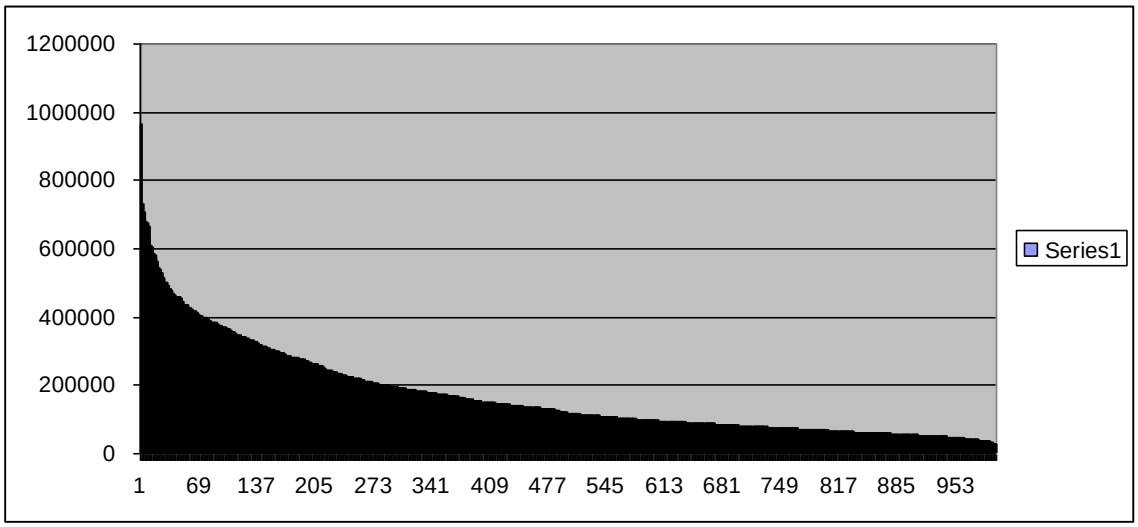
Winter 2026 Power Outlook for Tennessee Valley

The PowrSym Group July 2025

Summary

PowrSym Studies for Tennessee Valley Authority region for the fiscal year 2026 covering the period October 1, 2025 through September 30, 2026 Indicate a 30% probability that TVA will experience a power supply crisis during this period. The risk is concentrated in the winter weeks and associated with potential winter weather events. The studies used a random draw procedure for the uncertainty of generating unit performance and weather events. Figure 1 shows the unserved energy for FY 2026 for each of 1000 draws sorted by severity.



The X axis is the number of draws of this severity or more, the Y axis is the annual unserved energy in megawatt hours. Analysis shows that 98% of the unserved energy is in the winter weeks. Scenarios with about 200,000 mwh or more correlate to hourly deficiencies of 7000 megawatts or more likely resulting in a power supply crisis and rolling blackouts. About 30% of the random draw scenarios result in a crisis level situation.

Model and Data

The PowrSym model is a detailed power system model integrating thermal, hydro, storage, renewable, and grid resources in an optimal dispatch with hourly or minute granularity for both near term operational studies and multi-year planning studies. Uncertainties, such as generating unit forced outages and weather variation, are treated by a Monte Carlo random draw methodology.

The actual TVA hourly loads from FY 2024 were used as the basis for the study. The loads were escalated by a 2% annual growth rate to FY 2026.

The TVA generating unit data was obtained from public sources. The plants included in this study are:

- Hydro 4530 mw total
- Raccoon Mountain pumped hydro
- Cumberland 1-2 coal units
- Gallatin 1-4 coal units
- Kingston 1-9 coal units
- Shawnee 1-9 coal units
- Browns Ferry 1-3 nuclear units
- Sequoyah 1-2 nuclear units
- Watts Bar 1-2 nuclear units
- Natural Gas fueled units 12,500 mw total
- Solar 7000 mw total

The actual solar hourly generation pattern from FY 2024 was used to assure that the weather pattern driving the solar generation is the same as the weather pattern driving the loads. It should be noted that while solar made substantial contribution to serving summer peak loads, the contribution to winter peaks during extreme weather events was minimal.

Uncertainties Considered

The hydro is treated as certain because of its many smaller generating units. The solar is scheduled as certain, following its weather pattern, Other generating units were each considered to have a 10% probability of forced outage during the peak periods. Planned maintenance outages and nuclear refueling outages were assumed to be scheduled outside of peak periods and not included in this study.

The hourly loads have a variance of +/- 5% with a 25% probability of being 5% higher or 5% lower.

The random draw state selections are made at the beginning of each week and 1000 random draw week simulations were made. All the draws for generating unit and load states are independent.

Common Mode Failure Events Not Considered

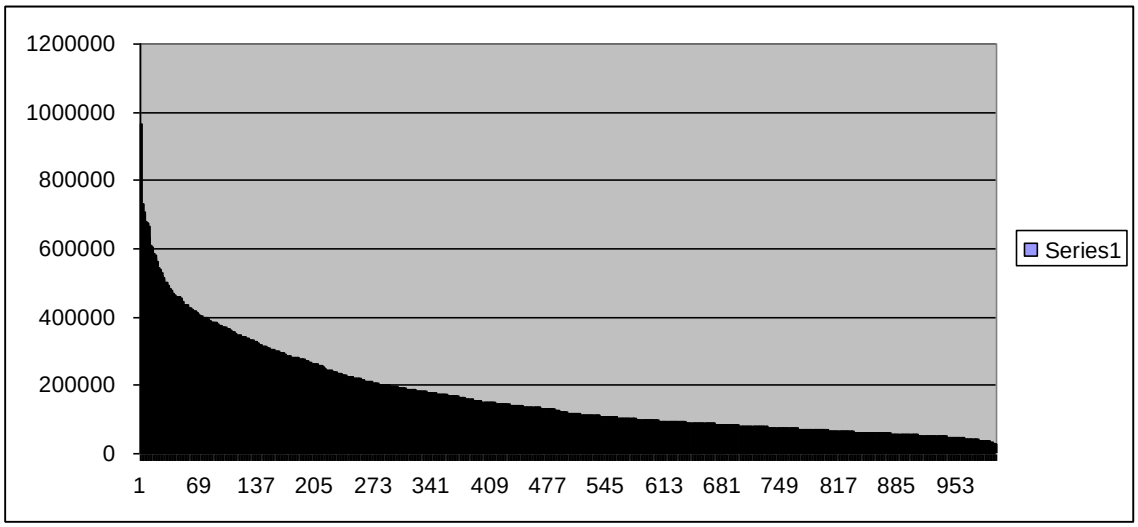
This study assumed all random events to be uncorrelated which is a favorable assumption for the results. Common mode failure events can cause simultaneous loss of generation at multiple plants, Common mode events that have happened in past years are:

- Coal plant and natural gas plant freeze damage during extreme weather, outages correlated with very cold weather.
- Natural gas fuel limitations correlated with very cold weather.
- Multiple nuclear units off for some safety related event.

It should also be noted that data centers and other large customers TVA may interrupt during peak periods often have natural gas fueled backup generators that will further complicate natural gas fuel shortages.

Study Results

Figure 1 shows the unserved energy for FY 2026 for each of 1000 draws sorted by severity.



The X axis is the number of draws of this severity or more, the Y axis is the annual unserved energy in megawatt hours. Analysis shows that 98% of the unserved energy is in the winter weeks. The megawatt shortages at time of the winter peak by number of draws with shortage of that amount or more are shown below:

- All 1000 cases >2000mw
- 996 cases >3000mw
- 973 cases >4000mw
- 808 cases >5000mw
- 540 cases >6000mw
- 289 cases >7000mw
- 114 cases >8000mw
- 31 cases >9000mw
- 10 cases >10,000mw
- 2 cases >11,000mw

These shortages can be mitigated by interrupting certain contract loads, reducing TVA inhouse power use, customer appeals for conservation, purchases from other utilities, and finally rolling blackouts. Given that this is an extreme winter peak, other utilities may also be facing shortages and not have support for TVA. It is likely that TVA would be forced into rolling blackouts in the range of 6000 to 7000 mw shortage, or in about 30% of the cases.

Many power system models report the average of the potential outcomes and the average of all the above outcomes is not a crisis situation. About 70% of the outcomes are not a crisis. Real life will be just one outcome, not the average, and the current study indicates a 30% chance of a crisis outcome.

Summer versus Winter Extreme Events

The summer situation is much better than the winter situation for two reasons:

1. Solar contribution
2. At higher than normal summer highs, air conditioning systems max out and the load increase levels out.
3. Natural gas fuel is readily available.
4. Power imports are likely available.

But the situation is opposite in winter:

1. Limited solar contribution.
2. The load grows at an even faster rate at lower temperatures as heat pumps max out and resistance heat kicks in.
3. The consequences of freezing pipes and cold homes can be severe. Small electric heaters are low cost and available in many stores further escalating the electric load.
4. Natural gas fuel supply may be limited.
5. Power imports may be limited.

Follow Up Studies

The PowrSym Group will update the winter outlook about the 15th of each month and then weekly beginning in December. The updates will include updates on load growth and generating unit status where known. Details are available at www.powrsym.com along with model description.

Conclusion

The TVA region is facing a 30% chance of a power supply crisis sometime during the winter of 2026. Action items are;

- TVA should recognize this risk and assure that all power plants are winterized and in good condition by December 2025.
- The public should be made aware of this risk and asked to take the following actions:
    - Weatherize their homes to reduce heating load.
    - If they have propane or wood backup heating systems, be sure those systems are in good condition and store extra fuel.
    - Have a plan to check on neighbors and relatives in the event of power outages.
    - Have flashlights and extra batteries, Consider a flashlight or battery backup with port for charging cell phone.
    - Stock canned ready-to-eat food supplies that do not require refrigeration or cooking.
    - Stock bottled water.
    - Maintain awareness of weather forecasts.