CASE STUDY

Huntsville Utilities

PROJECT

Integrated Planning Pilot with TVA

TVA TENNESSEE VALLEY AUTHORITY

ABOUT

A municipally owned local power company

700+
EMPLOYEES

800+
SQUARE MILE ELECTRIC SERVICE TERRITORY

CUSTOMERS

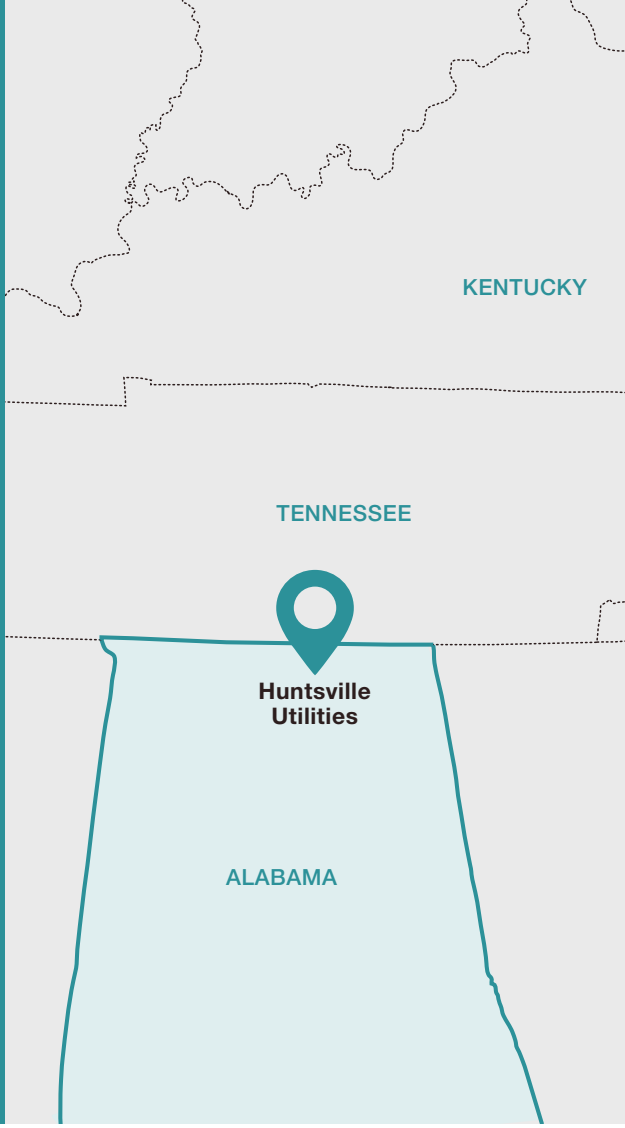
TOTAL
387,000*

ELECTRIC
216,231

GAS
62,572

WATER
108,209

*This figure may not represent a unique count of individuals or entities served by HU, as some customers may utilize more than one of these utility services.



Background

TVA uses an Integrated Resource Plan (IRP) as a strategic roadmap to forecast and address future energy demand in the coming decades. As part of its planning process, TVA develops future scenarios based on variables like extreme weather, technological advancements and shifts in economic and policy landscapes. TVA's planning process focuses on two key components - electricity generation and transmission, which are coupled together to account for changes in resource location mix.

In contrast to TVA's long-term, enterprise-wide planning efforts, local power companies (LPCs) like Huntsville Utilities (HU) tend to concentrate more on shorter-term, locally-based load growth and reliability issues. The LPC planning process varies widely, with some revising their forecasts annually to align with recent knowledge and local growth, while others may opt for updates every three years or longer. One key reason behind these LPC forecasts is to identify where new substations need to be built or expanded, a process that typically spans several years.

The Need

Prior to this pilot, integrated transmission and distribution planning between TVA and their LPCs had not been occurring. In fact, integrated planning itself has not been a well-understood or defined process.

The pilot project, which was part of the Regional Grid Transformation (RGT) Initiative, sought to understand the implications of a more integrated planning process between TVA and LPCs. HU and TVA were specifically interested in assessing the necessary data needed for this integrated approach, as well as the tools and processes.

What is integrated planning?

Integrated planning is a collaborative process that ensures TVA's long-term, enterprise-wide planning is in line with the planning efforts of its LPCs. The goal is to **promote transparency and alignment** in the planning of TVA's generation and transmission investments and the LPCs' distribution investments.

Goals

Data and insights from this pilot can be used to better understand how to target proactive grid upgrades or expansions and can also inform the suitability of solutions that may be beneficial to both TVA and HU, one of the main objectives of RGT's vision of integrated planning.

THROUGH THIS PILOT WITH HUNTSVILLE UTILITIES, TVA ASPIRES TO:

1

Gain a better understanding of the impacts of load, EV adoption and distributed energy resource (DER) growth

on HU's electric distribution system.

2

Help HU proactively plan for solar + storage and system upgrades

in strategic locations around their service territory instead of reacting to customer demands.

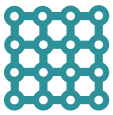
3

Lay the groundwork for future integrated transmission-distribution

planning efforts between TVA and its LPCs.

Approach

During the pilot, HU and TVA collaborated to assess and improve their resource planning capabilities, helping them better understand the impacts of load and DER growth on the distribution system. The pilot process involved the following steps, all designed to provide valuable insights into the use of Wide Area Distribution Analysis (WADA) techniques and the importance of integrated transmission and distribution planning.



WIDE-AREA DISTRIBUTION ASSESSMENT

Considers the entire distribution grid for a holistic understanding of the impacts and benefits of modernization.

COLLABORATIVE INTEGRATION

1. **Conducted a baseline assessment** to understand the grid's ability to accommodate future resources.

2. **Developed future scenarios and forecasts** (i.e., high DER, load growth, electrification and extreme weather) to understand how the system may be impacted under each future scenario.

3. **Performed impact and alternative assessments** of forecasted scenarios (e.g., high load growth, extreme weather) to provide insight into timing, location and magnitude of potential impacts and to identify mitigative solutions.

Key Learnings

Though this is a brand new approach for TVA, LPCs and the industry as a whole, the pilot project has showcased the potential benefits of integrated planning for the Valley, while also highlighting the additional capabilities that will be needed in order to achieve a more integrated planning process.

FOSTERED FOCUSED DISCUSSIONS

The pilot project encouraged more intentional discussions between TVA and HU, moving from broad regional planning discussions to more focused talks about joint solutions and potential collaborations as both entities plan for the future.

BROUGHT CLOSER RELATIONSHIPS

This process cultivated a closer relationship between TVA's transmission planners and HU's local distribution planners as well, helping both parties understand their needs and what information would be helpful for the other.

Initially, achieving the four core goals for a clean energy future — **transitioning**, **ensuring grid integrity, maintaining affordability** and **engaging customers** — might appear challenging. However, a well-coordinated approach involving key planning entities spanning across forecasting, generation, transmission, distribution and customer/pricing programs can drive significant progress.

LPCs that take on integrated planning will have differing experiences based on their unique environments, stakeholders and starting points. However, this process will become more streamlined over time and with more experience. Working together, LPCs and TVA can optimize grid planning across the traditional planning boundaries and better utilize infrastructure, keep costs low and engage customers — while maintaining the integrity of the grid.

Recommendations for Other LPCs

Build Strong Relationships

Identify key players and assemble a collaborative team early on to spearhead the planning process. Involve TVA in the development of your scenarios and forecasts.

Design Your Planning Process

Develop and document the planning process with input from leadership, integrate the training of your engineers in distribution studies and include the acquisition of necessary tools as essential components.

Document Current Processes

Map and document existing planning processes collaboratively with TVA. This should include developing and maintaining distribution grid models. This foundation will enable team members to understand each other's roles and build consensus.

Expect Evolution

Embrace the concept that the planning process is ever-evolving. Adapt your planning process to accommodate the evolving nature of collaborative scenario and forecast development and optimization of solutions.

Define Progress Metrics

Create new metrics that track progress toward your local planning goals. Where necessary, implement new systems and technology to track and report on these metrics.

Recognize Unique Experiences

Acknowledge that each LPC's local planning efforts will vary based on their unique circumstances and starting points. Expect the process to become streamlined over time.

Integrated Planning Supports TVA's Regional Grid Transformation Objectives

HU and TVA's collaboration in integrated planning is in line with TVA's Regional Grid Transformation (RGT) objective of upgrading our electric system to meet the changing needs of customers and the region.

As part of the RGT initiative, TVA and LPCs collaborated to identify capabilities necessary for advancing the Valley-wide electric system, known as the “Capability Progression Model.” One of the identified capability areas is integrated planning, which helps determine best practices, manage Valley-wide efforts and optimize investments. This pilot marks the initial step towards achieving a more integrated planning process for TVA and LPCs.

Next Steps

TVA intends to expand its collaboration with other LPCs through a potential cohort of multiple LPCs. This cohort will explore and demonstrate the processes, tools and modelling needed to optimize the location of DERs on the distribution system, leading to local and regional benefits. It will also help define the capabilities needed to transition from current planning methods to a more integrated approach.