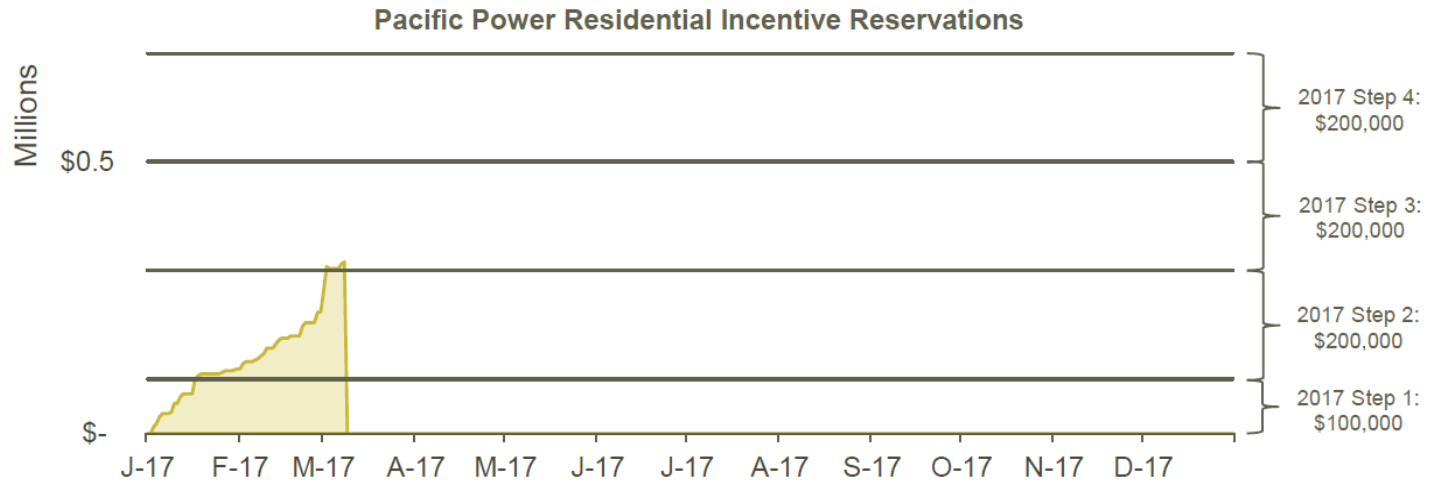


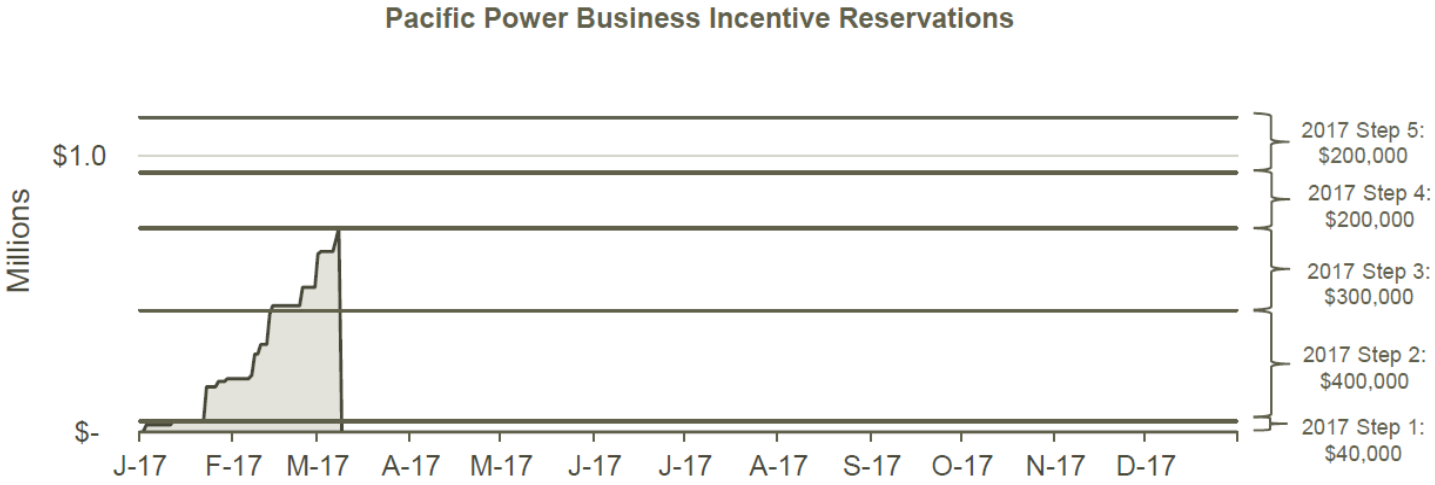
2017 budget for new incentives

	PGE	Pacific Power	Total
Residential	$2.0 million	$1.3 million	$3.3 million
Business	$1.8 million	$0.9 million	$2.7 million
Total	**$3.8 million**	**$2.2 million**	**$6.0 million**

Status report: energytrust.org/solarstatus

Strong demand for Pacific Power funds





What we're working on…

- Trade ally ratings (March)
- Trade ally summit: financial, marketing training (Q2)
- 2017 RMI e-Lab Accelerator: Renewable Resilient Power for Portland (R2P2) (Q2)
- PowerClerk 2.0 (Q3)

What's new?

- Planning for RETC expiration/extension
- Low-moderate income initiative
- Solar + storage feasibility support
- Community solar

Thank You!

Dave McClelland
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EnergyTrust of Oregon