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Global Energy Partners' Study Identifies Significant Energy Savings Potential for TVA Customers

The Tennessee Valley Authority (TVA) retained Global Energy Partners (Global) an EnerNOC, Inc. Company, to determine the potential for energy efficiency (EE) and demand response (DR) as a resource to help meet the Valley's future energy needs. TVA has an aspirational goal to lead the Southeast in energy efficiency, and believes this leadership can be accomplished through the development and implementation of action plans for EE and DR.

This study used state-of-the-art modeling to provide an analytical framework for estimating the achievable potential of EE and DR programs in the TVA service territory over the next 20 years.

ENERGY EFFICIENCY

Global simulated the effect of deploying a wide range of energy efficiency measures to all homes and businesses across TVA's 9-million-strong customer base. Examples include: compact fluorescent and LED lighting, high-efficiency heat pumps, programmable thermostats, motor control systems and variable speed drives, heat pump water heaters, secondary refrigerator recycling, and other new and emerging technologies.

The study projects that without utility efficiency programs to encourage the adoption of these measures, energy used by residential, commercial, and industrial customers in the valley will grow by about 1% annually, reaching nearly 180,959 GWh by 2030. However, energy efficiency programs have the potential to offset at least half of that growth.

The study developed high and low estimates of achievable savings. In 2015, the range of savings is 3,256 to 7,494 GWh, or 2.2 to 5.0% of the baseline forecast without EE programs. The high end of this range is roughly equivalent to the annual amount of energy produced by an average-sized (1000 MW) coal power plant. In 2030, savings in the low case are 19,093 MWh, equivalent to 10.6% of the baseline forecast, while in the high case they are 35,781 MWh or 19.8% of the baseline.

Energy efficiency measures also reduce system peak demand. In 2015, potential savings are between 687 MW and 1,590 MW or 2.1 – 5.0% of the baseline absent EE programs.

What is a Potential Study?

A potential study identifies future opportunities to save energy through efficiency programs.

The study begins with a thorough analysis to understand how homes and businesses currently use energy; for example, how much electricity is used for lighting, heating, cooling, and appliances.

Next, a baseline forecast is developed to project how customers would be expected to use energy in the future, in the absence of utility energy efficiency programs. This forecast assumes no intervention by utilities but does include savings expected from building codes and appliance standards that are already scheduled to be enacted.

Finally, equipment upgrades and other efficiency measures are applied to the forecast. The difference between the baseline forecast and the new, efficient forecast in each year is the potential for savings.

This study evaluated three levels of potential: 1) Technical Potential, a theoretical upper limit where all of the efficiency measures are phased in regardless of cost; 2) Economic Potential, which only applies the measures that will eventually pay for themselves with saved energy; and 3) Achievable potential, which further narrows the estimate by accounting for how quickly programs can be implemented, as well as customer adoption rates. Because this final step is a projection of customer and market behavior, the inherent uncertainties are sometimes accounted for by expressing Achievable Potential as a range.

DEMAND RESPONSE

Global also identified a broad set of Demand Response options, to help reduce peak demand, building upon TVA's strong base of existing DR programs currently available to large commercial and industrial customers. DR programs provide customers financial incentives to reduce their energy use at times of peak usage, so that TVA can avoid running additional generating units or purchasing energy on the spot market. This ensures lower system-wide costs and better grid reliability, to the benefit of all customers. TVA only enacts these programs a few hours each year during certain peak times.

DR programs in the analysis include options for all customer classes such as: dynamic pricing programs, where customers can choose to pay higher rates during peak usage hours in exchange for lower prices at all other times; direct air conditioner load control or communicating thermostats that allow TVA to partially reduce air conditioner use during peak load hours; and demand and capacity reduction programs, in which customers agree to reduce their use, for example by dimming lights, when TVA calls upon them to do so.

With the DR options presented in this report, TVA has the potential to reduce peak demand by 1,782 to 2,301 MW in 2015, or 6 to 7% of peak load. The achievable potential increases to a range of 3,199 MW to 4,579 MW in 2030, which equates to 8 to 12% of peak load. These impacts are equivalent to the capacity of several average-sized coal power plants.

OVERALL RESULTS

The results of the potential assessment reveal that TVA has significant potential for energy efficiency and demand response resources over the next two decades. TVA's programs are off to a strong start, with a comprehensive suite of programs currently moving from the planning phase to the implementation phase. With this report, Global provides a number of recommendations to preserve and augment that momentum, as well as an analytical basis to map the achievable path forward.

COMPARISON WITH OTHER STUDIES

Global also compared the results of this study to existing potential studies that were conducted in the Southeast region, as well as national studies. The comparison focuses on methodology, assumptions, approaches, estimated baselines, technical performance, adoption, and program/regulatory context. Direct comparison from study to study is often difficult due to the unique situation surrounding each new study and the complexity of each of the outlined issues. Nonetheless, Global's EE and DR savings estimates are generally in line with the other studies, as discussed in more detail in the final report.