

B. Collections of Information Employing Statistical Methods

1. To collect this information, TVA employs telephone, online, and mail surveys of residential households and businesses residing in the service area of one of the 154 local power companies (LPCs) that purchase power from TVA. This survey is conducted as an independent measure of indirect program impact, effectiveness of communication efforts, evolving household demographics, program administration, changes in the saturation of non-electric fuels, potential interest in distributed energy, possible adoption of demand response programs, interest in electrification programs, drivers of energy efficiency, and changes in saturation of electrical equipment. This information is not available from other public sources and must be gathered by TVA. The results of this survey aid groups such as TVA's Enterprise Planning as well as Products and Services managers in assessing the effectiveness of TVA's energy efficiency and demand response programs, planning improvements to existing programs, and designing new programs. Local power company staffs also use these results to determine ways to better meet the needs of their residential and commercial customers.

The respondent universe is comprised of households and businesses residing in the TVA service area. From this universe, sample sizes are calculated based on each LPCs total customer base and the proportion of overall TVA service area (Valley) customer base represented. TVA has developed a three-tiered approach to ensure that each LPCs survey sample size is sufficient for minimal analysis and based on customers served. More information on this approach can be found in **Section B.2**.

Samples sizes are calculated to attain representation with a minimum sample size of 30 for each LPC. Since reaching 30 completes per LPC is difficult, local power company samples are summed to the seven TVA geographically dispersed District levels. The total sample is designed for achieving a margin of error less than 2 percent at the 95 percent confidence level for the overall TVA service area. With sufficient sample sizes, statistical analysis can be completed down to the individual LPC service area for many LPCs. Results are summarized down to the LPC level; however, in most cases, TVA recommends using District or TVA level results when making substantive decisions from the data. **Table 1** contains the overall framework using this sampling method.

TABLE 1
2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
Albertville Municipal Utilities Board	7,902	Alabama	21	21.36%
Arab Electric Cooperative	12,458	Alabama	36	16.31%
Athens Electric Department, City of	34,227	Alabama	42	15.11%
Bessemer Electric Service	9,476	Alabama	20	21.89%
Cherokee Electric Cooperative	17,330	Alabama	21	21.37%
Courtland Electric Department	652	Alabama	0	0.00%
Cullman Electric Cooperative	35,273	Alabama	43	14.94%
Cullman Power Board	6,511	Alabama	6	39.99%
Decatur Utilities	22,517	Alabama	34	16.79%
Florence Utilities	40,482	Alabama	86	10.56%
Fort Payne Improvement Authority	6,464	Alabama	11	29.53%
Franklin Electric Cooperative	6,530	Alabama	3	56.57%
Guntersville Electric Board	4,681	Alabama	13	27.15%
Hartselle Utilities	4,300	Alabama	5	43.81%
Huntsville Utilities	160,556	Alabama	270	5.96%
Joe Wheeler Electric Membership Corporation	34,756	Alabama	64	12.24%
Marshall-DeKalb Electric Cooperative	14,808	Alabama	34	16.79%
Muscle Shoals Electric Board	6,311	Alabama	14	26.16%
North Alabama Electric Cooperative	13,041	Alabama	20	21.90%
Russellville Electric Board	3,927	Alabama	2	69.29%
Sand Mountain Electric Cooperative	25,158	Alabama	31	17.59%
Scottsboro Electric Power Board	6,706	Alabama	23	20.40%
Sheffield Utilities	15,337	Alabama	26	19.20%
Tarrant Electric Department	2,156	Alabama	6	39.96%
Tuscumbia Electricity Department	3,940	Alabama	5	43.80%
Alabama District Totals	495,499		836	3.39%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
Benton Electric System	1,847	Kentucky	4	48.96%
Bowling Green Municipal Utilities	24,775	Kentucky	32	17.31%
Franklin Electric Plant Board	3,773	Kentucky	7	37.01%
Fulton Electric System	1,244	Kentucky	0	0.00%
Glasgow Electric Plant Board	5,466	Kentucky	8	34.63%
Hickman Electric Plant Board	870	Kentucky	3	56.52%
Hopkinsville Electric System	10,300	Kentucky	24	19.98%
Mayfield Electric and Water Systems	4,434	Kentucky	8	34.62%
Murray Electric System	6,398	Kentucky	20	21.88%
Pennyrile Rural Electric Cooperative Corporation	42,525	Kentucky	61	12.54%
Russellville Electric Plant Board	3,214	Kentucky	4	48.98%
Tri-County Electric Membership Corporation	41,875	Kentucky	41	15.30%
Warren Rural Electric Cooperative Corporation	52,588	Kentucky	87	10.50%
West Kentucky Rural Electric Cooperative Corporation	30,436	Kentucky	21	21.38%
Kentucky District Totals	229,745		320	5.47%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
Caney Fork Electric Cooperative	27,029	Middle TN	29	18.19%
Clarksville Department of Electricity (CDE) Lightband	60,290	Middle TN	66	12.06%
Columbia Power & Water Systems	22,496	Middle TN	24	19.99%
Cookeville Electric Department	14,029	Middle TN	17	23.75%
Cumberland Electric Membership Corporation	84,034	Middle TN	85	10.62%
Dickson Electric Department	27,745	Middle TN	42	15.11%
Duck River Electric Membership Corporation	62,606	Middle TN	89	10.38%
Fayetteville Public Utilities	15,688	Middle TN	13	27.17%
Gallatin Department of Electricity	15,197	Middle TN	15	25.29%
Lawrenceburg Utility Systems	17,011	Middle TN	17	23.76%
Lewisburg Electric System	4,535	Middle TN	5	43.81%
McMinnville Electric System	6,360	Middle TN	6	39.99%
Meriwether Lewis Electric Cooperative	28,390	Middle TN	38	15.89%
Middle Tennessee Electric Membership Corporation	185,383	Middle TN	192	7.07%
Mt. Pleasant Power System	3,181	Middle TN	7	37.01%
Murfreesboro Electric Department	52,119	Middle TN	44	14.77%
Nashville Electric Service	345,517	Middle TN	352	5.22%
PES Energize (Pulaski Electric System)	11,812	Middle TN	17	23.75%
Shelbyville Power System	8,493	Middle TN	11	29.53%
Smithville Electric System	2,053	Middle TN	0	0.00%
Sparta Electric & Public Works	2,180	Middle TN	3	56.55%
Springfield Department of Electricity	6,290	Middle TN	7	37.02%
Tulahoma Board of Public Utilities	8,746	Middle TN	11	29.53%
Upper Cumberland Electric Membership Corporation	41,587	Middle TN	46	14.44%
Winchester Utility System	4,671	Middle TN	9	32.64%
Middle Tennessee District Totals	1,057,442		1,145	2.89%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
4-County Electric Power Association	38,457	Mississippi i	72	11.54%
Aberdeen Electric Department, City of	2,782	Mississippi i	4	48.97%
Alcorn County Electric Power Association	14,716	Mississippi i	28	18.50%
Amory Water & Electric	3,086	Mississippi i	9	32.62%
Central Electric Power Association	29,673	Mississippi i	31	17.59%
Columbus Light and Water Department	9,369	Mississippi i	22	20.87%
East Mississippi Electric Power Association	32,284	Mississippi i	11	29.54%
Holly Springs Utilities Department	8,686	Mississippi i	5	43.82%
Louisville Utilities	2,535	Mississippi i	2	69.28%
Macon Electric Department, City of	930	Mississippi i	0	0.00%
Monroe County Electric Power Association	10,796	Mississippi i	12	28.28%
Natchez Trace Electric Power Association	12,434	Mississippi i	15	25.29%
New Albany Light, Gas & Water, City of	7,875	Mississippi i	11	29.53%
North East Mississippi Electric Power Association	23,589	Mississippi i	24	19.99%
Northcentral Mississippi Electric Power Association	24,908	Mississippi i	36	16.32%
Okolona Electric Department, City of	4,167	Mississippi i	4	48.98%
Oxford Electric Department, City of	7,407	Mississippi i	2	69.29%
Philadelphia Utilities	2,806	Mississippi i	4	48.97%
Pontotoc Electric Power Association	15,227	Mississippi i	19	22.47%
Prentiss County Electric Power Association	10,808	Mississippi i	13	27.17%
Starkville Utilities	11,376	Mississippi i	24	19.98%
Tallahatchie Valley Electric Power Association	21,387	Mississippi i	36	16.32%
Tippah Electric Power Association	10,406	Mississippi	20	21.89%

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		Mississipp		
Tishomingo County Electric Power Association	10,891	i	11	29.53%
		Mississipp		
Tombigbee Electric Power Association	35,338	i	64	12.24%
		Mississipp		
Tupelo Water & Light Department, City of	10,591	i	38	15.87%
		Mississipp		
Water Valley Electric Department, City of	1,555	i	0	0.00%
		Mississipp		
West Point Electric System, City of	3,178	i	6	39.98%
Mississippi District Totals	367,257		523	4.28%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
Alcoa Electric Department, City of	25,243	Northeast	34	16.80%
Appalachian Electric Cooperative	39,633	Northeast	62	12.44%
Bristol Tennessee Essential Services	28,797	Northeast	50	13.85%
BVU Authority	13,605	Northeast	17	23.75%
Clinton Utilities Board	25,311	Northeast	24	20.00%
Elizabethton Electric Department, City of	22,952	Northeast	37	16.10%
Erwin Utilities	7,592	Northeast	9	32.65%
Greeneville Light and Power System	30,970	Northeast	37	16.10%
Harriman Utility Board	9,256	Northeast	15	25.28%
Holston Electric Cooperative	24,901	Northeast	22	20.88%
Jellico Electric and Water Systems	3,702	Northeast	5	43.80%
Johnson City Power Board	66,762	Northeast	82	10.82%
Knoxville Utilities Board	179,100	Northeast	200	6.93%
LaFollette Utilities	19,022	Northeast	17	23.76%
Lenoir City Utilities Board	52,145	Northeast	50	13.85%
Maryville Electric Department, City of	18,114	Northeast	24	19.99%
Morristown Utilities Commission	11,862	Northeast	8	34.64%
Mountain Electric Cooperative, Inc.	27,455	Northeast	27	18.85%
Newport Utilities	18,575	Northeast	15	25.29%
Oak Ridge Electric Department	13,096	Northeast	27	18.84%
Plateau Electric Cooperative	13,891	Northeast	16	24.49%
Powell Valley Electric Cooperative	25,978	Northeast	31	17.59%
Sevier County Electric System	35,546	Northeast	44	14.77%
Northeast District Totals	713,508		853	3.35%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error
Athens Utilities Board	10,948	Southeast	19	22.46%
Blue Ridge Mountain Electric Membership Corporation	39,964	Southeast	43	14.94%
Chickamauga Electric System	848	Southeast	3	56.51%
Cleveland Utilities	26,600	Southeast	37	16.10%
Dayton Electric Department, City of	8,617	Southeast	6	40.00%
EPB (Chattanooga)	153,982	Southeast	150	8.00%
Etowah Utilities	4,387	Southeast	7	37.02%
Fort Loudoun Electric Cooperative	27,552	Southeast	29	18.19%
Loudon Utilities	10,055	Southeast	17	23.75%
Murphy Electric Power Board	3,431	Southeast	3	56.56%
North Georgia Electric Membership Corporation	84,406	Southeast	107	9.47%
Rockwood Electric Utility	11,550	Southeast	9	32.66%
Sequachee Valley Electric Cooperative	29,653	Southeast	28	18.51%
Sweetwater Utilities Board	7,096	Southeast	4	48.99%
Tri-State Electric Membership Corporation	15,378	Southeast	22	20.88%
Volunteer Energy Cooperative	95,534	Southeast	118	9.02%
Southeast District Totals	530,001		602	3.99%

2018 RESIDENTIAL SATURATION MARGIN OF ERROR SUMMARY

Local Power Company	2018 Residents	District	2018 Sample	2018 Margin of Error	
Benton County Electric System	8,494	West TN	14	26.17%	
Bolivar Energy Authority	8,767	West TN	2	69.29%	
Brownsville Utility Department	4,241	West TN	4	48.98%	
Carroll County Electric Department	12,211	West TN	19	22.47%	
Chickasaw Electric Cooperative	16,110	West TN	13	27.17%	
Covington Electric System	3,724	West TN	11	29.51%	
Dyersburg Electric System	9,407	West TN	5	43.82%	
Forked Deer Electric Cooperative, Inc.	8,305	West TN	4	48.99%	
Gibson Electric Membership Corporation	31,713	West TN	33	17.05%	
Humboldt Utilities	3,488	West TN	2	69.29%	
Jackson Energy Authority	29,187	West TN	44	14.76%	
Lexington Electric System	17,897	West TN	16	24.49%	
Memphis Light, Gas and Water Division	360,916	West TN	362	5.15%	
Milan Department of Public Utilities	6,769	West TN	13	27.16%	
Newbern Electric Water and Gas	1,429	West TN	0	0.00%	
Paris Board of Public Utilities	15,472	West TN	20	21.90%	
Pickwick Electric Cooperative	16,424	West TN	26	19.20%	
Ripley Power & Light	5,337	West TN	11	29.52%	
Southwest Tennessee Electric Membership Corporation	42,127	West TN	58	12.86%	
Tennessee Valley Electric Cooperative	15,935	West TN	10	30.98%	
Trenton Light & Water Department	1,945	West TN	3	56.55%	
Union City Electric System	5,241	West TN	17	23.73%	
Weakley County Municipal Electric System	15,765	West TN	34	16.79%	
West Tennessee District Totals	640,904		721	3.65%	
Valley Totals			4,034,356	5000	1.39%

U.S. Postal Service (USPS) zip codes are used to define the sample frame

2. The survey population is comprised of all residential households or businesses residing in the TVA service area. From this population, sample sizes are calculated based on each local power company’s total customer base and the proportion of overall TVA service area residential customers represented. Sample sizes are determined based on a pooled proportion formula and have a goal of attaining 30 responses for each local power company. Individual LPC samples are summed to the seven TVA geographically dispersed District levels. The total sample is designed for achieving a margin of error less than 2 percent at the 95 percent confidence level for the overall Valley. See **Table 1** above.

When this method of sampling is used, local power companies within each stratum remain relatively stable due to similar growth patterns over time. While TVA would like to have this information annually with error margins of less than one percent, this is not practical from a cost standpoint or from a response burden. Attaining an overall margin of error of 1.3 percent to 1.8 percent provides sufficient differentiation that TVA can reasonably determine whether the *EnergyRight*® programs are having an indirect impact on Valley residents. While error margins at the local power company and District level vary, trends and differences can be seen for the larger power companies and the Districts. Also, TVA offers local power companies the opportunity to request some data by local power company groups. These may be groups of power companies that wish to aggregate service areas for some reason. Reasons might include pooling advertising resources due to a viewing or listening area boundary and the need to determine appropriate messages for these boundaries. A frequency of two to three years provides data at sufficient intervals that trends and changes can be seen without overburdening residents with surveys. This is also possible since this is an indirect measure of the *EnergyRight*® programs' effectiveness.

Due to the quota sampling method described earlier, it is also necessary to weight responses by local power company. This weighting is designed to account for the over-representation of the samples for smaller power companies. Weights are determined by dividing the proportion of the overall Valley residential customer base represented by a local power company's residential customers by the proportion of the overall Valley residential sample represented by a local power company's sample.

$$\text{Local Power Company Weight} = \frac{\text{Local Power Company Proportion of Residential Customers}}{\text{Local Power Company Proportion of Sample}}$$

For simplicity, weights are rounded to the nearest hundredth for analysis. Residential results are also weighted by data from the American Community Survey (ACS). Five-year trend results are used from data on all counties which comprise TVA's market area. Weights are based on homeownership, age of the residence, units in structure, and age of householders.

Commercial and industrial studies are weighted to D&B counts by TVA District, building type, and square footage.

4. The survey instrument used may be modified slightly between iterations depending upon changes in language usage, appliance availability, and appliance usage patterns. However, most questions remain consistent over time to enhance reliability. Modifications to the survey are carefully considered by various TVA staff that will use the information and are tested by the contractor before launching the fieldwork for the survey. These interviews, as well as the training, are monitored by TVA staff members. Also, as interviews begin, calls are monitored closely in a further effort to ensure the reliability of the data gathered.

5. When questions regarding statistical aspects of the survey methodology and analysis arise, TVA relies on our contractor staff. For the most recent study, KANTAR was the contractor. KANTAR is a full-service global strategy and research organization specializing in public policy and opinion surveys, banking and finance, telecommunications, media, energy, transportation, insurance, and health care. The KANTAR staff who work on TVA related surveys are listed below.

Chris Freehauf

VP, Client Services
KANTAR
3630 Peachtree Road NE, 11th Floor
Atlanta, GA 30326
t: 404-801-3727