SPEER

The South-central Partnership for Energy Efficiency as a Resource

Examining the History of Texas Energy Efficiency Programs

Utility Spending on Research and Development

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About the South-central Partnership for Energy Efficiency as a Resource (SPEER)

SPEER is a regional non-profit organization dedicated to increasing and accelerating the adoption of energy efficient products, technologies, and services in Texas and Oklahoma. Much of SPEER's work focuses on finding the best market-based approaches to increase energy efficiency and overcoming persistent market barriers. The views expressed in this paper do not necessarily reflect the views of all of SPEER's members, funders, or supporters. For more information about SPEER, please visit: www.eepartnership.org

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I. INTRODUCTION

In 2005 the Texas Investor Owned Utilities (IOUs) were given the flexibility to request funding to pursue research and development (R&D) projects related to their administration of energy efficiency programs. By law, investment in R&D must "foster continuous improvement and innovation in the application of technology and program design and implementation,"[1] as it relates to their energy efficiency responsibilities. In one of its yearly reports filed with the Public Utilities Commission of Texas (PUCT), AEP Texas Central indicated that "R&D activities are intended to help TCC meet future energy efficiency goals by researching new technologies, program options and developing better, more efficient ways to administer current programs."[2] In response to legislative guidance, regulations enacted by the PUCT ensured money utilities spent on R&D did not "exceed 10% of a utility's total program costs for the previous program year."[3]

It has been over twelve years since the IOUs were given this flexibility to spend money on efficiency R&D, so it is worthwhile to examine what utilities have done. What has this flexibility allowed utilities to do? How much have they been spending and what have they been spending that money on?

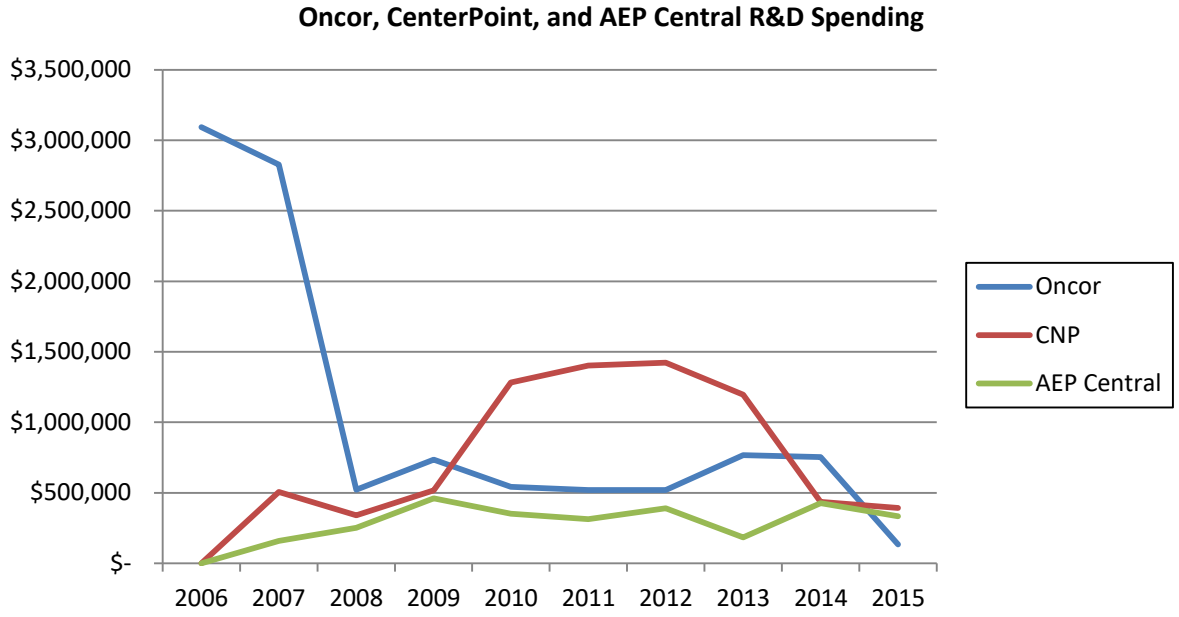
This report will provide an overview of the investment amounts that each utility has made in R&D since 2006. It won't come as any particular surprise that overall spending on R&D since 1999 has been dominated by the largest IOUs, given that total efficiency spending is driven by size, and R&D spending is capped in proportion to the utility program budget. What may be surprising is that while spending on R&D is capped at 10% of the previous year's program costs, rarely did any utility in any one year spend enough on R&D to come close to that cap. Almost all utilities spent only 1% to 4% of their approved energy efficiency program budget on R&D in any one year.

This report will also review some of the programs utilities have used their R&D resources on over the past twelve years. Taken as a whole, utilities have invested in dozens of R&D projects over the years, and while those projects involved many aspects, almost all of them focused either on researching a certain issue or on deploying an actual pilot project. This report will take a look at some of the research papers, pilot projects, and educational efforts that utilities have used R&D money on over the past few years.

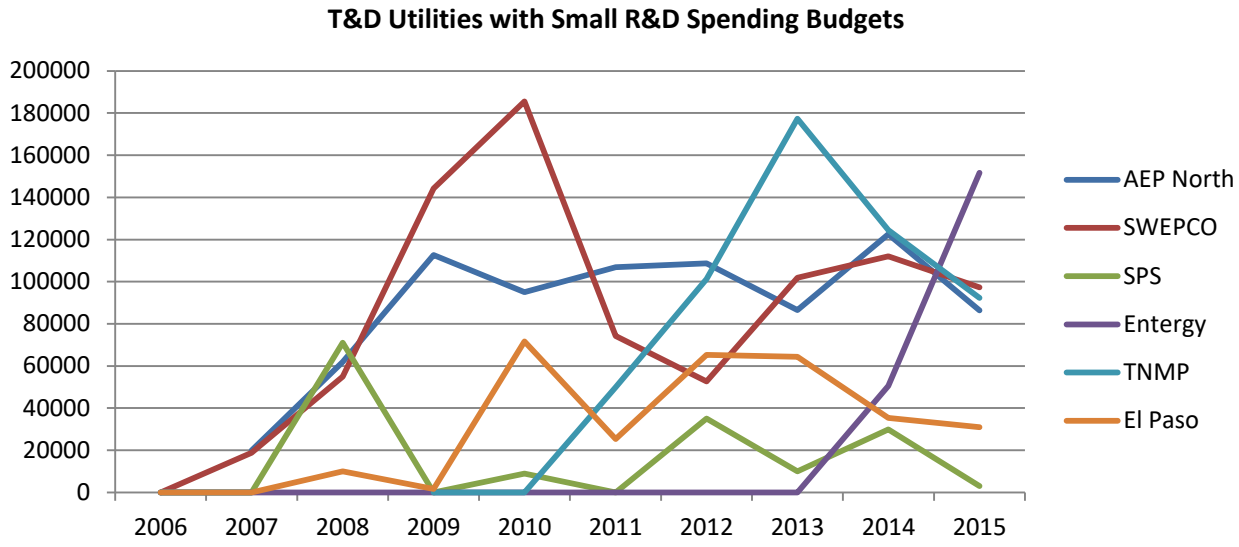
[1] Public Utility Regulatory Act, Tex. Util. Code § 39.905(e)
[2] AEP Texas Central Company 2015 Energy Efficiency Plan and Report; Amended July 30, 2015;PUCT Project No. 44480
[3] 16 Tex. Admin. Code §25.181(i) (TAC)

II. How Much Are Utilities Spending?

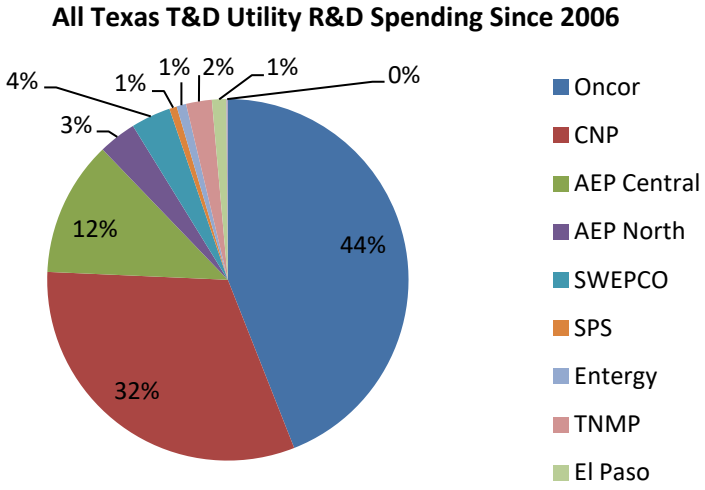
Since 2006, the most any utility has spent on R&D in any one year was $3,093,271, which Oncor spent on R&D in 2006. Oncor also spent $2,827,632 on R&D in 2007, but since then Oncor never spent more than $767,444 on R&D, spending a low of $132,844 in 2015.



With the exception of the aforementioned outlier years from Oncor, CenterPoint and AEP Central spending on R&D did not differ substantially from Oncor. CenterPoint's R&D spending ranged from a high of $1,422,482 in 2012 to a low of $340,989 in 2008. Relative to the R&D budgets of CenterPoint and Oncor, AEP Central spent the least on R&D, from a high of $490,300 in 2009 to a low of $158,300 spent in 2006. Most of the smaller utilities spent less than $100,000 in any one year on R&D.

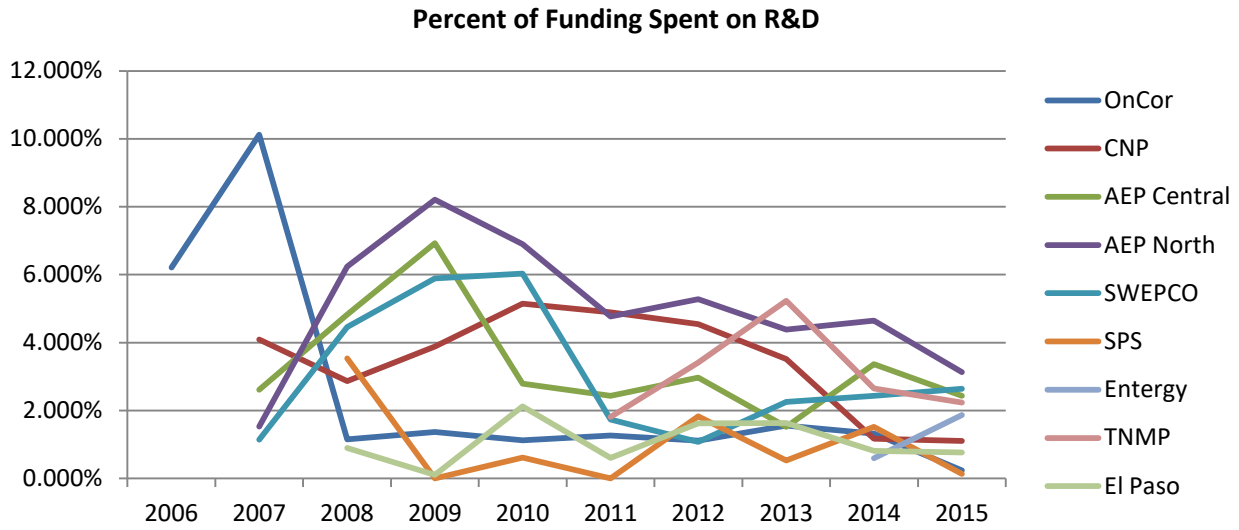


When it comes to considering all of the energy efficiency R&D spending since 2006, Oncor, Centerpoint, and Texas AEP Central are responsible for over 88% of the R&D spending which has occurred in Texas. However, the smaller utilities often follow the lead on new programs that are developed by these larger entities, benefiting indirectly from the R&D expenditure of their larger peers.



III. Are Utilities Spending As Much As They Are Allowed?

According to the energy efficiency regulations, "The cost of research and development shall not exceed 10% of a utility's total program costs for the previous program year." When comparing the amount of money utilities could be spending on R&D with the amount of money utilities actually spend on R&D, only rarely has any utility in any one year come close to hitting the cap on R&D spending.



While Oncor has spent more money than any other utility on R&D, the utility usually spends around 1% of their approved energy efficiency budget on R&D. The only time the cost cap appears to come into play for Oncor was in 2007, but since then no utility has come close. Most utilities spent less than 5% of their approved energy efficiency budget on R&D. In fact, SPEER found only 11 times, around 15% of the time, that a utility spent more than 5% of the previous years approved energy efficiency budget on R&D. AEP North usually spent the most money on R&D as a percentage of their previous year's approved energy efficiency budget.

IV. Regulatory Changes

Energy efficiency regulations concerning R&D spending have not been static over time. Initially spending on R&D and administrative costs were both capped at 10% of an approved energy efficiency budget. The PUCT adjusted these spending caps in 2010, and while the PUCT still limited administration and R&D costs combined to 20% of an approved energy efficiency budget, PUCT allowed utilities to spend up to 15% of their energy efficiency budgets on administrative costs.

How this combined administrative and R&D spending were apportioned between administrative and R&D costs was up to the utilities. In the end, given that the percentage of spending on R&D was already low relative to what it could be, this adjustment--allowing more administrative spending, and consequently less R&D spending under the combined cap--had no discernible impact on R&D spending. For the most part, utilities simply used the new rule to expand their administrative budgets. Only AEP North appeared to drop from slightly above to slightly below 5%.

V. Projects and Research Funded by R&D Money

In addition to considering how much utilities are spending on R&D, it is worth reviewing what projects and reports utilities are spending their R&D money on. While utilities are required to report overall R&D spending, there are few requirements, and therefore little consistency in the substance of utility reports

on R&D. Regardless, most utilities did document in annual program reporting, what they spent their respective R&D money on, and this provides a snapshot of the kind of projects utilities have invested in.

While there was great variation in the kind of projects utilities invested in, almost all of the R&D investments can be broken down into two broad categories: R&D funding focused on research and R&D funding focused on developing and implementing a pilot project. While each R&D project has some combination of research investment and pilot project deployment, whichever one of those aspects dominates determines how that particular spending is categorized for the purpose of this report.

R&D activities are intended to help utilities meet future energy efficiency goals by researching new technologies, program options and developing better, more efficient ways to administer current programs.

VI. RESEARCH PROJECTS

A good example of the research projects utilities invested in was the research initiative entitled *End-Use Energy Efficiency and Demand Response in a Low-Carbon Future.*[4] As described by Oncor, this initiative was a broad, collaborative project funded by over 40 members of the Electric Power Research Institute, an organization which conducts research regarding the electric power industry.[5] While the initiative spanned numerous years, during 2014 this program focused on a few elements, including but not limited to: research, development and demonstration on advanced end-use technologies that enable and enhance energy efficiency; collaboration with equipment venders to improve performance and reduce costs of energy efficiency equipment and demand response systems; development of analytical frameworks to value the economic and environmental benefits of energy efficiency and demand response to utilities, customers, and society; and development of an industry-standard modeling approach to quantify the impact of energy efficiency on reducing carbon emissions.[6]

CenterPoint also funded a R&D project which examined the best ways to implement energy efficiency measures in small commercial buildings.[7] According to the CenterPoint report, owners of small commercial buildings "lack the time and capital to spend on energy efficiency measures and there are very few resources and tools available", so CenterPoint partnered with the Houston Advanced Research Center (HARC) to analyze the cost-effectiveness and potential of certain programs which would encourage the installation of energy efficiency measures.[8] They examined a conventional direct install

[4] Oncor Electric Delivery 2015 Energy Efficiency Plan and Report; April 1, 2015;PUCT Project No. 44480
[5] Ibid
[6] Ibid
[7] CenterPoint Energy Houston Electric, LLC, 2015 Energy Efficiency Plan and Report; REVISED June 19, 2015;PUCT Project No. 44480
[8] Ibid

approach and two different energy manager style programs, and CenterPoint planned to undertake a pilot study of the most cost-beneficial approach.[9]

Another R&D project funded by a utility included Texas-New Mexico Power Company supporting an energy education project, which involved offering a live theater production for TNMP service territory elementary school students which focused on educating young people about using energy efficiently.[10] Workbooks and teacher guides were also distributed in an effort to reinforce the message of the live theater production.[11]

Small commercial building owners lack the time and capital to spend on energy efficiency measures and there are very few resources and tools available.

More recently, several of the utilities have paid to join the Texas Energy Power Research institute, a 501(c)(3) dedicated to researching the "root causes of energy and fuel poverty and provide data for solutions that have an impact on low-income households."[12]

V. PILOT PROJECTS

One of the more interesting R&D projects undertaken was the pilot SWEPCO ran in 2010 and 2011 to measure and verify the electrical demand and energy savings from replacing incandescent lamps with LED lamps in Broiler Houses, which are large facilities to help grow and raise chickens.[13] SWEPCO partnered with a grower who had two separate broiler farms, each with numerous broiler houses. All of the broiler houses on one farm had their 60-watt incandescent feeder lamps replaced with 10-watt LED lamps, while the other farm was the control group for the project, so no lights were replaced. The lighting circuits for each farm were submetered in order to provide information on electricity consumption. SWEPCO even brought in the Poultry Science Department of Texas A&M to provide data on "final bird weight and the financial payout of the test houses compared to the control houses."[14] Ultimately, SWEPCO determined there was "significant energy savings and demand savings associated with the replacement of the incandescent with LED bulbs," but thanks to the Energy Independence and Securitization Act of 2007, which has phased-out the manufacturing of incandescent bulbs, they found no future need to invest in energy efficiency programs focused on the poultry industry lighting. [15] The impact of the LED lights on the various tracked bird metrics was deemed inconclusive.[16]

[9] Ibid
[10] Texas-New Mexico Power Company, 2012 Energy Efficiency Plan and Report, April 1, 2012, Project No. 40194
[11] Ibid
[12] Oncor Electric Delivery Company LLC, 2016 Energy Efficiency Plan and Report, April 1, 2016, PUCT Project No. 45675
[13] Southwestern Electric Power Company; 2012 Energy Efficiency Plan and Report; March 30, 2012; PUCT Project No. 40194
[14] Ibid
[15] Ibid
[16] Ibid

Another interesting pilot undertaken by a utility using R&D funds is the project CenterPoint funded which involved partnering with a residential community developer north of Houston.[17] Discovery at Spring Trails was a gated community under construction in which the developer required builders to use ultra-high energy efficient construction and appliances, as well as installing solar roof-top panels. A 250 kW solar farm was included to offset part of the community's energy demand, which included water and sewage treatment as well as outdoor lighting. The whole project involved creating a micro-grid to manage the energy usage of the new development. CenterPoint provided funds to measure the savings and assess the performance of the solar and energy efficiency systems. The Center for Commercialization of Electric Technologies, a partner in the project, helped demonstrate direct load control communicating directly through the Smart Meter Texas Portal as a Smart Grid demonstration.[18]

Other examples of R&D pilots funded include CenterPoint's demonstrating the technology integration of plug-in electric vehicles. Oncor funded a collaborative project which demonstrated hyper-efficiency technologies in commercial buildings and household appliances.[19] In addition to the previously mentioned projects, both CenterPoint and Oncor evaluated the combined efficiency and demand response impacts of residential energy management systems.[20] AEP Central set up a similar pilot, but offered participating customers an advanced programmable communicating thermostat which allowed a third-party to control the customer's central air conditioner during a certain number of summer peak load events.[21]

VI. CONCLUSION

When it comes to R&D spending, only once has a utility come close to hitting the 10% cap on R&D spending imposed by the PUCT. In their yearly report AEP Texas Central indicated that "R&D activities are intended to help TCC meet future energy efficiency goals by researching new technologies, program options and developing better, more efficient ways to administer current programs."[22] Perhaps because the energy efficiency goals in Texas are relatively modest, utilities don't need to invest more in R&D projects because are not challenged with complying with the goals currently.

Since 2005, when Texas IOUs were first given permission to use funds on energy efficiency R&D various utilities have invested in a diverse portfolio interesting projects. While the PUCT imposes few

[17] CenterPoint Energy Houston Electric, LLC, 2013 Energy Efficiency Plan and Report; REVISED August 21, 2013;PUCT Project No. 41196
[18] Ibid
[19] CenterPoint Energy Houston Electric, LLC, 2013 Energy Efficiency Plan and Report; REVISED August 21, 2013;PUCT Project No. 41196; Oncor Electric Delivery Company LLC, 2013 Energy Efficiency Plan and Report, April 1, 2013, PUCT Project No. 41196
[20] CenterPoint Energy Houston Electric, LLC, 2013 Energy Efficiency Plan and Report; REVISED August 21, 2013;PUCT Project No. 41196
[21] AEP Texas Central Company; 2011 Energy Efficiency Plan and Report; April 1, 2011; PUCT Project No. 39105
[22] AEP Texas Central Company 2015 Energy Efficiency Plan and Report; Amended July 30, 2015;PUCT Project No. 44480

requirements on utilities when it comes to reporting on the substance of the various R&D projects utilities invest in from year to year, those utilities have provided enough information to give a snapshot of how they spend their R&D funding. It may be helpful in the future, if PUCT provided some guidance that would ensure each utility provides more transparency or consistent detail about their respective R&D investments.