

# Integrated Resource Plan

## Technical Appendix

### Volume 1

### Load Forecast



A Touchstone Energy Cooperative 

# 2021 - 2035 Load Forecast

Prepared by:  
Load Forecasting Department

December 2020

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## **Section 1.0**

### **Executive Summary and Key Results**

East Kentucky Power Cooperative Inc. (EKPC) is a generation and transmission electric cooperative located in Winchester, Kentucky and is a member of the PJM Interconnection LLC (PJM). EKPC is owned by 16 owner-member distribution cooperatives (owner-members) serving a population of approximately 1,100,000.

EKPC's load forecast is prepared every two years in accordance with EKPC's Rural Utilities Service (RUS)-approved Load Forecast Work Plan (Work Plan). EKPC's "2021 - 2035 Load Forecast" was prepared pursuant to its Work Plan, which was approved by both EKPC's Board of Directors and by RUS in December 2019. The Work Plan details the methodology used to develop the forecasts. The EKPC Load Forecasting Department works with the staff of each owner-member to prepare 16 owner-member forecasts and then aggregates the resulting forecasts, adds projections of use of EKPC facilities and transmission losses, incorporates energy efficiency and demand response impacts resulting in EKPC's total system forecast. Owner-members use their load forecasts as input in developing construction work plans, long-range work plans, and financial forecasts. EKPC uses the load forecast for demand-side management analyses, marketing analyses, transmission planning, power supply planning, and financial forecasting.

Factors considered in preparing the forecast include national, regional, and local economic performance, population and housing trends, service area industrial development, electric price, household income, appliance saturations and efficiencies, demand-side management programs, and weather.

#### **Key Results**

Due to the pandemic in 2020, this load forecast was produced later in the year than typical. Coronavirus Disease 2019 (COVID-19) began impacting Kentucky's economy in March of 2020. In an effort to better understand the near and longer-term impacts, EKPC opted to wait until updated economic forecasts became available. IHS Global Insight, Inc. (IHS) released an updated outlook in June 2020. EKPC's load experienced its greatest reduction in April at an estimated 14%,

weather normalized. Business and school closings and other government-imposed restrictions continue to impact the load. Having actual energy for most of 2020, energy for 2020 was estimated outside of the construct of the model using insights from the owner-members and analysis of recent impacts due to COVID-19. To prevent skewing the growth rates, 2020 has been excluded from the calculations.

The forecast indicates that, in the period of 2021 through 2035, total customers served by owner-members will increase from 554,011 to 612,888, an average of 0.7 percent per year which is consistent with historical growth. COVID-19 has not significantly impacted customer growth. Some owner-members reported an increase in the housing starts in the second and third quarter of 2020. The Residential Class will continue to be the largest class with respect to customers and energy use.

### **Customer Growth by Class**

Time Period	Residential	Seasonal	Small Commercial	Public Buildings	Large Commercial	Public Street / Highway Lighting	Total Customers
2014 - 2019	0.7%	5.5%	0.5%	0.9%	2.9%	0.0%	0.7%
2021 - 2026	0.7%	5.8%	0.8%	0.5%	1.8%	0.5%	0.7%
2009 - 2019	0.6%	-28.7%	0.6%	1.6%	1.3%	-0.4%	0.5%
2021 - 2031	0.7%	5.2%	0.8%	0.5%	1.5%	0.4%	0.7%
2005 - 2019	0.8%	-21.3%	0.9%	1.8%	0.9%	0.4%	0.7%
2021 - 2035	0.7%	4.8%	0.8%	0.5%	1.5%	0.3%	0.7%

*Note: The Seasonal Sales Class is reported by 2 owner-members. Historical fluctuations are a result of owner-members reclassifying into the Residential Class.*

EKPC's load forecast projects net total energy requirements to increase from 13.5 to 16.7 million MWh, an average of 1.5 percent per year over the 2021 through 2035 period. Sales to the Residential Class will increase by 0.7 percent per year, small commercial sales (customers with  $\leq 1000$  KVA) will increase by 0.9 percent per year, and large commercial and industrial sales (customers with  $> 1000$  KVA) will increase by 3.3 percent per year. The higher growth rate for the large commercial and industrial sales is primarily due to the expansion of a steel mill.

### Energy Sales Growth by Class

Time Period	Residential	Seasonal	Small Commercial	Public Buildings	Large Commercial	Public Street / Highway Lighting	Total Sales
2014 - 2019	-0.3%	12.3%	0.1%	0.0%	0.4%	-2.4%	-0.1%
2021 - 2026	0.5%	5.4%	1.3%	0.5%	8.0%	0.3%	2.9%
2009 - 2019	0.4%	-25.8%	0.8%	1.2%	1.6%	-0.3%	0.7%
2021 - 2031	0.6%	5.1%	1.0%	0.2%	4.3%	0.3%	1.8%
2005 - 2019	0.3%	-19.8%	0.8%	4.2%	0.7%	0.9%	0.5%
2021 - 2035	0.7%	4.8%	0.9%	0.2%	3.3%	0.3%	1.6%

Net winter and summer peak demands will increase by approximately 355 MW or 0.8 percent per year and 370 MW or 1.0 percent per year, respectively. Annual load factor projections are increasing from 48 percent to approximately 53 percent due to a large industrial customer expanding its operation resulting in additional energy but minimal peak demand because they have an interruptible contract.

Historical and projected class sales, total energy requirements, seasonal peak demands, and annual load factor for the EKPC system are presented on the following pages. Peak demands are based on coincident hourly-integrated demand intervals. Load factor is calculated using annual net peak demand and energy requirements.

**Coincident Peak Demands and Total Requirements  
Historical and Projected**

Season	Net Winter	Net Summer		Net Total	
	Peak Demand (MW)	Year	Peak Demand (MW)	Year	Requirements (MWh) Load Factor (%)
2009 - 10	2868.0	2010	2443.0	2010	13,376,292 53.2%
2010 - 11	2891.0	2011	2388.0	2011	12,666,998 50.0%
2011 - 12	2481.0	2012	2354.0	2012	12,190,070 55.9%
2012 - 13	2597.0	2013	2199.0	2013	12,644,590 55.6%
2013 - 14	3425.0	2014	2192.0	2014	13,163,516 43.9%
2014 - 15	3507.0	2015	2179.0	2015	12,604,942 41.0%
2015 - 16	2890.0	2016	2293.0	2016	13,039,953 51.4%
2016 - 17	2871.0	2017	2311.0	2017	12,680,111 50.4%
2017 - 18	3437.0	2018	2375.0	2018	13,576,581 45.1%
2018 - 19	3073.0	2019	2366.0	2019	13,140,304 48.8%
2019 - 20	2723.0	2020	2312.0	2020	12,790,896 53.5%
2020 - 21	3218.5	2021	2402.1	2021	13,521,597 48.0%
2021 - 22	3337.0	2022	2571.5	2022	15,025,345 51.4%
2022 - 23	3359.2	2023	2569.3	2023	15,205,782 51.7%
2023 - 24	3379.7	2024	2607.5	2024	15,318,864 51.6%
2024 - 25	3386.8	2025	2618.2	2025	15,411,475 51.9%
2025 - 26	3404.2	2026	2629.8	2026	15,514,567 52.0%
2026 - 27	3423.7	2027	2646.2	2027	15,618,780 52.1%
2027 - 28	3452.4	2028	2664.3	2028	15,761,578 52.0%
2028 - 29	3465.6	2029	2679.1	2029	15,863,406 52.3%
2029 - 30	3476.5	2030	2690.4	2030	15,959,404 52.4%
2030 - 31	3489.8	2031	2702.8	2031	16,072,284 52.6%
2031 - 32	3515.6	2032	2721.1	2032	16,241,768 52.6%
2032 - 33	3528.4	2033	2737.9	2033	16,353,444 52.9%
2033 - 34	3551.4	2034	2756.3	2034	16,505,292 53.1%
2034 - 35	3573.8	2035	2775.0	2035	16,661,197 53.2%

**Impacts from demand response and energy efficiency programs have been subtracted from the projections.**

### Energy Sales by Class

Year	Residential Sales (MWh)	Seasonal Sales (MWh)	Small Comm. Sales (MWh)	Public Buildings (MWh)	Large Comm. Sales (MWh)	Public Street and Highway Lighting (MWh)	Total Retail Sales (MWh)
2010	7,388,901	13,959	1,935,479	39,809	2,845,857	9,503	12,233,507
2011	6,967,413	12,774	1,892,090	38,468	2,889,142	9,845	11,809,733
2012	6,577,784	227	1,883,241	35,194	2,901,688	9,600	11,407,734
2013	6,909,853	300	1,917,730	37,215	3,017,925	9,845	11,892,868
2014	7,142,350	370	1,919,198	39,753	3,246,287	9,916	12,357,874
2015	6,781,622	354	1,958,109	38,996	2,979,716	9,890	11,768,687
2016	6,847,090	416	1,951,787	37,627	3,296,495	9,940	12,143,355
2017	6,502,113	534	1,896,475	36,578	3,395,430	9,325	11,840,456
2018	7,324,079	621	1,962,505	41,142	3,425,613	8,796	12,762,756
2019	7,036,916	663	1,925,821	39,829	3,314,391	8,770	12,326,390
2020	7,005,512	673	1,798,762	35,885	3,219,793	8,703	12,069,329
2021	7,205,739	744	1,967,078	39,064	3,546,763	8,707	12,768,095
2022	7,253,125	787	2,015,313	39,744	4,950,393	8,714	14,268,076
2023	7,283,102	830	2,043,245	39,984	5,068,151	8,724	14,444,036
2024	7,322,856	875	2,062,484	40,066	5,121,298	8,751	14,556,331
2025	7,346,496	921	2,079,718	40,009	5,173,293	8,788	14,649,225
2026	7,392,185	970	2,097,729	40,027	5,211,114	8,817	14,750,841
2027	7,447,191	1,024	2,108,594	40,062	5,248,287	8,845	14,854,002
2028	7,528,324	1,079	2,125,152	40,080	5,290,142	8,872	14,993,649
2029	7,573,245	1,126	2,142,182	40,010	5,327,401	8,898	15,092,862
2030	7,614,810	1,172	2,153,353	39,979	5,369,151	8,923	15,187,389
2031	7,659,372	1,222	2,170,018	39,974	5,418,073	8,949	15,297,607
2032	7,745,879	1,274	2,188,051	40,009	5,476,916	8,974	15,461,102
2033	7,794,976	1,325	2,204,658	39,993	5,519,501	8,999	15,569,452
2034	7,876,424	1,374	2,215,933	40,003	5,573,828	9,024	15,716,587
2035	7,960,650	1,427	2,236,079	40,019	5,619,644	9,049	15,866,867



### Purchased Power and Total Requirements

Year	Total Retail Sales (MWh)	Owner-Member Office Use (MWh)	Average Distribution Losses (%)	Purchased Power (MWh)	EKPC Facilities Use (MWh)	Transmission Losses (%)	Total Requirements (MWh)	Energy Efficiency and Demand Response Impacts (MWh)	Net Total Requirements (MWh)
2010	12,233,507	10,401	4.4%	12,811,906	8,654	4.3%	13,376,292		
2011	11,809,733	9,742	3.8%	12,289,071	10,146	3.0%	12,666,998		
2012	11,407,734	9,120	4.4%	11,943,406	8,811	2.0%	12,190,070		
2013	11,892,868	9,977	4.0%	12,400,903	8,270	1.9%	12,644,590		
2014	12,357,874	10,497	4.1%	12,898,402	8,246	2.0%	13,163,516		
2015	11,768,687	10,008	4.3%	12,303,441	8,190	2.3%	12,604,942		
2016	12,143,355	10,270	4.1%	12,674,244	8,203	2.7%	13,039,953		
2017	11,840,456	9,992	4.0%	12,340,793	8,374	2.5%	12,680,111		
2018	12,762,756	10,647	3.5%	13,238,766	8,451	2.4%	13,576,581		
2019	12,326,390	10,232	3.6%	12,798,772	7,891	2.5%	13,140,304		
2020	12,069,329	10,408	4.0%	12,518,672	7,524	2.4%	12,799,104	(8,208)	12,790,896
2021	12,768,095	10,408	4.0%	13,245,253	8,250	2.4%	13,540,813	(19,216)	13,521,597
2022	14,268,076	10,408	4.0%	14,757,434	8,250	2.4%	15,060,976	(35,631)	15,025,345
2023	14,444,036	10,408	4.0%	14,939,564	8,250	2.4%	15,247,429	(41,647)	15,205,782
2024	14,556,331	10,408	4.0%	15,056,005	8,273	2.4%	15,366,526	(47,662)	15,318,864
2025	14,649,225	10,408	4.0%	15,152,394	8,250	2.4%	15,465,153	(53,678)	15,411,475
2026	14,750,841	10,408	4.0%	15,258,528	8,250	2.4%	15,573,999	(59,432)	15,514,567
2027	14,854,002	10,408	4.0%	15,365,931	8,250	2.4%	15,683,966	(65,186)	15,618,780
2028	14,993,649	10,408	4.0%	15,511,082	8,273	2.4%	15,832,518	(70,940)	15,761,578
2029	15,092,862	10,408	4.0%	15,614,917	8,250	2.4%	15,938,985	(75,579)	15,863,406
2030	15,187,389	10,408	4.0%	15,713,246	8,250	2.4%	16,039,622	(80,218)	15,959,404
2031	15,297,607	10,408	4.0%	15,828,009	8,250	2.4%	16,157,141	(84,857)	16,072,284
2032	15,461,102	10,408	4.0%	15,998,097	8,273	2.4%	16,331,264	(89,496)	16,241,768
2033	15,569,452	10,408	4.0%	16,111,536	8,250	2.4%	16,447,579	(94,135)	16,353,444
2034	15,716,587	10,408	4.0%	16,264,512	8,250	2.4%	16,604,066	(98,774)	16,505,292
2035	15,866,867	10,408	4.0%	16,421,239	8,250	2.4%	16,764,610	(103,413)	16,661,197

**Note: Losses do not apply to direct serve loads.**

## Section 2.0 Description of the Cooperative

EKPC is a generation and transmission electric cooperative headquartered in Winchester, Kentucky, and owned by its 16 owner-members:

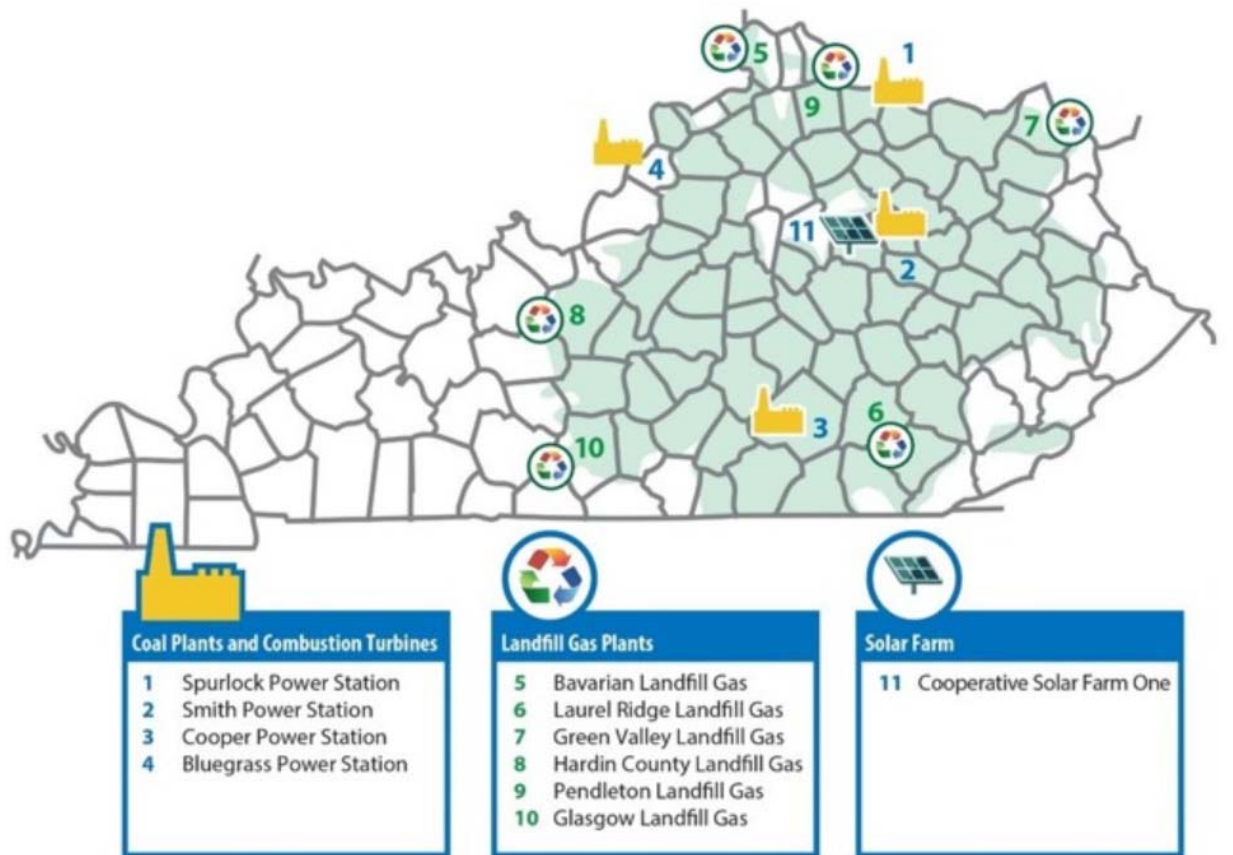
- Big Sandy RECC
- Blue Grass Energy Cooperative
- Clark Energy Cooperative
- Cumberland Valley Electric
- Farmers RECC
- Fleming-Mason Energy
- Grayson RECC
- Inter-County Energy Cooperative
- Jackson Energy Cooperative
- Licking Valley RECC
- Nolin RECC
- Owen Electric Cooperative
- Salt River Electric
- Shelby Energy Cooperative
- South Kentucky RECC
- Taylor County RECC

EKPC owns a generation fleet of 3,267 MW, including coal, natural gas, oil, solar and landfill gas units, and an additional 170 MW of hydropower purchases from the Southeastern Power Administration (SEPA). EKPC operates within PJM, which has over 180,000 MW of generation. EKPC's all-time peak demand of 3,507 MW occurred on February 20, 2015.

Generation includes (net winter rating):

- Spurlock – 1,346 MW
- Cooper – 341 MW
- Smith Combustion Turbine Units  
– 989 MW
- Bluegrass Combustion Turbine Units  
– 567 MW
- Cooperative Solar 1 – 8.5 MW
- SEPA, hydropower – 170 MW
- Landfill Gas Plants
  - Boone County – 4.6 MW
  - Laurel County – 3.0 MW
  - Greenup County – 2.3 MW
  - Glasgow – 0.9 MW
  - Pendleton County – 3.0 MW
  - Hardin County – 2.3 MW

EKPC owns and operates a 2,955-circuit mile network of high voltage transmission lines consisting of 69 kV, 138 kV, 161 kV, and 345 kV lines, and all the related substations. EKPC is a member of the SERC Reliability Corporation (SERC). EKPC maintains 74 normally closed free-flowing interconnections with its neighboring utilities.



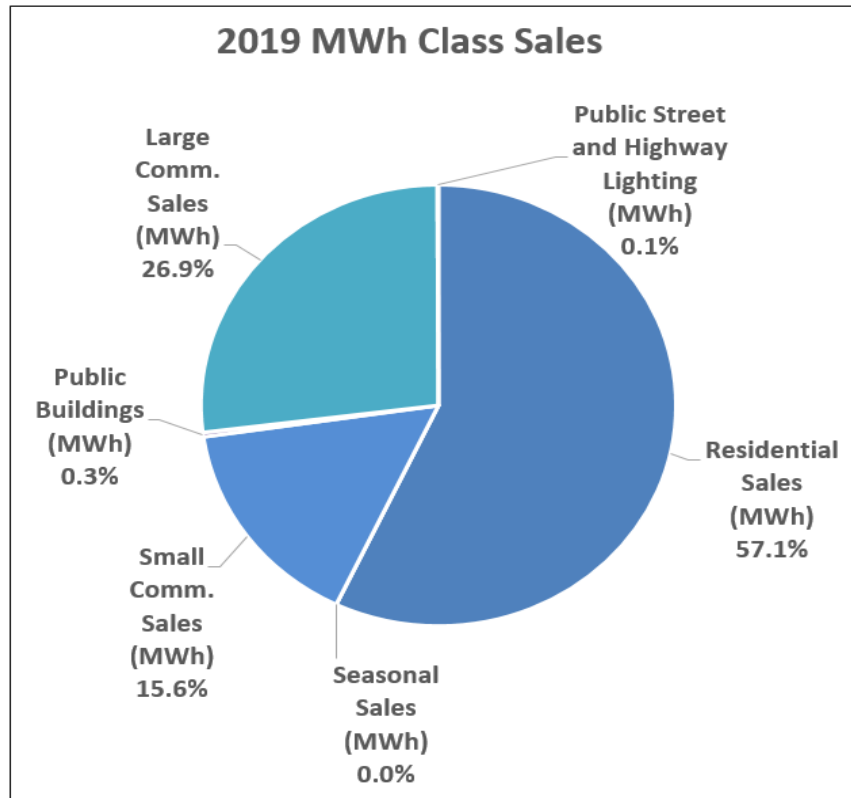
## 2.1 Owner-Members' Service Territory

EKPC owner-members serve approximately 545,000 retail meters (approximately 1,100,000 customers) in 87 counties in Kentucky and 3 counties in Tennessee, including portions of the Louisville, Cincinnati, Elizabethtown, Lexington, Huntington, and Bowling Green Metropolitan Statistical Areas (MSA). EKPC owner-members serve most of the rural areas, while investor-owned and municipal utilities serve most of the cities and towns. Interstates 64, 65, 71, and 75 and several limited-access parkways pass through the area. EKPC owner-members' fixed service territory boundaries are on file with the Kentucky Public Service Commission.

The service territory is diverse. Areas around Lexington and Louisville have a significant amount of manufacturing. The region around Cincinnati contains a growing number of retail trade, transportation and service jobs. Mining has seen strong decreases due to regulatory changes as well as decreased gas prices, the most notable impacts being in eastern and southeastern regions. Tourism is an important aspect of the southern and southwestern service area, with Lake Cumberland and Mammoth Cave National Park contributing to jobs in the service and retail trade industries. Kentucky as a whole expects to see growth in the health care sector due to the aging population.

## 2.2 Customer Overview

The owner-members' collective customer base is comprised predominantly of residential customers, 93 percent. In 2019, 57 percent of EKPC's owner-member retail sales were to the residential class. The 2020 End-Use Survey results indicate electricity is the primary method for water heating, 86 percent, and home heating, 63 percent. The availability of natural gas is limited in most of the service territory.



Appliance efficiency improvements, the economy, and the increasing electricity prices in recent years have had a dampening effect on electric use per customer and this is expected to continue. In 2019, residential customer use averaged 1,153 kWh per month. Over the last 10 years, the use per customer averaged 1,170 kWh per month. The forecast is projecting 1,150 kWh per month.

## **Section 3.0**

### **Description of the Forecasting Method**

#### **3.1 Coordination with Owner-Members**

EKPC's load forecast was prepared pursuant to the Work Plan, which was approved by EKPC's Board of Directors and RUS in December 2019. Factors considered when preparing the forecast include regional economic growth, electric appliance saturation and efficiency trends, electricity rates, and weather. The EKPC Load Forecasting Department works with the staff of each owner-member to prepare its forecast and then aggregates the 16 owner-member forecasts, adds forecasts of use of EKPC facilities and transmission losses, and subtracts planned demand response and energy efficiency to create EKPC's forecast.

EKPC and its owner-members will use the load forecast for long-term planning, including construction work plans and financial forecasts for the owner-members and transmission, generation, demand response and energy efficiency, and financial planning for EKPC.

The general steps followed in developing the load forecast include:

1. Develop regional economic projections: EKPC subscribes to IHS, in order to analyze regional economic performance. IHS provides county-level projections for population, employment, income as well as other variables. EKPC further analyzes the data to appropriately reflect the owner-members' individual service territories.
  
2. Perform analysis and construct models: EKPC prepares a preliminary forecast for each of its owner-members for each classification as reported on the RUS Form 7, which contains retail sales data for owner-members. These classes include: residential, seasonal, small commercial, public buildings, large commercial, and public street and highway lighting. EKPC's sales to owner-members are then determined by adding distribution losses to total retail sales. EKPC's total requirements are estimated by adding transmission losses to total owner-member sales. Seasonal peak demands are developed using historical normalized peaks and seasonal load factors.

3. Collect insights from the owner-members: EKPC meets with each owner-member to discuss their preliminary forecast. Owner-member staff at these meetings includes the President/CEO and other key individuals.
4. Revise the forecasts: The preliminary forecast is revised based on mutual agreement of EKPC staff and owner-member's President/CEO and staff. This final forecast is approved by the Board of Directors of each owner-member.
5. Develop the system load forecast: The EKPC forecast is the summation of the forecasts of its 16 owner-members with demand response, energy efficiency, transmission losses and EKPC facilities' use incorporated.

There is close collaboration and coordination between EKPC and its owner-members in this process. This working relationship is essential because EKPC has no retail customers. Input from owner-members relating to industrial development, subdivision growth, and other specific service area information is crucial to the development of accurate forecasts. Review meetings provide opportunities to critique the assumptions and the overall results of the preliminary forecast. The resulting load forecast reflects a combination of EKPC's structured forecast methodology combined with the judgment and experience of the owner-member staff.

### **3.2 Forecast Model Structure and Inputs**

Customer and energy models for each class are used to develop load forecasts for each owner-member. The regional economy, customer and sales trends, appliance saturations, energy efficiency and demand response impacts, weather impacts and electricity rates are modeled and analyzed during the forecast study.

**Regional Economic Model:** EKPC has divided its owner-members' service area into seven economic regions with economic activity projected for each. Some natural regions exist within the EKPC territory. For example, the Central Economic Region defined by EKPC fits closely within the Lexington Standard Metropolitan Statistical Area ("SMSA"). The Bureau Economic

Analysis (BEA) defines SMSA's as areas of interrelated economic activity that go beyond a single county's boundaries. The Northern Region includes Kentucky counties that border Cincinnati. Regional forecasts for population, income and employment are developed and used as variables in customer or energy models as appropriate. EKPC combines county-level forecasts from IHS into regional economic forecasts based roughly on owner-member service territory boundaries. Owner-members and counties are assigned to regions as follows:

- Central Region:  
*Owner-members:* Blue Grass Energy Cooperative  
*Counties:* Anderson, Bourbon, Clark, Fayette, Franklin, Harrison, Jessamine, Madison, Mercer, Scott, and Woodford
- East Region:  
*Owner-members:* Big Sandy RECC, Cumberland Valley Electric, Jackson Energy Cooperative and Licking Valley RECC  
*Counties:* Bell, Breathitt, Clay, Estill, Floyd, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lee, Leslie, Letcher, Magoffin, Martin, Morgan, Owsley, Perry, Pike, Rockcastle, Whitley, and Wolfe
- North Region:  
*Owner-members:* Owen Electric Cooperative  
*Counties:* Boone, Bracken, Campbell, Carroll, Gallatin, Grant, Kenton, Owen, and Pendleton
- North Central Region:  
*Owner-members:* Nolin RECC, Salt River Electric, and Shelby Energy Cooperative  
*Counties:* Bullitt, Hardin, Henry, Jefferson, Larue, Meade, Nelson, Oldham, Shelby, Spencer, Trimble, and Washington
- North East Region:  
*Owner-members:* Clark Energy Cooperative, Fleming-Mason Energy, and Grayson RECC  
*Counties:* Bath, Boyd, Carter, Elliott, Fleming, Greenup, Lawrence, Lewis, Mason, Menifee, Montgomery, Nicholas, Powell, Robertson, and Rowan
- South Region:  
*Owner-members:* Inter-County Energy Cooperative, South Kentucky RECC, and Taylor County RECC  
*Counties:* Adair, Boyle, Casey, Garrard, Green, Lincoln, Marion, McCreary, Pulaski, Russell, Taylor, and Wayne
- South Central Region:  
*Owner-member:* Farmers RECC  
*Counties:* Allen, Barren, Butler, Cumberland, Edmonson, Grayson, Hart, Metcalfe, Monroe, Simpson, and Warren



EKPC utilized a geographic information system from Environmental Systems Research Institute (ESRI) to define owner-members' territories. The county-level economic data provided by IHS is segmented into owner-members' service territories using the mapping of county and service territory boundaries. Using economic data that closely represents individual owner-members' territories produces more accurate forecasts.

The load forecast is based on IHS's county-level economic forecasts released in June 2020. County-level historical and projected data provided to EKPC include:

- North American Industry Classification System (NAICS) Employment
  - Total Non-farm, Non-Manufacturing, Service Providing Private, Construction, Manufacturing, Transportation, Trade & Utilities, Information, Financial Activities, Professional & Business Services, Educational & Health Services, Leisure & Hospitality, Other Services, Government, Federal Government, State & Local Government, Military
- Personal Income
- Real Personal Income
- Population
- Households

These county-level projections combine into regional economic activity. EKPC converts IHS's county-level projections to monthly values to use in the load forecasting models. Projections of regional economic activity enhance the sales forecasting and strategic planning of EKPC because changes in regional employment and income are important determinants of customer and sales growth.

**Customer and Sales Models:** Residential, seasonal energy sales and the public building class are forecasted using regression analysis. At the owner-member level, energy use per customer is projected using a statistically adjusted end-use (SAE) model. This method of modeling incorporates end-use forecasts and is used to separate the monthly and annual forecasts into end-use components. SAE models offer the structure of end-use models while also using the strength of time-series analysis. This method, like end-use modeling, requires detailed information about appliance saturation, appliance use, appliance efficiencies, household characteristics, weather

characteristics, and demographic and economic data. The SAE approach segments the average household use into end-use components as follows:

$$\text{Use}_{y,m} = \text{Heat}_{y,m} + \text{Cool}_{y,m} + \text{Water Heat}_{y,m} + \text{Other}_{y,m}$$

Where,  $y$ =year  
 $m$ =month

Each component is defined in terms of its end-use structure. For example, the cool index may be defined as a function of appliance saturation, efficiency of the appliance, and usage of the appliance. Annual end-use indices and a usage variable are constructed and used to develop a variable to be used in least squares regression in the model. These variables are constructed for heating, cooling, water heating, and an 'Other' variable, which includes lighting and other miscellaneous usages.

$$\text{CoolIndex}_y = \sum_{\text{Type}} \text{Wgt}^{\text{Type}} * \left( \frac{\text{CoolShare}_y^{\text{Type}}}{\text{CoolShare}_{98}^{\text{Type}}} \right) \left( \frac{\text{Eff}_y^{\text{Type}}}{\text{Eff}_{98}^{\text{Type}}} \right)$$

$$\text{CoolUse}_{y,m} = \left( \frac{\text{CDD}_{y,m}}{\text{NormCDD}} \right) * \left( \frac{\text{HHSize}_y}{\text{HHSize}_{by}} \right) * \left( \frac{\text{Income}_y}{\text{Income}_{by}} \right) * \left( \frac{\text{Price}_{y,m}^{-.30}}{\text{Price}_{by}} \right)$$

Where,  $by$ =base year

$$\text{Cool}_{y,m} = \text{CoolIndex}_y * \text{CoolUse}_{y,m}$$

The Cool, Heat, Water Heat, and Other variables are then used in a least squares regression, which results in estimates for annual and monthly use per household.

The number of residential customers is also projected with regression analysis using economic variables such as population and households. The owner-member results are summed to determine total customers and total class sales. System residential energy use per customer is calculated by dividing the forecasted number of customers into the energy sales forecast. Seasonal sales are only reported by one owner-member. Accounts include seasonal residences, such as vacation homes

and weekend retreats. Public building sales are reported by two owner-members and are government buildings, libraries and sometimes schools.

Owner-members classify commercial and industrial accounts into two groups. Customers whose annual peak demand is less than 1 MW are classified as small commercial customers and customers whose annual peak demand is greater than or equal to 1 MW are classified as large commercial/industrial customers. Small commercial energy sales forecast results from regression analysis. The number of small commercial customers is forecasted by means of regression analysis on various regional economic data. Exogenous variables include electric price, employment by sector and economic activity. Energy use per customer is calculated by dividing the forecasted number of customers into the energy sales forecast.

Large commercial sales projections rely on the input of the owner-members. Owner-members, having knowledge of their key accounts, project usage for existing large loads, and advise of new customers or customers that are leaving. The longer-term energy projections use economic variables as model drivers. EKPC projects new large loads based on history, the presence of industrial parks, and the economy of the service territory. The Large Commercial Class is forecasted using input from owner-members as well as a modeling approach. New industrial customers that owner-members expect in the next few years are explicitly input into the forecasts. To estimate total new large loads at the system level, a regression approach is used. A probabilistic model is then used to distribute these customers among the 16 owner-members. A load of 1.5 MW and 60% load factor is assumed for these new loads. This methodology for forecasting new large commercial customers and energy provides a robust and defensible projection at the owner-member level as well as the system level.

Public street and highway lighting sales is a relatively small class reported by eleven owner-members. Customers are correlated with residential customers. Energy has been impacted by upgrading light bulbs to high-efficient light-emitting diode light bulbs (LEDs).

**Demand Response, Energy Efficiency Appliance Saturations:** EKPC and its 16 owner-members promote the cost-effective use of energy by offering conservation, energy efficiency and

other programs to the retail customer. These programs were designed to meet the needs of the customer and to delay the need for additional generating capacity. EKPC considers the programs' impacts as part of its overall supply portfolio. Projections of appliance efficiencies are sourced from the Energy Information Administration (EIA). EKPC is a member of Itron's Energy Forecasting Group and receives the EIA projections for the East South Central U.S. Census Division. States included in this division are: Alabama, Kentucky, Mississippi, and Tennessee. These projections combined with EKPC's End-Use Survey saturations are used in the models. Every 2-3 years since 1981, EKPC has surveyed its owner-members' residential customers to gather information on electric appliance saturation, household characteristics, resident demographics, and other factors affecting electricity demand. EKPC projects these saturations for each owner-member as a function of time. The most recent survey was conducted first quarter of 2020. Naturally-occurring appliance efficiency and lighting improvements will have a dampening effect on residential retail sales.

**Electricity Rates:** The wholesale power cost projections are based on EKPC's 2019 Integrated Resource Plan filing with the Kentucky Public Service Commission. Each owner-member provides a projection of the distribution adder for the retail rate assumption used in the individual owner-member models.

**Weather:** The forecasts rely on National Oceanic and Atmospheric Administration (NOAA) weather stations located at seven airports in or near the EKPC system. Normal weather is based on historic 20-year values (1999-2019). Owner-members are assigned to airports as follows:

- Blue Grass Airport (LEX) in Lexington, KY:  
*Owner-members:* Blue Grass Energy Cooperative, Clark Energy Cooperative, and Inter-County Energy Cooperative
- Bowling Green/Warren County Regional Airport (BWG) in Bowling Green, KY:  
*Owner-members:* Farmers RECC and Taylor County RECC
- Cincinnati/Northern Kentucky International Airport (CVG) in Covington, KY:  
*Owner-members:* Fleming-Mason Energy and Owen Electric Cooperative
- Huntington Tri-State Airport (HTS) in Huntington, WV:  
*Owner-member:* Grayson RECC

- Julian Carroll Airport (JKL) in Jackson, KY:  
*Owner-members:* Big Sandy RECC, Cumberland Valley Electric, Jackson Energy Cooperative, and Licking Valley RECC
- Louisville International Airport (SDF) in Louisville, KY:  
*Owner-members:* Nolin RECC, Salt River Electric, and Shelby Energy Cooperative
- Pulaski County Airport (SME) in Somerset, KY:  
*Owner-member:* South Kentucky RECC.

**Development of Alternative Economic and Weather Scenarios:** Seasonal peak demands are projected using normalized historical peaks, the summation of monthly energy usages and load factors. High and low scenarios have been constructed around the base case forecast by developing weather and economic variations resulting in optimistic and pessimistic projections.

EKPC presents three economic growth scenarios:

- **Baseline:** This is the most likely forecast scenario, representing base economic assumptions and normal weather.
- **Lower:** To simulate pessimistic economic conditions, the annual increase in energy sales falls short of the baseline by the same amount by which the average annual increase in energy sales in the slowest-growing 10-year period in the past 20 years falls short of the 20-year average annual increase.
- **Higher:** The annual increase in energy sales exceeds the baseline by the same amount by which the average annual increase in energy sales in the fastest-growing 10-year period in the past 20 years exceeds the 20-year average annual increase.

Scenarios are also presented assuming mild and extreme winter and summer weather. The LEX weather station, which is central to Kentucky, was used. EKPC uses the distribution of weather during 1999 - 2019 to identify mild and extreme temperatures, as well as seasonal degree days to develop:

- 1-in-30 mild,
- 1-in-2 normal,
- 1-in-10 extreme, and
- 1-in-30 extreme.

Total energy requirements, winter peak demand, and summer peak demand are modeled as functions of the appropriate weather concepts.

## **Section 4.0**

### **Key Assumptions**

#### **4.1 Regional Economy Summary**

As previously mentioned, Kentucky was greatly affected by the COVID-19 pandemic. IHS provided the following summary:

Employment in Kentucky contracted 13.4% year over year (y/y) in the second quarter of 2020 as business shutdowns and social distancing measures intended to mitigate the spread of COVID-19 pummeled the state economy. The state's labor market fell quicker than the national rate of 11.3% y/y. Large drops in retail trade, leisure/hospitality, and manufacturing employment pushed the state into a sudden recession as restaurants, hotels, shops, and factories suspended operations. Leisure and hospitality services employment fell 32.0% y/y. The cancellation of concerts and major events coupled with closures of restaurants and hotels during the second quarter resulted in mass layoffs at many businesses. A 12.6% y/y contraction in retail trade payrolls stemming from the pandemic-related business restrictions was a large contributor to the overall drop in the trade, transportation, and utilities sector of 10.6% y/y. Manufacturing employment fell 15.3% y/y in the second quarter, with most of the decline originating from durables-producing firms. Temporary production halts at automotive assembly plants and nearby suppliers caused a large slide in transportation equipment manufacturing jobs. Food manufacturing suffered a far less severe decline as firms kept workers on to meet increased demand for food as consumers stocked up.

After lifting business restrictions in late May, Kentucky's third-quarter level of total employment grew by 8.0% quarter on quarter (q/q) as the state reopened and began its recovery earlier than many states. While state employment was still below its level from the prior year, it experienced a stronger rebound than the national average, which grew by 5.1% q/q. Much of the state's growth stemmed from leisure and hospitality, which added 46,000 jobs, just 10% below pre-COVID-19 levels, in spite of a brief, two-week reemergence of restrictions in late July due to concerns of rising caseloads. Manufacturing also saw a strong return in the third quarter, adding 11.4% q/q to payrolls as plants reopened and work resumed under modified health protocols. The state's unemployment rate fell to 8.9% in the third quarter. While the state saw an uptick in August, it returned to a downward trend in September, which came in at 5.6%, just 1.3 points above the rate seen in January 2020.

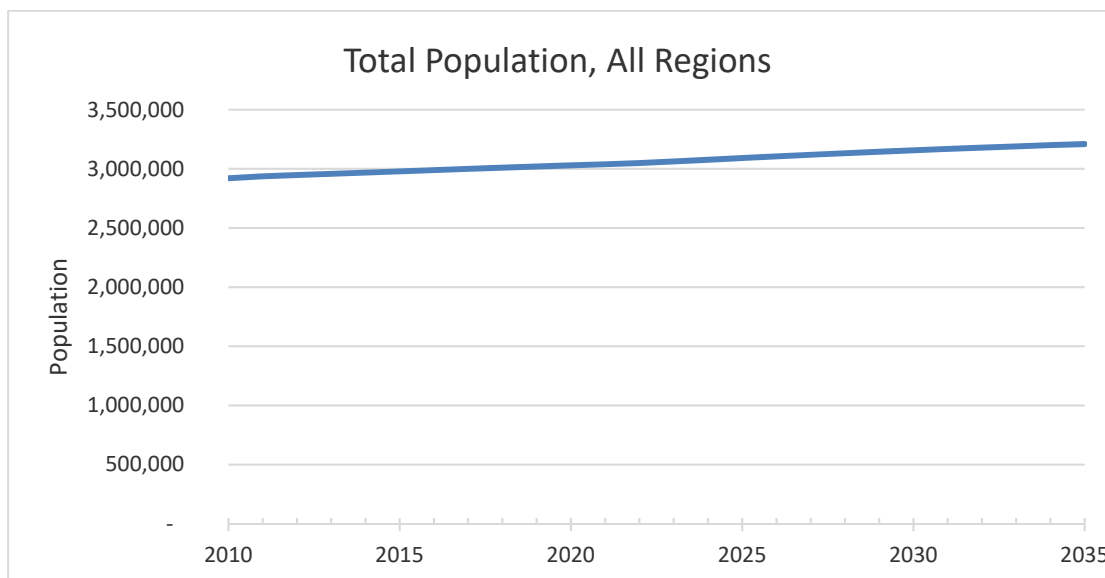
For the forecast period, the economic projections over the medium term show Kentucky's labor market expanding at a compound annual rate of 2.1% across the 2020-2025 period following an

employment contraction over the next three years. Slumping demand and business closures related to COVID-19 mitigation measures will depress the state economy over the first half of the forecast period, but Kentucky will match the national average over the medium term. Leisure and hospitality services will experience the most severe hits in the near term but are expected to see modest gains by 2025. Real personal income will grow at a compound annual rate of around 1.4% while real gross state product is forecast to advance 2.8% over the medium term, both below the national rates.

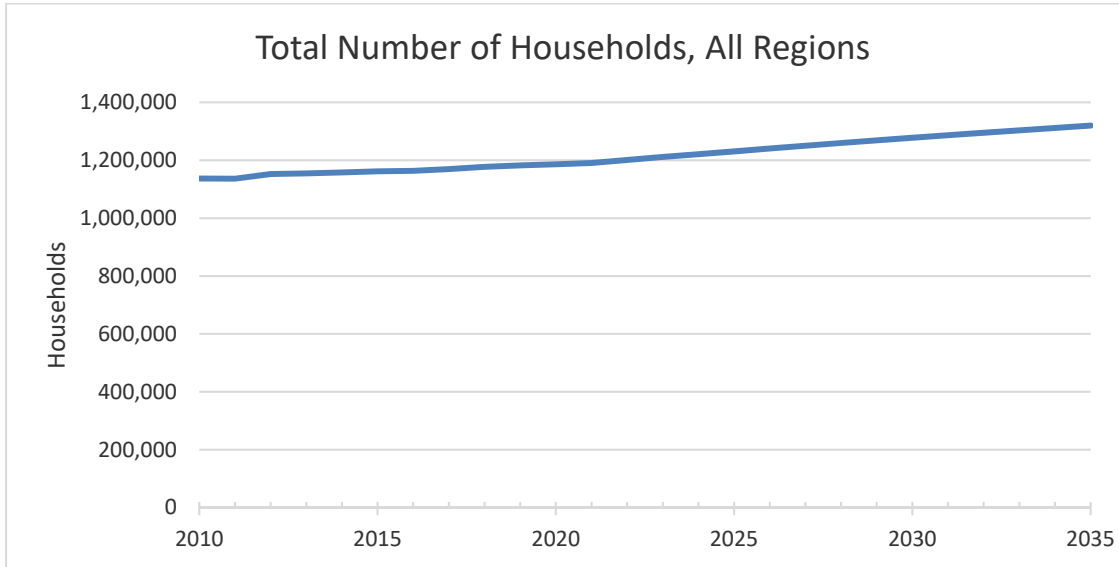
While many firms are laying off staff, either temporarily or permanently, as COVID-19 inflicts damage on the economy, growth in e-commerce and shipping is strong, which positively impacts the owner-members in the northern part of the state. Transportation and warehousing is expected to continue to grow as more shopping is done online.

#### *Overview of Key Economic Variables*

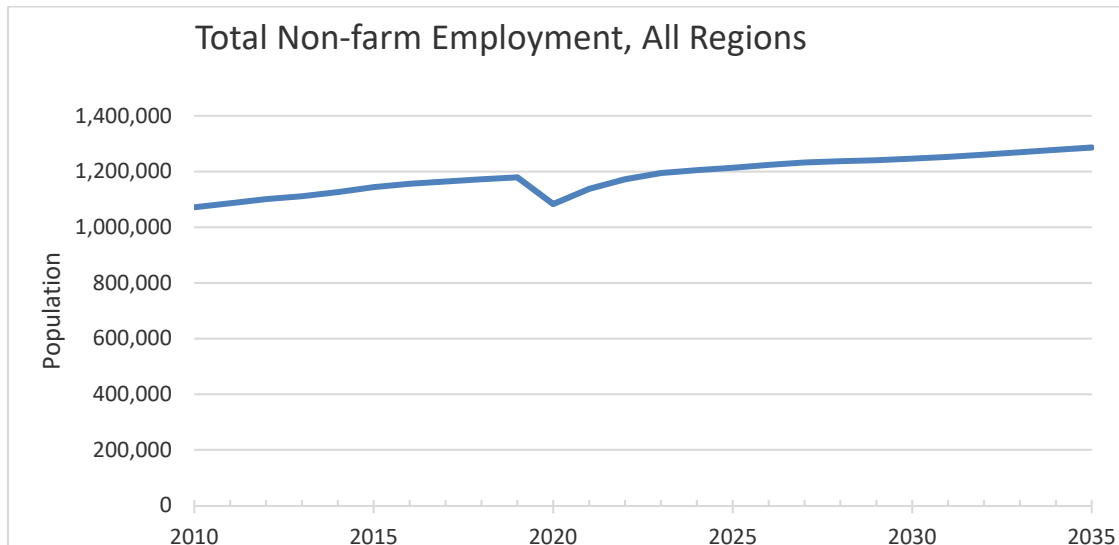
An important variable that impacts the load forecast is regional population. The spreadsheets with the county-level data from IHS are provided in Appendix. Overall, population continues to show some moderate growth, however, some regions in the eastern part of the state are projected to decline.



Household growth did slow during COVID-19 response, but it is expected to recover and grow moderately through the forecast period.



Total regional employment is tied closely to the national economy. During the response to COVID-19, total non-farm employment decreased significantly, however, is expected to recover in the coming years and then continue to grow throughout the forecast period.





## 4.2 Results by Region

Northern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	475,548	0.57%	183,252	0.63%	209,520	-5.89%
2021	478,752	0.67%	184,311	0.58%	220,697	5.33%
2022	482,621	0.81%	186,326	1.09%	227,503	3.08%
2023	486,600	0.82%	188,309	1.06%	230,371	1.26%
2024	490,119	0.72%	189,937	0.86%	231,273	0.39%
2025	493,584	0.71%	191,517	0.83%	232,660	0.60%
2026	497,268	0.75%	193,352	0.96%	235,218	1.10%
2027	501,036	0.76%	195,228	0.97%	237,327	0.90%
2028	504,744	0.74%	197,028	0.92%	238,622	0.55%
2029	508,431	0.73%	198,774	0.89%	239,477	0.36%
2030	512,109	0.72%	200,580	0.91%	241,035	0.65%
2031	515,780	0.72%	202,508	0.96%	242,760	0.72%
2032	519,282	0.68%	204,394	0.93%	244,595	0.76%
2033	522,853	0.69%	206,313	0.94%	246,942	0.96%
2034	526,426	0.68%	208,271	0.95%	248,956	0.82%
2035	529,912	0.66%	210,163	0.91%	251,259	0.93%

Central Northern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	456,723	0.64%	171,345	0.82%	133,546	-7.75%
2021	460,326	0.79%	172,766	0.83%	138,989	4.08%
2022	464,267	0.86%	175,092	1.35%	143,563	3.29%
2023	468,360	0.88%	177,255	1.24%	146,489	2.04%
2024	472,528	0.89%	179,314	1.16%	148,282	1.22%
2025	476,557	0.85%	181,301	1.11%	149,659	0.93%
2026	480,443	0.82%	183,405	1.16%	151,003	0.90%
2027	484,270	0.80%	185,504	1.14%	151,984	0.65%
2028	488,044	0.78%	187,541	1.10%	152,564	0.38%
2029	491,607	0.73%	189,462	1.02%	152,955	0.26%
2030	494,944	0.68%	191,321	0.98%	153,767	0.53%
2031	498,059	0.63%	193,214	0.99%	154,235	0.30%
2032	501,215	0.63%	195,261	1.06%	155,099	0.56%
2033	504,350	0.63%	197,130	0.96%	156,011	0.59%
2034	507,246	0.57%	198,893	0.89%	156,792	0.50%
2035	510,079	0.56%	200,599	0.86%	157,558	0.49%

North Eastern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	268,814	-0.29%	105,985	-0.36%	78,532	-8.00%
2021	268,190	-0.23%	105,792	-0.18%	81,790	4.15%
2022	267,901	-0.11%	106,282	0.46%	83,592	2.20%
2023	268,032	0.05%	106,786	0.47%	85,212	1.94%
2024	268,399	0.14%	107,241	0.43%	86,013	0.94%
2025	268,880	0.18%	107,725	0.45%	86,538	0.61%
2026	269,384	0.19%	108,314	0.55%	87,163	0.72%
2027	269,875	0.18%	108,904	0.54%	87,645	0.55%
2028	270,344	0.17%	109,455	0.51%	87,958	0.36%
2029	270,819	0.18%	109,983	0.48%	88,172	0.24%
2030	271,242	0.16%	110,480	0.45%	88,560	0.44%
2031	271,467	0.08%	110,909	0.39%	88,960	0.45%
2032	271,662	0.07%	111,285	0.34%	89,482	0.59%
2033	271,787	0.05%	111,640	0.32%	89,998	0.58%
2034	271,843	0.02%	111,976	0.30%	90,519	0.58%
2035	271,879	0.01%	112,280	0.27%	91,013	0.55%

Central Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	729,063	0.58%	288,890	0.69%	335,865	-7.48%
2021	733,997	0.68%	290,871	0.69%	354,875	5.66%
2022	739,121	0.70%	294,388	1.21%	365,595	3.02%
2023	745,166	0.82%	297,865	1.18%	372,757	1.96%
2024	751,251	0.82%	300,971	1.04%	375,305	0.68%
2025	757,287	0.80%	304,014	1.01%	377,887	0.69%
2026	762,778	0.73%	307,114	1.02%	381,466	0.95%
2027	767,822	0.66%	310,056	0.96%	384,310	0.75%
2028	772,584	0.62%	312,803	0.89%	385,900	0.41%
2029	777,123	0.59%	315,391	0.83%	387,020	0.29%
2030	781,432	0.55%	317,909	0.80%	389,065	0.53%
2031	785,522	0.52%	320,430	0.79%	391,186	0.55%
2032	789,520	0.51%	322,900	0.77%	393,913	0.70%
2033	793,557	0.51%	325,393	0.77%	396,832	0.74%
2034	797,506	0.50%	327,905	0.77%	399,580	0.69%
2035	801,345	0.48%	330,320	0.74%	402,365	0.70%

Central Southern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	317,920	0.88%	124,265	1.04%	110,660	-10.25%
2021	319,183	0.40%	125,117	0.69%	116,724	5.48%
2022	320,546	0.43%	126,671	1.24%	120,729	3.43%
2023	322,075	0.48%	128,125	1.15%	123,830	2.57%
2024	323,483	0.44%	129,374	0.98%	125,574	1.41%
2025	324,934	0.45%	130,631	0.97%	126,735	0.92%
2026	326,373	0.44%	132,012	1.06%	127,806	0.85%
2027	327,874	0.46%	133,437	1.08%	128,611	0.63%
2028	329,272	0.43%	134,798	1.02%	129,118	0.39%
2029	330,508	0.38%	136,075	0.95%	129,422	0.24%
2030	331,684	0.36%	137,238	0.86%	129,980	0.43%
2031	332,864	0.36%	137,918	0.50%	130,680	0.54%
2032	334,011	0.34%	138,932	0.73%	131,556	0.67%
2033	335,052	0.31%	139,939	0.73%	132,475	0.70%
2034	336,049	0.30%	140,973	0.74%	133,408	0.70%
2035	336,951	0.27%	141,957	0.70%	134,297	0.67%

Eastern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	496,605	-0.71%	198,902	-0.65%	130,189	-10.74%
2021	492,744	-0.78%	197,721	-0.59%	135,880	4.37%
2022	489,284	-0.70%	197,722	0.00%	139,472	2.64%
2023	486,718	-0.52%	197,793	0.04%	142,073	1.87%
2024	484,640	-0.43%	197,793	0.00%	143,245	0.82%
2025	482,794	-0.38%	197,853	0.03%	143,835	0.41%
2026	481,026	-0.37%	198,119	0.13%	144,389	0.39%
2027	479,219	-0.38%	198,375	0.13%	144,670	0.19%
2028	477,465	-0.37%	198,595	0.11%	144,702	0.02%
2029	475,966	-0.31%	198,870	0.14%	144,587	-0.08%
2030	474,472	-0.31%	199,114	0.12%	144,775	0.13%
2031	473,148	-0.28%	199,457	0.17%	145,079	0.21%
2032	471,789	-0.29%	199,697	0.12%	145,577	0.34%
2033	470,309	-0.31%	199,919	0.11%	146,094	0.36%
2034	468,625	-0.36%	200,095	0.09%	146,648	0.38%
2035	466,972	-0.35%	200,246	0.08%	147,151	0.34%

Southern Economic Region Forecast Summary						
	Population		Households		Total Employment	
		(%) Change		(%) Change		(%) Change
2020	284,443	0.13%	113,663	0.16%	84,661	-9.94%
2021	284,546	0.04%	113,871	0.18%	88,917	5.03%
2022	284,778	0.08%	114,725	0.75%	91,843	3.29%
2023	285,439	0.23%	115,591	0.76%	94,052	2.40%
2024	286,307	0.30%	116,390	0.69%	95,357	1.39%
2025	287,238	0.33%	117,200	0.70%	96,283	0.97%
2026	288,147	0.32%	118,109	0.78%	97,189	0.94%
2027	288,969	0.29%	118,992	0.75%	97,916	0.75%
2028	289,761	0.27%	119,833	0.71%	98,459	0.55%
2029	290,467	0.24%	120,615	0.65%	98,846	0.39%
2030	291,091	0.21%	121,346	0.61%	99,417	0.58%
2031	291,482	0.13%	121,998	0.54%	99,955	0.54%
2032	291,802	0.11%	122,572	0.47%	100,612	0.66%
2033	292,061	0.09%	123,145	0.47%	101,283	0.67%
2034	292,197	0.05%	123,696	0.45%	101,980	0.69%
2035	292,349	0.05%	124,233	0.43%	102,645	0.65%

### 4.3 Energy and Peak Adjustments

EKPC's owner-member residential sales account for nearly 60 percent of all retail sales. To understand the load characteristics of homes, every two to three years since 1981, EKPC has surveyed the owner-members' residential customers. The most recent survey was conducted in 2020. EKPC gathers appliance, heating and cooling, economic, and demographic data. Appliance holdings of survey respondents are analyzed in order to better understand electricity consumption and to project future appliance saturations. Results are also used to identify potential energy efficiency program offerings. EKPC evaluates new potential programs using the California tests and offers programs to customers that are deemed beneficial to EKPC and the customer. These programs generally result in a reduction in energy sales or peak demand. Commercial and industrial customers may choose to be on an interruptible rate contract that allows EKPC to request a customer reduce load during peak times or when price volatility is high. The cumulative impact of these offerings are projected to be:

**Additional Effect of Demand Response and  
Energy Efficiency Programs**

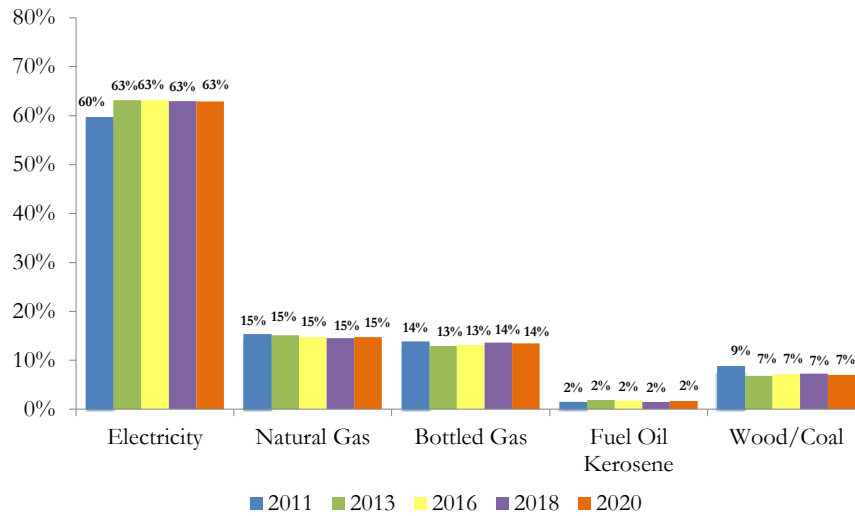
	Annual Energy (MWH)	Winter Peak (MW)	Summer Peak (MW)
2021	-19,216	-133	-133
2022	-35,631	-238	-237
2023	-41,647	-239	-238
2024	-47,662	-240	-238
2025	-53,678	-241	-239
2026	-59,432	-242	-240
2027	-65,186	-243	-240
2028	-70,940	-244	-241
2029	-75,579	-245	-241
2030	-80,218	-246	-241
2031	-84,857	-246	-242
2032	-89,496	-247	-242
2033	-94,135	-248	-243
2034	-98,774	-249	-243
2035	-103,413	-249	-243

*Note: To avoid double counting, additional effects do not include energy efficiency measures installed prior to 2021. These are assumed to be embedded in the historical data.*

#### 4.4 Residential Appliance Saturations

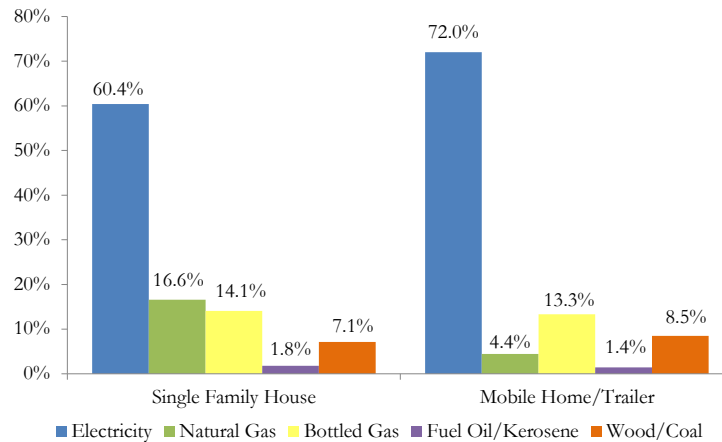
Survey Results – Heating: Electricity continues to be the main method of home heating. All fuel types have remained constant compared to the last few studies.

Historic Comparison of Main Heating Methods  
EKPC Weighted Average



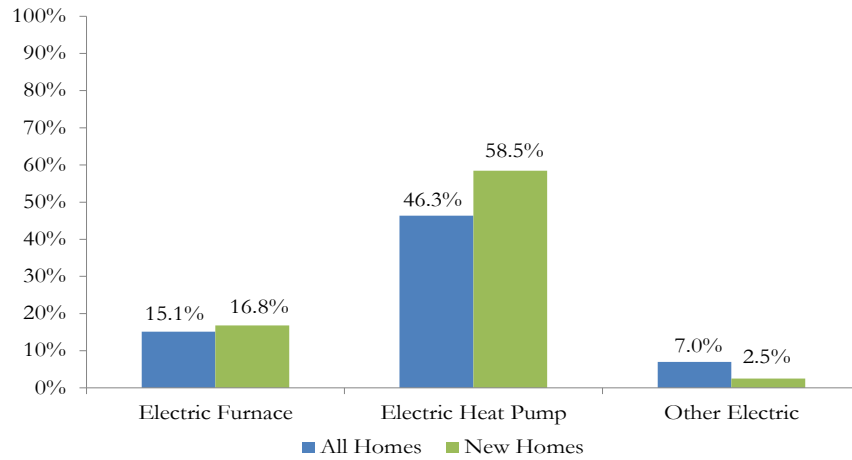
Electric heat continues to be more popular in mobile homes and trailers, while natural gas heat has a much higher percentage rate in single family homes. Among both types of homes, bottled gas and fuel oil/kerosene are relatively similar.

Main Heating Method  
EKPC Weighted Average



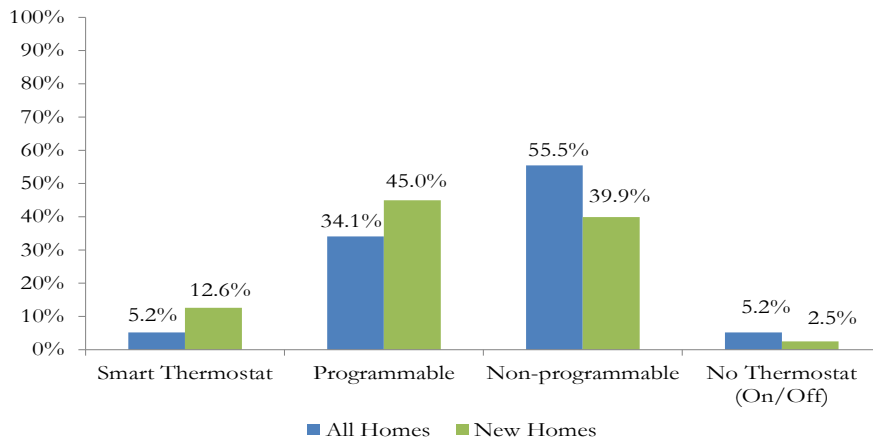
When compared to those who use an electric furnace (15.5 percent) and other types of electric heat (7.0 percent), central heating continues to be the predominant type of electric heat installed in all homes (46.3 percent), a finding which is consistent with results from previous surveys. This trend is particularly strong among newer homes, with few homes that are less than five years old having electric baseboard and ceiling cable heat installed.

Installation of Electric Heat  
EKPC Weighted Average

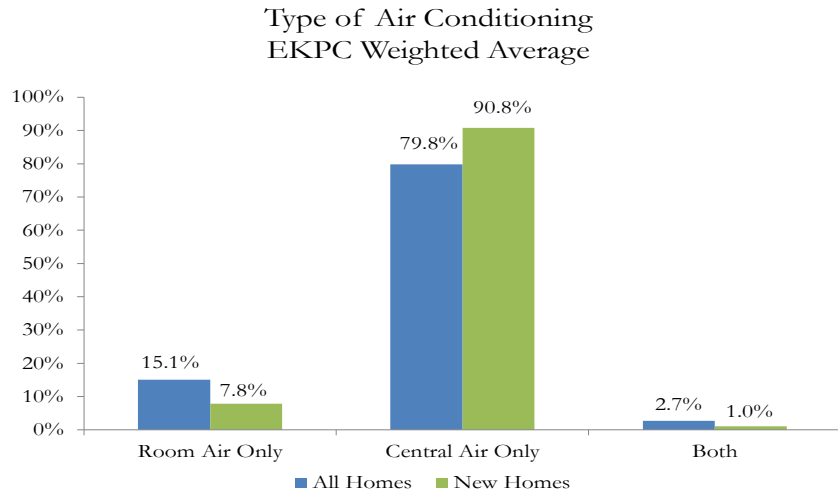


Over 55 percent of all homes use a non-programmable thermostat. Only five percent of all homes have a smart thermostat, whereas new homes are more than twice as likely to use a smart thermostat at over 12 percent.

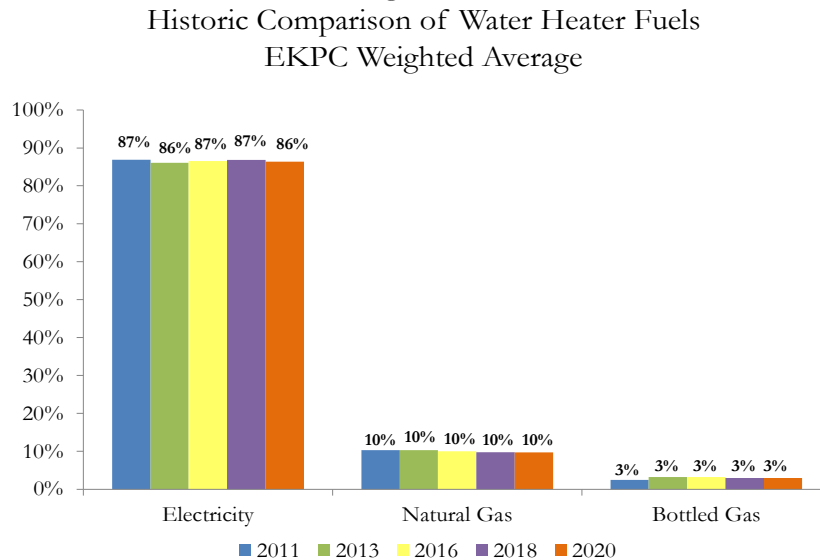
Type of Thermostat for Main Heating  
EKPC Weighted Average



Survey Results – Cooling: Almost 80 percent of homes in have central air conditioning, including the majority of all homes that are less than five years old. A few homes have both central air conditioning and a room air conditioner.

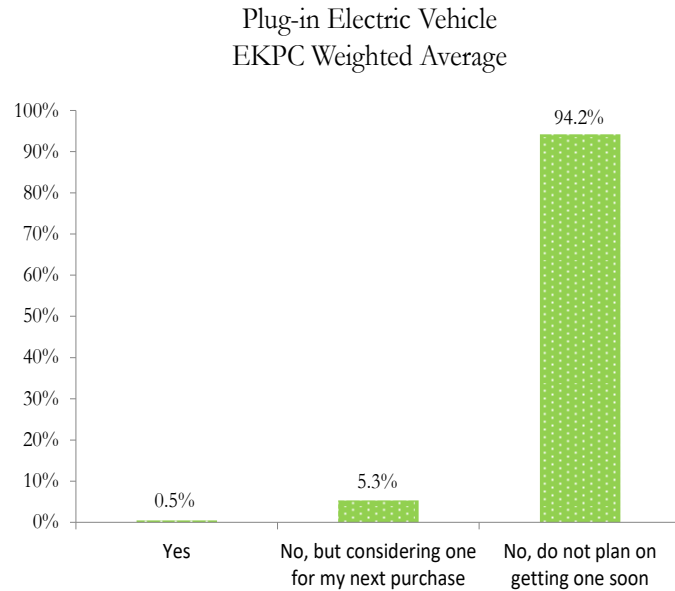


Survey Results - Water Heating: Water heater ownership has changed very little over time with electricity being the dominant fuel.





Survey Results – Plug-in Vehicles: The question was asked if residential customers owned/leased or are interested in owning a plug-in electric vehicle. Less than 1 percent of residential customers currently own one, but almost 5 percent are considering one. Whereas, 94 percent are not interested in owning an electric vehicle.



Survey Results – Demographics: Over forty-nine percent of member households are headed by someone 65 years of age or older, which is a 4 percent increase from the 2018 survey. While less than 1 percent is headed by someone under 25 years of age. Studies show adults 65 year or older are more likely to complete a survey than younger adults. (Traugott, 1987; Shaiko et al., 1991; Merkle et al., 1993). While the owner-members serve predominantly rural and older segments of the population, survey design and delivery methods have been changed and continue to adapt in an effort to collect data from all customer segments.

#### **4.5 Energy Efficiency Programs**

The programs currently offered target residential customers and energy efficiency and include:

- Button-Up Weatherization Program
- CARES Low-Income Weatherization
- Heat Pump Retrofit Program
- Touchstone Energy Program
- ENERGY STAR® Manufactured Home Program
- Energy Audit
- Residential Efficient Lighting

Button-Up Weatherization Program designed to incentivize members with poor energy-performing homes to improve the energy efficiency of the home's shell. The Button-Up Weatherization Program is an important program to assist members with high bills caused by excessive heat losses. Air-sealing and attic insulation are the most cost-effective measures to improve home energy performance. The Button-Up Weatherization Program offers an incentive for reducing the heat loss of a home and is based on based on heat loss reduction measured in British Thermal Units per hour ("BTUH"). The retail member may qualify for this incentive by reducing the air leakage of their home and/or adding insulation in the attic.

Community Assistance Resources for Energy Savings (CARES) Low-Income Program provides an incentive to enhance the weatherization and energy efficiency services provided to its residential retail members by the Kentucky Community Action Agency's (CAA) network of not for profit community action agencies. EKPC and its owner-members provide an incentive to the CAA implementing the project on behalf of the end-use member. EKPC's program has two primary objectives. First, EKPC's incentive will enable the CAA to install more measures in each home. Second, the additional incentive from EKPC will assist CAA in weatherizing more homes. Two types of homes are eligible for incentives: Heat Pump Eligible Homes are single family or multi-family residential dwellings that use electricity for their primary source of heat. The EKPC incentive can be used to upgrade the home to an air source heat pump as well as to install weatherization improvements including insulation, air sealing, duct sealing, and a water heater blanket. Heat Pump ineligible homes are single family or multi-family residential dwellings that do not use electricity for their primary source of heat, but do cool their home with central or window unit air conditioners. The EKPC incentive can be used to install weatherization improvements.

Heat Pump Retrofit Program provides incentives for residential members to replace their existing resistance heat source heat (electric furnace, ceiling cable heat, baseboard heat, or electric thermal storage) with a more efficient heat pump. Most high bill complaints are from members with homes that are heated with electric resistive heat instead of a heat pump. Installing an electric heat pump lowers electric bills significantly for those members. The Heat Pump Retrofit Program provides incentives for both centrally ducted systems and mini-split systems.

Touchstone Energy Program is designed to encourage new homes to be built to higher standards for thermal integrity and equipment efficiency, as well as to choose a geothermal or an air source heat pump rather than less efficient forms of heating and cooling. The Touchstone Energy Program provides guidance during the building process to guarantee a home that is  $\geq 25$ -30% more efficient than the Kentucky standard built home. The typical home built in rural Kentucky scores a 105 on the Home Energy Rating System (HERS) Index. The HERS testing and rating system is the industry accepted standard for evaluating the energy efficiency of a new home. Therefore, EKPC and the owner-members will provide the incentive for a home that either scores a HERS of 75 or better for the Performance Path or completes a Prescriptive Path check list of energy saving measures that assure the home performs equivalently to a 75 HERS tested home.

ENERGY STAR<sup>®</sup> Manufactured Home Program (ESMH) is designed to ensure that residential customers purchase an energy efficient manufactured home. EKPC will accomplish this by providing an incentive to purchase and install a new ENERGY STAR<sup>®</sup> certified manufactured home instead of a U.S. Department of Housing and Urban Development (HUD) minimum standard home. The incentive is paid to the member who purchases the ENERGY STAR<sup>®</sup> manufactured home. In February 2018, the U.S. Environmental Protection Agency (EPA) changed the ENERGY STAR<sup>®</sup> requirements for ENERGY STAR<sup>®</sup> manufactured homes. Effectively, EPA lessened the efficiency requirements for the home's shell. The changes allow the manufacturers to achieve ENERGY STAR<sup>®</sup> certification while spending less on improving the home's shell. Therefore, EKPC is lowering the incentive to a more appropriate level to offset these lower costs. Through the program, EKPC will pay incentives in the form of rebates for electrically heated manufactured homes that qualify for the ENERGY STAR<sup>®</sup> label. Such homes use a combination of structural envelope and equipment measures that, in combination, result energy consumption that is significantly lower than comparable factory-built homes produced in accordance with the HUD code.

Energy Audit program uses targeted information on home energy use to help customers manage their energy use and save energy. The Energy Audit is designed to offer two kinds of information delivery: an in-home audit and an online audit. EKPC uses the *BillingInsights* tool from Apogee

Interactive, Inc. to analyze energy usage and make recommendations to lower energy consumption.

The in-home audit is available for members who want a more thorough assessment of their electricity usage. An energy advisor from one of our owner-members will visit the home to conduct an energy audit by inspecting the appliances, building shell, heating and cooling systems, ductwork, appliances, and other sources of energy consumption and energy losses. The energy advisors have access to blower doors and infrared cameras if needed to identify air leakage and other heat losses. The audit report will include simple low cost improvements that the homeowners can do themselves. The homeowner will also be made aware of any recommendations that are eligible for a rebate under our other energy efficiency programs.

Residential Efficient Lighting program's purpose is to improve the efficiency of residential lighting by subsidizing the cost of higher efficiency lighting products. EKPC and its owner-members distribute compact fluorescent light bulbs (CFLs) and (LEDs) to members. The Residential Efficient Lighting provides CFLs at the annual meetings held by the owner-members. In addition, each member who completes an online energy audit receives an LED light bulb.

## Section 5.0 Results by Customer Class

### Residential Class Customers and Sales

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Monthly Average (kWh)	Change (kWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	481,825	1,298	0.3	1,278	101	8.5	7,388,901	599,759	8.8
2011	482,351	526	0.1	1,204	-74	-5.8	6,967,413	-421,487	-5.7
2012	487,793	5,442	1.1	1,124	-80	-6.6	6,577,784	-389,629	-5.6
2013	489,738	1,945	0.4	1,176	52	4.6	6,909,853	332,069	5.0
2014	491,776	2,038	0.4	1,210	35	2.9	7,142,350	232,497	3.4
2015	494,297	2,521	0.5	1,143	-67	-5.5	6,781,622	-360,728	-5.1
2016	497,803	3,506	0.7	1,146	3	0.3	6,847,090	65,468	1.0
2017	500,260	2,457	0.5	1,083	-63	-5.5	6,502,113	-344,977	-5.0
2018	505,379	5,119	1.0	1,208	125	11.5	7,324,079	821,967	12.6
2019	508,475	3,096	0.6	1,153	-54	-4.5	7,036,916	-287,163	-3.9
2020	512,906	4,431	0.9	1,138	-15	-1.3	7,005,512	-31,404	-0.4
2021	517,009	4,103	0.8	1,161	23	2.0	7,205,739	200,227	2.9
2022	521,049	4,040	0.8	1,160	-1	-0.1	7,253,125	47,386	0.7
2023	524,917	3,868	0.7	1,156	-4	-0.3	7,283,102	29,977	0.4
2024	528,726	3,809	0.7	1,154	-2	-0.2	7,322,856	39,754	0.5
2025	532,583	3,857	0.7	1,150	-5	-0.4	7,346,496	23,640	0.3
2026	536,459	3,876	0.7	1,148	-1	-0.1	7,392,185	45,689	0.6
2027	540,328	3,869	0.7	1,149	0	0.0	7,447,191	55,006	0.7
2028	544,224	3,896	0.7	1,153	4	0.4	7,528,324	81,133	1.1
2029	548,114	3,890	0.7	1,151	-1	-0.1	7,573,245	44,921	0.6
2030	551,999	3,885	0.7	1,150	-2	-0.2	7,614,810	41,564	0.5
2031	555,873	3,874	0.7	1,148	-1	-0.1	7,659,372	44,562	0.6
2032	559,802	3,929	0.7	1,153	5	0.4	7,745,879	86,507	1.1
2033	563,721	3,919	0.7	1,152	-1	-0.1	7,794,976	49,097	0.6
2034	567,644	3,923	0.7	1,156	4	0.3	7,876,424	81,448	1.0
2035	571,512	3,868	0.7	1,161	4	0.4	7,960,650	84,225	1.1

**Notes: Totals may not equal sum of components due to rounding.**

**In 2012, there was a reclassification of 4,400 customers from the Seasonal Class to the Residential Class.**

**In 2018, there was a reclassification of about 500 customers from the Small Commercial Class to the Residential Class.**

### Seasonal Class Customers and Sales

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Monthly Average (kWh)	Change (kWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	4,490	70	1.6	259	12	5.1	13,959	879	6.7
2011	4,518	28	0.6	236	-23	-9.1	12,774	-1,185	-8.5
2012	67	-4,451	-98.5	282	46	19.6	227	-12,547	-98.2
2013	94	27	40.3	266	-16	-5.6	300	73	32.4
2014	115	21	22.3	268	2	0.9	370	70	23.5
2015	120	5	4.3	246	-23	-8.4	354	-17	-4.5
2016	125	5	4.2	277	31	12.8	416	62	17.5
2017	141	16	12.8	316	38	13.8	534	118	28.4
2018	144	3	2.1	360	44	14.0	621	88	16.4
2019	150	6	4.2	368	8	2.3	663	41	6.6
2020	160	10	6.7	351	-18	-4.8	673	10	1.6
2021	170	10	6.3	365	14	4.1	744	71	10.6
2022	180	10	5.9	364	-1	-0.2	787	43	5.7
2023	191	11	6.1	362	-2	-0.6	830	43	5.5
2024	203	12	6.3	359	-3	-0.8	875	45	5.5
2025	214	11	5.4	359	-1	-0.2	921	46	5.2
2026	225	11	5.1	359	1	0.2	970	49	5.3
2027	238	13	5.8	358	-1	-0.3	1,024	53	5.5
2028	251	13	5.5	358	0	-0.1	1,079	55	5.4
2029	262	11	4.4	358	0	0.0	1,126	47	4.4
2030	273	11	4.2	358	0	-0.1	1,172	46	4.1
2031	284	11	4.0	358	1	0.2	1,222	50	4.2
2032	295	11	3.9	360	1	0.4	1,274	52	4.3
2033	307	12	4.1	360	0	-0.1	1,325	51	4.0
2034	317	10	3.3	361	2	0.4	1,374	49	3.7
2035	329	12	3.8	361	0	0.0	1,427	53	3.8

**Notes: Totals may not equal sum of components due to rounding.**

**In 2012, there was a reclassification of 4,400 customers from the Seasonal Class to the Residential Class.**

**Public Buildings Class Customers and Sales**

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Monthly Average (kWh)	Change (MWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	1,046	48	4.8	3,172	207	7.0	39,809	4,301	12.1
2011	1,084	38	3.6	2,957	-214	-6.8	38,468	-1,341	-3.4
2012	1,096	12	1.1	2,676	-281	-9.5	35,194	-3,274	-8.5
2013	1,109	13	1.2	2,796	121	4.5	37,215	2,021	5.7
2014	1,117	8	0.7	2,966	169	6.1	39,753	2,537	6.8
2015	1,132	15	1.3	2,871	-95	-3.2	38,996	-757	-1.9
2016	1,137	5	0.4	2,758	-113	-3.9	37,627	-1,369	-3.5
2017	1,156	19	1.7	2,637	-121	-4.4	36,578	-1,049	-2.8
2018	1,165	9	0.8	2,943	306	11.6	41,142	4,563	12.5
2019	1,166	1	0.1	2,847	-96	-3.3	39,829	-1,313	-3.2
2020	1,171	5	0.4	2,554	-293	-10.3	35,885	-3,943	-9.9
2021	1,178	7	0.6	2,763	210	8.2	39,064	3,178	8.9
2022	1,184	6	0.5	2,797	34	1.2	39,744	680	1.7
2023	1,190	6	0.5	2,800	3	0.1	39,984	240	0.6
2024	1,197	7	0.6	2,789	-11	-0.4	40,066	82	0.2
2025	1,203	6	0.5	2,771	-18	-0.6	40,009	-58	-0.1
2026	1,209	6	0.5	2,759	-12	-0.5	40,027	18	0.0
2027	1,216	7	0.6	2,745	-13	-0.5	40,062	35	0.1
2028	1,222	6	0.5	2,733	-12	-0.4	40,080	18	0.0
2029	1,228	6	0.5	2,715	-18	-0.7	40,010	-70	-0.2
2030	1,235	7	0.6	2,698	-17	-0.6	39,979	-30	-0.1
2031	1,241	6	0.5	2,684	-13	-0.5	39,974	-5	0.0
2032	1,247	6	0.5	2,674	-11	-0.4	40,009	34	0.1
2033	1,254	7	0.6	2,658	-16	-0.6	39,993	-16	0.0
2034	1,260	6	0.5	2,646	-12	-0.5	40,003	10	0.0
2035	1,266	6	0.5	2,634	-12	-0.4	40,019	15	0.0

**Note: Totals may not equal sum of components due to rounding.**

**Small Commercial Class Customers and Sales**

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Annual Average (MWh)	Change (MWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	32,553	173	0.5	59	4	7.3	1,935,479	148,367	8.3
2011	32,653	100	0.3	58	-1	-1.7	1,892,090	-43,389	-2.2
2012	33,069	416	1.3	57	-1	-1.7	1,883,241	-8,850	-0.5
2013	33,287	218	0.7	58	1	1.8	1,917,730	34,489	1.8
2014	33,670	383	1.2	57	-1	-1.7	1,919,198	1,468	0.1
2015	34,117	447	1.3	57	0	0.0	1,958,109	38,912	2.0
2016	34,252	135	0.4	57	0	0.0	1,951,787	-6,322	-0.3
2017	34,494	242	0.7	55	-2	-3.5	1,896,475	-55,312	-2.8
2018	34,199	-295	-0.9	57	2	3.6	1,962,505	66,030	3.5
2019	34,517	318	0.9	56	-1	-1.8	1,925,821	-36,684	-1.9
2020	34,750	233	0.7	52	-4	-7.1	1,798,762	-127,059	-6.6
2021	35,054	304	0.9	56	4	7.7	1,967,078	168,316	9.4
2022	35,341	287	0.8	57	1	1.8	2,015,313	48,234	2.5
2023	35,644	303	0.9	57	0	0.0	2,043,245	27,932	1.4
2024	35,929	285	0.8	57	0	0.0	2,062,484	19,239	0.9
2025	36,211	282	0.8	57	0	0.0	2,079,718	17,234	0.8
2026	36,507	296	0.8	57	0	0.0	2,097,729	18,011	0.9
2027	36,805	298	0.8	57	0	0.0	2,108,594	10,866	0.5
2028	37,093	288	0.8	57	0	0.0	2,125,152	16,558	0.8
2029	37,374	281	0.8	57	0	0.0	2,142,182	17,030	0.8
2030	37,658	284	0.8	57	0	0.0	2,153,353	11,171	0.5
2031	37,945	287	0.8	57	0	0.0	2,170,018	16,665	0.8
2032	38,240	295	0.8	57	0	0.0	2,188,051	18,033	0.8
2033	38,535	295	0.8	57	0	0.0	2,204,658	16,607	0.8
2034	38,827	292	0.8	57	0	0.0	2,215,933	11,275	0.5
2035	39,122	295	0.8	57	0	0.0	2,236,079	20,146	0.9

**Note: Totals may not equal sum of components due to rounding.  
Beginning in 2018 there is a reclassification from Small Commercial to Residential.**



### Large Commercial Class Customers and Sales

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Annual Average (MWh)	Change (MWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	125	-13	-9.4	22,767	2,246	10.9	2,845,857	13,922	0.5
2011	128	3	2.4	22,571	-195	-0.9	2,889,142	43,285	1.5
2012	130	2	1.6	22,321	-251	-1.1	2,901,688	12,546	0.4
2013	135	5	3.8	22,355	34	0.2	3,017,925	116,237	4.0
2014	136	1	0.7	23,870	1,515	6.8	3,246,287	228,362	7.6
2015	129	-7	-5.1	23,099	-771	-3.2	2,979,716	-266,571	-8.2
2016	138	9	7.0	23,888	789	3.4	3,296,495	316,779	10.6
2017	149	11	8.0	22,788	-1,100	-4.6	3,395,430	98,935	3.0
2018	153	4	2.7	22,390	-398	-1.7	3,425,613	30,183	0.9
2019	157	4	2.6	21,111	-1,279	-5.7	3,314,391	-111,222	-3.2
2020	161	4	2.5	19,999	-1,112	-5.3	3,219,793	-94,598	-2.9
2021	169	8	5.0	20,987	988	4.9	3,546,763	326,970	10.2
2022	173	4	2.4	28,615	7,628	36.3	4,950,393	1,403,630	39.6
2023	178	5	2.9	28,473	-142	-0.5	5,068,151	117,758	2.4
2024	180	2	1.1	28,452	-21	-0.1	5,121,298	53,147	1.0
2025	183	3	1.7	28,269	-182	-0.6	5,173,293	51,995	1.0
2026	185	2	1.1	28,168	-101	-0.4	5,211,114	37,821	0.7
2027	187	2	1.1	28,066	-102	-0.4	5,248,287	37,173	0.7
2028	189	2	1.1	27,990	-76	-0.3	5,290,142	41,855	0.8
2029	191	2	1.1	27,892	-98	-0.4	5,327,401	37,259	0.7
2030	193	2	1.0	27,819	-73	-0.3	5,369,151	41,750	0.8
2031	196	3	1.6	27,643	-176	-0.6	5,418,073	48,922	0.9
2032	199	3	1.5	27,522	-121	-0.4	5,476,916	58,843	1.1
2033	202	3	1.5	27,324	-198	-0.7	5,519,501	42,585	0.8
2034	204	2	1.0	27,323	-2	0.0	5,573,828	54,327	1.0
2035	207	3	1.5	27,148	-175	-0.6	5,619,644	45,816	0.8

**Note: Totals may not equal sum of components due to rounding.**

**Public Street and Highway Lighting Class Customers and Sales**

Year	<i>Customers</i>			<i>Use Per Customer</i>			<i>Class Sales</i>		
	Annual Average	Annual Change	% Change	Monthly Average (kWh)	Change (kWh)	% Change	Total (MWh)	Annual Change (MWh)	% Change
2010	423	-1	-0.2	22	1	5.1	9,503	438	4.8
2011	416	-7	-1.7	24	1	5.3	9,845	342	3.6
2012	414	-2	-0.5	23	0	-2.0	9,600	-245	-2.5
2013	412	-2	-0.5	24	1	3.0	9,845	244	2.5
2014	408	-4	-1.0	24	0	1.7	9,916	72	0.7
2015	412	4	1.0	24	0	-1.2	9,890	-26	-0.3
2016	402	-10	-2.4	25	1	3.0	9,940	50	0.5
2017	381	-21	-5.2	24	0	-1.0	9,325	-615	-6.2
2018	390	9	2.4	23	-2	-7.9	8,796	-530	-5.7
2019	409	19	4.9	21	-1	-4.9	8,770	-25	-0.3
2020	429	20	4.9	20	-1	-5.4	8,703	-68	-0.8
2021	431	2	0.5	20	0	-0.4	8,707	4	0.0
2022	433	2	0.5	20	0	-0.4	8,714	8	0.1
2023	436	3	0.7	20	0	-0.6	8,724	9	0.1
2024	438	2	0.5	20	0	-0.1	8,751	27	0.3
2025	440	2	0.5	20	0	0.0	8,788	37	0.4
2026	441	1	0.2	20	0	0.1	8,817	28	0.3
2027	442	1	0.2	20	0	0.1	8,845	28	0.3
2028	444	2	0.5	20	0	-0.1	8,872	27	0.3
2029	445	1	0.2	20	0	0.1	8,898	26	0.3
2030	446	1	0.2	20	0	0.1	8,923	26	0.3
2031	447	1	0.2	20	0	0.1	8,949	25	0.3
2032	449	2	0.4	20	0	-0.2	8,974	25	0.3
2033	450	1	0.2	20	0	0.1	8,999	25	0.3
2034	451	1	0.2	20	0	0.1	9,024	25	0.3
2035	452	1	0.2	20	0	0.1	9,049	25	0.3

**Note: Totals may not equal sum of components due to rounding.**

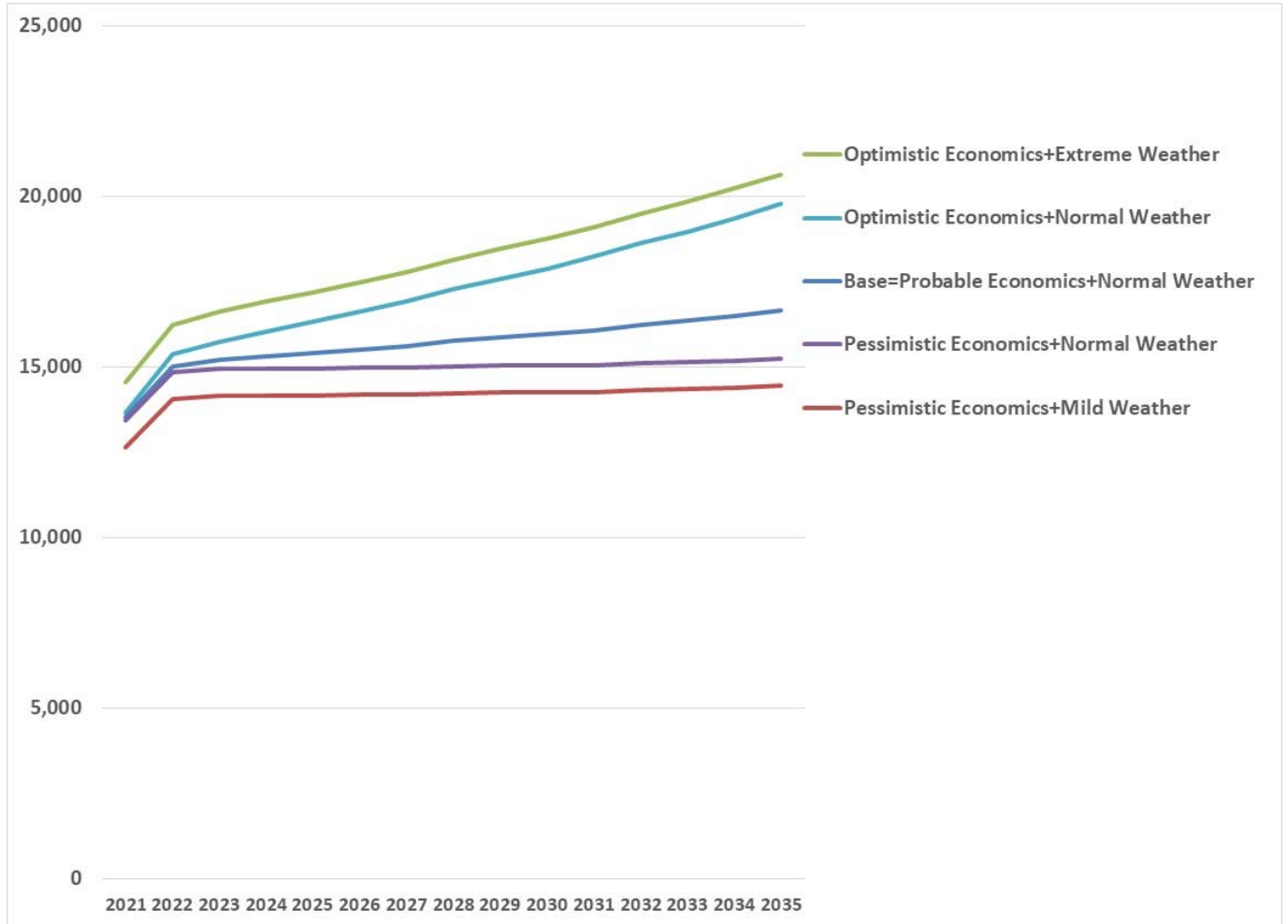
## Section 6.0 Results by Owner-Member

The forecast indicates that total energy sales growth is higher for owner-members located near large MSAs (Cincinnati, Lexington, and Louisville) or in the South Region. Owner-members located in the East Region are forecast to remain relatively flat.

Owner-Member	Economic Region	Customers		Total Energy Sales	
		Portion of System Total	Growth Rate 2021 - 2035	Portion of System Total	Growth Rate 2021 - 2035
Big Sandy RECC	East	2.2%	0.0%	1.8%	0.2%
Blue Grass Energy	Central	11.3%	1.1%	11.5%	1.8%
Clark Energy	North East	4.9%	0.7%	3.6%	0.9%
Cumberland Valley Electric	East	4.1%	0.2%	3.6%	0.3%
Farmers RECC	South Central	4.6%	0.6%	4.2%	1.1%
Fleming Mason Energy	North East	4.4%	0.4%	4.1%	0.8%
Grayson RECC	North East	2.6%	0.1%	2.0%	0.4%
Inter County Energy	South	4.8%	0.6%	4.8%	1.8%
Jackson Energy	East	8.8%	0.1%	7.4%	0.1%
Licking Valley RECC	East	2.9%	0.0%	2.0%	0.2%
Nolin RECC	North Central	6.6%	0.9%	6.1%	0.9%
Owen Electric	North	11.9%	1.1%	19.2%	3.4%
Salt River Electric	North Central	10.5%	1.5%	10.5%	1.9%
Shelby Energy	North Central	3.3%	1.5%	4.1%	1.5%
South Kentucky RECC	South	12.1%	0.4%	10.6%	0.8%
Taylor County RECC	South	4.8%	0.7%	4.7%	1.1%

## Section 7.0 Results by Weather and Economic Scenario

### Net Total Energy Requirements (MWh) by Economic and Weather Scenario



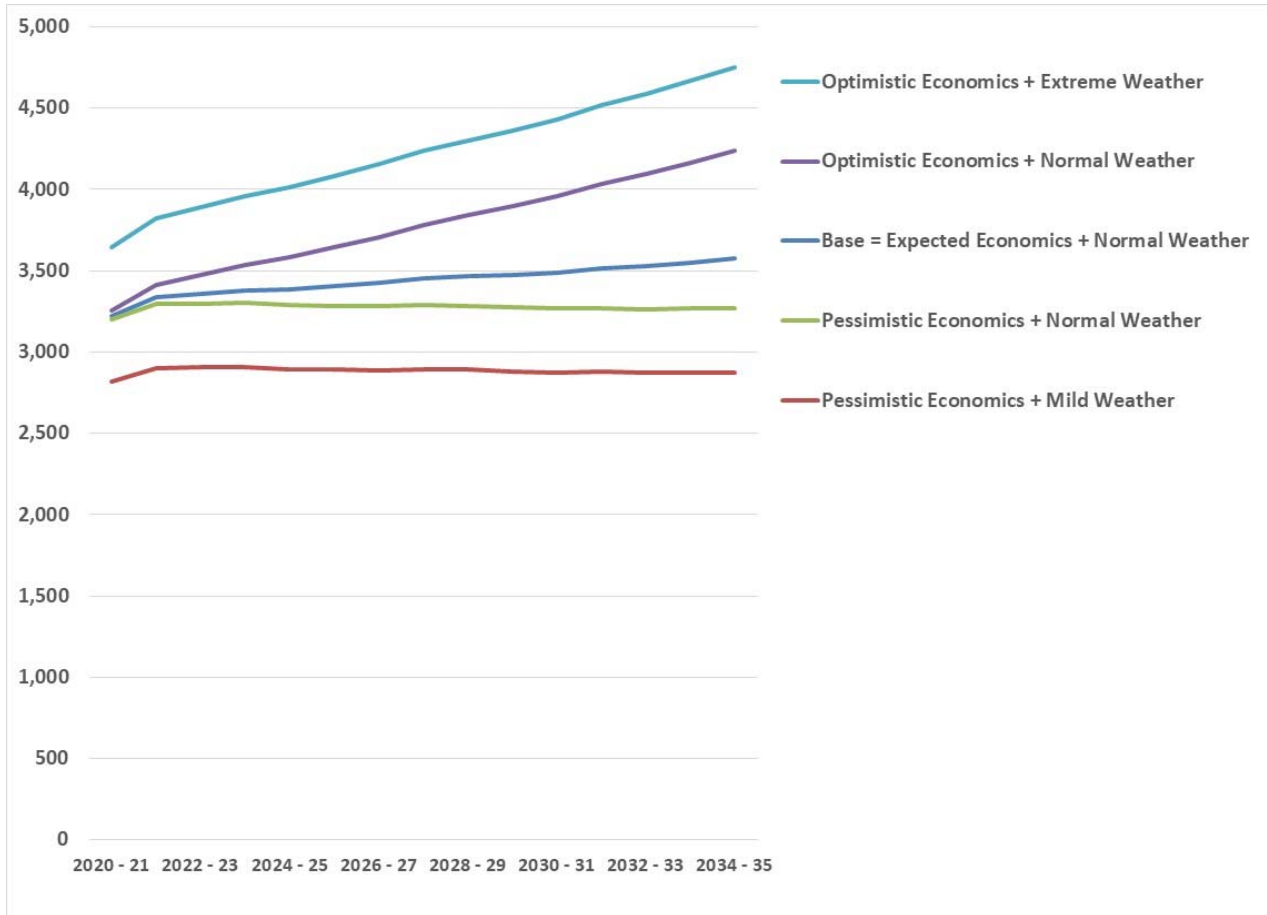
The higher economic growth scenario begins 1.1 percent and ends 18.7 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 0.6 and ends 8.6 percent less than the baseline economic growth scenario.

The higher economic growth scenario combined with extreme weather begins 7.6 percent and ends 23.9 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 6.4 and ends 13.3 percent less than the baseline economic growth scenario.

**Net Total Energy Requirements (MWh)  
By Economic and Weather Scenario**

Year	Pessimistic Economics Mild Weather	Pessimistic Economics Normal Weather	<b>BASE CASE</b>	Optimistic Economics Normal Weather	Optimistic Economics Extreme Weather
2021	12,653	13,441	<b>13,522</b>	13,677	14,551
2022	14,059	14,847	<b>15,025</b>	15,372	16,247
2023	14,147	14,936	<b>15,206</b>	15,736	16,610
2024	14,169	14,957	<b>15,319</b>	16,035	16,909
2025	14,170	14,958	<b>15,411</b>	16,317	17,191
2026	14,180	14,968	<b>15,515</b>	16,614	17,489
2027	14,191	14,979	<b>15,619</b>	16,918	17,792
2028	14,238	15,026	<b>15,762</b>	17,269	18,143
2029	14,245	15,033	<b>15,863</b>	17,580	18,454
2030	14,245	15,034	<b>15,959</b>	17,889	18,764
2031	14,262	15,050	<b>16,072</b>	18,223	19,097
2032	14,330	15,118	<b>16,242</b>	18,626	19,500
2033	14,343	15,131	<b>16,353</b>	18,969	19,844
2034	14,392	15,180	<b>16,505</b>	19,365	20,240
2035	14,444	15,233	<b>16,661</b>	19,773	20,647

## Net Winter Peak Demand (MW) by Economic and Weather Scenario



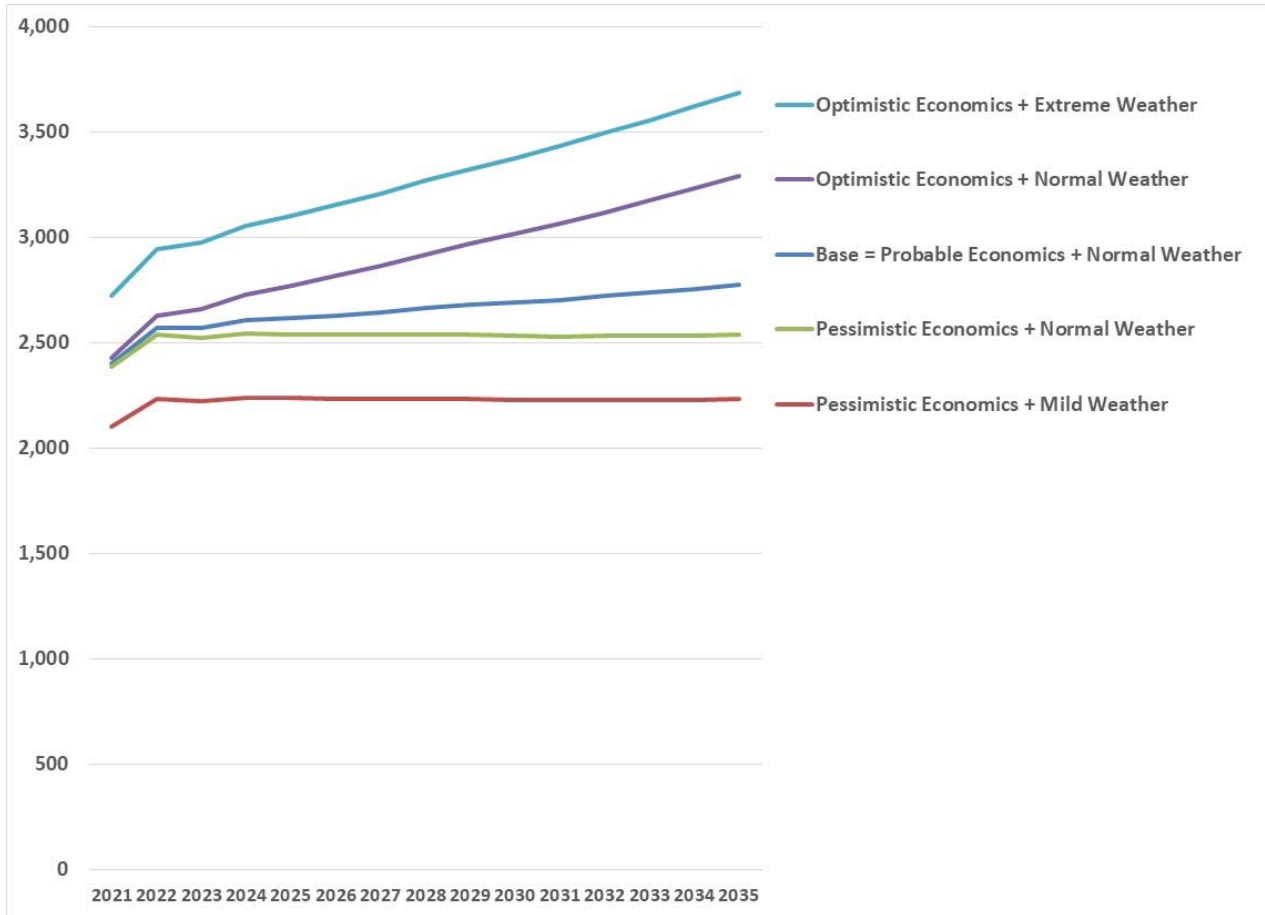
The higher economic growth scenario begins 1.1 percent and ends 18.7 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 0.6 and ends 8.6 percent less than the baseline economic growth scenario.

The higher economic growth scenario combined with extreme weather begins 13.3 percent and ends 32.9 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 12.5 and ends 19.5 percent less than the baseline economic growth scenario.

## Net Winter Peak Demand (MW) by Economic and Weather Scenario

Year	Pessimistic Economics Mild Weather	Pessimistic Economics Normal Weather	<b>BASE CASE</b>	Optimistic Economics Normal Weather	Optimistic Economics Extreme Weather
2020 - 21	2,815	3,199	<b>3,219</b>	3,255	3,646
2021 - 22	2,902	3,297	<b>3,337</b>	3,414	3,824
2022 - 23	2,904	3,300	<b>3,359</b>	3,476	3,893
2023 - 24	2,904	3,300	<b>3,380</b>	3,538	3,962
2024 - 25	2,893	3,287	<b>3,387</b>	3,586	4,016
2025 - 26	2,890	3,284	<b>3,404</b>	3,646	4,083
2026 - 27	2,889	3,283	<b>3,424</b>	3,708	4,153
2027 - 28	2,896	3,291	<b>3,452</b>	3,783	4,236
2028 - 29	2,890	3,284	<b>3,466</b>	3,841	4,301
2029 - 30	2,882	3,275	<b>3,477</b>	3,897	4,364
2030 - 31	2,876	3,268	<b>3,490</b>	3,957	4,431
2031 - 32	2,880	3,272	<b>3,516</b>	4,032	4,515
2032 - 33	2,873	3,265	<b>3,528</b>	4,093	4,584
2033 - 34	2,874	3,266	<b>3,551</b>	4,167	4,667
2034 - 35	2,875	3,267	<b>3,574</b>	4,241	4,750

## Net Summer Peak Demand (MW) by Economic and Weather Scenario



The higher economic growth scenario begins 1.1 percent and ends 18.7 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 0.6 and ends 8.6 percent less than the baseline economic growth scenario.

The higher economic growth scenario combined with extreme weather begins 13.3 percent and ends 32.9 percent greater than the baseline economic growth scenario. The lower economic growth scenario begins 12.5 and ends 19.5 percent less than the baseline economic growth scenario.



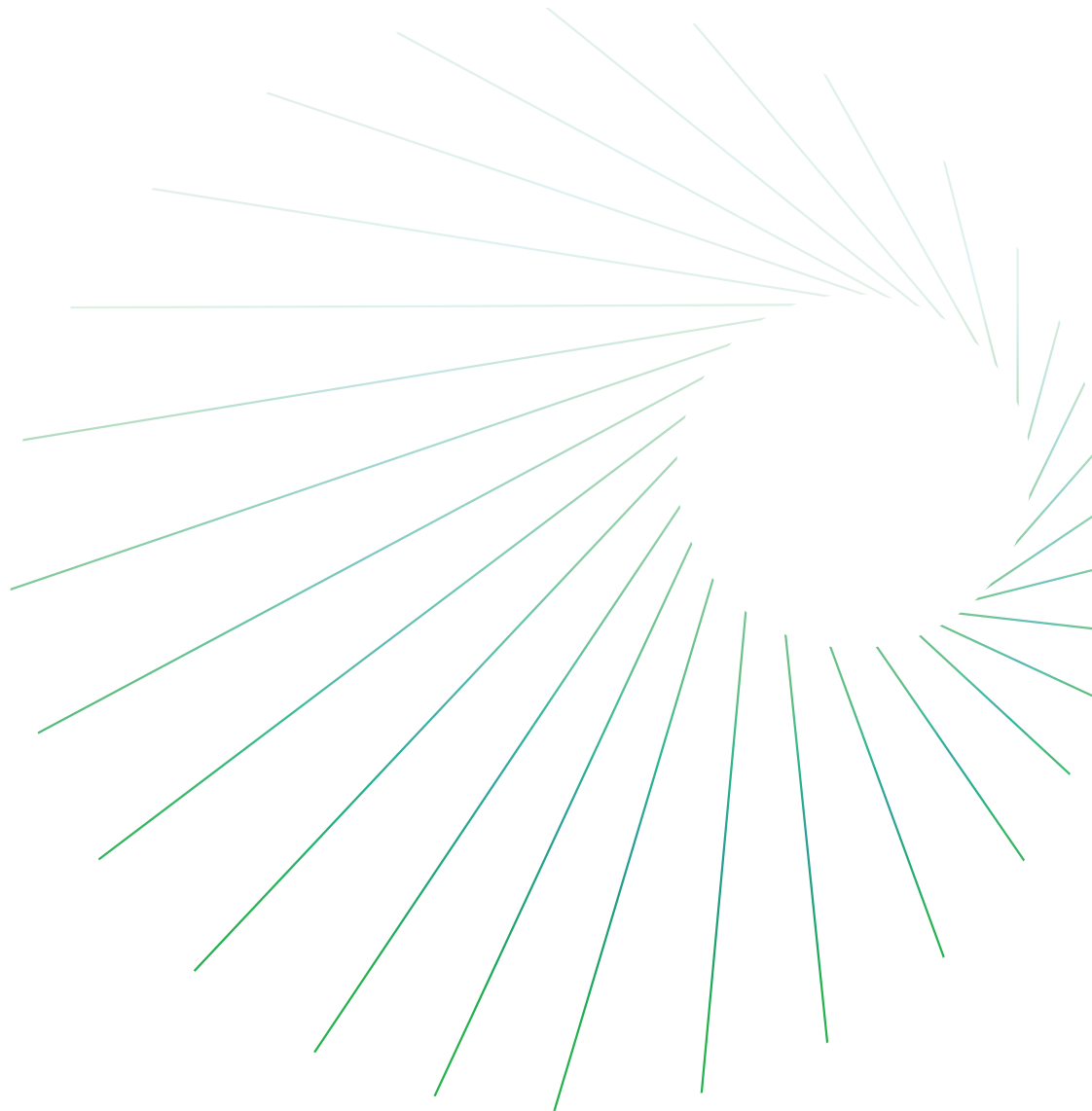
## Net Summer Peak Demand (MW) by Economic and Weather Scenario

Year	Pessimistic Economics Mild Weather	Pessimistic Economics Normal Weather	<b>BASE CASE</b>	Optimistic Economics Normal Weather	Optimistic Economics Extreme Weather
2021	2,101	2,388	<b>2,402</b>	2,430	2,721
2022	2,236	2,541	<b>2,572</b>	2,631	2,947
2023	2,221	2,524	<b>2,569</b>	2,659	2,978
2024	2,240	2,546	<b>2,607</b>	2,729	3,057
2025	2,236	2,541	<b>2,618</b>	2,772	3,105
2026	2,233	2,537	<b>2,630</b>	2,816	3,154
2027	2,233	2,538	<b>2,646</b>	2,866	3,210
2028	2,235	2,540	<b>2,664</b>	2,919	3,269
2029	2,234	2,539	<b>2,679</b>	2,969	3,325
2030	2,230	2,534	<b>2,690</b>	3,016	3,378
2031	2,227	2,531	<b>2,703</b>	3,064	3,432
2032	2,229	2,533	<b>2,721</b>	3,121	3,495
2033	2,229	2,533	<b>2,738</b>	3,176	3,557
2034	2,231	2,535	<b>2,756</b>	3,234	3,622
2035	2,233	2,537	<b>2,775</b>	3,293	3,688

# US Markets State Economies

Kentucky

Summer 2020



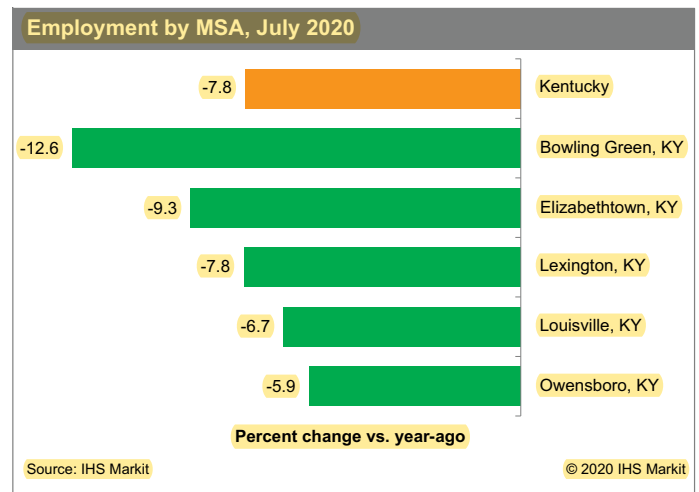
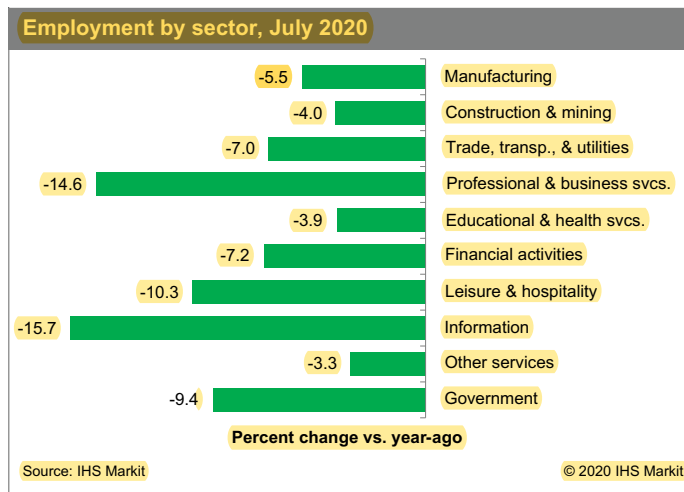
## Kentucky

### At a glance

#### COVID-19 mitigation hammers hospitality, retail trade, durables manufacturing

Employment in Kentucky contracted 13.4% year over year (y/y) in the second quarter of 2020 as business shutdowns and social distancing measures intended to mitigate the spread of COVID-19 pummeled the state economy. The state's labor market fell quicker than the national rate of 11.3% y/y. Large drops in retail trade, leisure/hospitality, and manufacturing employment pushed the state into a sudden recession as restaurants, hotels, shops, and factories suspended operations. Smaller job losses were felt in every other sector as demand dropped away and uncertainty spiked. Leisure and hospitality services employment fell 32.2% y/y with similarly sized double-digit falls in both accommodation/food services and arts, entertainment, and recreation. The cancellation of concerts and major events coupled with closures of restaurants and hotels during the second quarter resulted in mass layoffs at many businesses. A 12.7% y/y contraction in retail trade payrolls stemming from the pandemic-related business restrictions was a large contributor to the overall drop in trade, transportation, and utilities sector of 10.6% y/y.

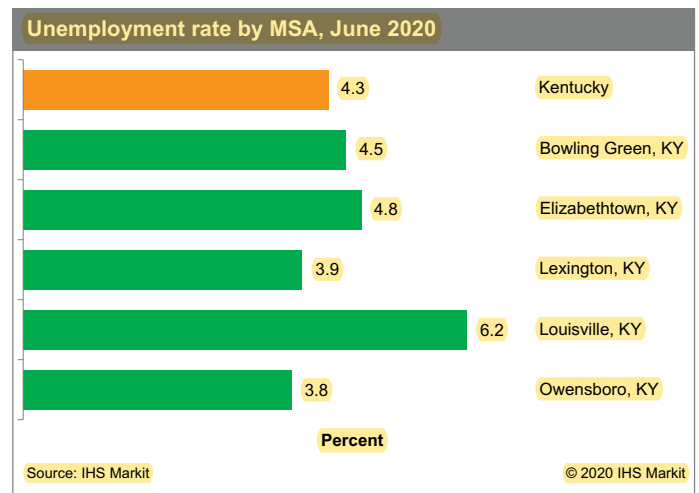
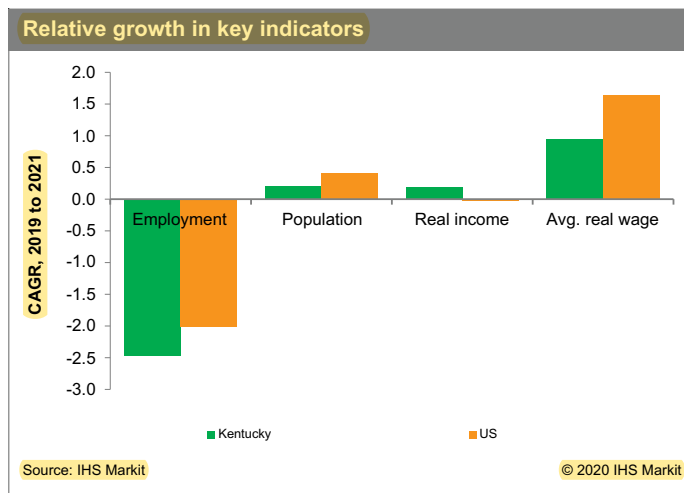
Manufacturing employment fell 15.7% y/y in the second quarter with most of the decline originating from durables-producing firms. Temporary production halts at automotive assembly plants and nearby suppliers caused a 26.1% y/y slide in transportation equipment manufacturing jobs. Large contractions were also felt in machinery and electrical equipment. Food manufacturing suffered a far less severe decline as firms kept workers on to meet increased demand for food as consumers stocked up. Natural resources and mining in Kentucky, dominated by the coal industry, has suffered large jobs losses in the face of low natural gas prices, clean air standards, and alternative energy sources. While employment in the sector saw modest gains in late 2018, hiring tumbled 38.8% y/y. Educational and health services employment declined 9.5% y/y in the second quarter, while financial activities slid 6.8% y/y. Professional and business services took a hit of around 17.0% y/y owing to a stunning 55.9% y/y plunge in company management employment. Kentucky's unemployment rate was 10.6% in the second quarter of 2020, 6.3 percentage points higher than a year earlier and below the current national rate of 13.0%.



### Issues to watch

- While many firms are laying off staff, either temporarily or permanently, as COVID-19 inflicts damage on the economy, FedEx announced it will hire 700 more employees for its operations in northern Kentucky. Growth in e-commerce and shipping over the last few months has led to the need to expand the company's workforce. Transportation and warehousing will be a bright spot for the state as more shopping is done online.
- Ford plans to invest another \$1.1 billion into its manufacturing facilities in Louisville following a new contract with the UAW. Most of the new investment over the next four years will go toward the Kentucky Truck Plant, which will build new pickup truck and SUV models.

- Transportation and logistics employment at Cincinnati-Northern Kentucky International Airport (CVG) continues to boom. Along with Amazon’s \$1.5-billion air cargo hub, which will bring nearly 2,700 jobs to the airport, maintenance and support operations are expanding their workforces in anticipation of increased cargo traffic. FEAM Aero opened its new cargo plane maintenance hangar, creating 100 new jobs. Atlas Air will open its operations center near the airport in 2021, adding nearly 600 positions.
- UPS announced plans to hire an additional 1,000 employees over the next 15 years at its Louisville Worldport global air hub. Initial expansion plans include hangar space and maintenance facilities that can house two 747-8F freighter aircraft.
- Hemp production continues to grow in Kentucky. AgTech Scientific opened a 2 million square foot indoor growing facility in October. Initially employing 100 workers, the facility will need 300 workers during peak production periods.



**Near-term developments**

While Kentucky saw a sudden drop in payrolls in the second quarter of 2020 owing to business closures and measures to mitigate the spread of COVID-19, the initial recovery from the low point will result in a 12.3% y/y rise in jobs by the second quarter of 2021. After seeing some of the largest declines, leisure and hospitality services will be able to make quick strides in the near term to recoup a chunk of its losses. However, longer-term restrictions on “socially dense” businesses like sporting events, concerts, racetracks, and other places where large numbers of people gather will limit gains. Trade, transportation, and utilities employment will see similar quick gains over the next few quarters. As retail stores reopen, hiring will increase at a fast pace. Transportation and warehousing will also see a substantial rebound as firms rehire to meet demand. The manufacturing sector will see modest positive y/y gains in the second quarter of 2021 as its recovery will be slower. While professional and business services is forecast to rise at a moderate y/y pace, financial activities payrolls will still lag in the near term. Educational and health services will see a large boost by the middle of next year. Real personal income in Kentucky will see a y/y decline faster than the national average in the second quarter of 2021 while real gross state product will slightly outpace its national average.

**Kentucky outlook over the next four quarters**

	Baseline scenario			Pessimistic			Optimistic		
	Level	Percent	Rank	Level	Percent	Rank	Level	Percent	Rank
<b>Year-over-year change (2021Q3)</b>									
Employment	+57,226	+3.2	23	+11,378	+0.7	29	+45,244	+2.5	23
Personal income (mil.\$)	-14,557	-6.7	44	-17,393	-8.2	42	-13,390	-6.1	41
Real gross state product (mil. 2012\$)	+6,022	+3.4	17	+4,351	+2.6	26	+6,834	+3.7	18
<b>Level (2021Q3)</b>									
Unemployment rate (%)	7.4		24	10.1		27	6.3		22
Housing starts	12,247		31	11,430		31	12,480		31

Source: IHS Markit

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**Outlook****Economic recovery in medium term will be driven by service, trade sectors**

Over the medium term, Kentucky's labor market will expand at a compound annual rate of 2.1% across the 2020–25 period following an employment contraction over the next three years. Slumping demand and business closures related to COVID-19 mitigation measures will depress the state economy over the first half of the forecast period, but Kentucky will match the national average over the medium term. Leisure and hospitality services, along with trade, transportation, and utilities, will experience the most severe hits in the near term but are expected to see modest gains by 2025.

Manufacturing employment, especially workforces in durable goods production, is forecast to decline across the forecast period as sustained slower global demand ripples through supply chains. Professional and business services hiring will pick back up quicker than most sectors in Kentucky and educational and health services will see steady modest gains as healthcare jobs become a focus point in the labor market. Persistent low population growth and a higher proportion of elderly residents will continue to push Kentucky's growth modestly below the national average. Real personal income will grow at a compound annual rate of around 1.4% while real gross state product is forecast to advance 2.8% over the medium term, both below their national rates.

**Changes to the forecast (short term)**

Real GSP	Lower
Employment	Lower
Personal income	Lower
Unemployment rate	Higher
Housing starts	Lower

Source: IHS Markit

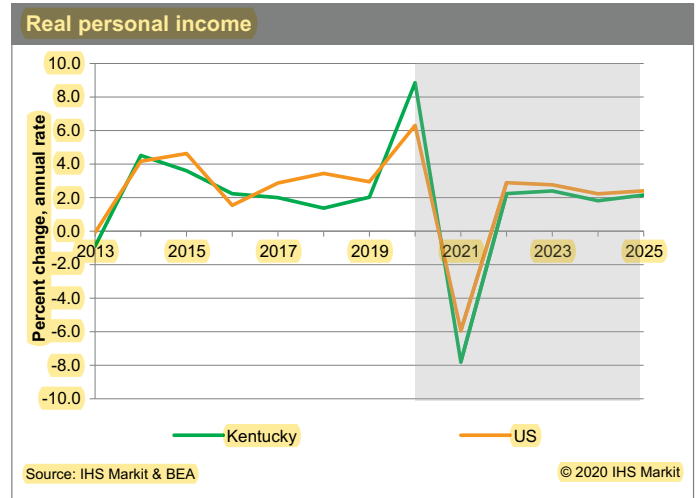
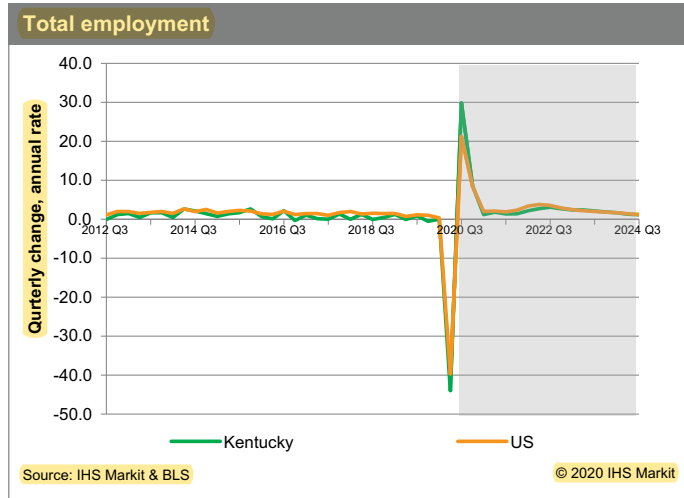
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**Strengths**

- Kentucky's central location in the East South Central census division and large manufacturing base make the state an attractive destination for transportation and warehousing firms. UPS has a major air hub, the Worldport, at Louisville International Airport. In addition, online retailers have ramped up their presence in an effort to reap the benefits of Kentucky's prime real estate.
- Kentucky has long been a vital manufacturing hub, given its central location and automotive manufacturers. The state is home to several major assembly plants, including Toyota's TMMK Complex in Georgetown, Ford's Louisville plant, and General Motors' Corvette manufacturing facility in Bowling Green. Manufacturing operations thus account for a considerable share of total payrolls and real output. Not surprisingly, the state's famed automotive manufacturers have maintained in-state operations for decades, defining the region as an advanced manufacturing hub.
- Infrastructure continues to be a major strength for Kentucky. The state has numerous operating river ports with access to the Mississippi, Ohio, Tennessee, and Cumberland rivers. Kentucky's five major highways—I-75, I-71, I-65, I-64, and I-24—highlight its logistical strength. With three major Class 1 railways (Canadian National, CSX, and Norfolk Southern) and five commercial airports, Kentucky continually ranks among the country's top states for cargo shipments.

## Weaknesses

- Despite being home to several large four-year universities, lower educational attainment levels have kept Kentucky from expanding employment across higher-paying sectors. Fewer than one-third of the state's residents hold a post-secondary degree. This limits the state's ability to diversify its economy toward more advanced industries and puts downward pressure on wages and household income. Thus, the state has long relied on traditional manufacturing and service-sector jobs.



## Economic key indicators

	Historical data edge	2016	2017	2018	2019	2020	2021	2022	2023
Real gross state product (mil. 2012 \$)	2019	182,619	184,541	187,216	189,366	178,258	183,193	189,006	194,009
Real gross state product (% change)	2019	0.7	1.1	1.4	1.1	-5.9	2.8	3.2	2.6
Total employment (thous.)	2019	1,909	1,920	1,930	1,940	1,810	1,845	1,885	1,932
Total employment (% change)	2019	1.2	0.6	0.5	0.5	-6.7	2.0	2.1	2.5
Manufacturing employment (thous.)	2019	248	250	252	252	233	232	233	239
Nonmanufacturing employment (thous.)	2019	1,660	1,669	1,678	1,688	1,576	1,614	1,652	1,693
Population (thous.)	2019	4,440	4,453	4,462	4,469	4,476	4,486	4,500	4,518
Population (% change)	2019	0.3	0.3	0.2	0.2	0.2	0.2	0.3	0.4
Unemployment rate (%)	2019	5.1	4.9	4.3	4.3	7.5	7.3	6.1	4.9
Personal income (% change)	2019	1.7	3.8	3.9	3.6	9.9	-6.2	3.8	4.0
Real gross domestic product (% change)		1.7	2.3	3.0	2.2	-4.8	3.1	4.1	3.3
Employment (% change)		1.8	1.6	1.6	1.4	-5.5	2.5	2.8	2.5

Source: IHS Markit

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## Real estate and construction

### Housing starts plummet in April and May as COVID-19 spreads

Kentucky's housing market continued to see improvement in both construction activity and home prices in early 2020, but construction activity fell away as the COVID-19 pandemic spread throughout the country. New home construction as measured by housing starts ended the first quarter of 2020 near an annual rate of 14,800, but April and May data indicated a sharp reduction in starts as social distancing measures and business closures took hold. Sales of existing homes, as of the first quarter of 2020, have maintained a steady pace but are expected to lose steam in the second quarter as the COVID-19 recession takes hold.

Prices of existing homes suffered a slight decline in Kentucky during the housing crash, with the median price dropping from around \$121,000 before the recession to a low of around \$114,000. Since then, Kentucky has surpassed its pre-recession peak and prices have maintained a steady upward trend. In the first quarter of 2020, the Federal Housing

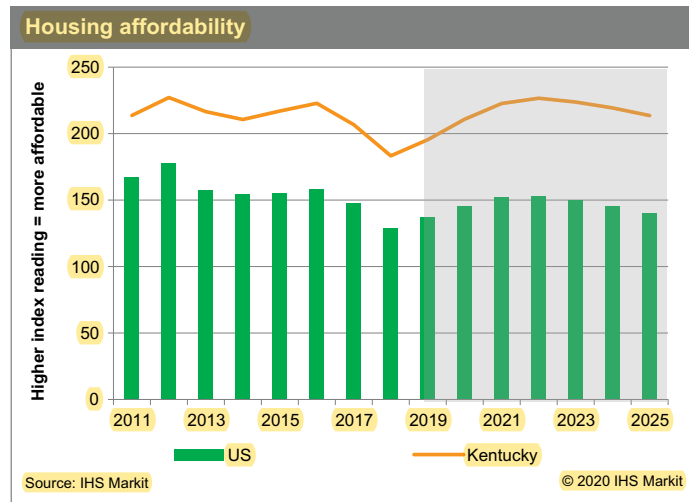
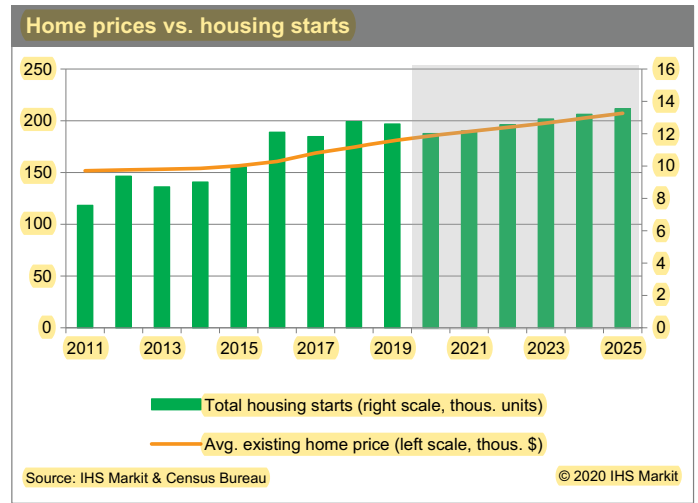
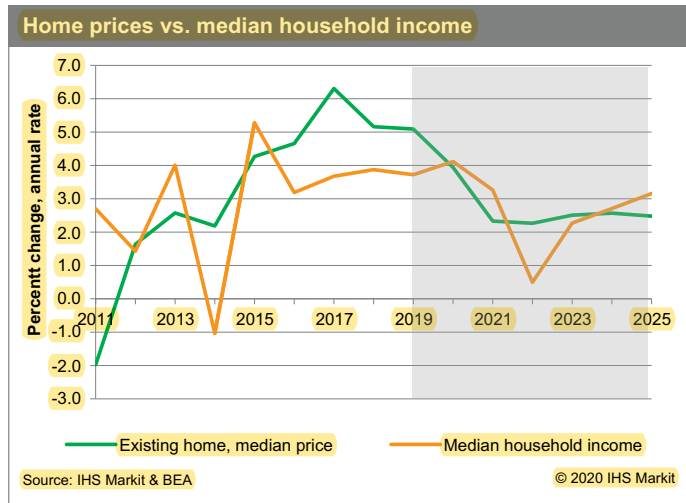
Finance Agency’s purchase-only index recorded an increase of 5.2% year over year (y/y). The median price for existing homes remained steady near \$160,800. Prices of new homes, which have seen steady declines in the past year, ticked down slightly. The median price fell to just above \$200,500. Home price growth is expected to downshift slightly in the near term.

**Real estate key indicators**

	Historical data edge	2016	2017	2018	2019	2020	2021	2022	2023
<b>Construction activity</b>									
Housing starts, total private	2019	12,093	11,823	12,749	12,602	12,011	12,175	12,557	12,913
Housing starts, total private (% change)	2019	21.5	-2.2	7.8	-1.2	-4.7	1.4	3.1	2.8
Single-family units	2019	7,711	8,171	7,830	8,474	8,086	8,572	8,995	9,248
Multifamily units	2019	4,382	3,652	4,919	4,128	3,925	3,604	3,561	3,665
<b>Prices and sales</b>									
Home price, existing average (\$)	2019	160,721	168,829	174,510	180,745	185,432	189,522	193,544	198,014
Home price, existing average (% change)	2019	2.7	5.0	3.4	3.6	2.6	2.2	2.1	2.3
Home sales, existing single-family units (thous.)	2019	76.9	78.1	76.6	76.2	56.3	83.1	90.7	86.2
Home sales, existing single-family units (% change)	2019	2.7	1.5	-1.9	-0.6	-26.0	47.6	9.1	-5.1

Source: IHS Markit

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### Key mortgage foreclosure statistics for Kentucky

	Share of Total Loans	U.S. Average	U.S. Rank
Total loans in foreclosure, end of 2020Q2	0.9%	0.7%	17
Loans in foreclosure, begun during 2020Q2	0.0%	0.0%	19
Conventional loans in foreclosure, end of 2020Q2	0.7%	0.6%	19
FHA loans in foreclosure, end of 2020Q2	1.3%	1.2%	18

Source: Mortgage Bankers Association

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### Labor force and demographics

In 2018, Kentucky was the 26th-largest state by population. From 2017 to 2018, the state's total population increased 0.3%, to 4.47 million, behind the national growth rate (0.6%), making Kentucky the 29th-fastest-growing state. Kentucky experienced a net influx of 5,850 new residents from foreign countries, while net domestic migration measured 990.

Kentucky's two largest metropolitan areas, Louisville and Lexington, combine for more than one-third of the total residents. The state is not heavily urbanized, with 44% of the population living in rural areas, compared with 21% nationally. While the open space is good for the mining, distillery, livestock, and agriculture industries, it is not conducive to attracting domestic and international migration to the state. As a result, population gains have been lackluster over the last decade, averaging 0.6% annually, and its percentage of foreign-born residents stands at just 3.5%.

### Age distribution

	Percent of population, 2018		Average annual percent change	
	Kentucky	United States	2013-18	2018-23
0-24	31.9	31.7	-0.3	-0.3
25-34	13.1	14.0	0.6	0.0
35-44	12.4	12.6	-0.5	0.3
45-54	12.9	12.7	-1.4	-0.5
55-64	13.4	12.9	0.9	-0.3
65+	16.4	16.0	2.8	2.5

Source: IHS Markit

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### Population characteristics

(percent of total population, 2018)

	Kentucky	United States
High school diploma *	86.8	88.3
Higher education **	33.4	41.2
Foreign-born	3.8	13.7
Non-US citizen	2.2	6.8
Median household income	50,247	61,937

\*Population over 25 years of age

\*\* Associate's, Bachelor's, or Advanced Degree

Source: American Community Survey

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### Kentucky's Top-Five Counties By Per Capita Income (2018)

	Income (\$)	Encompassing MSA
Oldham (KY)	62,023	KY Part of Louisville, KY-IN
Kenton (KY)	54,694	KY Part of Cincinnati, OH-KY-IN
Jefferson (KY)	50,595	KY Part of Louisville, KY-IN
Boone (KY)	48,540	KY Part of Cincinnati, OH-KY-IN
Mccracken (KY)	47,785	-

Source: U.S. Bureau of Economic Analysis and IHS Markit Economics

### Personal income indicators

	Historical data edge	2016	2017	2018	2019	2020	2021	2022	2023
Per capita personal income (thous. \$)	2019	39.6	41.0	42.5	44.0	48.3	45.2	46.7	48.4
Per capita personal income (% change)	2019	1.4	3.5	3.7	3.5	9.7	-6.4	3.5	3.5
Average annual wage (thous. \$)	2019	44.4	45.5	46.7	48.1	49.7	50.4	51.7	53.0
Average annual wage (% change)	2019	1.7	2.5	2.6	3.1	3.2	1.4	2.5	2.6
Total personal income (mil. \$)	2019	175,921	182,605	189,717	196,577	216,080	202,647	210,359	218,675
Total personal income (% change)	2019	1.7	3.8	3.9	3.6	9.9	-6.2	3.8	4.0
Wage disbursements (mil. \$)	2019	87,663	90,360	93,180	96,591	93,334	96,471	100,885	106,027
Wage disbursements (% change)	2019	2.7	3.1	3.1	3.7	-3.4	3.4	4.6	5.1
Other labor income (mil. \$)	2019	21,721	22,812	23,699	24,451	24,405	25,255	26,416	27,598
Other labor income (% change)	2019	0.5	5.0	3.9	3.2	-0.2	3.5	4.6	4.5
Dividends, interest & rent (mil. \$)	2019	29,067	30,668	33,063	33,852	33,375	34,194	34,955	35,537
Dividends, interest & rent (% change)	2019	3.9	5.5	7.8	2.4	-1.4	2.5	2.2	1.7
Transfer payments (mil. \$)	2019	42,607	43,783	45,160	47,363	72,045	55,685	57,255	58,885
Transfer payments (% change)	2019	0.5	2.8	3.1	4.9	52.1	-22.7	2.8	2.8
Other income (mil. \$)	2019	-5,137	-5,019	-5,384	-5,679	-7,079	-8,957	-9,152	-9,371

Source: IHS Markit

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## Energy

Kentucky ranks fifth in the nation in coal production, with major coal deposits in the east Central Appalachian Basin and western Illinois Basin. It also uses coal as a major source of its electricity generation, accounting for more than 83% of production, one of the highest shares in the nation. Outside of coal, the rest of the electricity generation comes from hydroelectric and natural gas-fired power plants. In 2019, a record 26% of the state's electricity came from natural gas-fired plants.

Kentucky's industrial sector is a major user of electricity, accounting for 36% of all energy consumed in the state. Its large manufacturing sector, including a sizable energy-intensive aluminum industry, drives overall consumption. This makes Kentucky's per capita electricity consumption one of the highest in the nation.

## Energy Prices

### Kentucky average electricity prices for quarter ended December 2019

	Price (cents/kWh)	Relative price (US avg. = 1)	State price rank (highest = 1)	Year/year change	Five-year avg. change
Residential	10.7	0.8	42	0.6	1.1
Industrial	5.4	0.8	46	-6.3	-0.1
Commercial	10.1	0.9	25	2.8	1.4

Source: IHS Markit Economics, EIA

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### Kentucky average natural gas prices for quarter ended December 2019

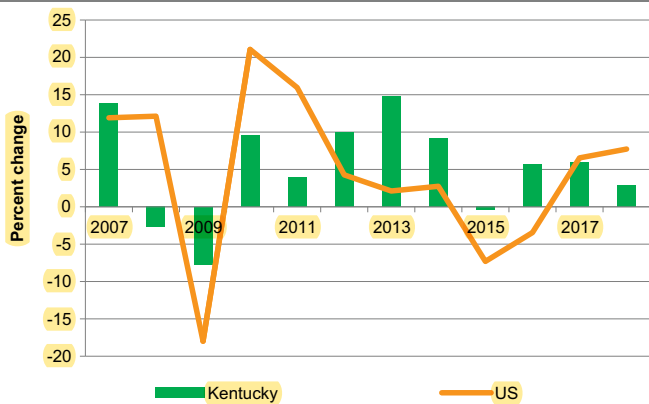
	Price (dollars/million btu)	Relative price (US avg. = 1)	State price rank (Highest = 1)	Year/year change	Five-year avg. change
Residential	14.2	1.2	16	0.0	0.2
Industrial	3.6	1.0	41	-19.9	-7.5
Commercial	9.2	1.3	14	1.5	-1.3

Source: IHS Markit Economics, EIA

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### Export performance

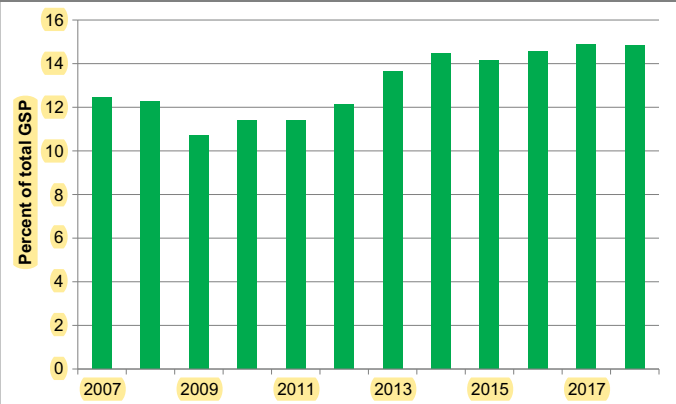
#### Total exports



Source: IHS Markit Economics & Census Bureau

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#### Merchandise exports



Source: IHS Markit Economics & Census Bureau

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Kentucky's total export merchandise value rose 4.0% to \$33.1 billion in 2019. Transportation equipment accounts for a 58.1% share of the total and a value of \$19.2 billion. The second-largest trade category is chemicals, making up 13.9% of Kentucky's total exports. Computer and electronic products, as well as machinery, make up the other largest shares of exports from the state. Canada continues to be the largest recipient of exports from Kentucky, with 52.3% of the total consisting of transportation equipment. The United Kingdom and France are the second- and third-largest export destinations, receiving \$3.6 billion and \$3.5 billion in exports, respectively.

### Kentucky's top export product categories in 2019

	Share of total (%)	Value (mil. \$)	Change y/y (%)
Transportation equipment	58.1	19,219	9.3
Chemicals	13.9	4,600	1.2
Computer & electronic products	6.2	2,039	9.1
Machinery	4.7	1,541	-3.3
Miscellaneous manufactured commodities	2.6	862	2.3
Fabricated metal products	2.2	736	-5.2
Electrical equipment	1.9	636	-17.8
Beverages & tobacco products	1.8	581	9.5
Primary metal manufacturing	1.7	572	-16.3
Plastics & rubber products	1.2	411	1.0
Other	5.7	1,898	-14.1

Source: Census Bureau

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**Kentucky's largest export destinations in 2019**

	Share of total (%)	Value (mil. \$)	Change y/y (%)
Canada	23.5	7,767	-0.1
United Kingdom	10.7	3,552	19.9
France	10.6	3,508	5.7
Brazil	7.9	2,624	5.5
Mexico	6.6	2,201	-3.2
China (mainland)	6.3	2,098	-6.0
Germany	3.6	1,204	3.5
Netherlands	3.4	1,128	-14.2
Japan	2.8	942	-11.3
Singapore	2.6	869	0.4
Other	21.8	7,201	4.0

Source: Census Bureau

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**Manufacturing****Manufacturing detail**

	Historical	2016	2017	2018	2019	2020	2021	2022	2023
	data edge								
Manufacturing employment (thous.)	2019	248.4	250.4	251.7	252.0	233.4	231.6	232.7	238.6
Manufacturing employment (% change)	2019	2.9	0.8	0.5	0.2	-7.4	-0.7	0.5	2.5
Durables manufacturing employment (thous.)	2019	161.8	162.6	163.7	163.9	146.6	144.0	145.6	150.1
Durables manufacturing employment (% change)	2019	4.0	0.5	0.7	0.1	-10.5	-1.8	1.1	3.1
Nondurables manufacturing employment (thous.)	2019	86.6	87.8	88.0	88.1	86.7	87.6	87.1	88.4
Nondurables manufacturing employment (% change)	2019	1.0	1.3	0.2	0.2	-1.6	1.0	-0.6	1.5

Source: IHS Markit

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Accounting for 13% of total employment, Kentucky has the 10th-highest concentration of manufacturing employment in the nation. Automobile and auto parts manufacturing is the state's largest subsector, with assembly plants for Ford, General Motors, and Toyota, as well as another dozen assembly plants located within 250 miles of Kentucky. Kentucky benefits from its central proximity to the traditional auto manufacturers to its north and the growing automobile industry to the south. Food manufacturing is the second-largest subsector in the state. Among the largest industries are animal slaughtering/meat processing, bakeries, and fruit and vegetable preserving.

**Economic structure**

Kentucky's economy has long been heavily reliant on manufacturing, and it still is with 13% of employment devoted to that sector, the 10th-highest concentration in the country. That share has dwindled over the years, though, largely because of aggressive competition overseas. The share of manufacturing employment has declined since 2000, although we expect that the worst of the job losses are over and that the share will remain roughly steady over the next decade. Home to assembly plants for Ford, General Motors, and Toyota, automobile production is a prominent industry, accounting for about one-fifth of manufacturing payrolls. The large manufacturing sector also drives employment in the transportation and warehousing industry, which represents almost 6% of employment. United Parcel Service has an international air hub in Louisville, which is an important shipment point in the Southeast, while DHL and Amazon have a large air cargo presence at Cincinnati-Northern Kentucky International Airport.

Meanwhile, the service sectors are becoming a more important piece of the local economy. Healthcare services is one of Kentucky's largest sectors and it will be a key source of future growth, especially considering the state's large elderly population. Professional and business services is another key sector, although much of the employment is concentrated in the lower quality temporary and administration employment component, in part because low high-educational attainment rates make the state less competitive in attracting high-tech jobs.

**Kentucky - Employment structure**

	2009		2019		2029	
	Share of total	Location quotient (US avg = 100)	Share of total	Location quotient (US avg = 100)	Share of total	Location quotient (US avg = 100)
<b>Construction</b>	4.2%	92	4.1%	84	4.4%	84
<b>Natural Resources and Mining</b>	1.3%	256	0.5%	107	0.4%	85
<b>Manufacturing</b>	12.1%	134	13.0%	153	10.9%	150
Durables	7.3%	131	8.5%	159	6.7%	150
Nondurables	4.9%	140	4.5%	144	4.2%	150
<b>Trade, Transportation, and Utilities</b>	20.6%	109	20.8%	113	19.4%	115
Wholesale Trade	4.1%	97	3.9%	100	3.8%	101
Retail Trade	11.5%	103	10.8%	104	9.6%	104
Transportation and Warehousing	4.7%	147	5.7%	152	5.7%	160
Utilities	0.4%	87	0.3%	96	0.3%	101
<b>Information</b>	1.5%	68	1.1%	58	1.0%	57
<b>Financial Activities</b>	5.0%	85	4.8%	84	4.7%	86
Finance and Insurance	4.0%	91	3.8%	90	3.7%	92
Real Estate and Rental and Leasing	1.1%	69	1.1%	69	1.0%	69
<b>Professional and Business Services</b>	9.8%	78	11.2%	79	12.9%	79
Prof., Scientific, and Technical Svcs	4.0%	69	4.0%	63	4.5%	60
Management of Companies	1.1%	76	1.0%	64	0.8%	58
Admin/Support and Waste Mgt	4.8%	88	6.2%	100	7.6%	103
<b>Education and Health</b>	14.2%	95	14.6%	91	16.1%	95
Educational Services	1.7%	74	1.5%	62	1.3%	62
Healthcare and Social Services	12.5%	98	13.1%	97	14.9%	99
<b>Leisure and Hospitality</b>	9.5%	96	10.4%	95	10.1%	96
Arts, Entertainment, and Recreation	1.1%	75	1.2%	76	1.1%	75
Accommodation and Food Services	8.4%	99	9.2%	99	9.0%	100
<b>Other Services</b>	4.0%	99	3.4%	88	3.3%	89
<b>Government</b>	17.7%	102	16.0%	106	16.8%	109
Federal Government	2.3%	106	1.8%	96	1.7%	97
State and Local Government	15.4%	101	14.3%	107	15.1%	110

Source: IHS Markit &amp; BLS

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**Short Term Outlook for Kentucky**

August 2020 Forecast

	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2019	2020	2021	2022	2023
<b>Establishment Employment (Thousands)</b>												
Total Non-Agricultural	1939.8	1939.9	1678.6	1791.6	1829.0	1834.4	1842.6	1939.8	1809.8	1845.3	1884.8	1931.5
Pct. Ch. Ann. Rate	-0.5	0.0	-43.9	29.8	8.6	1.2	1.8	0.5	-6.7	2.0	2.1	2.5
Manufacturing	250.3	251.6	212.6	234.0	235.3	232.7	232.1	252.0	233.4	231.6	232.7	238.6
Pct. Ch. Ann. Rate	-3.6	2.0	-49.0	46.8	2.1	-4.2	-1.1	0.2	-7.4	-0.7	0.5	2.5
Durables	162.3	162.7	128.2	147.2	148.5	145.4	144.3	163.9	146.6	144.0	145.6	150.1
Fabricated Metals	22.9	22.8	21.1	21.6	21.8	21.6	21.9	22.9	21.8	22.0	23.1	23.7
Machinery	20.6	20.3	16.4	18.4	18.2	18.2	18.1	20.8	18.3	18.0	18.5	19.0
Comp. & Elec. Prod.	4.0	4.0	4.1	4.0	4.0	4.0	4.0	4.1	4.0	4.0	4.1	4.1
Transportation Equip.	64.8	65.3	48.0	58.2	59.6	57.8	57.1	65.3	57.8	56.7	55.8	58.2
Nondurables	88.0	88.9	84.5	86.9	86.8	87.3	87.8	88.1	86.7	87.6	87.1	88.4
Food Manufacturing	28.5	28.6	26.9	27.5	27.7	28.5	29.2	28.4	27.7	29.2	29.3	30.9
Plastics & Rubber	17.1	17.2	16.6	17.4	17.6	17.6	17.7	17.2	17.2	17.7	17.8	17.9
Non-Manufacturing	1689.5	1688.3	1466.0	1557.6	1593.7	1601.6	1610.5	1687.7	1576.4	1613.6	1652.1	1693.0
Pct. Ch. Ann. Rate	-0.1	-0.3	-43.2	27.4	9.6	2.0	2.2	0.6	-6.6	2.4	2.4	2.5
Construction & Mining	89.5	88.8	83.5	87.0	83.7	83.5	82.4	90.3	85.7	82.5	82.5	83.2
Pct. Ch. Ann. Rate	-3.9	-3.1	-21.9	18.1	-14.3	-0.8	-5.2	2.5	-5.1	-3.7	-0.1	0.8
Trade, Trans., & Utilities	400.1	398.7	361.0	378.2	386.2	387.0	388.9	403.5	381.0	389.8	396.0	391.0
Pct. Ch. Ann. Rate	-4.7	-1.4	-32.8	20.5	8.7	0.9	2.0	0.0	-5.6	2.3	1.6	-1.3
Wholesale Trade	75.0	75.4	71.7	73.3	74.8	74.4	73.5	75.6	73.8	74.3	78.2	81.6
Retail Trade	207.1	207.1	183.4	196.8	199.7	200.6	202.8	209.7	196.7	202.4	197.9	184.8
Trans. & Warehousing	111.2	109.5	99.1	101.4	105.1	105.5	106.1	111.4	103.8	106.7	113.7	118.6
Utilities	6.7	6.8	6.7	6.7	6.6	6.5	6.5	6.8	6.7	6.5	6.2	5.9
Information	21.3	20.6	18.1	18.6	19.3	20.2	19.9	21.6	19.1	19.7	20.0	19.6
Pct. Ch. Ann. Rate	-4.9	-12.5	-40.5	11.3	16.3	21.2	-5.9	-1.8	-11.3	3.2	1.2	-2.0
Financial Activities	93.5	92.5	87.0	88.8	89.7	86.2	85.1	93.5	89.5	85.1	87.7	89.3
Pct. Ch. Ann. Rate	-0.4	-3.9	-21.9	8.5	3.9	-14.4	-5.1	0.3	-4.2	-5.0	3.1	1.8
Finance & Insurance	72.5	71.7	67.4	68.7	69.8	66.6	65.2	73.0	69.4	65.1	66.7	68.1
Real Estate & Rental	21.0	20.8	19.6	20.1	19.9	19.6	19.9	20.5	20.1	20.0	21.1	21.3
Prof. & Business Svcs.	218.8	219.7	178.3	192.0	198.6	198.2	199.6	216.5	197.1	200.4	220.0	232.2
Pct. Ch. Ann. Rate	4.0	1.7	-56.6	34.5	14.4	-0.7	2.7	-0.3	-8.9	1.7	9.8	5.6
Prof, Scientific, & Tech Management	77.3	76.9	68.4	71.9	71.9	71.4	71.5	76.9	72.3	71.3	76.3	81.3
Admin & Waste Svcs	19.7	19.4	8.8	11.9	12.3	12.6	13.0	19.9	13.1	13.1	14.6	15.2
Educ & Health Services	121.7	123.4	101.1	108.3	114.4	114.2	115.1	119.7	111.8	116.0	129.1	135.7
Pct. Ch. Ann. Rate	285.6	286.7	255.5	267.5	275.2	273.3	272.0	283.2	271.2	274.8	282.1	291.0
Educational Services	2.6	1.6	-37.0	20.1	12.0	-2.7	-1.8	2.0	-4.2	1.3	2.6	3.2
Health Care	28.6	28.3	26.3	27.0	27.4	27.9	27.1	29.6	27.3	26.8	27.1	27.7
Leisure & Hospitality	257.0	258.4	229.2	240.5	247.7	245.3	244.9	253.6	244.0	248.0	254.9	263.3
Pct. Ch. Ann. Rate	203.7	203.0	136.9	171.0	183.1	195.9	204.5	202.1	173.5	202.4	196.3	211.8
Arts, Entertainm, & Rec	4.2	-1.4	-79.3	143.1	31.4	31.1	18.7	2.0	-14.2	16.7	-3.1	7.9
Accom & Food Svcs	23.6	24.4	14.1	19.5	19.8	20.0	21.4	23.8	19.5	22.5	26.6	26.9
Other Services	180.1	178.6	122.8	151.5	163.2	175.9	183.1	178.3	154.0	179.9	169.7	184.9
Pct. Ch. Ann. Rate	66.1	67.3	58.8	63.7	63.5	62.2	61.2	65.9	63.3	61.1	64.5	66.2
Government	0.6	7.0	-41.5	37.6	-1.6	-7.6	-6.5	0.3	-3.8	-3.4	5.5	2.6
Pct. Ch. Ann. Rate	311.0	311.1	286.9	290.8	294.6	295.0	296.8	311.2	295.9	297.7	303.1	308.7
Federal	-0.4	0.1	-27.6	5.5	5.4	0.5	2.5	-0.5	-4.9	0.6	1.8	1.8
State & Local	34.4	34.4	34.1	37.0	34.8	33.3	33.2	34.8	35.1	33.2	33.2	33.2
	276.6	276.7	252.9	253.8	259.8	261.7	263.6	276.4	260.8	264.5	269.9	275.5
<b>Resident Employment &amp; Unemployment (Thousands)</b>												
Total Employment	1992.4	1982.9	1789.1	1868.3	1894.4	1894.3	1899.0	1983.4	1883.7	1900.9	1935.7	1976.7
Pct. Ch. Ann. Rate	0.8	-1.9	-33.7	18.9	5.7	0.0	1.0	0.7	-5.0	0.9	1.8	2.1
Labor Force	2082.7	2078.4	2000.6	2025.8	2039.3	2044.1	2049.5	2072.4	2036.0	2050.6	2062.3	2078.2
Labor Force Partic Rate	58.1	58.0	55.7	56.4	56.7	56.8	56.9	57.9	56.7	56.9	57.0	57.1
Number Unemployed	90.3	95.4	211.5	157.5	144.9	149.7	150.5	89.0	152.3	149.6	126.6	101.6
Unemployment Rate	4.3	4.6	10.6	7.8	7.1	7.3	7.3	4.3	7.5	7.3	6.1	4.9
<b>Other Economic Indicators</b>												
CPI (Pct. Ch. Ann. Rate)	2.9	0.7	-3.2	3.3	1.6	3.4	2.4	1.3	0.9	2.3	1.9	1.6
Retail Sales (Billions \$)	71.1	70.3	67.1	71.7	71.3	71.1	71.7	70.1	70.1	72.0	74.6	76.5
Vehicles, Parts, & Gas	24.3	22.3	19.7	22.5	22.4	22.2	22.5	23.8	21.7	22.6	23.3	23.6
Excl. Vehicles, Parts, & Gas	46.8	48.0	47.3	49.2	48.9	48.9	49.2	46.3	48.4	49.4	51.3	52.9
Personal Cons Exp (Billions \$)	165.1	163.1	146.5	157.2	158.5	159.3	162.0	162.8	156.3	162.9	171.2	178.6
New Car Regis. (Ths)	143.9	129.4	120.6	131.8	130.7	129.9	131.0	148.9	128.1	131.6	136.2	138.5
Mfg. Ship. (Billions 82\$)	72.6	71.6	61.6	67.1	67.5	67.6	67.7	72.3	66.9	67.7	69.2	71.0

Source: IHS Markit

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**Short Term Outlook for Kentucky**

August 2020 Forecast

	2019Q4	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2019	2020	2021	2022	2023
<b>Personal Income (Billions \$)</b>												
Total Personal Income	199.1	200.2	223.2	218.6	222.4	199.3	201.9	196.6	216.1	202.6	210.4	218.7
Pct. Ch. Ann. Rate	3.8	2.2	54.5	-8.1	7.1	-35.4	5.3	3.6	9.9	-6.2	3.8	4.0
Real Personal Income	206.0	206.4	231.2	225.0	228.3	203.4	205.1	204.6	222.7	205.4	210.0	215.0
Pct. Ch. Ann. Rate	2.3	0.9	57.4	-10.2	5.9	-37.0	3.3	2.0	8.9	-7.8	2.2	2.4
Real Disposable Income	184.6	184.9	211.3	204.4	207.5	182.6	184.1	183.2	202.0	184.3	188.4	192.8
Real Per Capita Income (Ths)	46.1	46.1	51.7	50.3	51.0	45.4	45.7	45.8	49.8	45.8	46.7	47.6
Med. Household Income (Ths)	51.6	50.2	55.2	54.6	57.1	53.7	56.0	52.1	54.3	56.0	56.3	57.6
Avg. Annual Wage (Ths)	48.8	48.5	50.2	50.1	50.0	49.9	50.2	48.1	49.7	50.4	51.7	53.0
<b>By Place of Work</b>												
Wages and Salaries	97.9	97.4	87.6	93.2	95.0	95.2	96.0	96.6	93.3	96.5	100.9	106.0
Manufacturing	15.8	15.4	13.3	14.8	14.8	14.6	14.7	15.5	14.6	14.7	14.9	15.7
Construction & Mining	5.2	5.2	4.9	5.2	5.0	5.0	5.0	5.3	5.1	5.0	5.1	5.3
Trade, Trans., & Utilities	18.2	18.2	17.0	17.9	18.3	18.5	18.7	18.1	17.9	18.8	19.7	20.3
Information	1.3	1.3	1.2	1.2	1.2	1.3	1.3	1.3	1.2	1.3	1.3	1.3
Financial Activities	7.2	7.3	7.0	7.1	7.2	6.9	6.9	6.9	7.1	6.9	7.3	7.7
Prof. & Business Svcs.	11.5	11.5	9.1	9.9	10.2	10.3	10.6	11.4	10.2	10.7	12.0	13.1
Educ & Health Services	14.0	13.9	12.5	13.4	13.9	13.8	13.9	13.7	13.4	14.0	14.5	15.2
Leisure & Hospitality	4.2	4.0	2.9	3.6	3.8	4.1	4.3	4.2	3.6	4.3	4.2	4.6
Other Services	3.0	3.0	3.0	3.1	3.0	2.9	2.9	3.0	3.0	2.9	3.2	3.4
Government	14.1	14.2	13.3	13.7	13.9	14.1	14.3	14.0	13.8	14.4	15.1	15.8
Other Labor Income	24.8	24.8	23.8	24.4	24.7	24.9	25.2	24.5	24.4	25.3	26.4	27.6
Less: Social Insurance	16.0	16.1	15.4	15.8	16.0	16.1	16.2	15.8	15.8	16.3	17.0	17.8
<b>By Place of Residence</b>												
Residence Adjustment	-2.7	-2.7	-2.7	-2.8	-2.9	-2.9	-2.9	-2.6	-2.8	-2.9	-3.3	-3.5
Property Income	34.0	34.3	33.5	32.9	32.8	33.4	34.2	33.9	33.4	34.2	35.0	35.5
Proprietor's Income	13.2	13.2	11.4	11.8	9.6	9.7	10.2	12.8	11.5	10.3	11.1	11.9
Farm Proprietor	0.9	0.9	0.6	0.5	0.4	0.4	0.5	0.7	0.6	0.5	0.6	0.7
Business Proprietor	12.2	12.3	10.9	11.3	9.2	9.3	9.7	12.0	10.9	9.8	10.5	11.2
Transfer Payments	47.9	49.3	84.9	74.9	79.0	55.2	55.5	47.4	72.0	55.7	57.3	58.9
<b>Real Gross State Product, NAICS Based (Billions 2012\$)</b>												
Total GSP	190.6	187.8	167.1	178.1	180.0	180.6	182.7	189.4	178.3	183.2	189.0	194.0
Pct. Ch. Ann. Rate	2.3	-5.8	-37.2	29.0	4.1	1.5	4.6	1.1	-5.9	2.8	3.2	2.6
Agriculture	3.6	3.7	3.6	3.8	4.0	4.0	4.0	3.5	3.8	4.0	4.1	4.2
Manufacturing	35.0	34.4	29.5	32.2	32.3	32.2	32.5	34.8	32.1	32.6	33.3	34.4
Mining	2.2	2.2	1.6	1.8	1.7	1.7	1.7	2.2	1.8	1.7	1.8	1.9
Construction	6.8	6.9	6.2	6.7	6.4	6.4	6.4	6.8	6.5	6.4	6.4	6.4
Trade, Trans., & Util.	37.8	37.3	34.0	35.9	36.5	36.9	37.3	37.4	35.9	37.5	39.3	40.5
Information	5.5	5.4	4.6	4.8	5.0	5.2	5.3	5.4	4.9	5.3	5.6	5.8
Financial Activities	28.8	28.4	26.6	27.5	27.3	27.2	27.5	28.7	27.5	27.6	28.7	29.3
Prof. & Business Svcs.	17.4	17.3	14.1	15.4	15.7	16.0	16.4	17.1	15.6	16.5	17.9	18.8
Educ & Health Services	18.7	18.3	16.3	17.5	17.8	17.8	18.5	17.5	17.9	18.1	18.4	18.4
Leisure & Hospitality	6.6	6.1	4.4	5.3	5.5	5.9	6.1	6.6	5.4	6.0	5.8	6.1
Other Services	3.8	3.7	3.5	3.6	3.5	3.5	3.5	3.8	3.6	3.5	3.6	3.7
State & Local Govt.	16.2	16.0	14.0	14.7	14.9	14.9	15.2	16.1	14.9	15.2	15.6	15.9
Federal Govt.	4.3	4.3	4.3	4.5	4.5	4.4	4.4	4.3	4.4	4.5	4.6	4.6
<b>Housing</b>												
Total Housing Starts (Ths)	13.0	14.8	9.4	11.9	11.9	12.0	12.1	12.6	12.0	12.2	12.6	12.9
Single-Family (Ths)	8.8	9.0	6.9	8.2	8.3	8.4	8.5	8.5	8.1	8.6	9.0	9.2
Multi-Family (Ths)	4.2	5.8	2.5	3.7	3.7	3.6	3.6	4.1	3.9	3.6	3.6	3.7
New Median Price (\$)	211,080	200,575	212,262	209,656	211,072	213,387	214,602	206,315	208,391	213,960	218,657	221,304
Unit Sales, Existing (Ths)	75.8	78.4	42.7	38.6	65.7	74.0	81.6	76.2	56.3	83.1	90.7	86.2
Existing Median Price (\$)	159,486	160,860	164,678	165,309	164,404	164,864	168,493	157,605	163,813	167,631	171,429	175,728
<b>Population (Thousands)</b>												
Total Population	4471.4	4473.4	4475.2	4477.3	4479.5	4482.0	4484.7	4468.6	4476.4	4486.2	4500.1	4517.8
Pct. Ch. Ann. Rate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4
Under 14 years	830.9	829.9	828.9	828.1	827.3	826.6	825.9	832.5	828.6	825.7	823.8	822.8
15 to 24 years	582.6	582.1	581.6	581.2	580.8	580.5	580.1	583.5	581.5	580.0	578.9	578.3
25 to 44 years	1138.8	1138.8	1138.8	1138.9	1139.0	1139.1	1139.4	1138.4	1138.9	1139.6	1141.2	1143.5
45 to 64 years	1158.6	1157.4	1156.1	1154.8	1153.5	1152.3	1151.1	1161.3	1155.4	1150.6	1147.1	1145.6
65 years and over	760.4	765.2	769.8	774.3	778.9	783.5	788.1	753.0	772.0	790.4	809.1	827.6
Net Migration	0.2	0.3	0.2	0.4	0.6	0.8	1.1	-0.2	1.4	4.9	9.8	13.4
Households	1778.4	1780.7	1781.4	1779.3	1779.1	1778.4	1777.7	1776.1	1780.1	1780.5	1797.5	1814.4

Source: IHS Markit

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