



5 Ways Utilities Can Boost Revenue Without Expensive Infrastructure Upgrades

This paper provides a strategic road map for utility companies looking to increase revenue without increasing peak demand or infrastructure upgrades as well as integrating renewable resources, and improving brand image. It addresses 5 economic and regulatory pressures limiting revenue potential and concludes with a plain-English solution displaying 5 ways utilities can increase sales while optimizing existing resources.

Challenges for Utilities: Decreased Margins and Renewable Integration

Economic and regulatory pressures on utilities dramatically increased over the past 5 years, frustrating leading utilities' efforts to grow or even maintain revenue.

- Load growth slowed to a trickle or in many cases became negative due to a contracting economy
- Wholesale energy costs increased with fossil fuel prices and more stringent government policies
- Government requirements for more renewable energy
- Profitably integrating large quantities of wind and solar resources
- Balancing renewable electric generation with consumer demand
- Cycling inefficiencies: Today power plants spin generators faster when frequency is high and throttle down when it is low. This method is inefficient which decreases profitability of power being sold on the market and is hard on generators.

How Utilities are Taking Back Control Over Revenue Growth with Smart kWh Sales

While utilities have little control over the macroeconomic and political issues impacting revenue growth, recent technological breakthroughs in smart kWh sales allow utilities to reclaim control over their financial future, without requiring expensive infrastructure upgrades.

Electric storage lets utilities increase kWh sales without increasing peak demand or requiring upgrades to utility infrastructure. Electric storage allows wholesale energy to be purchased at its lowest cost and when most abundantly available. Additionally, utility infrastructure is optimized with electric storage by providing demand management. Large quantities of renewable electric resources are brought online economically by utilizing electric storage. Electric storage is beneficial to utilities, consumers, and the grid for balancing supply and demand in "Real Time" and to maintain power grid stability.

5 Ways Utilities Increase Revenue with Electric Storage

1 Peak Energy Reduction

An electron generated and transmitted at 5:00 p.m. on a hot August afternoon is far more costly than one generated at 3:00 a.m. in the morning.

Electric storage reduces the source fuel needed to generate every kilowatt-hour of energy by shifting from on-peak usage to off-peak. Studies by the California Energy Commission shows the amount of savings ranges from 8 to 30 percent, and this study was performed when fuel costs were substantially lower than today. ([Energy & Environmental Impacts of Thermal Energy Storage](#), [California Energy Commission](#) (CEC), P500-95-005, Feb. 1996.).

2 Maximizing Infrastructure Capacity

Electric storage helps power companies better utilize current capacity without eroding kWh sales. It reduces transmission line losses, by shifting load from times of constraints to times of adequate capacity. This can be done at the generation level, the transmission level, the distribution level, and/or the end use level.

Most of the costs of electric sales are fixed. When sales are increased during times when the grid is not constrained, more revenue will be achieved. Because of this, off-peak electricity can sell at a reduced price while providing nice margins for the utility.

3 Economic Integration of Renewables

The US Midwest region provides an example of how electric storage provides utilities with greater revenue for their renewables. Renewable energy from wind is predominantly generated at night. Unfortunately the demand is low at this time, which means often renewable energy is sold for a very low price and in some cases curtailed. According to MISO, some wind farms are experiencing 20% curtailment. Electric storage allows your customers to purchase this extra inventory of energy and use it productively throughout the next day.

4 Grid Reliability

Electric storage helps to stabilize the grid by providing regulation and protection from faults. By providing stabilization, electric storage helps to reduce repair and redundancy costs.

5 New Value Streams: Frequency Control & pinning Reserve

In organized energy markets (ISOs and RTOs) resources can bid to provide regulation (frequency control) and spinning reserve. Recently FERC issued order 755, which states that fast acting reserves, like some electric storage, must be compensated at a larger price than slow moving reserves, like thermal power plants. As more variable renewable resources are brought on to the grid, the value of providing frequency control and spinning reserve will continue to increase. Aggregated fast acting electric storage will be able to receive payments for providing these ancillary services.

How much revenue will energy storage provide?

According to a recent evaluation by the Cooperative Research Network a distribution utility will realize a net present benefit of between \$4,626-\$12,331/kW of storage installed.

Choosing the Lowest Cost, Most Effective and Grid-Scalable Electric Storage

For over 30 years utilities have used electric thermal storage to help shift load and increase sales. Today gridinteractive electric thermal storage (GETS) is proven to be the low-cost, long-life, grid-scalable, electric storage.

| Technology | Cost | |
|---|---------------|---------------|
| | \$/kW-h | \$/kW |
| Grid-interactive Thermal Storage [†] | \$30-\$60 | \$100-\$200 |
| CAES (above ground) | \$200-\$250 | \$700-\$800 |
| ZnBr Flow Cell | \$280-\$450 | \$425-\$1300 |
| Pb-Acid Battery | \$330-\$480 | \$420-\$660 |
| NaSBattery | \$350-\$400 | \$450-\$550 |
| Flywheel | \$1340-\$1570 | \$3360-\$3920 |

Source: EPRI 2009 energy storage technology cost estimates
[†] Source: Steffes Corporation

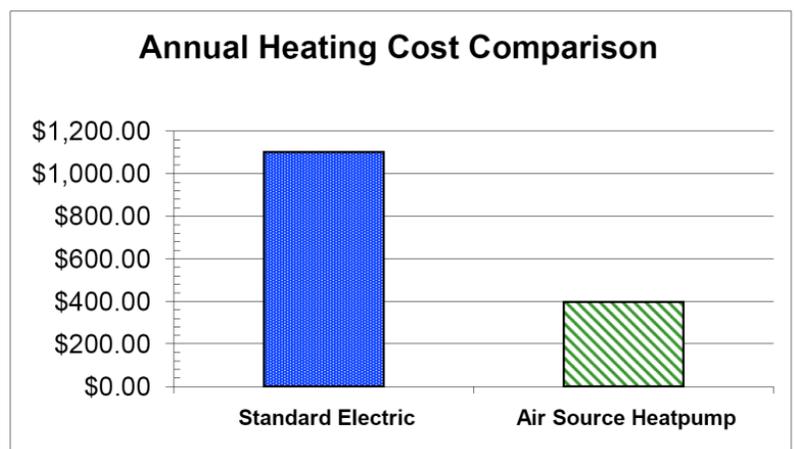
What is GETS?

GETS combines standard load management systems or other smart grid signals with electric thermal storage space and water heaters in residential, commercial, and industrial applications. High-density bricks and/or water are used to store low cost, off-peak or renewable generated energy. This stored energy provides space and water heating for residential and commercial buildings. As the smart grid becomes more developed, GETS provides dynamic control, which allows utilities to get additional economic value for frequency control and spinning reserve, LMP optimization.

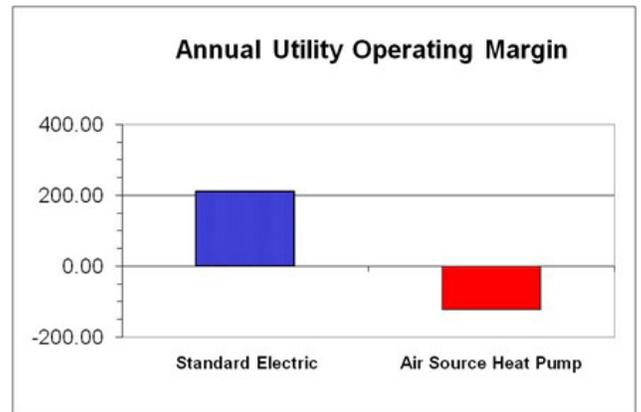
Utility Cost Analysis: How a Southern Distribution Utility Increased Revenue with Electric Storage and Smart Grid Technology

The initial problem: The utility was faced with high demand charges due to large percentage of electrically heated homes. This cause increased rates and unhappy customers.

Solution #1: The utility encouraged the use of heat pumps to replace the electric heat. This reduced energy consumption in the home and saved the consumer money on their electric bill.

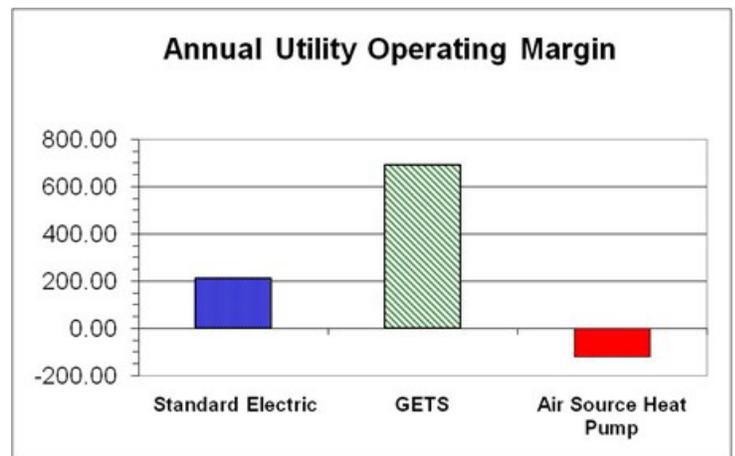


Results of Solution #1: The distribution utility lost energy sales to the home and saw their operating margin decrease. The consumers were able to reduce their bill (in the short term) because they used less kWh. The utility lost revenue because they still were hit with similar demand costs, due to compressor load and resistance back up heat, but had less kWh sales.



Solution #2: Since the implementation of air source heat pumps actually caused rates to rise, the utility looked for another solution. The utility encouraged the use of a GETS room unit (Steffes 2100 series) in the electrically 4 heated homes. The electric furnace was controlled during peak times and the GETS room unit provided comfort to the home.

Results of Solution #2: The distribution utility was able to shift the entire heating load of the home to off-peak, retaining the kWh sales without the demand penalty. The utility was able to give a monthly rebate to the consumer during the heating season and increase their operating margin.



Future benefit for the utility: By aggregating several hundred GETS room units, the distribution utility will be able to bid them into the regulation market from their independent system operator. Early analysis shows that revenue generated by providing regulation will actually **exceed** the wholesale energy cost for the GETS heater.

How Electric Storage Improves Brand Image and Makes Happier Customers

In addition to increasing revenue and optimizing resources, utilities also benefit from how electric storage improves brand image and increases customer satisfaction. Low capital costs, high turnaround efficiencies, and low environmental impacts, make GETS the ideal systems to build an electric storage program around. The extra revenue generated by GETS systems keeps overall rates low, which translates into more happy customers and improved perception of your brand.

Affordable Space and Water Heating for Consumers

- Offers consumers a low-cost method of heating with electricity
- Reduces high bill complaints makes happier customers and frees customer support to deal with other issues
- Makes electric heat competitive with fossil fuels
- GETS let your customers store energy from variable generation sources like wind or solar, for use in heating as needed.

Reduces our Country's Dependence on Foreign Oil

Off-Peak Electricity is an underutilized domestic resource, which can be used for space and water heating purposes, thereby reducing the amount of oil we import. Letting your customers know you are committed to independence and stewardship of our natural resources improves their confidence in your energy leadership for their community.

Shows public your commitment to the environment

The reduction in source fuel by reducing peak demand normally reduces greenhouse-gas emissions produced by the power plant and demonstrates your commitment to a clean environment.

Who is the Leader in GETS Technology?

Steffes Corporation has worked with utilities across North America for over 25 years and is the world leader in providing utility companies with grid-interactive electric thermal storage solutions. Steffes Heating Systems range from 1.3 kW to 160 kW. A successful GETS program featuring Steffes Heating Systems increases revenue, optimizes infrastructure, and efficiently integrates renewable resources.

What to Do Next

Steffes Heating Systems developed a “30 Minute Utilities Revenue Tune-Up” which we conduct over the telephone with you and your top staff members. Here is what we accomplish together in this fast-paced session:

Review utility economics and reasons for exploring a GETS program. Rates, renewable integration, and competitive fuels will be discussed. Would a GETS program be beneficial for the utility and the consumer?

Discuss what type of products would work best. Advantages of a space heating and/or water heater program will be reviewed. Where is the low hanging fruit for a GETS program on your lines, residential (new construction or retrofit), commercial, or industrial?

Discussion of metering and control. Is there existing metering and controls available or is there a clean slate?



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