

Large-Scale Battery Storage for Clean Energy: Is Now the Time?

BACKGROUND

Since the days of Spindletop, Texas has maintained our place as a global energy leader by innovating. Today, our state has the largest wind fleet in the country (as of 2013, if Texas were its own country, we would rank 6th worldwide in wind power). In recent years we invested nearly \$7 billion in the Competitive Renewable Energy Zone (CREZ) transmission lines to bring 18,000 MW of wind power from rural West Texas to urban population centers in Central and North Texas. (One MW is enough power to serve about 200 homes during periods of peak demand, like a winter ice storm or a hot August afternoon.)

Wide-scale use of renewable power is complicated by the fact that wind and solar intensity varies over a 24-hour period, since the wind in West Texas usually blows harder at night and the sun only shines during the day. In the context of electric power, this variability is referred to as "intermittency."

There are several ways to address the intermittency of power from Texas' growing fleet of renewable energy, such as using natural gas power plants, which can turn on and off quickly to level out the intermittent flow of renewable power, or using large batteries to store excess renewable energy until it is needed.

Last fall, Dallas-based Oncor Electric Delivery Company¹, which operates the largest network of power lines in Texas, released a report by The Brattle Group² that

¹ Oncor is a transmission and distribution (T&D) company regulated by the Texas Public Utility Commission (PUC). Oncor is an Energy Future Holdings company. A map of Oncor's service territory is at <http://www.oncor.com/en/pages/oncor-service-area.aspx>.

² The Brattle Group is a respected international research firm that also does research for this coalition, as well as the PUC and the Electric Reliability Council of Texas (ERCOT), among others.

examined how the large-scale use of such batteries might work in Texas. Entitled "The Value of Distributed Electricity Storage in Texas", the report analyzed the potential benefits of installing 25,000 dinner-table-size batteries around the state, at a cost of \$3 to \$5 billion.

This paper summarizes the Brattle report and examines some pros and cons. The full report is available at http://www.brattle.com/system/news/pdfs/000/000/749/original/The_Value_of_Distributed_Electricity_Storage_in_Texas.pdf?1415631708.

SUMMARY OF ONCOR'S PROPOSAL

Under the plan envisioned in the Brattle report, Oncor and other transmission and distribution (T&D) companies would purchase the batteries and install them throughout the ERCOT grid³ in areas where electric reliability is lowest, in order to balance out intermittent renewable energy and enhance the electric grid's reliability.

The Brattle report also envisions that the T&D companies that invest in batteries could offset their investment by auctioning off the storage capacity to electric wholesalers like Luminant, NRG or Calpine. Those companies could then sell the stored power in the wholesale market for the best available price, such as during times of peak demand when wholesale electric prices are high. Current Texas law does not permit T&D companies to own power or sell it to wholesalers. T&D companies are the only segment of the Texas electric market still regulated by the state, and as such are guaranteed a certain profit on their investments. The costs of a T&D company's investment in the batteries would be added to its PUC-regulated rates, and could be offset by auctioning off the right to sell the stored energy.

³ ERCOT is the Independent System Operator (ISO) for most of Texas. ERCOT oversees the wholesale and retail electric markets in the state. Learn more at <http://www.ercot.com/about/index.html>.

Using a projected battery cost of \$350/kWh⁴ by 2020, the report found that a battery fleet of 5,000 MW would provide the greatest net benefits. Brattle’s study analyzed three categories of benefits from the proposed fleet of batteries:

1. *Merchant Benefits*: energy wholesalers could sell the stored electricity when demand and prices are high;
2. *System-Wide or Societal Benefits*: the overall electric grid would benefit from greater reliability, reduced growth in peak electric demand and reduced need for new generation; and
3. *Customer Benefits*: retail electric bills would decrease slightly and the grid would be more reliable, which is especially valuable for commercial and industrial customers.

PROS AND CONS OF ONCOR’S PROPOSAL

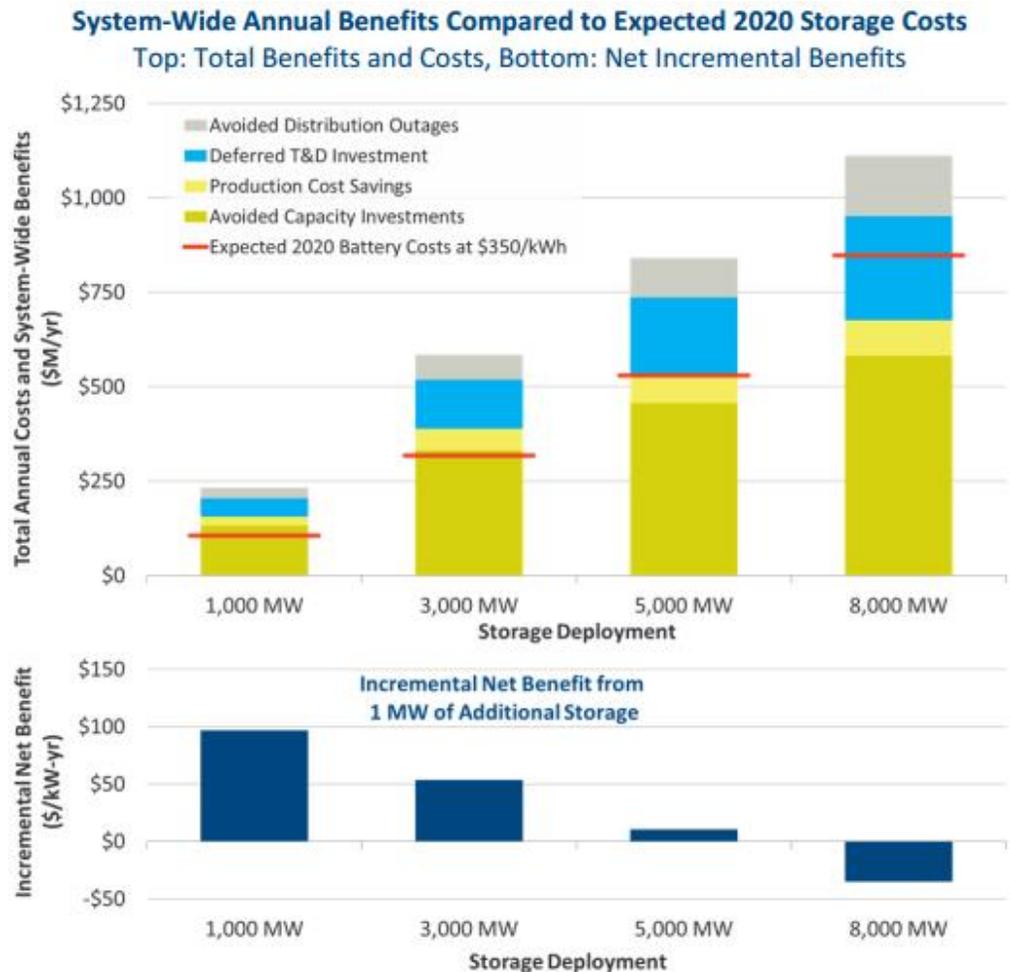
Pros: This proposal could help the Texas electric grid become cleaner by creating a fleet of batteries that can harness and store intermittent renewable power until it is needed.

Both wind and solar power have zero fuel prices, so using more renewable power would help keep electric rates affordable, make the electric grid more reliable and the air cleaner.

Cons: If the power stored in the batteries does not bring a good price in the Texas electric market, wholesalers will not want to buy the stored power and the auction proceeds will not offset much of the investment in the batteries. Because the batteries would be funded through the T&D companies’ regulated rates, retail customers could pay for the bad investment. Also, although the battery plan would delay the need for T&D system upgrades by strategically placing the batteries on the weakest parts of the electric grid, it would only be a temporary patch. The

batteries would not eliminate the need for eventual system upgrades, which would be paid for by retail customers along with the investment in the batteries.

Finally, because batteries will likely keep getting cheaper for some time after the Texas T&D companies buy the fleet of batteries envisioned in this plan, ratepayers could be stuck paying for outdated, overpriced batteries. The financial drag of paying off that bad investment could also make it harder for new, cheaper batteries to enter the market later on.



WHAT OTHERS ARE SAYING

- “Oncor Proposes Giant Leap for Grid, Batteries,” *Dallas Morning News*, Nov. 8, 2014. <http://www.dallasnews.com/business/energy/20141108-ocor-proposes-giant-leap-for-grid-batteries.ece>
- “Family feud? TXU Energy and Luminant aren’t on board Oncor’s battery plan,” *Dallas Bus. Journal.*, Nov. 26, 2014. <http://www.bizjournals.com/dallas/news/2014/11/26/family-feud-txu-energy-and-luminant-arent-on-board.html>
- “Texas-size battery proposal adds to debate about electricity grid,” *Austin American-Statesman*, Jan. 10, 2015. <http://m.statesman.com/news/business/texas-size-battery-proposal-adds-to-debate-about-e/nijgf/>

⁴ Brattle based its projection on industry sources and Oncor’s discussions with vendors. Other projections for battery costs range from \$110 to \$1,500 per kilowatt hour (kWh). One kWh can keep a 40-watt light bulb burning for 25 hours.