I&M Exhibit: _____

Cause No. 45235

**INDIANA MICHIGAN POWER COMPANY**

**PRE-FILED VERIFIED DIRECT TESTIMONY**

**OF**

**CHAD M. BURNETT**

## INDEX

**PRE-FILED VERIFIED DIRECT TESTIMONY OF CHAD M. BURNETT**
**ON BEHALF OF**
**INDIANA MICHIGAN POWER COMPANY**

**Q. Please state your name and business address.**

A. My name is Chad M. Burnett, and my business address is 212 East 6th Street, Tulsa, Oklahoma 74119.

**Q. By whom are you employed and in what capacity?**

A. I am employed by American Electric Power Service Corporation (AEPSC) as the Director of Economic Forecasting. AEPSC supplies engineering, financing, accounting, planning, advisory, and other services to the subsidiaries of the American Electric Power (AEP) system, one of which is Indiana Michigan Power Company (I&M or the Company).

**Q. Please briefly describe your educational background and professional experience.**

A. I received a Bachelor of Science degree in Business Administration from the University of Tulsa in 1998 with emphasis in Economics and Finance. In 2002, I received a Master of Business Administration degree from the University of Tulsa. In 2005, I completed the Executive Strategic Leadership program at Ohio State University.

I have worked in the utility industry as an economist since 1997 when I was employed by Central and South West Service Corporation, which later merged with American Electric Power Company (AEP) in June 2000. I became the Manager of Economic Forecasting in June 2007. In October 2013, I was promoted to Director of Economic Forecasting. In my current role, I am responsible for

preparing customer, sales, peak demand, and revenue forecasts for each of the AEP operating companies in the eleven jurisdictions and three regional transmission organizations (RTOs) that cover the AEP service territory. In addition, I am responsible for the weather normalization calculations and sales and revenue variance reports for each of the AEP operating companies including I&M.

**Q. Have you previously testified before any regulatory commissions?**

A. Yes. I filed testimony before the Indiana Utility Regulatory Commission in Cause No. 44967. I have also testified before regulatory commissions in the states of Virginia,[1] Oklahoma,[2] Tennessee,[3] and Texas.[4]

## PURPOSE OF TESTIMONY

**Q. What is the purpose of your testimony in this proceeding?**

A. The purpose of my testimony is to present the kilowatt-hour (kWh or energy), customer, and kilowatt (kW or peak) forecasts used by the Company to develop its test year billing determinants. In the course of this presentation, I will discuss the processes and methodology employed to forecast the Test Year, which is the 12-month period ending December 2020.

**Q. Are you sponsoring any attachments in this proceeding?**

A. I am sponsoring the following attachments:

- Attachment CMB-1, which contains the summarized load forecast results (kWh, kW, customers) used in the Test Year. All of the input data, model

[1] Case No. PUR-2017-00174 and Case No. PUR-2018-00051 in 2018.
[2] Cause No. 20080014 in 2008 and Cause No. 201800097 in 2019.
[3] Docket No. 16-00001 in 2016.
[4] Docket No. 36966 in 2009, Docket No. 37364 in 2009, Docket No. 40443 in 2012, Docket No. 44701 in 2015, and Docket No. 46449 in 2016.

equations, and statistical results for the various forecast models used to develop the Test Year load forecast are provided in the workpapers discussed below.

- Attachment CMB-2, which contains the general form of the equations used in the long-term forecasting process for Industrial and Other Retail.

**Q. Are you sponsoring any workpapers in this proceeding?**

A. I am submitting the following workpapers:

- WP-CMB-1: Model Equations, Results of Statistical Tests and Input Data Sets, Pertaining to the 2018 Vintage Load Forecast
- Confidential WP-CMB-2: Short-Term Large Industrial Energy Models and Input Data
- Confidential WP-CMB-3: Long-Term Forecast Model Price Data
- Confidential WP-CMB-4: Wholesale Energy Models and Input Data
- WP-CMB-5: Itron Residential SAE Model documentation
- WP-CMB-6: Itron Commercial SAE Model documentation

**Q. Were the attachments and workpapers that you are sponsoring prepared or assembled by you or under your direction and supervision?**

A. Yes.

## LOAD FORECAST BACKGROUND AND METHODOLOGY

**Q. How often does I&M prepare a load forecast?**

A. I&M generates a new load forecast once a year as part of its normal planning process. The load forecast is one of the first inputs used in the development of I&M's long-term financial forecast. Typically, the load forecast is completed in the summer months while the rest of I&M's work plans are still being developed.

**Q. Is the load forecast monitored or updated during the year?**

A. Yes. Because the load forecast is completed early in the planning process, we monitor its performance during the last half of the year to ensure that it accurately predicts the most recent actual results. Updates to the load forecast may occur during this time period, depending on the degree of the differences between the load forecast and the actual results.

**Q. When was the load forecast used in this proceeding prepared?**

A. The load forecast used in this proceeding was originally completed in June 2018 using actual data through December 2017. However, as part of its normal monitoring process, the Economic Forecasting group noticed a slight forecast variance trend developing over the last half of 2018 that was the result of I&M's service territory experiencing a slightly better near-term economic recovery than was previously assumed. The Economic Forecasting group alerted I&M's management team of the trend and recommended an upward adjustment to the load forecast which was adopted by I&M. The load forecast presented as the Test Year in this proceeding is the June 2018 forecast that includes the update that was made in October 2018.

**Q. Why are forecasts of customers, energy (kWh), and hourly demand (kW) prepared?**

A. Forecasts of customers, energy sales (kWh), and demand (kW) are prepared to provide planning information for a variety of business uses. These uses include financial, fuel, capacity, and rate planning.

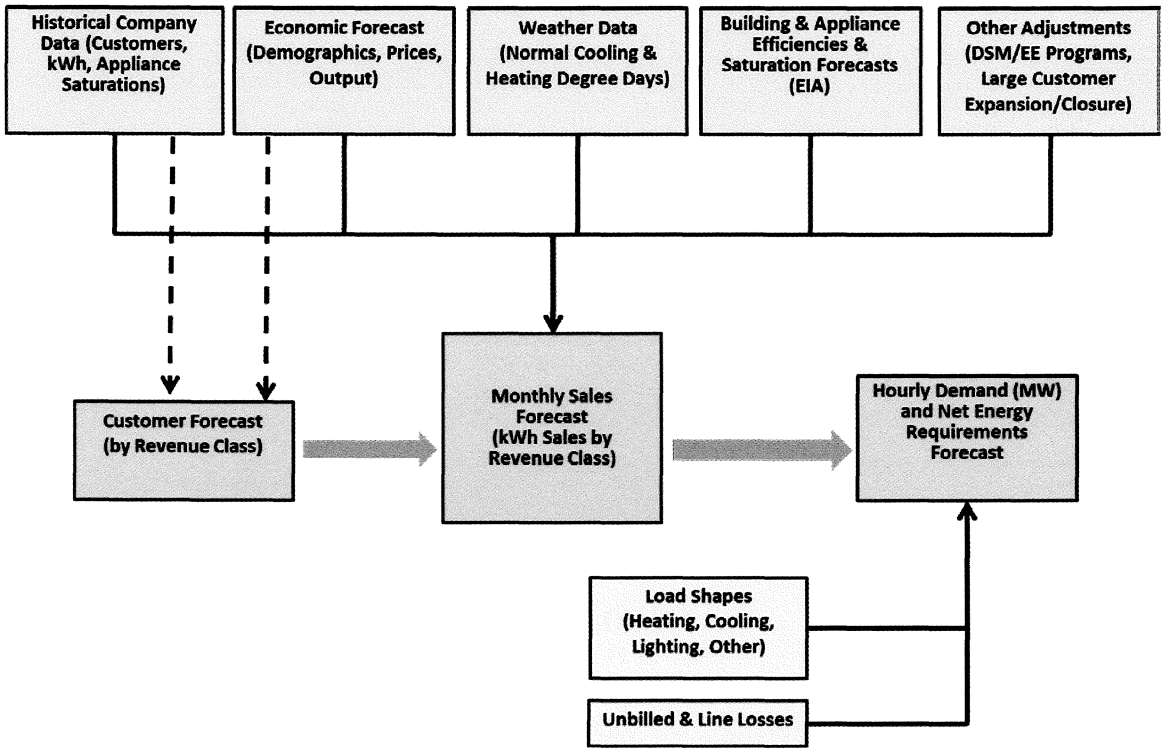
**Q. What are the major objectives considered when determining how the Company will prepare its load forecast?**

A. The primary objective when determining how to model the Company's load forecast is to utilize models that will accurately predict future electricity consumption. There are many different modeling techniques available, and the Company employs a balanced approach to modeling. In other words, we select models that are sophisticated enough to be able to produce accurate and reliable results, yet simple enough that they can be readily shared and understood by management, regulators, intervenors, and other stakeholders.

**Q. How are the kWh energy, customer, and kW demand forecasts prepared?**

A. I&M uses a methodical approach to forecasting load. Figure CMB-1 below illustrates the various inputs and processes involved in the development of the load forecast. The final forecast is the culmination of a series of underlying forecasts that build on each other (*i.e.*, customer forecast feeds the sales forecast which goes into the demand forecast).

**Figure CMB-1**
**Inputs and Processes Used in I&M's Load Forecast**




**Q. What methods does I&M use to develop the load forecast?**

A. Two distinct methods were used for forecasting customers and kWh for the short-term (*i.e.*, 0 to 24 months following the last actual data point utilized) and the long-term (0 to 30 years following the last actual data point utilized). The last actual data point utilized in the 2018 vintage forecast in this proceeding was December 2017. Because the 2020 Test Year falls outside the short-term forecast period, the Test Year forecast uses data from the long-term process, and thus I will focus most of my description on the long-term forecast methodology. Nonetheless, the short-term forecast was used as a reference to confirm the accuracy of the long-term forecast.

To forecast long-term kWh sales, I&M used Itron's Statistically Adjusted End-use (SAE) models for forecasting Residential and Commercial kWh. SAE models are widely used across the industry for long-term planning. SAE models are econometric models with features of end-use models included to specifically account for energy efficiency impacts, such as those included in the Energy Policy Act of 2005 (EPACT) and the Energy Independence and Security Act of 2007 (EISA), etc. SAE models start with the construction of structured end-use variables that capture underlying trends in end-use equipment saturation levels and efficiencies. Factors are also included to account for changes in energy prices, household size, home size, income, and weather conditions.

The long-term process for forecasting Industrial and Other Retail kWh starts with an economic forecast provided by Moody's Analytics for the United States as a whole, each state, and regions within each state. These forecasts include forecasts of employment, population, industrial production, and income. The Industrial and Other Retail long-term kWh forecast uses econometric models incorporating the economic forecast to produce a forecast of annual kWh sales. Inputs such as regional and national economic and demographic conditions, energy prices, customer-specific information and informed judgment are all utilized in producing the forecasts. Attachment CMB-2 shows the general form of the equations used in the long-term forecasting process for Industrial and Other Retail.

The results of the kWh sales models, in turn, are inputs to the demand (or kW) models. As part of the forecast review process, the Company evaluates and

validates the historical relationship between the energy (kWh) and peak demand (kW) based on the metered load factors.

**Q. Why does I&M use different methods for short-term and long-term kWh forecasting?**

A. I&M uses processes that take advantage of the relative strengths of each methodology. The short-term process utilizes time-series regression models that capture patterns within the recent sales and weather data to represent the variation in kWh sales on a monthly basis for short-term applications like capital budgeting and resource allocation. Although these models can produce accurate forecasts in the short run, without logical ties to economic factors, they are less capable of capturing the structural trends in electricity consumption that are important for longer term planning. The long-term process, with its explicit ties to economics and demographics, as well as efficiency and saturation trends, is more appropriate for longer-term decisions such as capacity planning and distribution planning issues. In some cases, the long-term process may be used for short-term forecasting if the results are determined to be more reasonable and reliable than those produced from the short-term process during the internal review process.

**Q. How were class kWh level energy sales forecasts translated into an hourly load forecast?**

A. Historical load and temperature data was used to develop hourly load representations (load shapes) for specific temperature increments by revenue class and load type (*e.g.,* Residential cooling shape, Commercial heating shape, etc.). These load shapes are then applied with the sales forecasts and normal

weather file to generate hourly load forecasts. The aggregate of the load shapes for each of the classes is the system load profile. If necessary, the system load profile is calibrated based on the load factor trend to produce an hourly load and peak kW forecast. In this case, the peak forecast is primarily used for production costing and jurisdictional cost allocation development for rate design.

**Q. What are the sources of the data used in the forecast?**

A. All kWh sales, customer, and peak load data are taken from Company billing and operational records. The weather data is provided by the National Oceanic and Atmospheric Administration from weather stations in I&M's service territory (*i.e.* Ft. Wayne, IN and South Bend, IN). The economic forecasts are based on data gathered by federal, state, and local authorities, as well as propriety sources of Moody's Analytics for the counties served by I&M. The appliance saturations and efficiencies come from company surveys and/or Itron's SAE models which are linked to the Energy Information Administration (EIA's) National Energy Modeling System (NEMS) by census region. The DSM/Energy Efficiency assumptions come from Company reports filed with the IURC (*i.e.* EE Portfolio Plan and Integrated Resource Plan). And the large customer assumptions come from I&M's customer service engineers who have direct contact with our customers.

**Q. Does the Test Year forecast assume normal weather conditions, and if so, how is this accomplished?**

A. Yes, the forecast assumes normal weather conditions throughout the entire forecast horizon including the Test Year. It is appropriate to utilize weather normalized billing determinants when setting customer rates since it represents

the most likely outcome (*i.e.*, highest probability of occurrence) that minimizes the possibility that the Company will under or over collect the intended revenue requirement set by the Commission. The Company uses a rolling 30-year average of heating and cooling degree days to compute the projected normal degree days that are used in the forecast models.

**Q. How does the Company account for energy efficiency in the long-term load forecast?**

A. As mentioned earlier, the SAE model integrates end-use saturation and efficiency information into the forecast modeling that already incorporates the impact of federal energy standards and other relevant energy efficiency factors. The appliance saturation statistics are calibrated with the Company's periodic Residential Appliance Saturation Survey results, which are conducted every 3-4 years. In addition to the energy efficiency impacts that are included in the base SAE model framework, I&M also adjusts the load forecast for the impacts of its Demand Side Management (DSM) and Energy Efficiency programs that are approved by the Commission or for the longer term, contained within the Company's Integrated Resource Plan.

**Q. What DSM program assumptions were used to adjust the load forecast?**

A. The Company used the most recent DSM assumptions that were available at the time the load forecast was developed. For the near term, the Company adjusted the load forecast for the impact of DSM programs that had been implemented prior to 2018 or were included in I&M's 2018 DSM portfolio. For the long-term DSM

assumptions, I&M assumed DSM program savings reductions consistent with the Company's 2015 Integrated Resource Plan (IRP) filing.

**Q. How does the Company account for changes in specific large customer loads (*i.e.*, a major expansion or closure) in the load forecast?**

A. As part of the normal forecast routine, we reach out to I&M's customer service engineers to ask about any significant load additions or closures that are expected during the forecast horizon. Once we compile the list of expansions or closures, we then compare the list with the base forecast to see if these known expansions are implicitly accounted for in the base economic forecast. To the extent the specific customer changes are material and not already included in the base forecast, we make an adjustment to account for the difference.

**Q. Is the methodology used to produce the load forecast reasonable?**

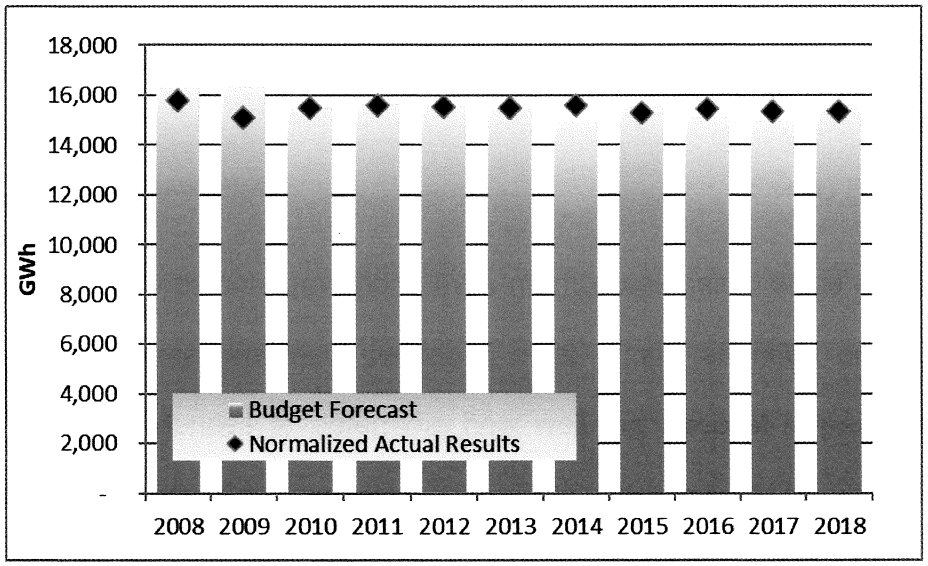
A. Yes. I&M's load forecast methodology is proven to produce accurate and reliable projections that are useful for planning and setting rates. The forecast techniques utilized by the Company are widely accepted across the electric utility industry. Furthermore, the necessary input data comes from reliable sources (*i.e.* National Oceanic and Atmospheric Administration (NOAA), Moody's Analytics, the U.S. Energy Information Administration (EIA), Itron, and I&M's customer billing and accounting systems, etc.).

**Q. Do you know how accurate the Company's forecasts have been using the methodology described above?**

A. Yes. As described earlier, part of my job is to monitor the performance of our load forecast on a routine basis. In the analysis, we identify the forecast variance that

is caused by weather (deviations from normal weather). Since our forecast is based on normal weather, we focus most of our attention on the weather normalized variances to determine how well the forecast is performing. The average accuracy of our budget load forecasts (GWh) for I&M since 2008 has been within 0.3% on a weather normalized basis as shown in Figure CMB-2 below.

**Figure CMB-2**
**I&M-IN Normalized Budget Variance (GWh)**




**Q. How accurate was the load forecast that was used in the Company's last base rate case (Cause No. 44967) that used a forecasted 2018 test year?**

A. The final load forecast that was filed in Cause No. 44967 predicted I&M's total retail sales in Indiana would be 15,431,924 MWh[5] in 2018. The weather normalized results for 2018 came in at 15,360,592 MWh, which means the load forecast that was used to develop the billing determinants was within 0.5% of the actual results.

[5] See Cause No. 44967 Rebuttal Testimony of Chad M. Burnett, Attachment CMB-1R.

## TEST YEAR FORECAST RESULTS

**Q. What is the purpose of this section of your testimony?**

A. The purpose of this section of my testimony is to present the forecast for I&M's Indiana jurisdiction over the Test Year using the procedures described above while providing historical context and explanation for some of the underlying trends that are influencing the forecast results.

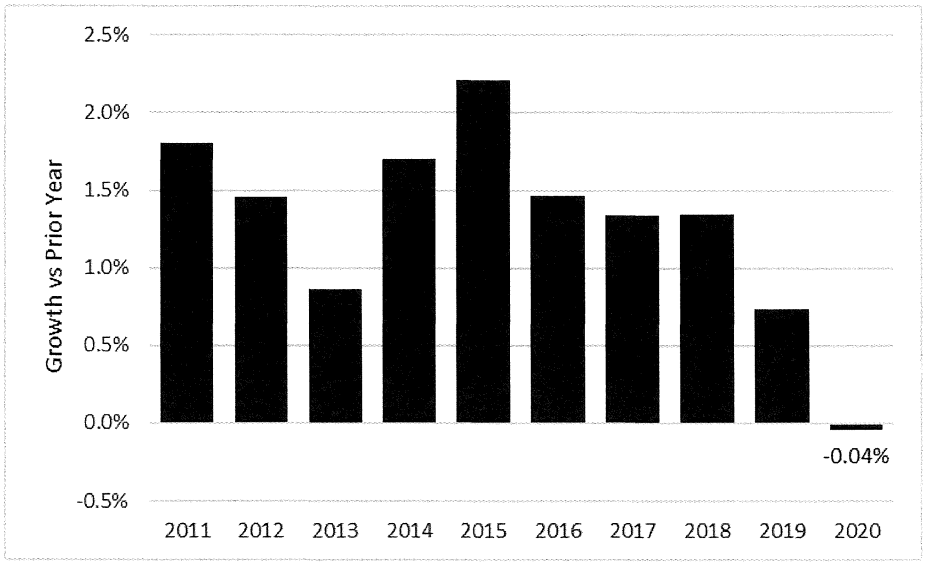
**Q. Please summarize the results of the economic forecast for I&M's Indiana service territory.**

A. Moody's Analytics projects I&M's Indiana service territory population will grow at an average annual rate of 0.2% per year from 2018 to 2020, which is only slightly higher than the 0.1% per year growth over the past decade (2008-2018). Over the same forecast period, the gross regional product for the Indiana jurisdiction of I&M's service territory is expected to grow at an average rate of 1.8% per year through 2020, which is marginally better than the 1.6% per year growth from the past decade. Finally, non-farm employment is expected to increase at an average annual rate of 0.3% per year compared to the 0.5% per year decline over the past decade.

**Q. Why is the Moody's projection for non-farm employment growth through 2020 within I&M's Indiana territory lower than I&M has experienced in recent history?**

A. Moody's Analytics is predicting the end of the current business cycle and the start of the next recession in the year 2020. As shown in Figure CMB-3 below, non-farm employment growth for I&M's Indiana jurisdiction is expected to stall in 2020.

**Figure CMB-3**
**I&M-IN Non-Farm Employment Forecast**




**Q. Do you know if many other economists are predicting the next recession to start in the next couple of years?**

A. Yes, the number of economists that are predicting the next recession will start in the next couple of years is increasing. In fact, a recent survey of business economists completed in December of 2018 indicated that 80% of respondents have lowered their outlook for 2019 and a growing number of economists are now predicting the US economy will be in recession by 2020 or 2021.[6]

**Q. How do the forecasted energy sales for the Test Year compare to actuals in 2018?**

A. Figure CMB-4 below shows I&M's kWh sales forecast comparison over the projected period for each jurisdiction. In summary, the total Test Year kWh are approximately 1,289 GWh below the weather normalized 2018 actual sales. The

[6] National Association of Business Economics (NABE) Outlook Survey published December 2018.

majority of the decrease in the Test Year sales is coming from the reduction in the Wholesale class load (-977 GWh). Company witnesses Thomas and Williamson provide a more robust explanation of this reduction in wholesale load.

**Figure CMB-4**
**Comparison of 2018 Weather Normalized Actuals to Forecasted Test Year (GWh by Jurisdiction)**

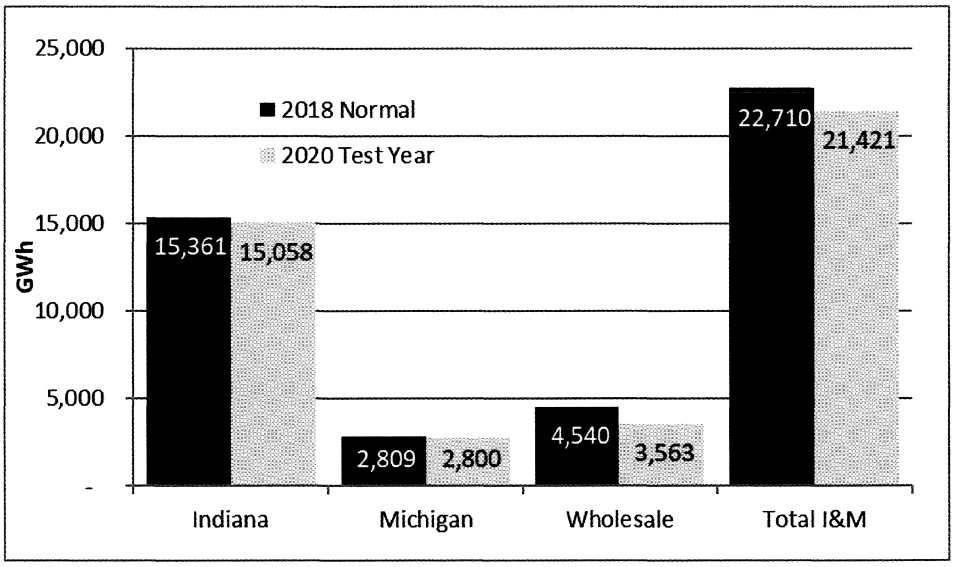
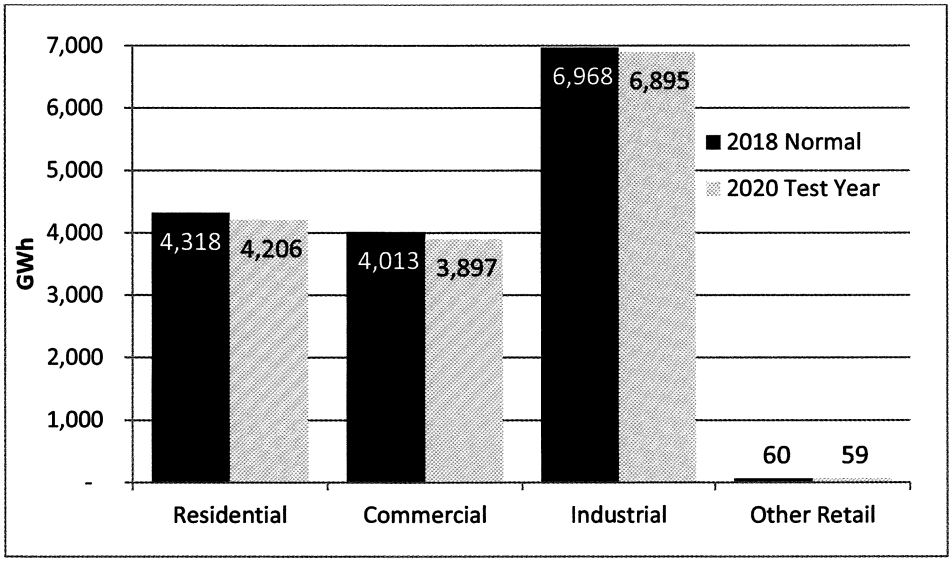



Figure CMB-5 below shows the forecast comparison for the Indiana retail jurisdiction by class. In total, the forecasted Test Year sales are down 303 GWh compared to the normalized actuals in 2018. The Commercial and Residential class sales are down approximately 116 GWh and 112 GWh, respectively compared to the 2018 weather normalized actuals. This is largely the continuation of the more recent downward trend in usage over the past decade that accounts for increasing saturation of energy efficient technology.

**Figure CMB-5**
**Comparison of 2018 Weather Normalized Actuals to Forecasted Test Year**
**(GWh by Class – Indiana)**



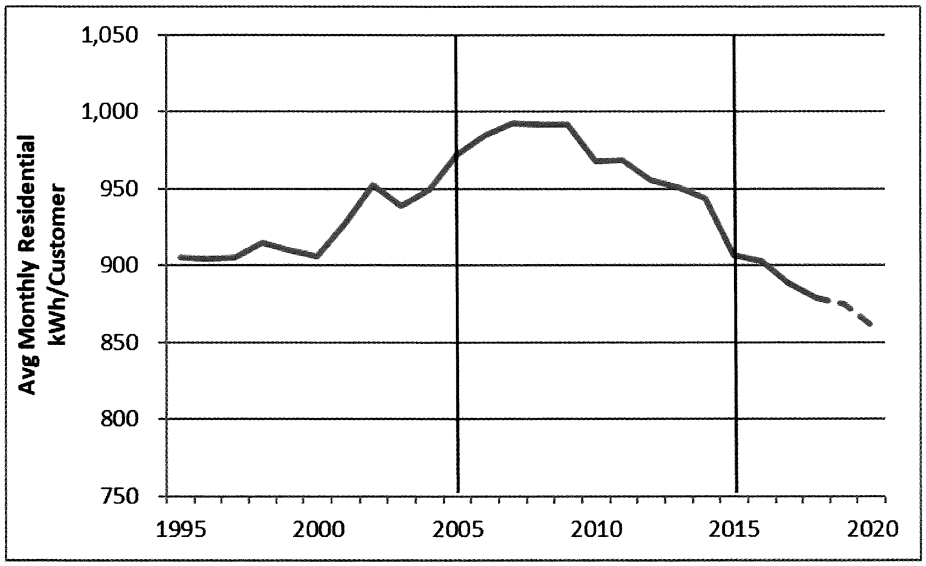

Residential customer counts in the test year are expected to be up by 243 customers compared to 2018, which is the equivalent of 0.03% per year growth in customer counts and is in line with the expected population growth from Moody's Analytics.

**Q. If forecasted residential customer counts are increasing while residential sales are down compared to the base period, this implies the forecasted usage per customer is expected to decline during the forecast horizon. Can you explain why the residential usage forecast is declining?**

A. Yes. There has been a dramatic decline in residential usage per customer over the past decade as illustrated in Figure CMB-6 below. From 1995 to 2005, normalized residential usage in I&M's Indiana jurisdiction grew by an average of 0.7% per year. From 2005 to 2015, however, normalized residential usage actually declined by 0.7% per year. During this time, I&M faced adverse impacts from the

recession and historically weak recovery, in addition to an aggressive promotion of energy efficient technologies from federal legislation (e.g., EPACT 2006, EISA 2007, etc.) and the promotion of Company-sponsored DSM programs. Finally, as shown in Figure CMB-6, the forecast is projecting a continued decline in normalized usage because of higher energy efficiency as discussed earlier.

**Figure CMB-6**
**I&M-IN Normalized Usage Trends in Indiana**




**Q. Please summarize I&M's peak forecast.**

A. I&M's total company forecasted peak demand for the Test Year is 4,030 MW in July of 2020. By comparison, I&M's actual peak demand in 2018 was 4,369 MW on June 18, 2018. The weather normalized peak estimate for 2018 was 4,400 MW. A weather normalized peak represents what the peak value would have been if the temperature on the peak day had been normal for a peak day. In 2018, the temperatures were mild on the peak day, so the actual peak came in lower than it would have been under normal peak day conditions.

The forecasted peak in the Test Year is expected to be below the normalized peak in 2018 primarily due to the expiring wholesale contracts and weaker economic conditions throughout the I&M service territory.

**Q. How is the Test Year load forecast you sponsor used in this Case?**

A. Company witness Nollenberger uses the Test Year load forecast to develop the forecasted billing determinants used in rate design. In addition, the load forecast is used in the jurisdictional and class cost study allocations.

## CONCLUSION

**Q. How would you describe I&M's load forecast that was used in the Test Year?**

A. The Test Year load forecast for the twelve-month period ending December 2020 is reasonable. The forecast was derived using widely accepted modeling techniques and is based on the best information that was available at the time it was completed.

**Q. Does this conclude your pre-filed verified direct testimony?**

A. Yes.

## VERIFICATION

I, Chad M. Burnett, Director of Economic Forecasting of American Electric Power Service Corporation (AEPSC), affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

Date: 5/3/19

Chad M. Burnett

**I&M- Indiana Jurisdiction**
**Forward Looking Test Year Ending December 2020**
*Energy Sales (MWh)*

| | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 465,412 | 376,426 | 389,101 | 265,741 | 292,920 | 314,444 | 402,513 | 403,552 | 320,761 | 253,101 | 305,020 | 417,315 | **4,206,305** |
| Commercial | 313,640 | 287,315 | 325,985 | 278,671 | 349,537 | 343,779 | 358,886 | 357,381 | 334,720 | 318,995 | 318,486 | 309,973 | **3,897,369** |
| Industrial | 542,904 | 544,411 | 599,067 | 555,767 | 624,408 | 587,854 | 578,834 | 605,487 | 568,405 | 573,991 | 571,163 | 542,888 | **6,895,179** |
| Other Retail | 6,237 | 5,160 | 5,168 | 4,467 | 4,112 | 3,701 | 3,896 | 4,415 | 4,666 | 5,394 | 5,892 | 5,938 | **59,048** |
| *Total IN Retail* | *1,328,194* | *1,213,312* | *1,319,321* | *1,104,647* | *1,270,977* | *1,249,779* | *1,344,129* | *1,370,834* | *1,228,552* | *1,151,481* | *1,200,561* | *1,276,114* | ***15,057,901*** |
| *Total MI Retail* | *249,303* | *228,959* | *239,138* | *202,746* | *223,322* | *230,787* | *260,824* | *267,292* | *227,792* | *208,746* | *220,404* | *240,494* | ***2,799,808*** |
| *Total Wholesale* | *392,298* | *356,169* | *365,730* | *348,280* | *357,817* | *243,885* | *256,419* | *262,656* | *240,386* | *243,213* | *239,712* | *256,891* | ***3,563,458*** |
| *Total I&M* | *1,969,795* | *1,798,440* | *1,924,190* | *1,655,673* | *1,852,116* | *1,724,451* | *1,861,372* | *1,900,783* | *1,696,731* | *1,603,440* | *1,660,677* | *1,773,499* | ***21,421,167*** |

*Customer Counts*

| | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | **Avg Customers** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Residential | 408,068 | 407,884 | 408,079 | 407,152 | 406,551 | 406,407 | 406,241 | 406,519 | 406,638 | 406,672 | 407,188 | 407,911 | **407,109** |
| Commercial | 53,374 | 53,378 | 53,383 | 53,389 | 53,396 | 53,405 | 53,416 | 53,429 | 53,444 | 53,460 | 53,477 | 53,496 | **53,421** |
| Industrial | 3,971 | 3,971 | 3,971 | 3,971 | 3,971 | 3,971 | 3,970 | 3,970 | 3,970 | 3,970 | 3,970 | 3,970 | **3,971** |
| Other Retail | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | 1,590 | **1,590** |
| *Total IN Retail* | *467,003* | *510,685* | *510,914* | *510,024* | *509,460* | *509,356* | *509,230* | *509,552* | *509,717* | *509,797* | *510,361* | *511,133* | ***466,090*** |
| *Total MI Retail* | *129,177* | *129,095* | *129,238* | *129,109* | *129,138* | *129,300* | *129,268* | *129,399* | *129,318* | *129,381* | *129,361* | *129,243* | **129,252** |
| *Total I&M* | *596,180* | *639,780* | *640,152* | *639,133* | *638,598* | *638,656* | *638,498* | *638,951* | *639,035* | *639,178* | *639,722* | *640,376* | ***595,343*** |

*Peak Demand*

| | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 | **Annual Max** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I&M System Peak Demand (MW) | 3,596 | 3,553 | 3,159 | 3,274 | 3,462 | 3,571 | 4,030 | 3,981 | 3,762 | 2,936 | 2,914 | 3,064 | **4,030** |

Attachment CMB-2

**Long-Term Forecasting Models for Industrial and Other Retail kWh, Customer Count**

(Generalized Equations)

Industrial KWH Sales = $f$ ( Industrial Production, Energy Prices )

Other Retail KWH Sales = $f$ ( Employment )

Customers = $f$ ( Employment )