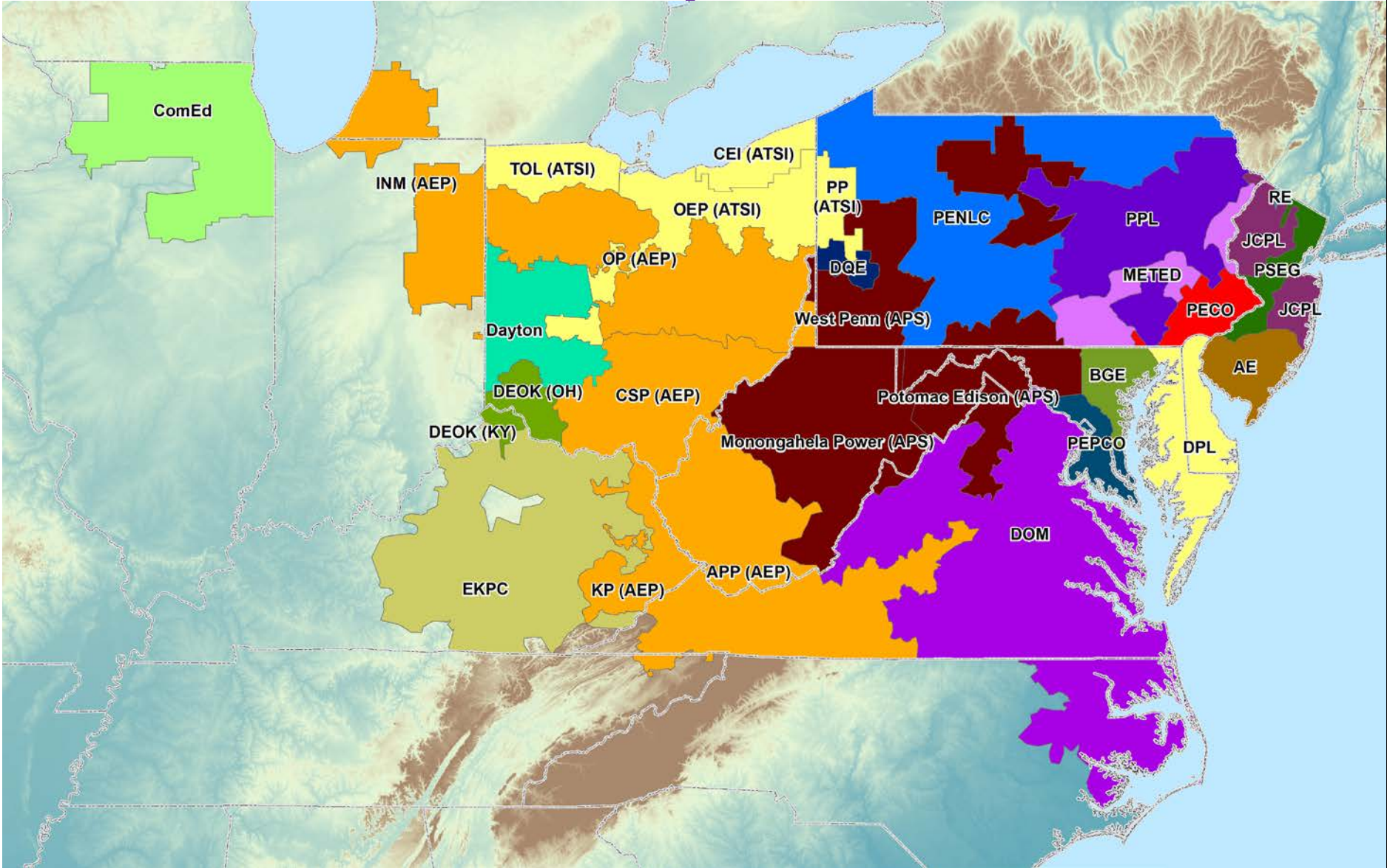


# PJM Load Forecast Report

## January 2018



Prepared by PJM Resource Adequacy Planning Department



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## TERMS AND ABBREVIATIONS USED IN THIS REPORT

AE	Atlantic Electric zone (part of Pepco Holdings, Inc)
AEP	American Electric Power zone (incorporated 10/1/2004)
APP	Appalachian Power, sub-zone of AEP
APS	Allegheny Power zone (incorporated 4/1/2002)
ATSI	American Transmission Systems, Inc. zone (incorporated 6/1/2011)
Base Load	Average peak load on non-holiday weekdays with no heating or cooling load. Base load is insensitive to weather.
BGE	Baltimore Gas & Electric zone
CEI	Cleveland Electric Illuminating, sub-zone of ATSI
COMED	Commonwealth Edison zone (incorporated 5/1/2004)
Contractually Interruptible	Load Management from customers responding to direction from a control center
Cooling Load	The weather-sensitive portion of summer peak load
CSP	Columbus Southern Power, sub-zone of AEP
Direct Control	Load Management achieved directly by a signal from a control center
DAY	Dayton Power & Light zone (incorporated 10/1/2004)
DEOK	Duke Energy Ohio/Kentucky zone (incorporated 1/1/2012)
DLCO	Duquesne Lighting Company zone (incorporated 1/1/2005)
DOM	Dominion Virginia Power zone (incorporated 5/1/2005)
DPL	Delmarva Power & Light zone (part of Pepco Holdings, Inc)
EKPC	East Kentucky Power Cooperative zone (incorporated 6/1/2013)
FE-East	The combination of FirstEnergy's Jersey Central Power & Light, Metropolitan Edison, and Pennsylvania Electric zones (formerly GPU)
Heating Load	The weather-sensitive portion of winter peak load
INM	Indiana Michigan Power, sub-zone of AEP
JCPL	Jersey Central Power & Light zone
KP	Kentucky Power, sub-zone of AEP

METED	Metropolitan Edison zone
MP	Monongahela Power, sub-zone of APS
NERC	North American Electric Reliability Corporation
Net Energy	Net Energy for Load, measured as net generation of main generating units plus energy receipts minus energy deliveries
OEP	Ohio Edison, sub-zone of ATSI
OP	Ohio Power, sub-zone of AEP
PECO	PECO Energy zone
PED	Potomac Edison, sub-zone of APS
PEPCO	Potomac Electric Power zone (part of Pepco Holdings, Inc)
PL	PPL Electric Utilities, sub-zone of PLGroup
PLGroup/PLGRP	Pennsylvania Power & Light zone
PENLC	Pennsylvania Electric zone
PP	Pennsylvania Power, sub-zone of ATSI
PRD	Price Responsive Demand
PS	Public Service Electric & Gas zone
RECO	Rockland Electric (East) zone (incorporated 3/1/2002)
TOL	Toledo Edison, sub-zone of ATSI
UGI	UGI Utilities, sub-zone of PLGroup
Unrestricted Peak	Peak load prior to any reduction for load management or voltage reduction.
WP	West Penn Power, sub-zone of APS
Zone	Areas within the PJM Control Area, as defined in the PJM Reliability Assurance Agreement

# 2018 PJM LOAD FORECAST REPORT

## EXECUTIVE SUMMARY

- This report presents an independent load forecast prepared by PJM staff.
- The report includes long-term forecasts of peak loads, net energy, load management and distributed solar generation for each PJM zone, region, locational deliverability area, and the total RTO.
- All load models were estimated with historical data from January 1998 through August 2017. The models were simulated with weather data from years 1994 through 2016, generating 299 scenarios. The economic forecast used was Moody's Analytics' September 2017 release.
- Equipment indexes reflect the 2017 update of Itron's end-use data, which is consistent with the Energy Information Administration's 2017 Annual Energy Outlook. PJM obtained additional information from certain zones on Residential saturation rates based on their own load research. Detail on zones providing information are as follows:
  - American Electric Power (AEP) provided saturation data on all appliance categories through 2015;
  - Allegheny Power (APS) provided saturation data on all appliance categories through 2016;
  - American Transmission Systems, Inc (ATSI) provided saturation data on all appliance categories through 2016;
  - Commonwealth Edison (COMED) provided saturation data on all appliance categories for 2012;
  - Duke Energy Ohio and Kentucky (DUKE) provided saturation data on all appliance categories through 2014;
  - East Kentucky Power Cooperative (EKPC) provided saturation data on Heat Pumps for Heating and Cooling, Electric Furnaces, Secondary Heating (Room Heating), Central A/C, Room Air Conditioners, and Water Heaters through 2013;
  - Jersey Central Power & Light (JCPL) provided saturation data on all appliance categories through 2016;
  - Metropolitan Edison (METED) provided saturation data on all appliance categories through 2016;
  - Pennsylvania Electric (PENLC) provided saturation data on all appliance categories through 2016;
  - Dominion Virginia Power (DOM or VEPCO) provided saturation data on Heat Pumps for Cooling, Central A/C and Room Air Conditioners through 2014.

- Table B-7 has been revised to add the Price Responsive Demand product to the load management forecast. Also, Summer-Period DR detail refers to DR resources that aggregate with Winter-Period resources to form a year-round commitment.
- The forecasts of the following zones have been adjusted to account for large, unanticipated load changes (see Table B-9 for details):
  - The forecast of the APS zone has been adjusted to account for accelerating load related to natural gas processing plants, adding 160-530 MW to the summer peak from 2018 through 2022 before declining to 350 MW in 2033;
  - The forecast of the DOM zone has been adjusted to account for substantial on-going growth in data center construction, which adds 160-560 MW to the summer peak from 2018 through 2022 before declining to 210 MW in 2033;
- Summer peak load growth for the PJM RTO is projected to average 0.4% per year over the next 10 years, and 0.4% over the next 15 years. The PJM RTO summer peak is forecasted to be 157,635 MW in 2028, a 10-year increase of 5,527 MW, and reaches 162,095 MW in 2033, a 15-year increase of 9,987 MW. Annualized 10-year growth rates for individual zones range from -0.2% to 0.8%.
- Winter peak load growth for PJM RTO is projected to average 0.4% per year over the next 10-year period, and 0.4% over the next 15-years. The PJM RTO winter peak load in 2027/28 is forecasted to be 136,702 MW, a 10-year increase of 5,239 MW, and reaches 139,975 MW in 2032/33, a 15-year increase of 8,512 MW. Annualized 10-year growth rates for individual zones range from -0.3% to 0.9%.
- Net energy for load growth for PJM RTO is projected to average 0.4% per year over the next 10-year period, and 0.5% over the next 15-years. Total PJM RTO energy is forecasted to be 841,506 GWh in 2028, a 10-year increase of 34,781 GWh, and reaches 864,236 GWh in 2033, a 15-year increase of 57,511 GWh. Annualized 10-year growth rates for individual zones range from -0.4% to 0.9%.
- Compared to the 2017 Load Report, the 2018 PJM RTO summer peak forecast shows the following changes for three years of interest:
  - The next delivery year – 2018-1,843 MW (-1.2%)
  - The next RPM auction year – 2021 -1,021 MW (-0.7%)
  - The next RTEP study year – 2023 -90 MW (-0.1%)

**NOTE:**

Unless noted otherwise, all peak and energy values are non-coincident, unrestricted peaks, which represent the peak load or net energy after reductions for distributed solar generation and prior to reductions for load management impacts.

All compound growth rates are calculated from the first year of the forecast.



**Summary Table**

**SUMMER PEAK LOAD (MW) AND GROWTH RATES FOR  
PJM RTO AND SELECTED GEOGRAPHIC REGIONS**

	<b>METERED 2017</b>	<b>UNRESTRICTED 2017</b>	<b>THIS YEAR 2018</b>	<b>RPM YEAR 2021</b>	<b>RTEP YEAR 2023</b>
<b>PJM RTO</b>	145,331	145,331	152,108	152,363	153,632
Demand Resources			-9,095	-7,691	-7,747
PJM RTO - Restricted			143,013	144,672	145,885
<b>PJM MID-ATLANTIC</b>	55,220	55,220	56,601	55,999	56,189
Demand Resources			-3,445	-2,999	-3,007
MID-ATL - Restricted			53,156	53,000	53,182
<b>EASTERN MID-ATLANTIC</b>	30,128	30,128	30,840	30,472	30,615
Demand Resources			-1,203	-1,066	-1,070
EMAAC - Restricted			29,637	29,406	29,545
<b>SOUTHERN MID-ATLANTIC</b>	12,545	12,545	13,172	12,937	12,910
Demand Resources			-1,159	-905	-903
SWMAAC - Restricted			12,013	12,032	12,007

## Summary of the September 2017 U.S. macro forecast

The U.S. economy is powering forward. Despite the uncertainty created by Hurricanes Harvey and Irma, Washington brinkmanship over almost everything, and North Korean nuclear threats, the expansion remains firmly intact. Real GDP is on track to come in at just over 2% this year and well more than 2 million jobs will be created.

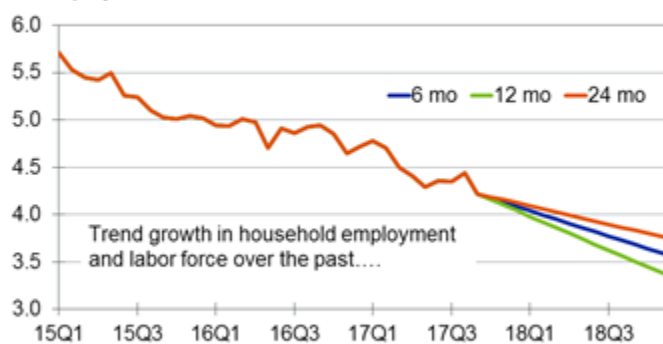
This is about the same growth seen since the expansion began more than eight years ago and is above the economy's current growth potential. Unemployment and underemployment continue to decline steadily—a half and full percentage point per annum, respectively—and are consistent with most estimates of full employment.

### The labor market

The unemployment rate fell from 4.4% in August to 4.2% in September even as the labor force increased by 575,000. The rate is already below the Fed's estimate of the longer-run unemployment rate of 4.6% and even below the lowest estimate within the Fed's central tendency of the longer-run unemployment rate.

### Reason to Expect Further Declines

Unemployment rate, %, based on...



Sources: BLS, Moody's Analytics

Concerns that the labor market may overheat and ignite wage and price inflation are not misplaced but are slightly premature. Businesses have been grumbling that they are having trouble finding qualified workers. However, if labor shortages were a serious issue, nominal wage growth would be accelerating more quickly. Because this has not happened, the labor supply pool is not completely dry.

There is no official estimate of the potential supply of workers. However, a loose one includes the number of unemployed—those who are willing and able to work now and thus reflect the existing potential labor pool—plus those who are not in the labor force but want a job. To pull more of the reserve supply into the labor force, stronger wage growth is needed. Since the mid-1960s, changes in labor income have had a strong relationship with labor force growth. This also makes sense in theory: Workers have a sense of the minimum they will accept—a reservation wage—to take a job.

The Moody's Analytics estimate of the pool of potential workers is 7.5% of the labor force, higher than that seen prior to the last recession and above that when the labor market was very tight in 1999 and 2000. If the potential labor supply declines an additional 1 million to 2 million, wage pressures will intensify as demand for labor outstrips supply.

### Pool Is Not Drained Yet

Pool of available labor supply, %



Sources: BLS, Moody's Analytics

All told, the supply of workers may not be a serious impediment to continued expansion over the next few months or even next year, but eventually it will be.

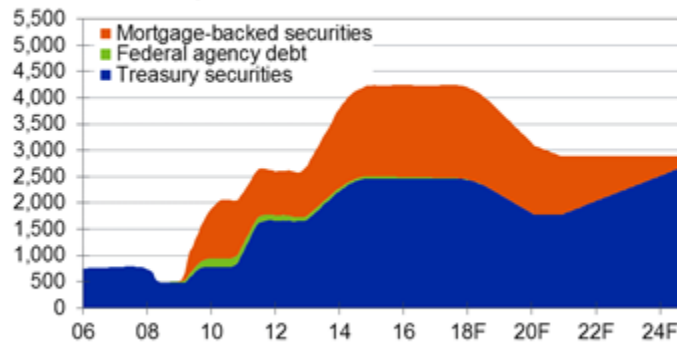
### Normalizing monetary policy

Despite the progress the economy has made, the cleanup from the Great Recession is incomplete. Normalizing monetary policy from the emergency measures taken during the financial crisis is critical unfinished business. The next step in the normalization process is the right-sizing of the Federal Reserve's balance sheet. The Fed dramatically expanded its balance sheet through several

rounds of so-called quantitative easing by purchasing trillions of dollars in longer-term Treasury securities, Fannie and Freddie's debt, and mortgage securities backed by Fan, Fred and Ginnie Mae. The Fed's ownership of these securities ballooned from less than \$1 trillion before the crisis, equal to just over 5% of GDP, to \$4.5 trillion today, some 25% of GDP. QE-induced low long-term rates have

### Fed Likely Aiming for \$3 Trillion

Assets held outright on Fed's balance sheet, \$ bil



Source: Moody's Analytics

been critical to jump-starting and supporting the expansion. They have facilitated several mortgage refinancing waves that eased pressure on hard-pressed homeowners and fueled housing demand, helping to end the housing collapse. They have also been behind the raging bull market in stocks, which has lifted household wealth, and thus consumer spending via the wealth effect. More broadly, the low rates have incited greater risk-taking, which is key to growth, but was severely depressed by the crisis.

The Fed appropriately believes the U.S. economy is in a good enough place to slowly end QE and reduce its security holdings. In the Fed's script, the QE wind-down will occur as the securities it owns mature and prepay, ramping up from \$10 billion a month initially to a peak of \$50 billion a month. Moody's Analytics expects the Fed will continue with this script until it owns approximately \$3 trillion in securities, not quite 15% of GDP, which is where policymakers will hold the balance sheet. Given changes in the way it manages short-term rates post-crisis, the Fed needs to maintain a bigger balance sheet than prior to the crisis. It should take the Fed approximately five years to right-size its balance sheet.

#### Whither short-term rates

There is little debate among investors over the wind-down of QE given the Fed's transparency on how it will go, but there is heated debate over the future path of short-term interest rates. The sentiment of policymakers as represented by the median of the dot-plot of their future interest rate expectations is for a quarter-

point rate hike in December, three hikes in 2018, and a 3% equilibrium rate—the rate that prevails in the long run when the economy is at full employment and growing at its potential and inflation is at the Fed's 2% target.

This seems a reasonable outlook given that while the economy is already at full employment and growing above its potential, inflation remains stubbornly below the Fed's target and has moderated this year. But if past business cycles are a guide, given the tightening labor market, wage and price pressures will soon develop, and the Fed will find itself scrambling to catch up a year or two from now, raising rates more quickly than policymakers currently anticipate. This would be consistent with the Moody's Analytics outlook for short-term rates.

### **Washington wild card**

The catalyst for a change in investor expectations may emanate from Washington. The widely held view is that the Trump administration and Congress will fail to get anything done on taxes and infrastructure and government spending—the status quo on fiscal policy will prevail. Perhaps. But there are powerful political incentives for the administration and Republican-controlled Congress to pass something—if not tax reform, then tax relief for U.S. corporations. Given that this will likely add to future deficits, conservative Republicans may not go along, thus requiring a few Democratic votes in the Senate. Some Democrats might go along if as part of the package there was a meaningful step-up in infrastructure spending.

There are lots of different directions all of this could go, but it is premature to rule out the passage of a modest package of tax and spending changes. Of course, deficit-financed tax cuts and spending increases, also known as fiscal stimulus, will pump-up growth, at least temporarily, which in a full-employment economy will create greater wage and price pressures. Investors will rightly figure that the Fed will respond by normalizing interest rates more quickly.

Regardless of how all this plays out, it is clear that fully cleaning up from the Great Recession is still a long way off and rife with risk. It is important that policymakers get the job done before the next recession hits.

### **Housing**

Gradually rising prices and a tight supply characterize the housing market in the U.S., and these factors have led to a slowdown in existing-home sales that has been exacerbated by recent natural disasters. Hurricanes Harvey and Irma pulled down on home sales in the South late in the summer and may have caused total sales to fall below expectations. However, the hurricanes do not account for all of the slowdown in sales, especially as the West had a monthly decline that was almost as large. The two main causes for the leveling out of existing-home sales

since last year are the scarcity of listings and moderate demand that has yet to reach full potential.

In addition, a rising number of households are paying a premium to purchase a dwelling with the desired location and features. This is also especially true in many western metro areas, where prices have advanced most quickly among their peers the past several years. In addition, the persistent shortage of skilled, specialty construction labor has prevented new-home supply from meeting increasing demand. Single-family home completions remain below the rate that would exist without these capacity constraints. As of now, the jobless rate for experienced construction workers per unit under construction remains at a cycle low.

The housing market outlook is still cautiously optimistic, as the tightening of the labor market will start to generate income gains that are stronger than the historical average, even among workers without advanced degrees. The financial position of renters will improve in the next few years as unemployment remains low, providing a better foundation for home purchase demand.

### **Forecast risks**

#### **Trade and immigration**

President Trump's strong protectionist stance on immigration and trade, especially anti-China and anti-Mexico trade rhetoric and the desire to renegotiate key trade agreements, poses a significant downside risk to the forecast. Though the baseline forecast does not assume a trade war, it would not be surprising if foreign countries retaliated in kind against U.S. tariffs. Should this scenario play out, growth in the U.S. would fall short of expectations. Immigration adds to uncertainty as undocumented workers leave the country, causing a contraction in the labor force. Tighter immigration policies, including a plan to limit the number of green cards, will dampen population growth, which is already the slowest since the Great Depression.

#### **Renewed global growth**

Despite numerous geopolitical risks, the global economy is strengthening and there are reasons to be optimistic that growth will be even stronger in the years ahead. Nearly 10 years after the recession, all the world's major economies are expanding. U.S. growth has accelerated after a sluggish first quarter, and the euro zone is expanding at the fastest rate in two years. South America is on the path to recovery after a two-year recession. Asia will remain the world's fastest-expanding region, with stabilizing growth in China driving broad-based expansion. Assuming the global economy can avoid serious setbacks, solid economic fundamentals could usher in a period of stronger economic growth.

## U.S. fiscal policy

Trump has struck a deal with congressional Democrats to pass a three-month continuing resolution and a suspension of the debt limit for the same amount of time. However, the deal only postpones a potentially bruising fiscal showdown until December. A shutdown during the holidays would do more economic harm than in the fall because of the sheer amount of consumer spending. Once the debt ceiling kicks in again in December, the Treasury will have fewer extraordinary measures at its disposal than in March when the statutory limit was last reinstated. This means that Treasury will only be able to stave off the deadline to raise the debt limit into early to mid-spring at most. Finally, the looming fiscal showdown could distract lawmakers from tax reform in the intervening period.

## Productivity

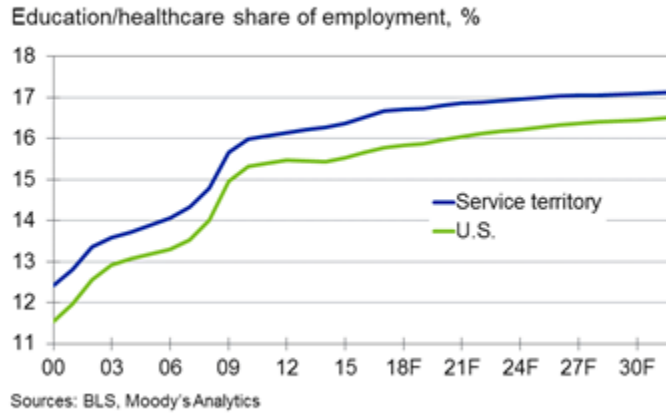
Productivity growth has been lackluster in the aftermath of the financial crisis. Since the recession, nonfarm business productivity has averaged a disappointing 1% per annum. The decline in productivity that stems from the pullback in business investment is especially concerning. Restrictions on legal immigration and the accelerated deportation of undocumented workers could affect long-run productivity as well, as immigrants have historically been a key driver of business creation and have played an important role in the tech industry. With the U.S. at or near full employment, unless productivity gains begin to improve, the economy will not deliver on GDP, income, profits, tax revenue and asset returns.

## Summary of the forecast for PJM service territories

The PJM service territory covers all or parts of 13 states and the District of Columbia, accounting for more than 65 million people, or just over a sixth of the U.S. population. The regional economies of the service territory include metro areas in the Midwest, South and Northeast and run the gamut from highly diversified, large economies such as Chicago, to small economies that depend heavily on one industry, such as Elkhart-Goshen IN.

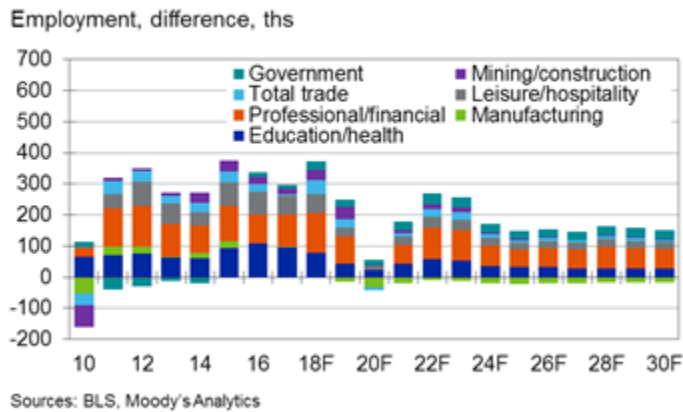
Overall, education/healthcare remains the dominant industry in the service territory. Even compared with the U.S. overall, healthcare and education make up a larger share of the economy in the service territory. Over the longer term, increasing demand from the aging population within the service territory and out will support job gains because of its greater utilization of health services. Healthcare is an export industry to some economies in the service territory. For example, both Pittsburgh and Philadelphia have large, specialized healthcare institutions that serve the regional population.

### Outsize Role for Education/Healthcare



Professional and financial services will also play a significant part, helped by large metro areas such as Chicago, Newark NJ and Pittsburgh. Job growth in professional and business services will be particularly strong, with growth expected to double that of overall employment. Finance will be a source of job gains as well, albeit at a more moderate pace. Finance has generally lagged overall employment in the aftermath of the Great Recession thanks to more stringent banking regulations and declining use of brick-and-mortar banking as customers increasingly switch to online banking. However, as the economy has strengthened finance is finally making up for lost time, and in recent quarters has pulled ahead of overall job growth.

### Professional/Financial a Source of Gains



On average, the concentration of manufacturing in the service territory is roughly in line with the national average. However, approximately 60% of the metro areas, mainly smaller old-line manufacturing localities in the Northeast and



Midwest, rely more heavily on industrial production for growth. The highest concentration of manufacturing is in Elkhart-Goshen IN, where nearly half of all jobs are in manufacturing. In contrast, the lowest concentration is in California-Lexington Park MD, where less than 1% of employment is in manufacturing.

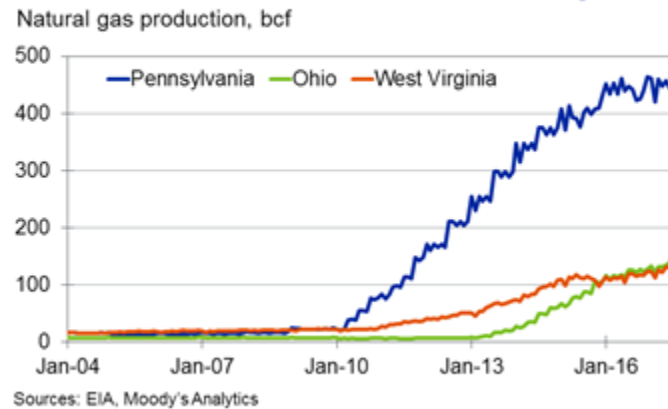
The factory sector's contribution to the labor market has downshifted and manufacturing employment is flat compared with its level two years ago. Local steel manufacturers have been hit hard by inexpensive imports. Although tariffs enacted a year earlier have provided a modicum of support, steel manufacturing employment has yet to regain the cyclical high reached in early 2015. This is weighing on payrolls in Pittsburgh and Western Pennsylvania in general.

Likewise, auto manufacturers have kept hiring restrained. Vehicle sales have topped out nationally despite the transitory September bump driven by replacement demand after Hurricane Harvey. Even machinery manufacturers have reduced headcount over the past 18 months as capital is steadily replacing labor. The broad-based slowdown in the factory sector has been especially detrimental to Akron, Toledo, Canton and Youngstown, where industrial diversity remains below average.

The outlook for manufacturing output is more positive, as global demand and an expanding U.S. economy should support production. However, automation and productivity gains will remain a headwind for labor demand. As a result, manufacturing employment will continue to shrink.

The natural resources and mining industry represents a small portion of the service territory's economy but has been a source of both job growth and job loss over the last decade. From 2006 to 2012, natural resources and mining added thousands of jobs to the service area, with strong gains in Pennsylvania, Ohio and West Virginia, thanks to the natural gas boom. However, a global drop in energy prices combined with a lack of infrastructure to ship natural gas out of the region translated to major layoffs and cutbacks on investment. The outlook is better, with natural resources and mining employment expected to bounce back over the next few years. The forecast is supported by the improving natural gas prices and an uptick in the Baker Hughes active rig count. In addition, the industry has benefited from significant productivity gains that have allowed output to remain steady despite the declines in rig count and employment. This will help the region remain a low-cost source of energy and output but means that the job gains will not be enough to recover those lost in the last few years.

## Natural Gas Production Remains High



While the public sector has a slightly smaller presence in the service territory than it does nationally, there is a greater concentration of federal government employment. This is largely because of the presence of the Washington-Arlington-Alexandria metro division, which contains the nation's capital and is home to one out of 10 federal government employees. With Republican leaders and the Trump administration focused more on tax cuts than spending increases, the outlook for federal government employment is for growth to lag that of the U.S. overall.

After years of cutbacks, an improving economy and growing revenues will help boost local government employment over the next few years, but it will be a slow path back to the previous employment peak. In addition, state fiscal positions in Illinois and Pennsylvania present a risk to the forecast for the service territory.

### Recent Performance

The service territory economy continues to improve. The unemployment rate has fallen to 4.5% compared with 4.9% a year earlier, and employment is growing at 1%. The service territory's unemployment and job growth are just slightly underperforming compared with the U.S. overall.

While the estimate of GDP growth from the third quarter of 2016 to the third quarter of 2017 is lower than had been expected, it still shows modest real growth. Total employment fell short of the forecast as well, but remains healthy. One reason the service territory's economy underperformed the forecast was that the momentum in job growth in 2016 was not as strong as it was previously believed. In the third quarter of 2016, job growth was initially estimated at 1.7% year to year, but the more comprehensive Quarterly Census of Employment and Wages revised growth down to 1.3%. Nevertheless, despite falling below

expectations, job growth has been strong enough to lower the unemployment rate and move the service territory closer to full employment

In the most recent quarter, education/healthcare is tracking the forecast for year-to-year growth but in general has outperformed expectations. Strong growth in healthcare is helped by healthcare systems, which are investing to meet the growing demand of an aging population. As a result, healthcare employment is expanding in 70% of the metro areas in the service territory.

Manufacturing employment is mostly flat, with total employment coming in close to expectations. Manufacturing is an important driver in many of the territory's metro areas, particularly Midwest metal-producing and auto-related metro areas. Demand is weaker for auto manufacturers because of a slowdown in new-vehicle sales, and global headwinds that are weighing on steel producers. However, in general the biggest headwind for manufacturing labor demand is productivity gains and automation.

Performance has varied significantly across the service territory. West Virginia is lagging the most, but the state's economy is beginning to improve. Although the only state still in recession, West Virginia is no longer losing jobs and gross state product has steadied. Payroll employment has stabilized after a five-year decline, bolstered by gains in healthcare, business/professional and financial services. Mining is also showing signs of life thanks to higher coal prices. The unemployment rate is down 1.4 percentage points over the past year to 4.6%, but some of the drop owes to a dip in the labor force, which is the smallest it has been since 1993. Residential real estate in West Virginia is on the mend as progress in the labor market and firmer income growth has led to a modest uptick in home sales.

Pennsylvania, Ohio and Virginia are all tracking close to the service territory average. However, the healthy overall performance in these states masks significant variation. Many metro areas lack dynamic drivers, rely on one or two industries, and are mired in an industrial past. For example, in Williamsport PA, one out of every six workers is employed in natural resources/mining or manufacturing, compared with one out of 11 for the U.S. as a whole. Payrolls have been flat in Williamsport recently, especially in the wake of the energy bust, and the metro area lacks drivers to fill the gap. Another example is Youngtown-Warren-Boardman, which is one of the weakest economies in Ohio. Payroll employment there has been falling since early 2015, reversing two-fifths of the increase that occurred in the first half of the decade. Private services in this metro area are struggling to expand, and manufacturing is backtracking.

In contrast, other parts of Ohio and Pennsylvania are doing much better and feature a variety of assets. After lagging the nation for decades, Philadelphia is finally adding itself to the list of the Pennsylvania's strongest economies, with job growth powering ahead of the U.S. pace. The metro division is expanding quickly thanks to a downtown investment boom that reflects a broad set of growing industries. Cincinnati and Columbus OH are both outpacing the service territory

thanks to the presence of high value-added industries and positive migration trends.

Overall, regardless of their strengths, the more successful parts of the service territory feature drivers that do not leave them as reliant on an industrial past that still casts a long shadow on many of the struggling areas in the region. An educated population and strong private service growth, as well as healthy downtowns that draw tourism and in-migration, are generally shared features of the more successful metro areas in the service territory.

Finally, local government remains a source of weakness in many areas because of state and local fiscal problems. This is true in particular in Illinois and Pennsylvania. Increasing pension costs in these states, which weigh on many municipalities and school districts, are keeping a lid on local government payrolls. For the service territory overall, local government employment is flat year to year and remains well below the 2009 peak. Even in some of the healthiest metro areas in the service territory, local government remains stuck in neutral. For example, despite being the wealthiest metro division in Pennsylvania and having an unemployment rate below 4%, Montgomery-Bucks-Chester has yet to see any significant recovery in local government payrolls.

### **Near-term outlook and changes to the forecast**

The 2017 baseline forecast for the region was generated in the context of the U.S. macro forecast. Changes to the near-term outlook for the PJM service territory are similar to changes in the U.S. macro forecast. Recent performance was weaker than expected in output, but still reflects an economy moving in the right direction. Payroll growth has slowed slightly as the economy approaches full employment. Meanwhile, productivity growth remains lackluster. Overall, output growth has disappointed recently, but this represents growth delayed, not cancelled, as the outlook calls for GDP growth to pick up over the next year.

Compared with last year's forecast, the economy will have a more volatile return to full employment. The Federal Reserve is expected to overshoot somewhat, as the unemployment rate falls below a rate that is consistent with a full-employment economy. In addition, immigration is expected to decrease amid restrictions pursued by the Trump administration. The net effect will be that the unemployment rate will tick back up after bottoming out in the next two years.

Retail is a sector that fell well short of the forecast over the past year. Pressure from online sales is weighing on brick-and-mortar retail establishments. While e-commerce has continued to steadily grow over the last two decades, long-standing pressures have come to a head in 2017. Layoffs, bankruptcies and closings have affected more than a dozen large retailers, including Sears, Macy's, Payless and HHGregg. While the weakness in retail is true across the U.S., it is more pronounced in the service territory, where the headwind of online sales is compounded by weak population growth. However, the forecast calls for a return

to growth for retail payrolls as shuttered stores are eventually replaced by new retailers that can better compete with e-commerce.

Multifamily housing has continued to grow but also fell short of the forecast amid reports of skilled worker shortages and an increased backlog of multifamily construction projects.

The single-family housing market has improved steadily, but the robust catch-up in single-family permitting that was expected has not yet materialized. Probably the strongest, though the least quantifiable, reason for the slower than expected recovery is still-low confidence in the long-term aftermath of the housing crisis, given the strong links between the housing and labor markets. Employment growth may be relatively strong, but wage growth has been slow to materialize as labor markets have yet to reach full employment.

The good news is that strong hiring and increased tightness, as measured by the unemployment rate and ratio of employment to working-age population, points to stronger wage income growth in coming years. The indirect effect will be to strengthen household spending, including home purchases. Wage growth will help households regain their willingness to invest in single-family housing, and as a result, the forecast for a single-family turnaround has only been pushed back.

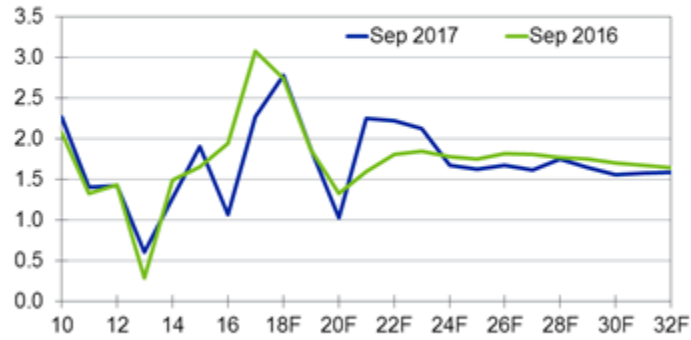
Overall, the service territory economy will return to full employment in the near term. Job and GDP growth will pick up through mid-2018 as the final pieces of the full-employment economy come into place, in particular a recovery in the single-family housing market. After the service area transitions to full employment, job growth will begin to slow to a pace that is more consistent with the long-run trajectory of the economy.

### **Long-term outlook**

The September forecast for long-term GDP growth in metro areas in the PJM service territory has been slightly downgraded from September 2016. Over the next few years, GDP be will be more volatile than previously expected, but in the long run will settle into a slightly slower growth path.

### Long-Run GDP Downgraded Slightly

Real GDP growth in PJM service territory metro areas, % change



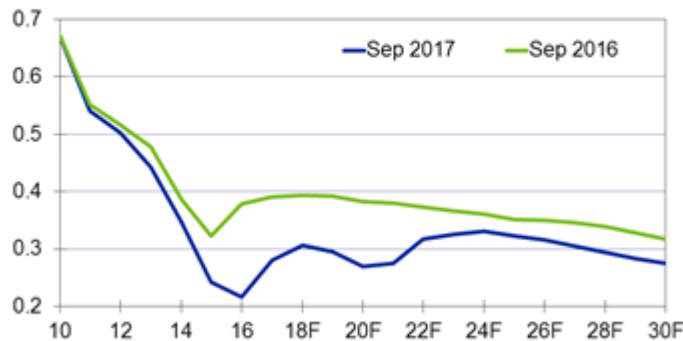
Sources: BEA, Moody's Analytics

In the long run, the PJM service territory will underperform the U.S., with average annual real GDP growth of 1.8% from 2017 to 2032, compared with the U.S. average of 2%.

One reason for slower long-run GDP growth is that the population forecast has been lowered. Census data from 2016, the most recent available, reveal that population once again fell slightly below the forecast. As a result, the September forecast is for population to expand by 4.8% from 2017 to 2032, down from 5.8% in the September 2016 forecast. As a result, the service territory's population will be 783,000 lower by 2032 than previously expected.

### Population Projections Lowered

Population forecast, % change yr ago



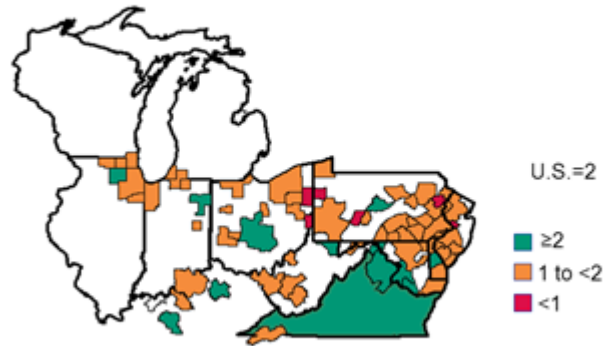
Sources: Census Bureau, Moody's Analytics

Washington DC and Virginia will outperform the service territory and U.S. for GDP growth thanks to a highly educated labor force, productivity growth, and positive

demographic trends. Other metro areas that will outperform the U.S. include Lancaster PA, Elgin IL, and Columbus OH.

### Service Territory Will Underperform U.S.

Avg real GDP growth from 2017 to 2032, %



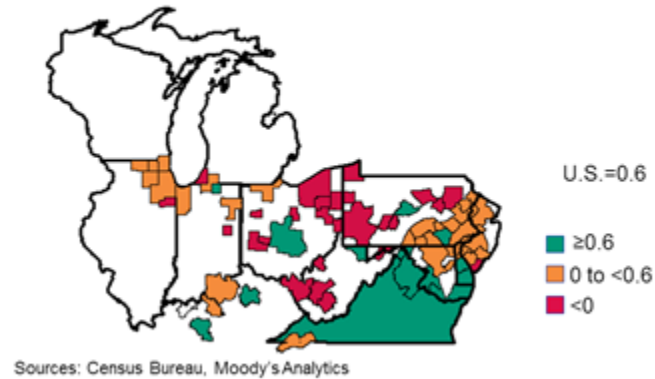
Sources: Census Bureau, Moody's Analytics

Metro areas in Ohio, West Virginia, and western and northern Pennsylvania will expand more slowly. Expansion in those areas will be more restrained as the region transitions away from manufacturing and other blue-collar industries toward more service-oriented economies. With lower-value-added services accounting for a larger part of the regional economies, income gains are expected to be more restrained.

Weaker demographics will also undermine long-term growth for many metro areas, as workers and their families are expected to seek opportunities in stronger labor markets outside of the slow-growth metro areas in the Midwest and Northeast. While the presence of institutions of higher education and high tech will help some cities such as Pittsburgh, even there the long-standing blue-collar industry headwinds will lead to below-average demographic performance.

## Many Shrinking Metro Areas

Avg population growth from 2017 to 2032, %

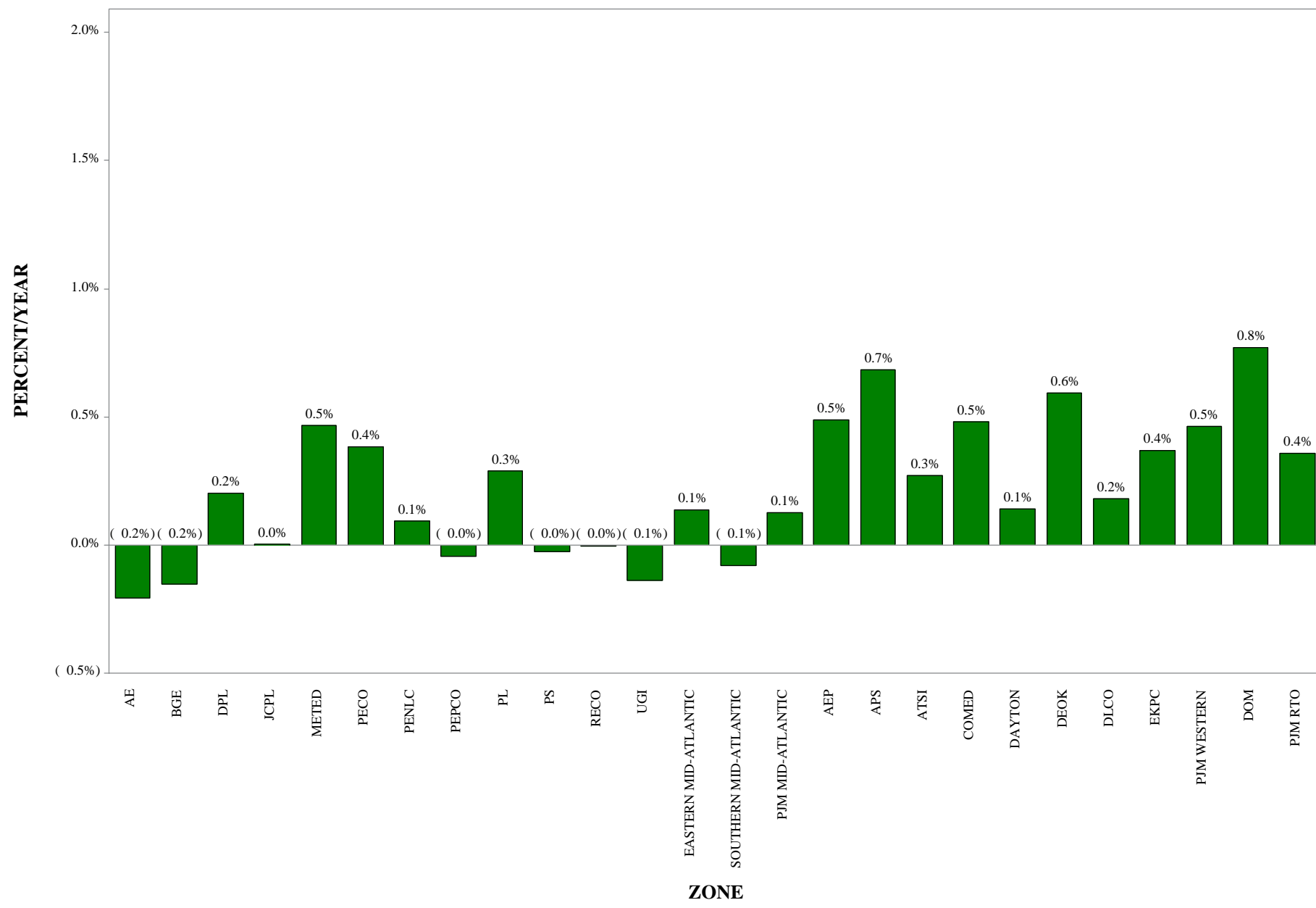


Of the 10 areas with the weakest population growth, nine are in Ohio or Pennsylvania. These areas, along with 15 others, will post net declines in the population.

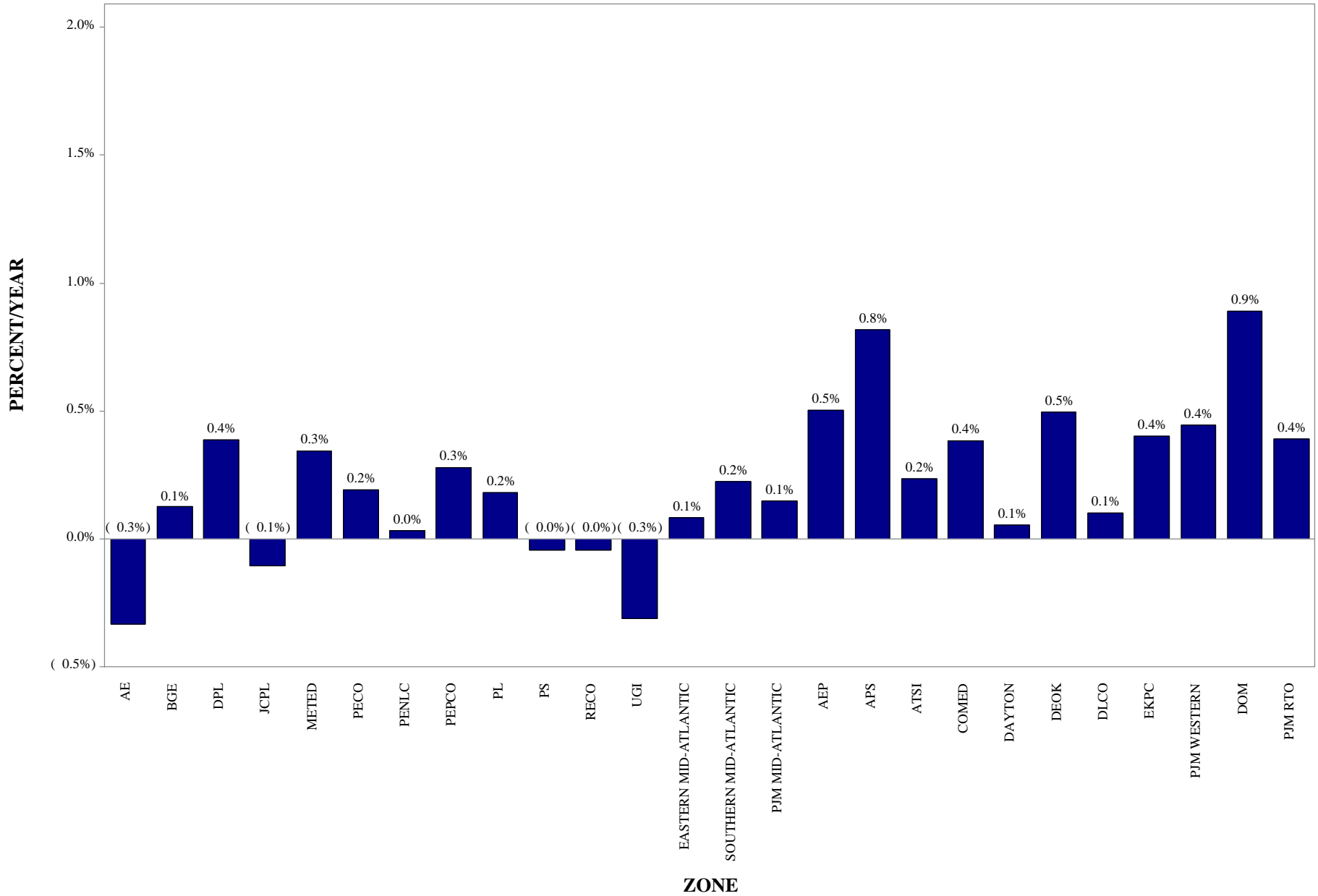
In Pennsylvania, the long-run decline of manufacturing is exacerbated by poor public sector finances, which will weigh on local government employment as well as taxpayers.



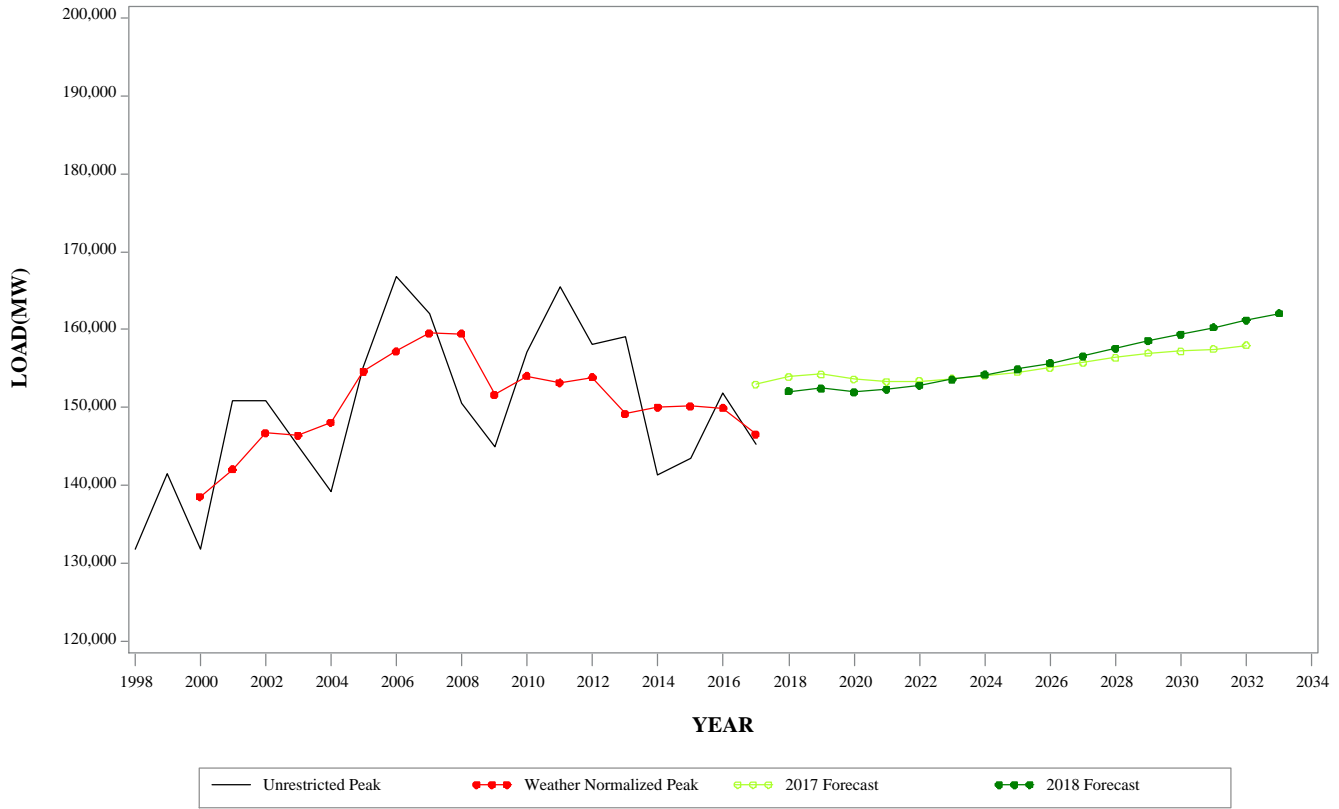
**PJM SUMMER PEAK LOAD GROWTH RATE  
2018 - 2028**



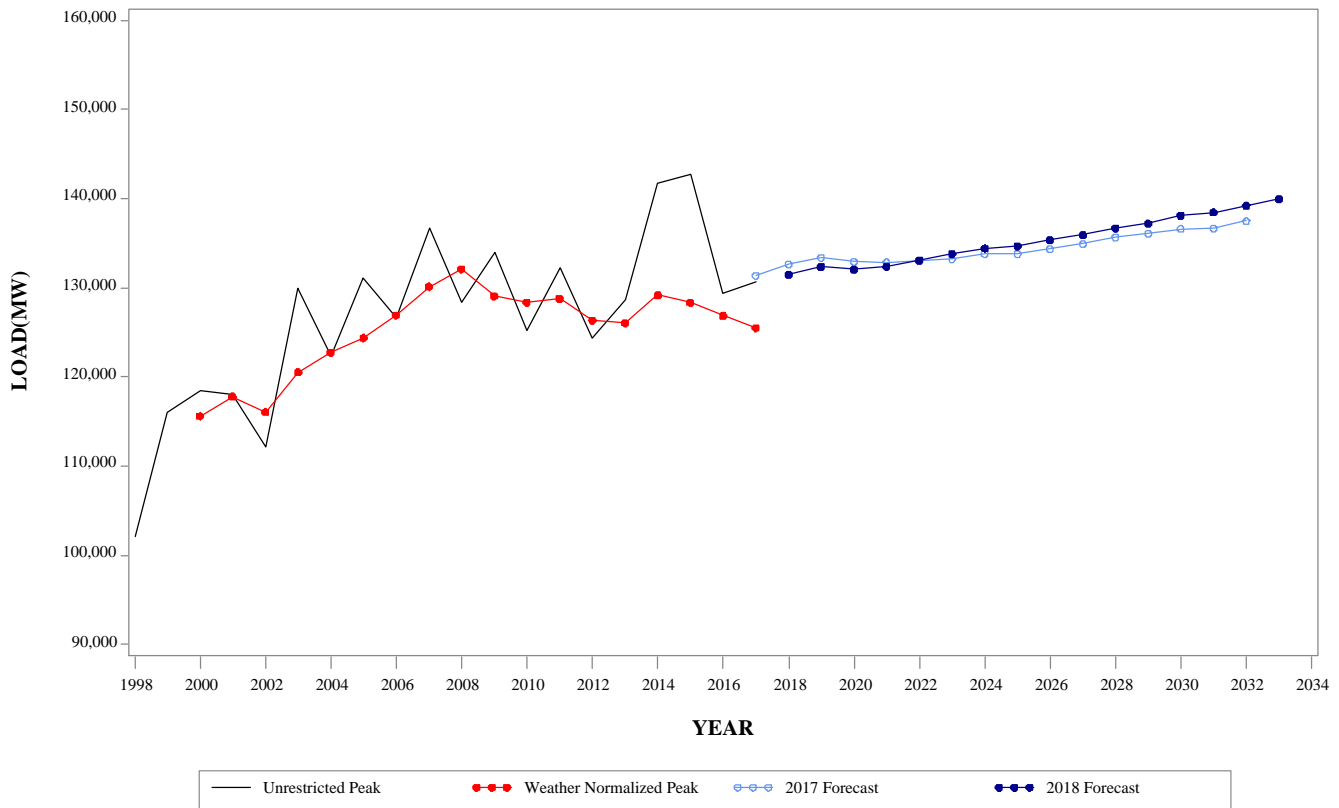
**PJM WINTER PEAK LOAD GROWTH RATE  
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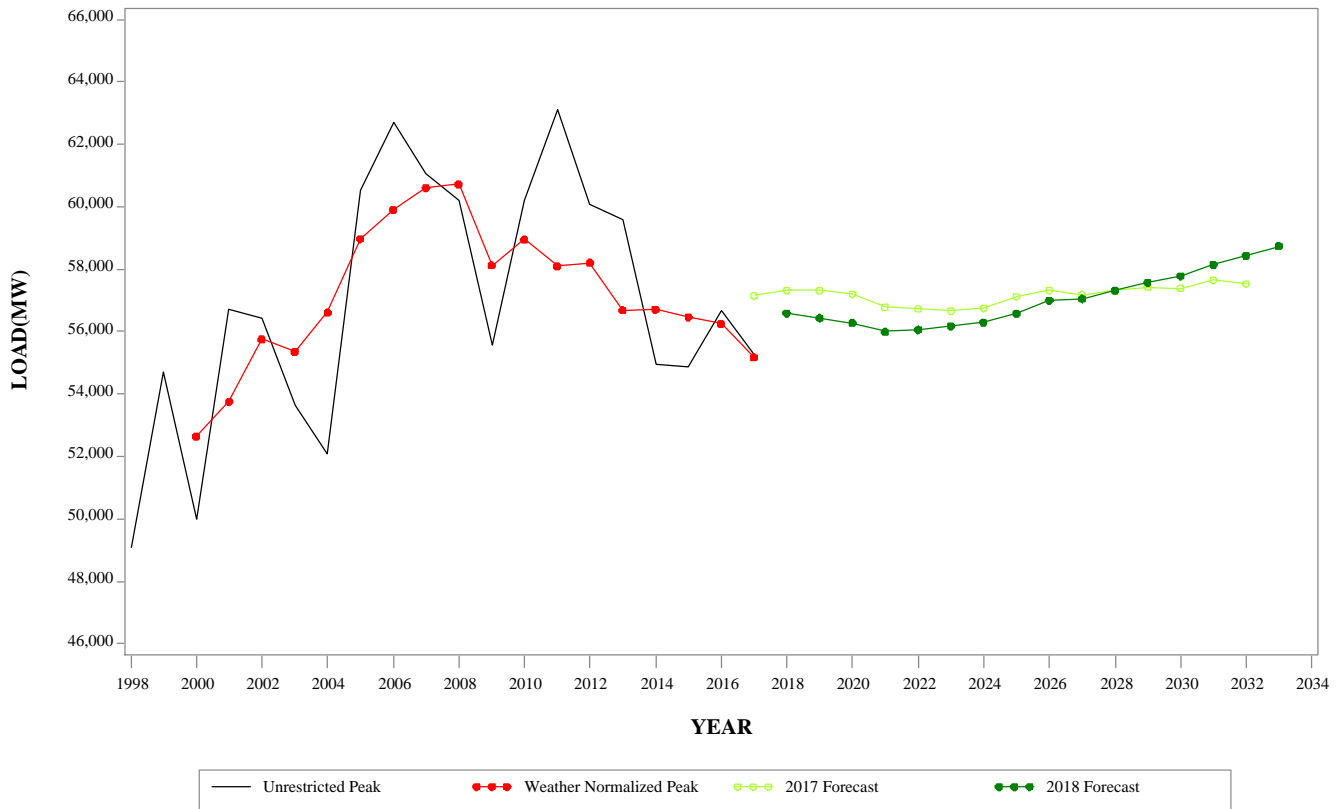
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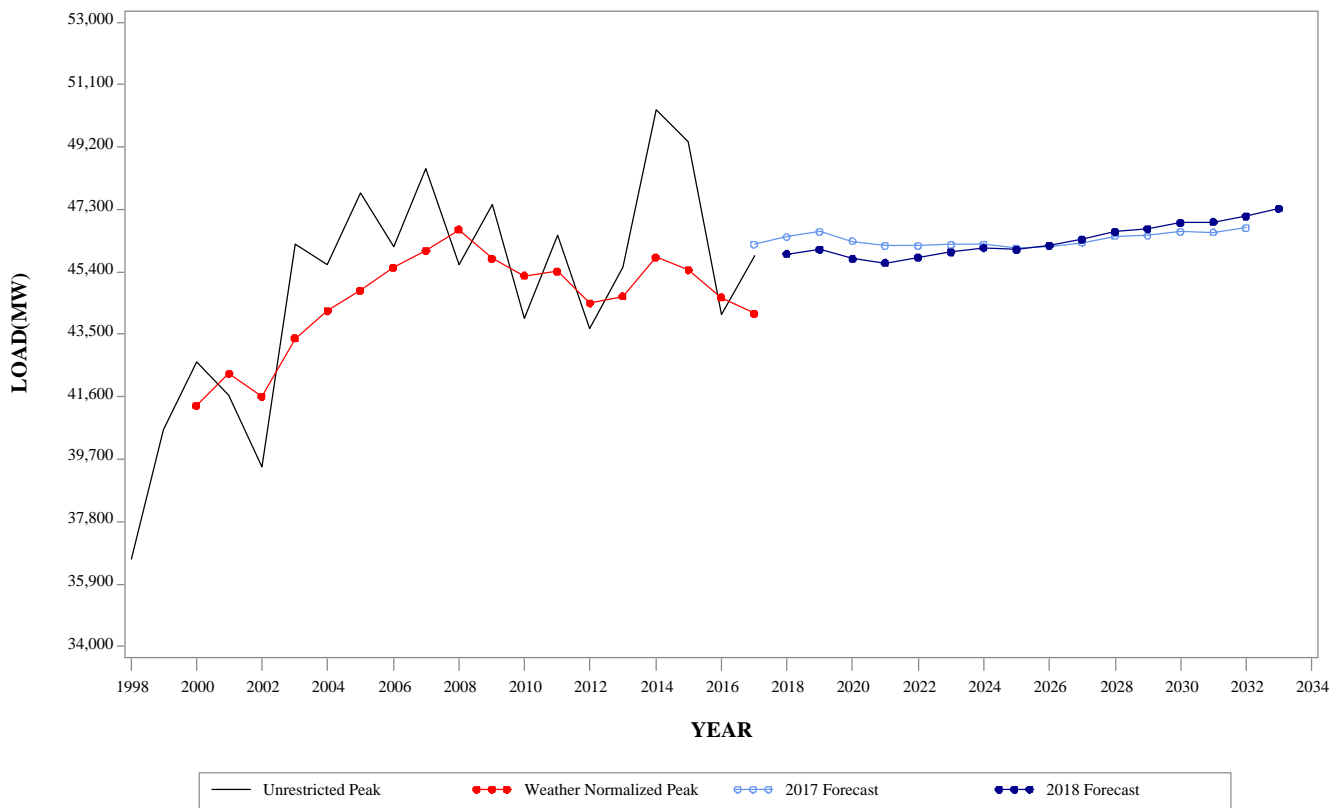
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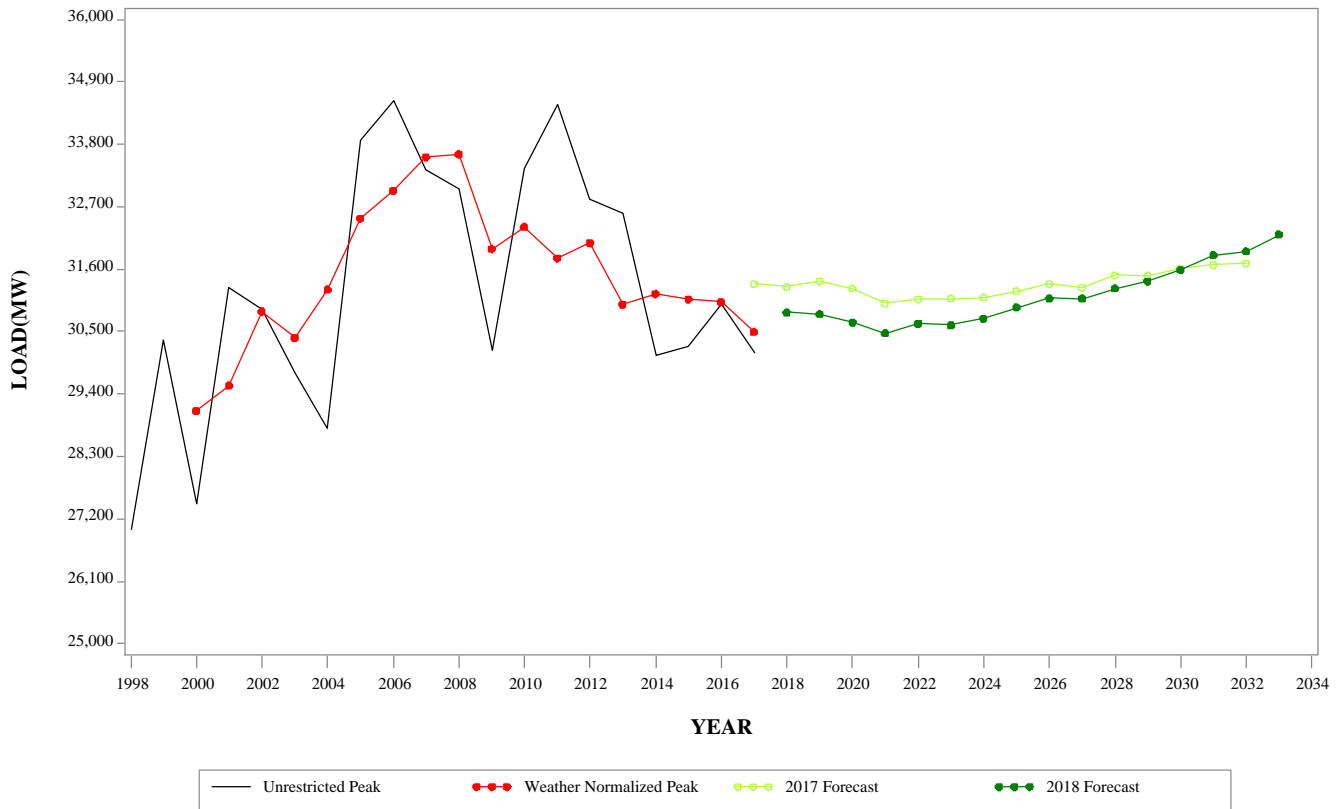
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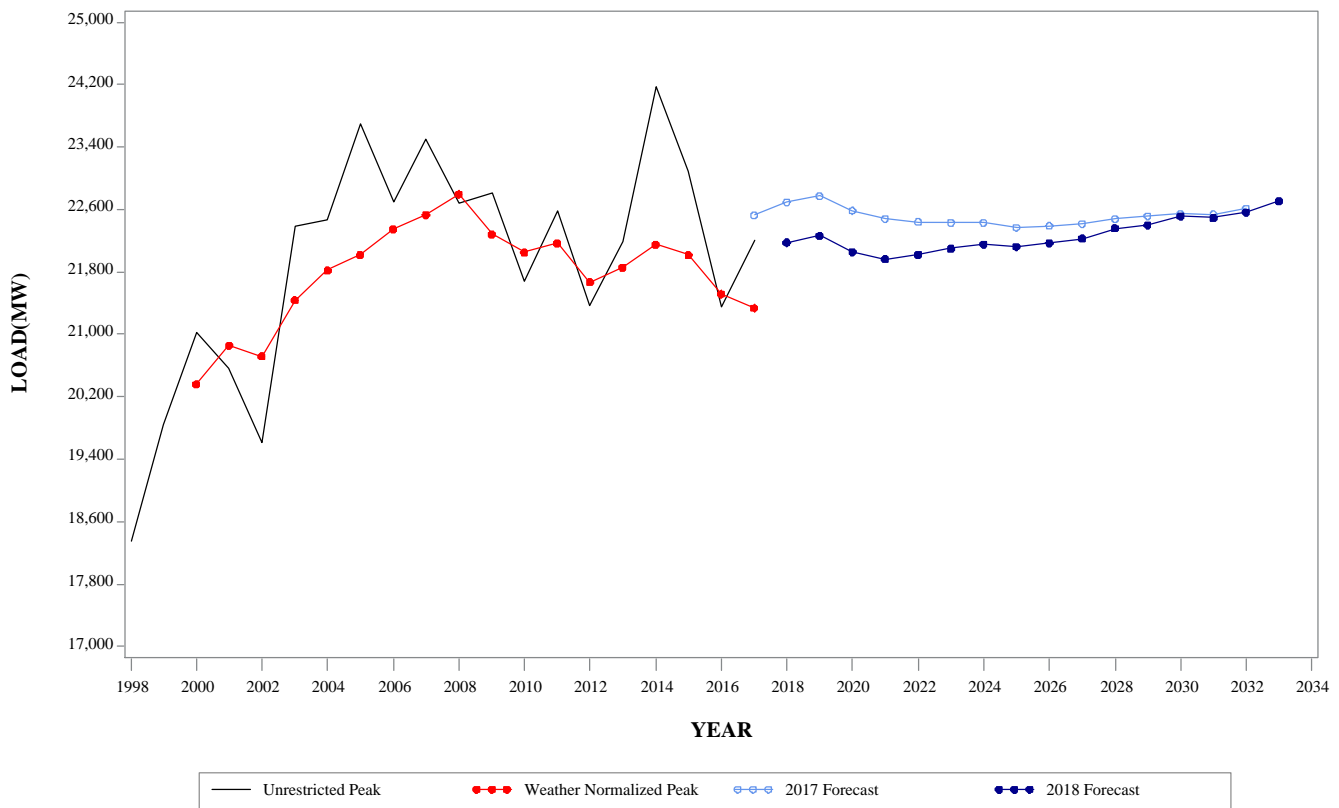
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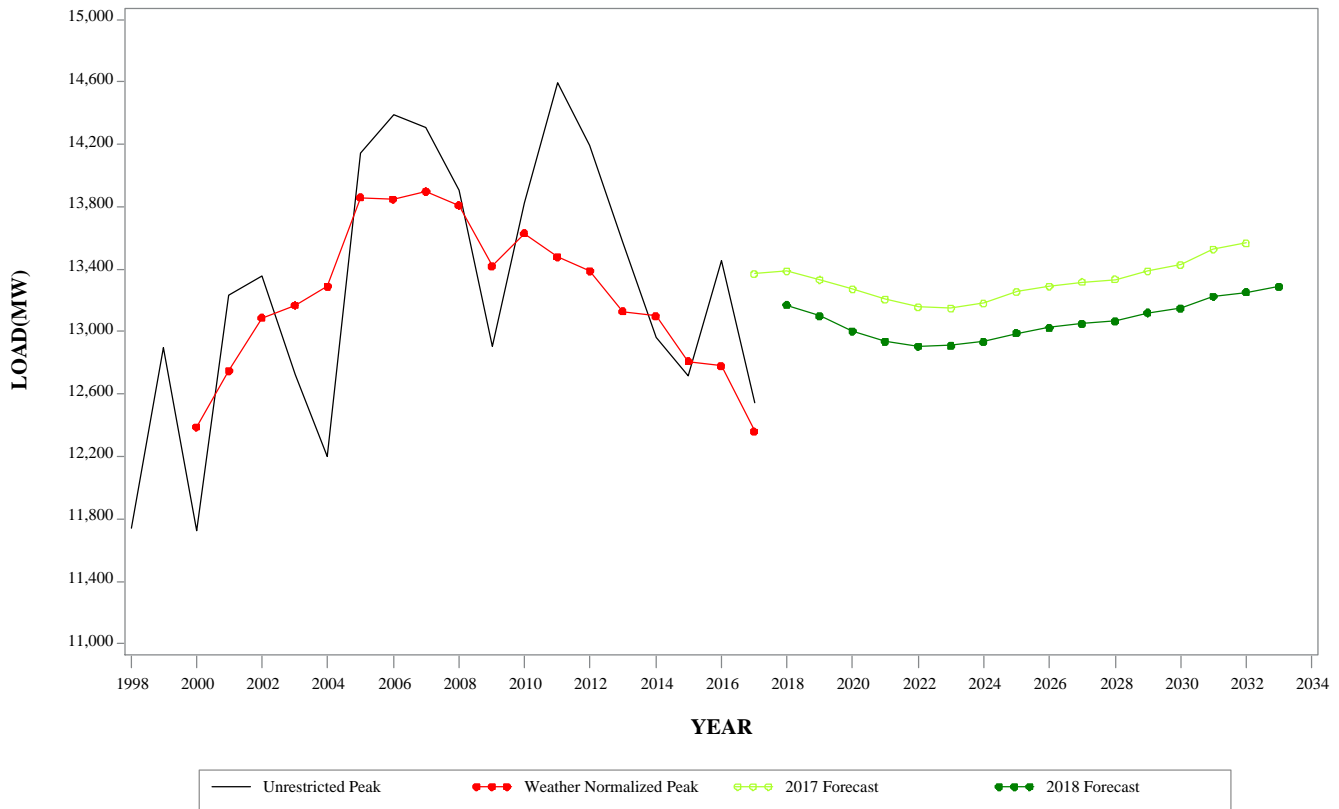
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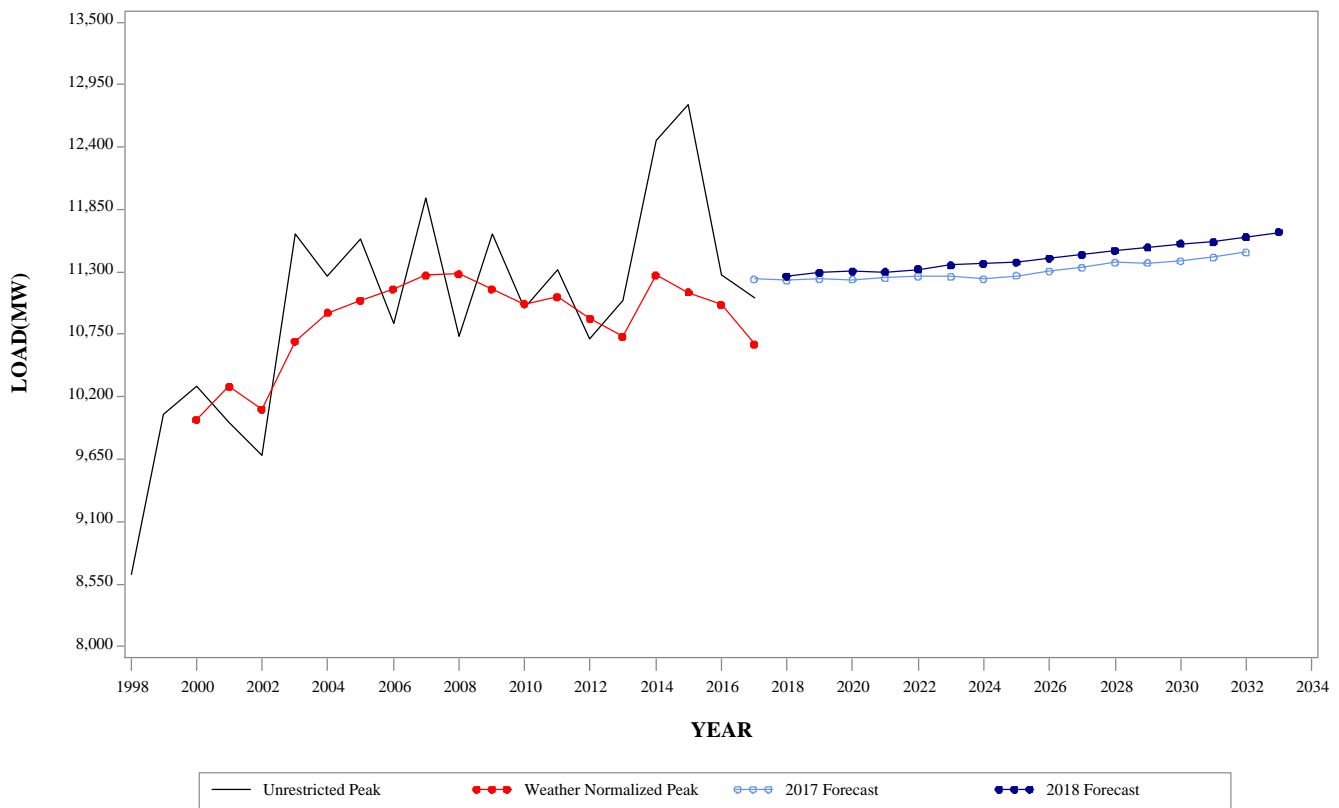
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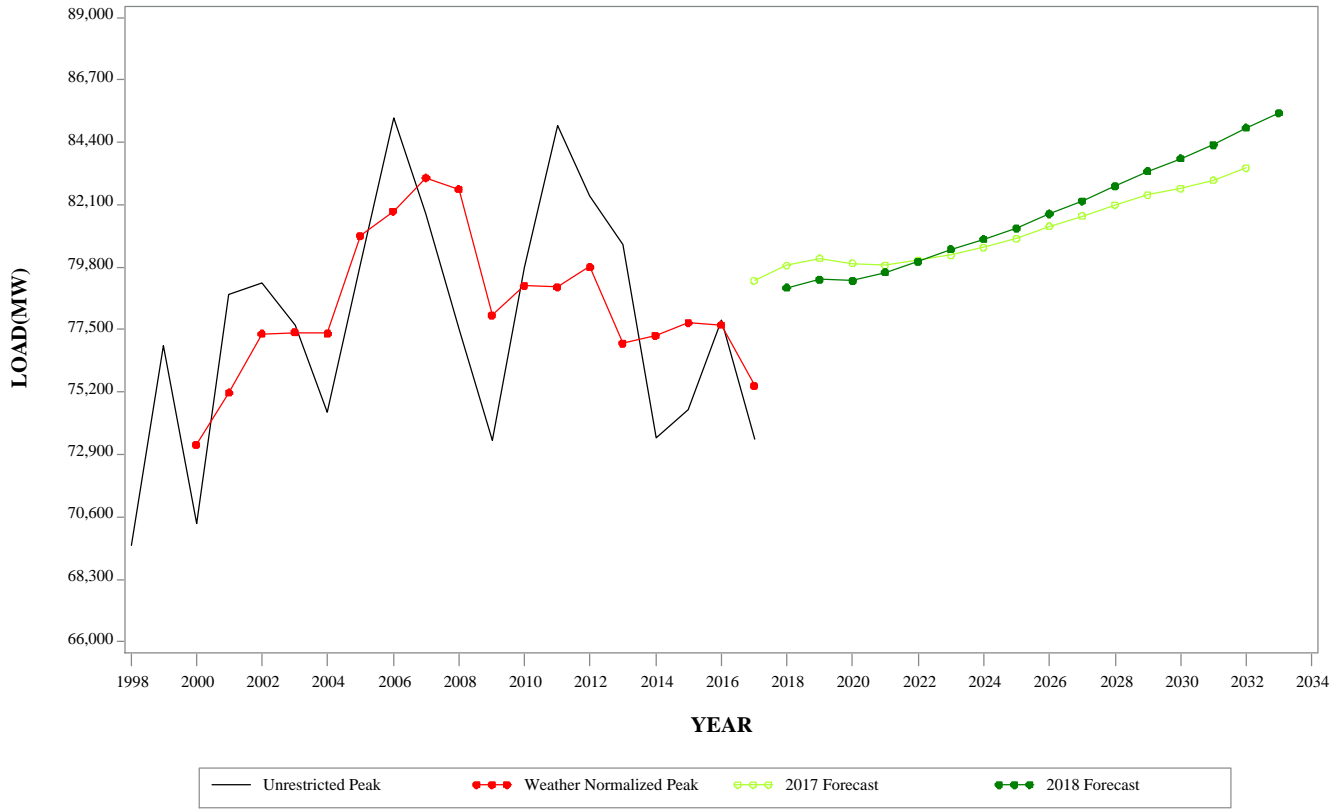
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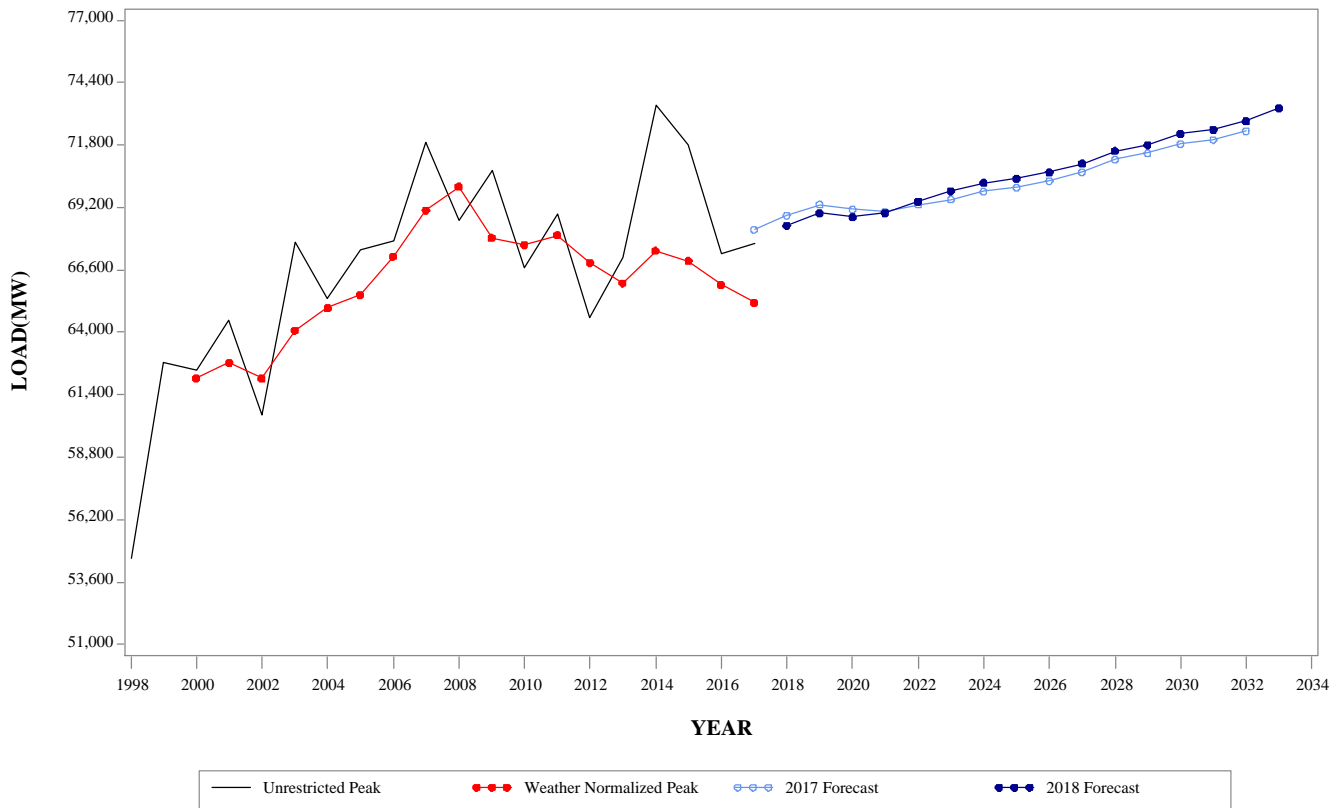
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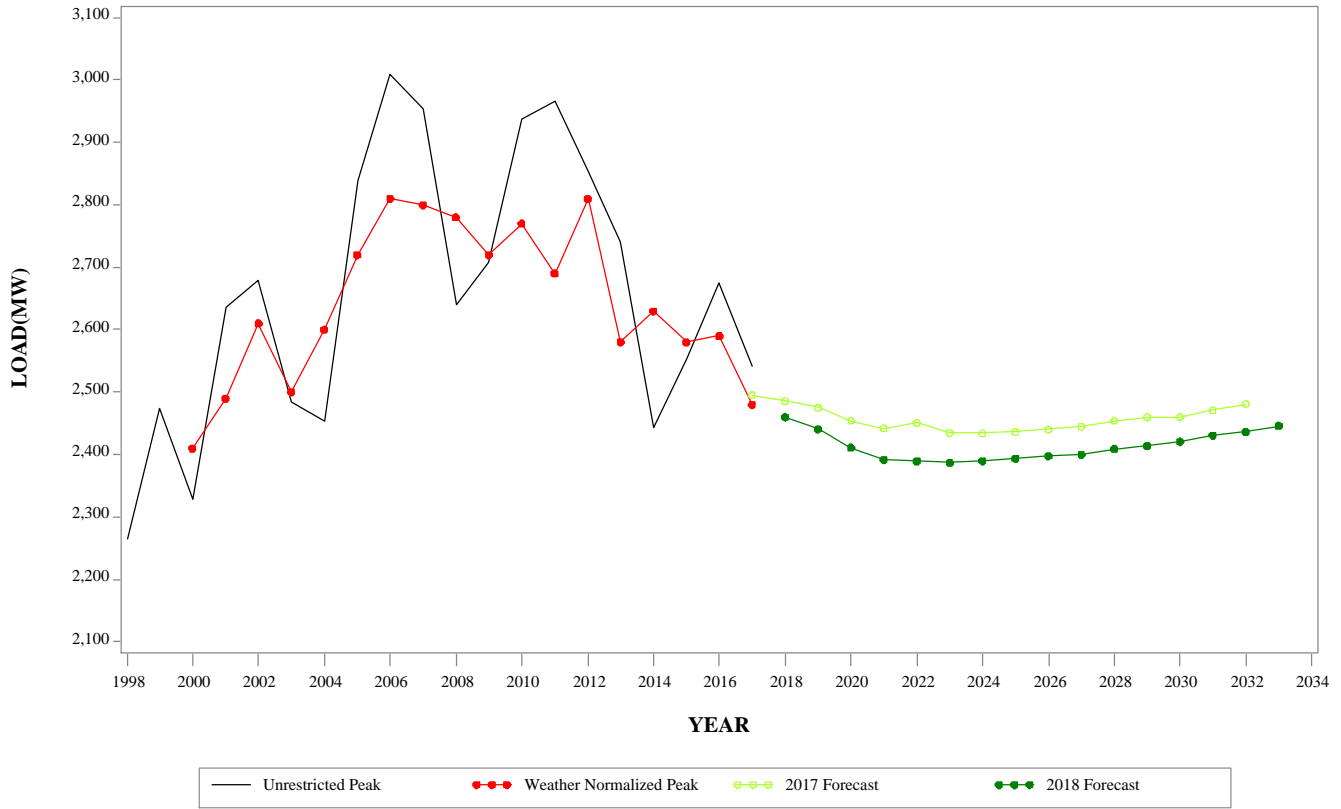
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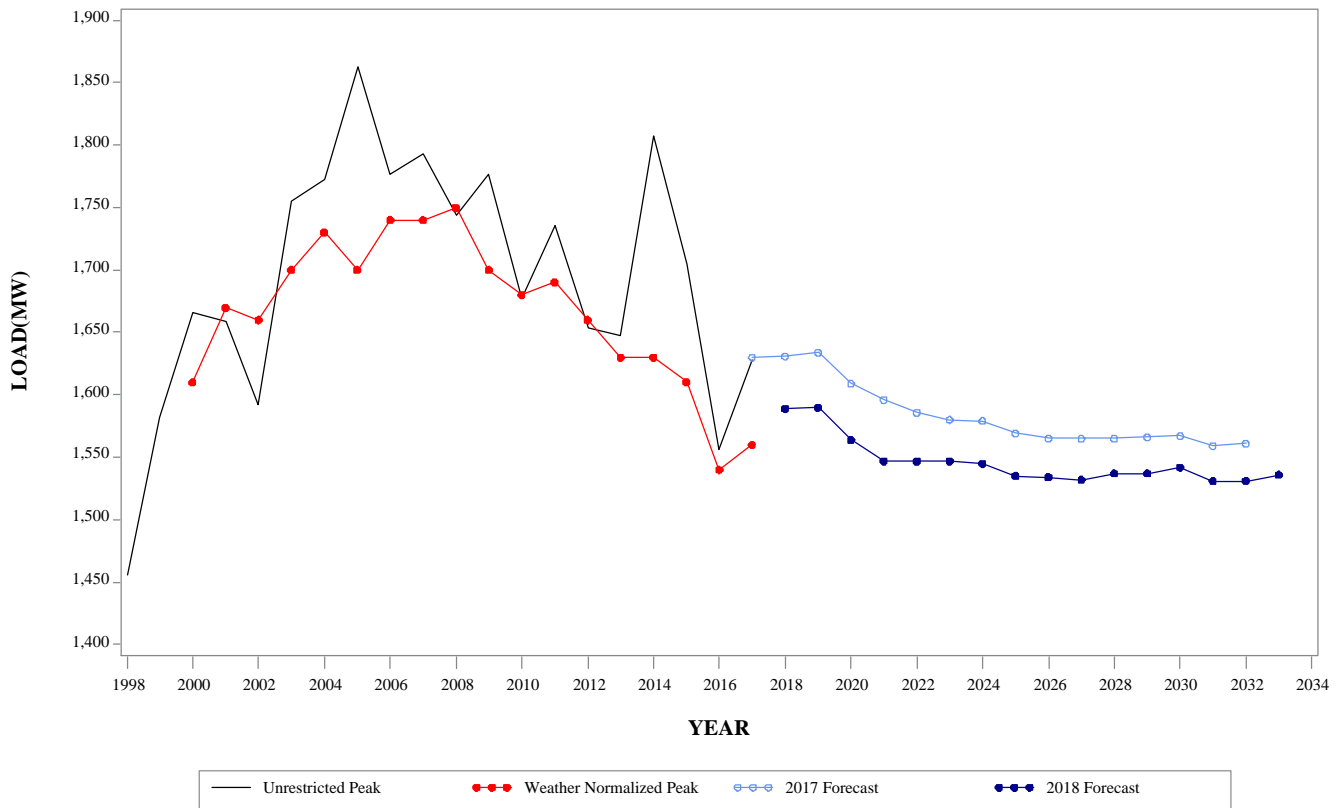
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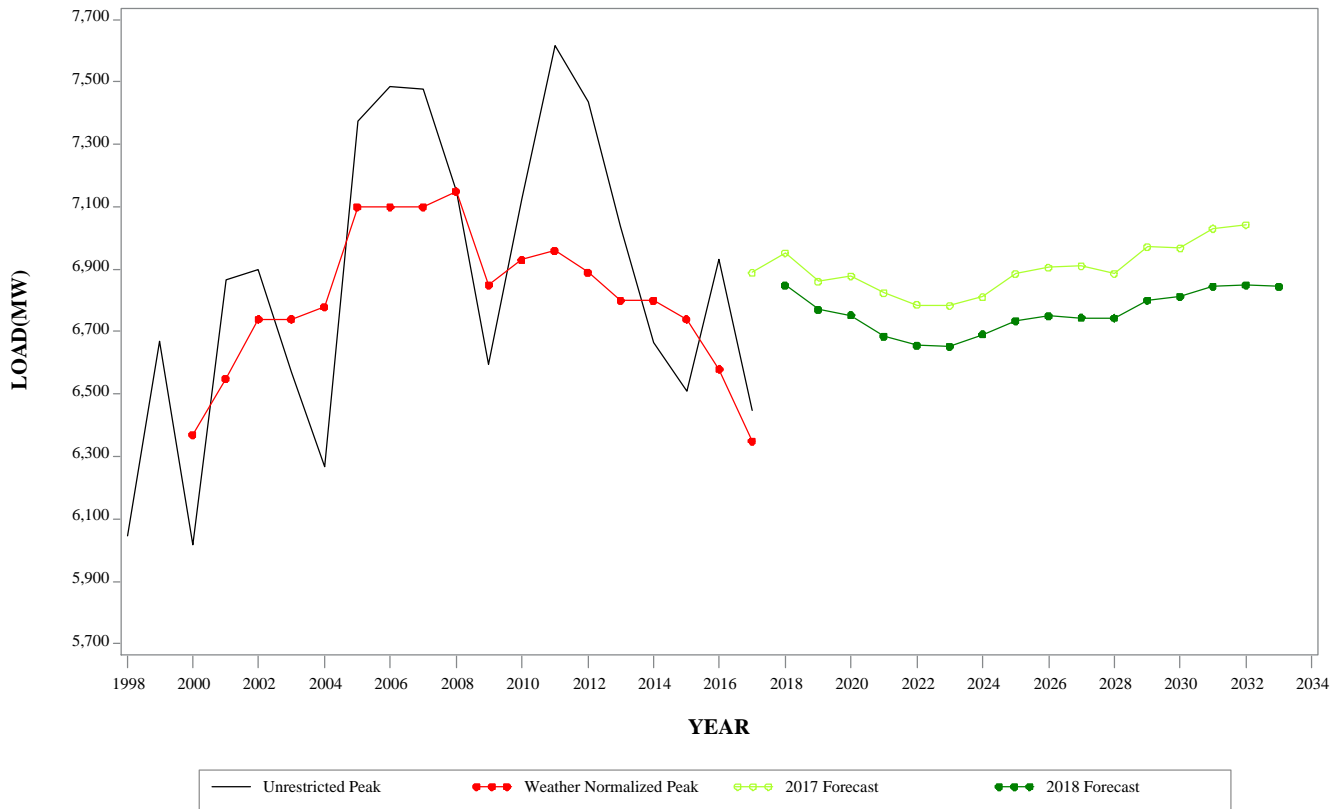


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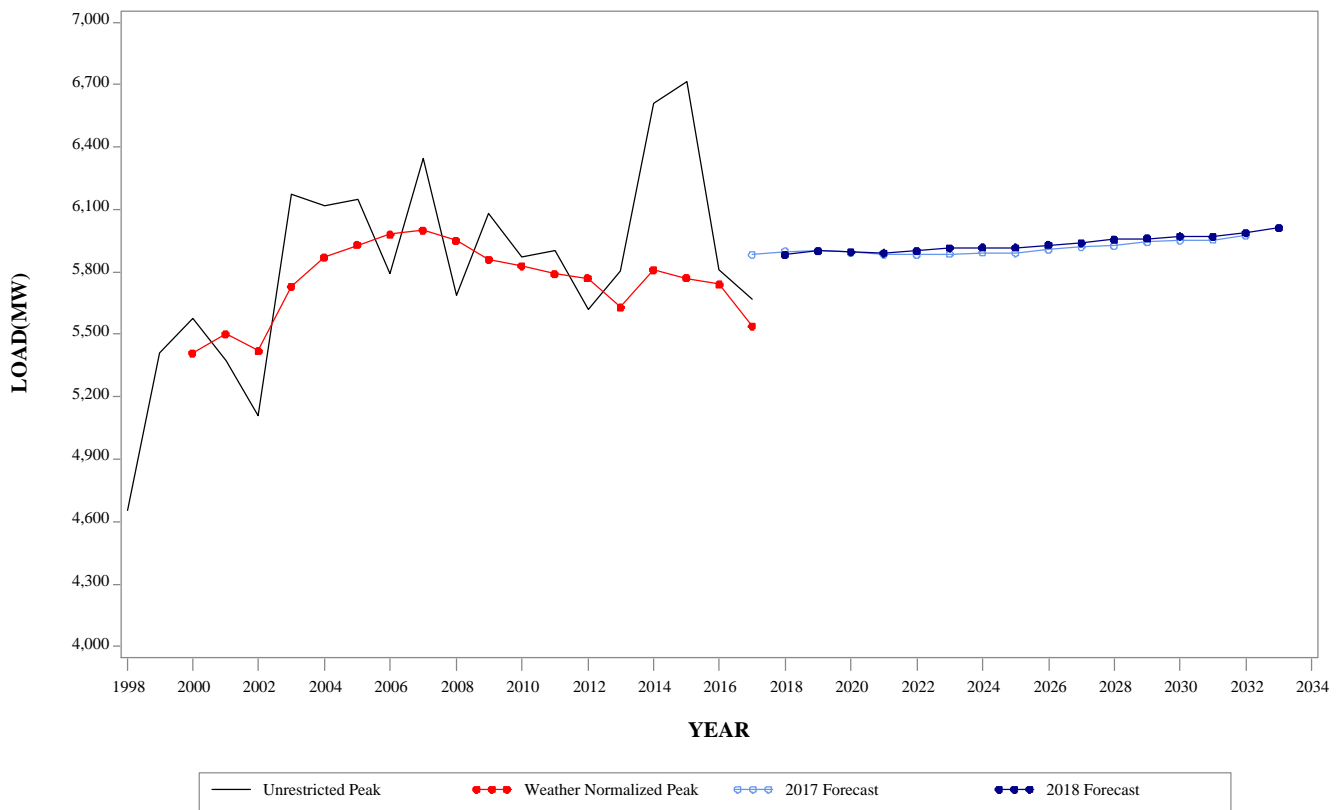




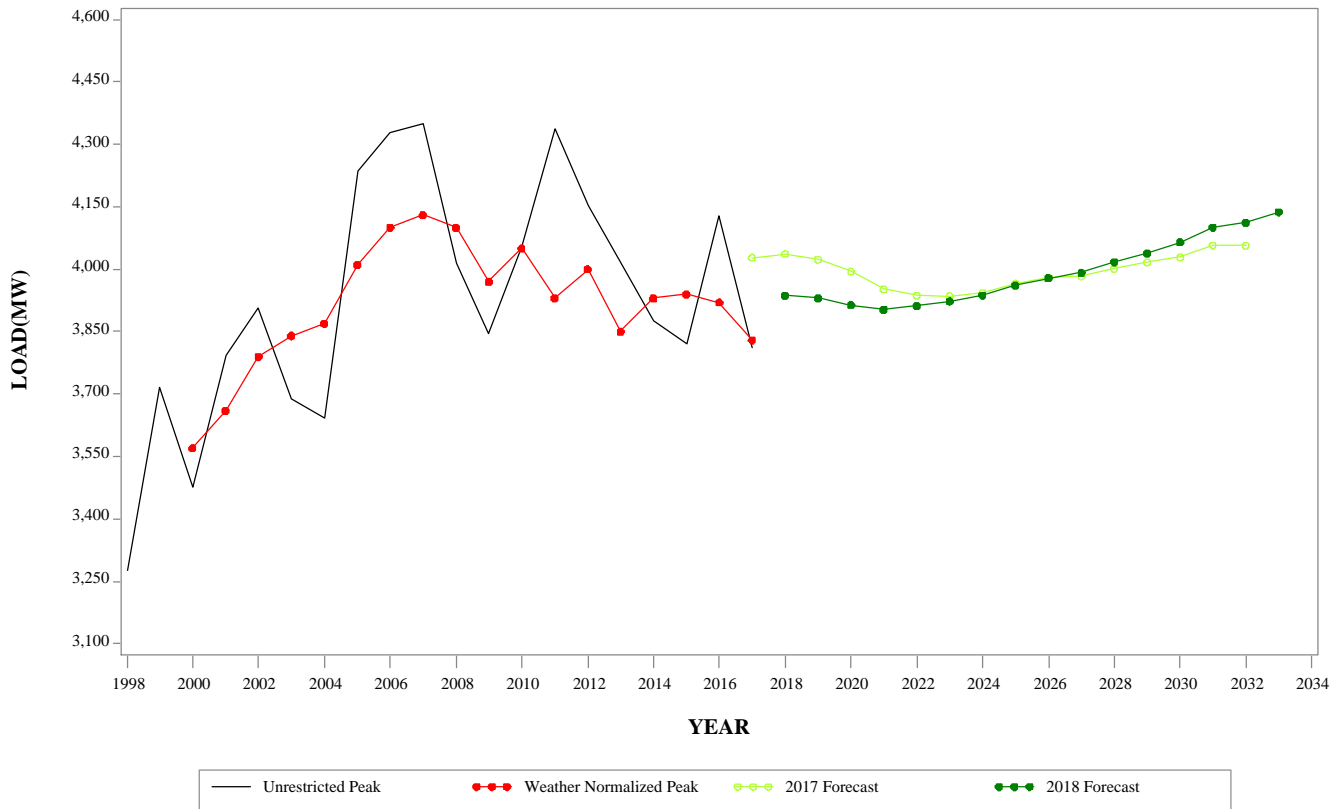
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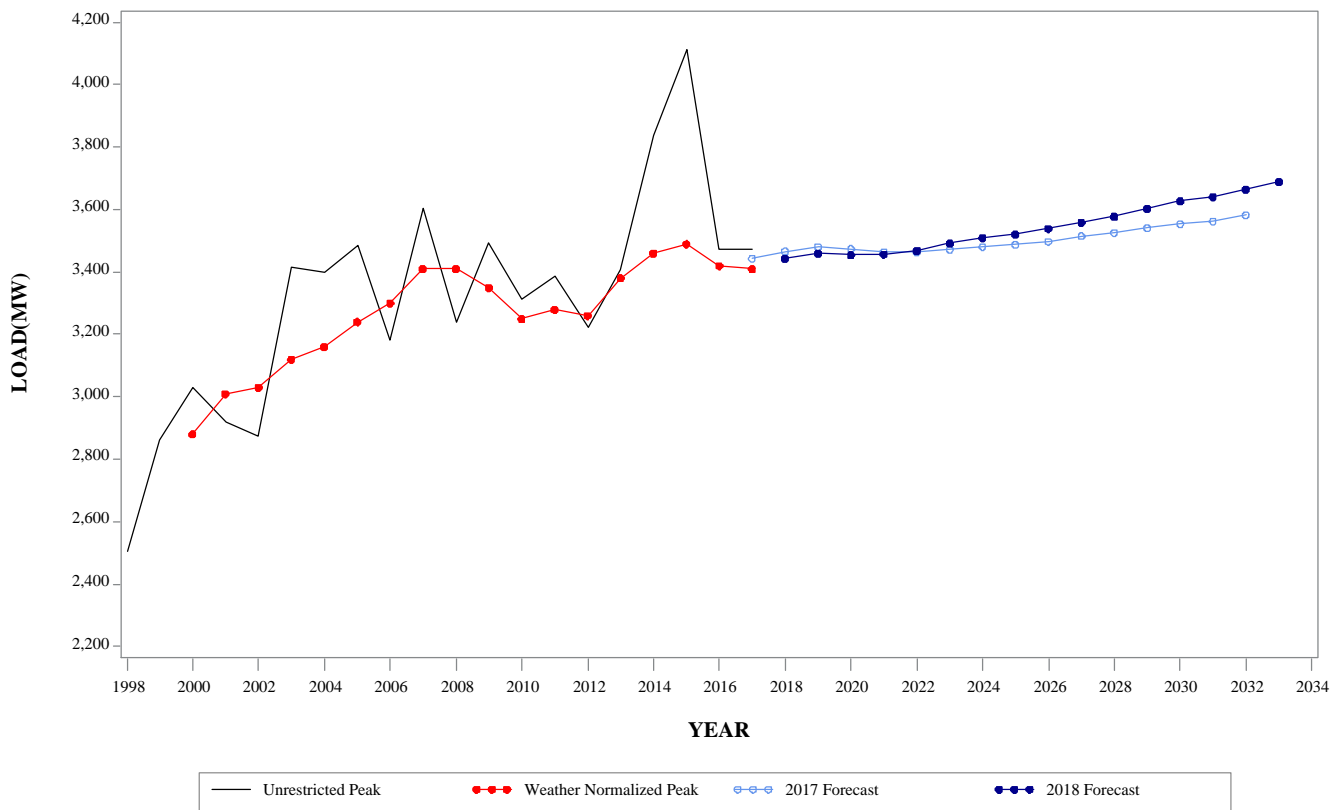
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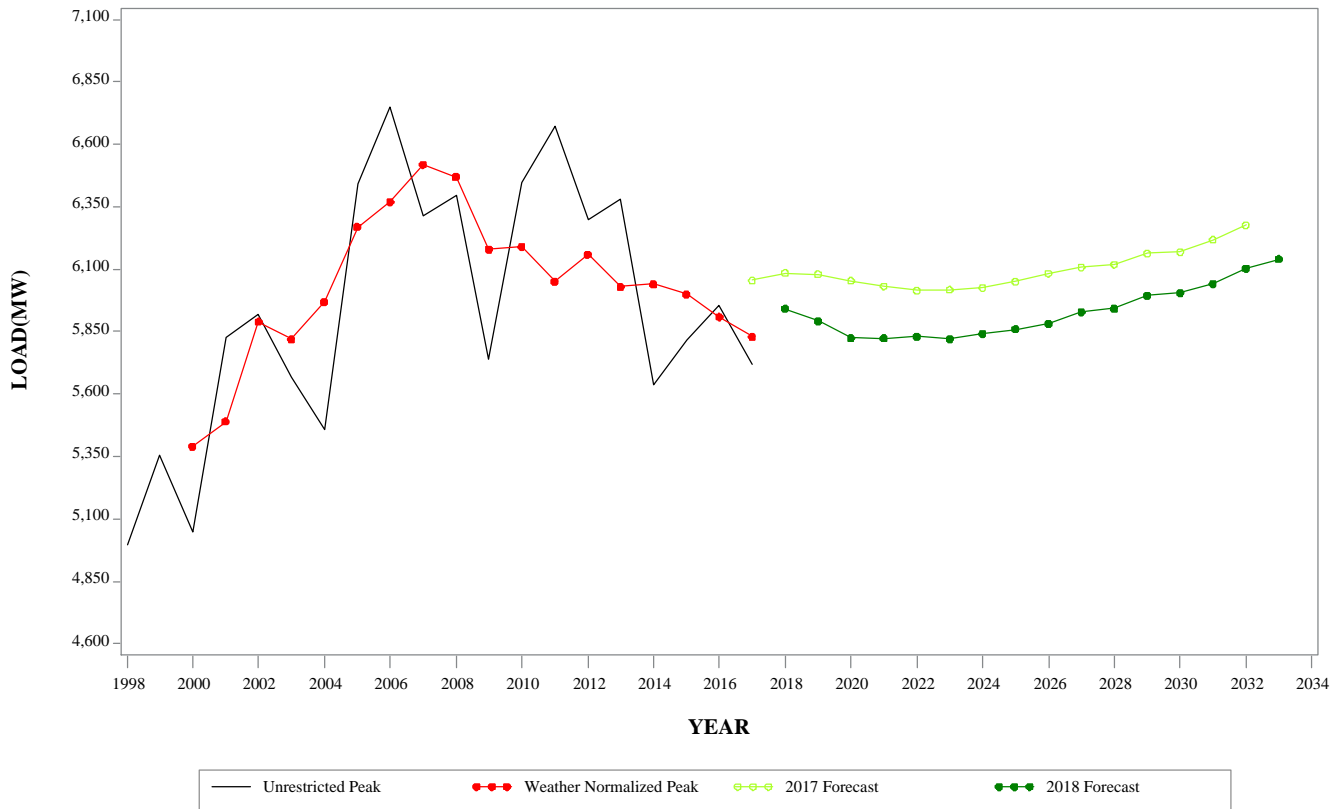
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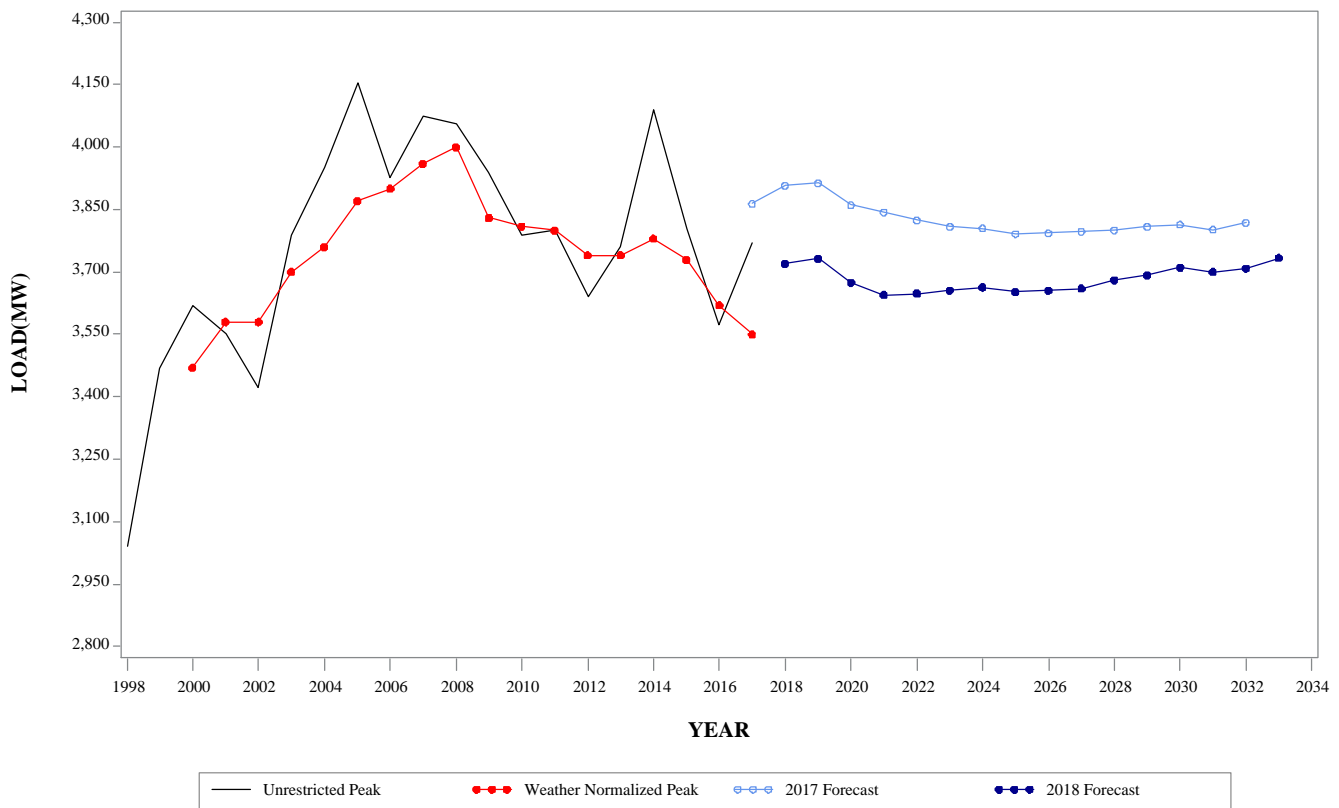
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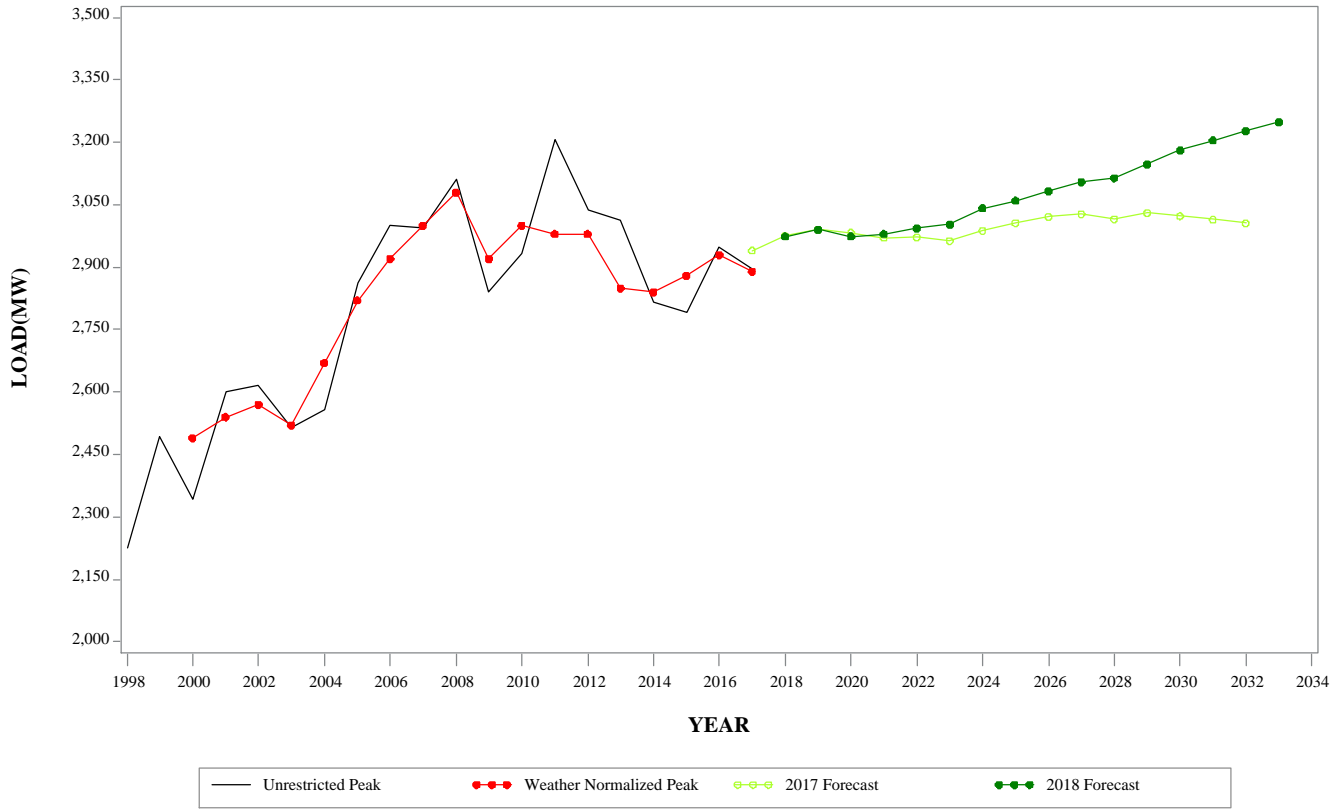
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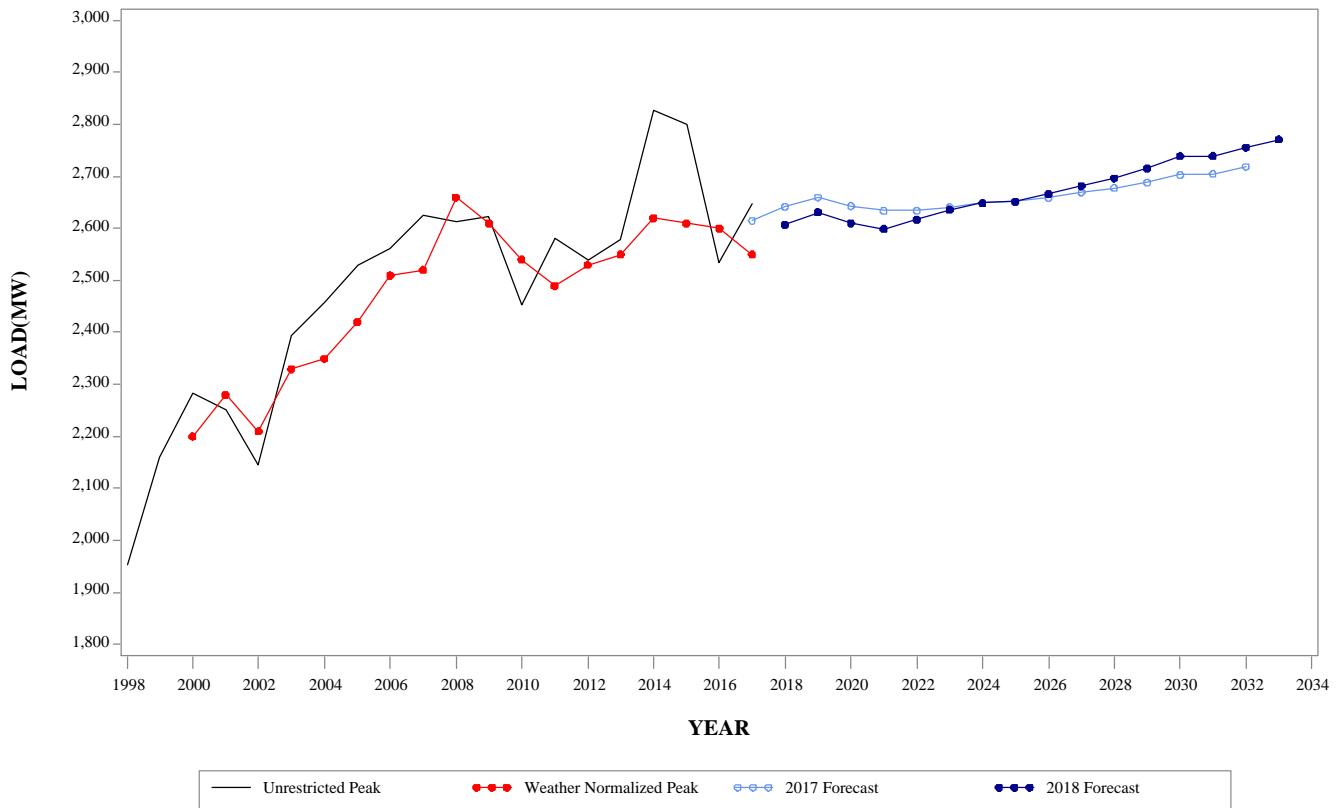
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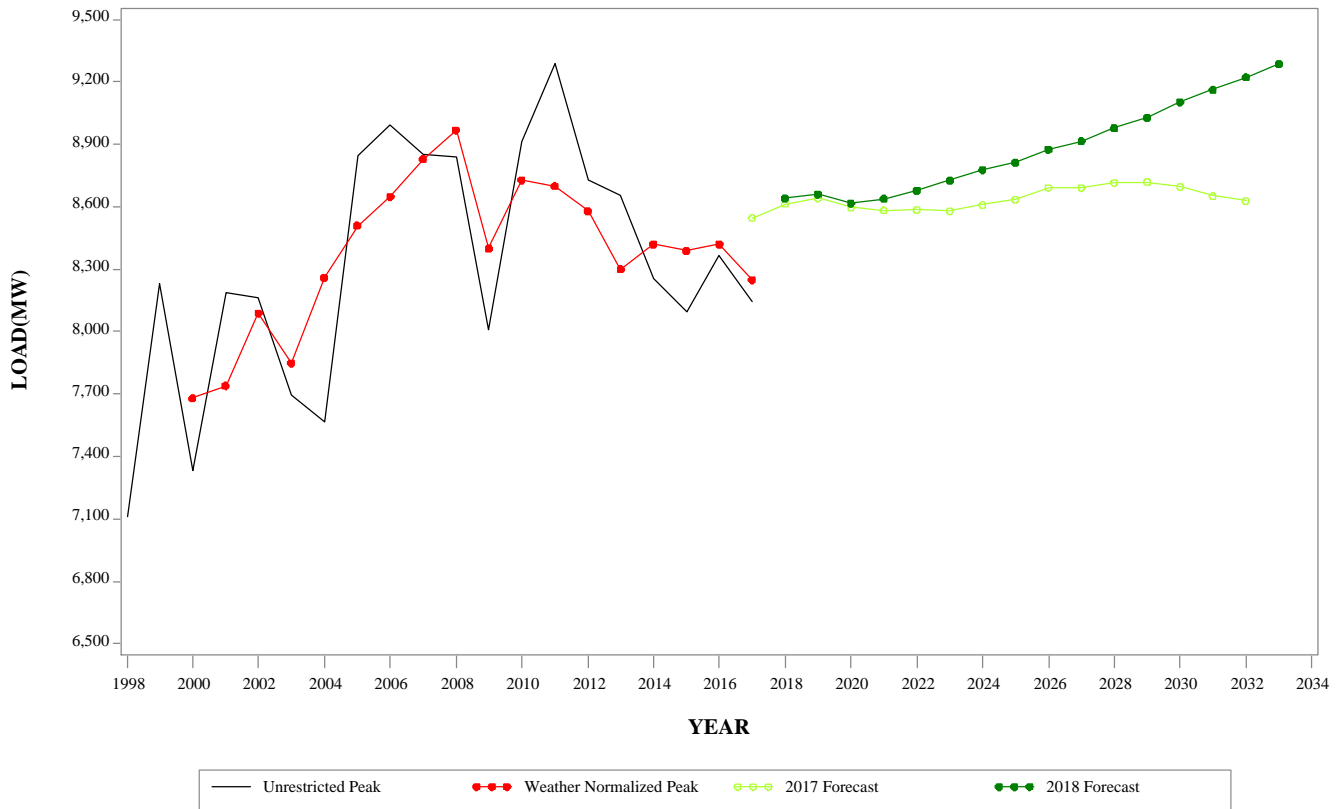
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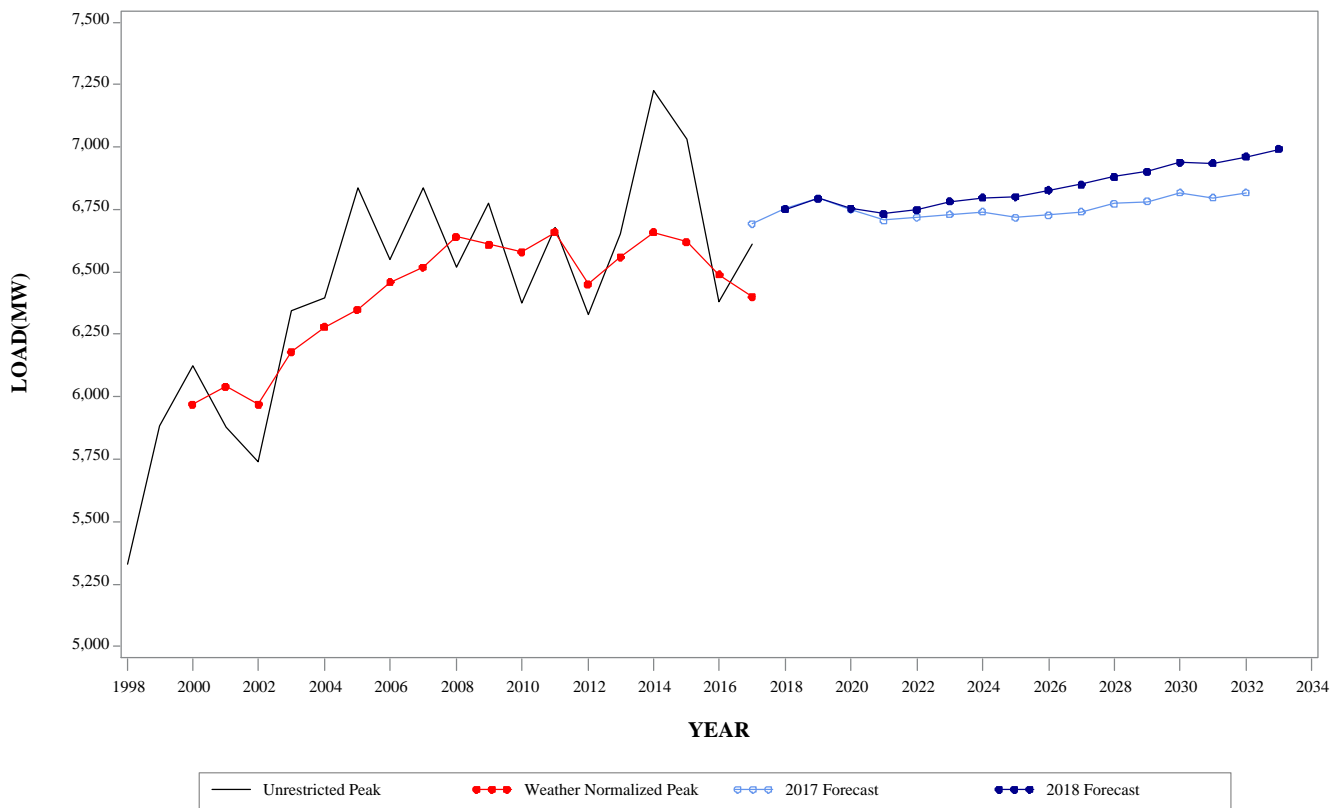
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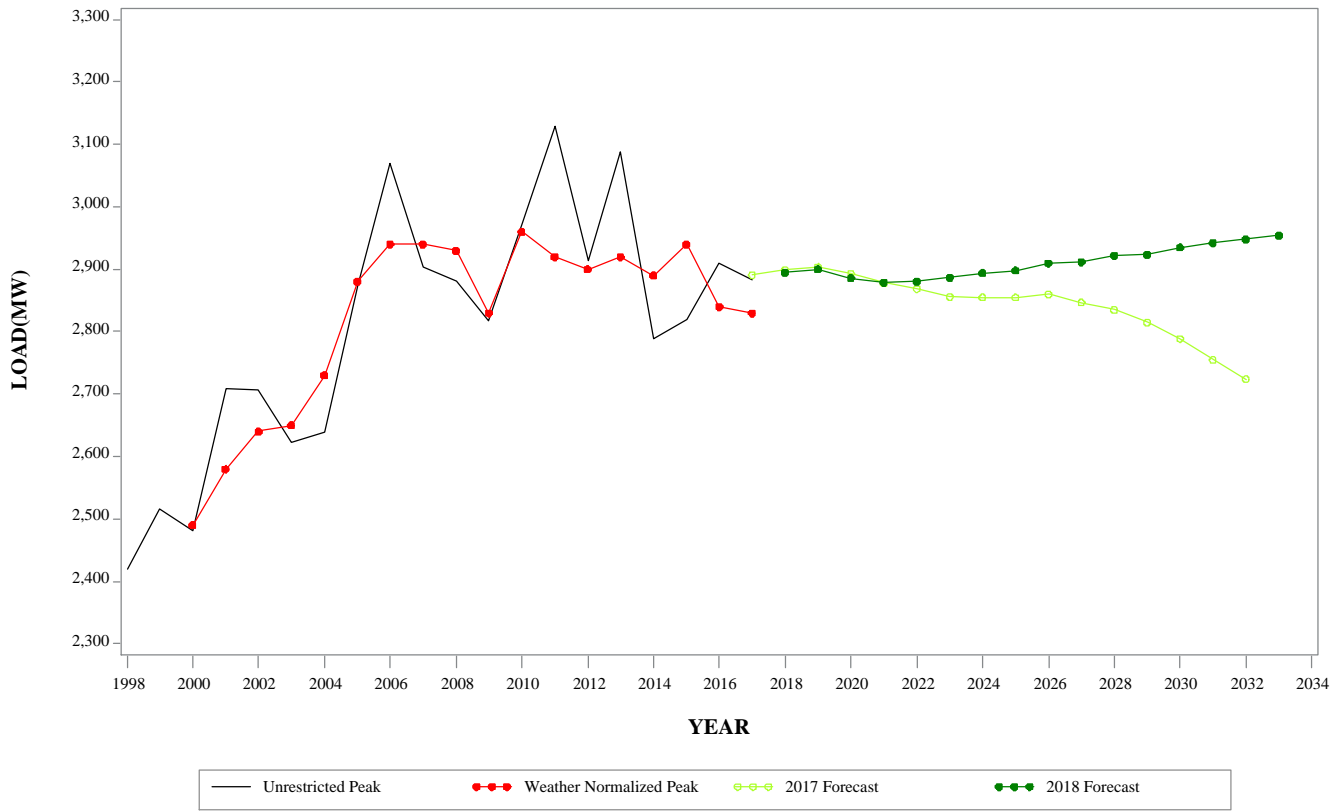
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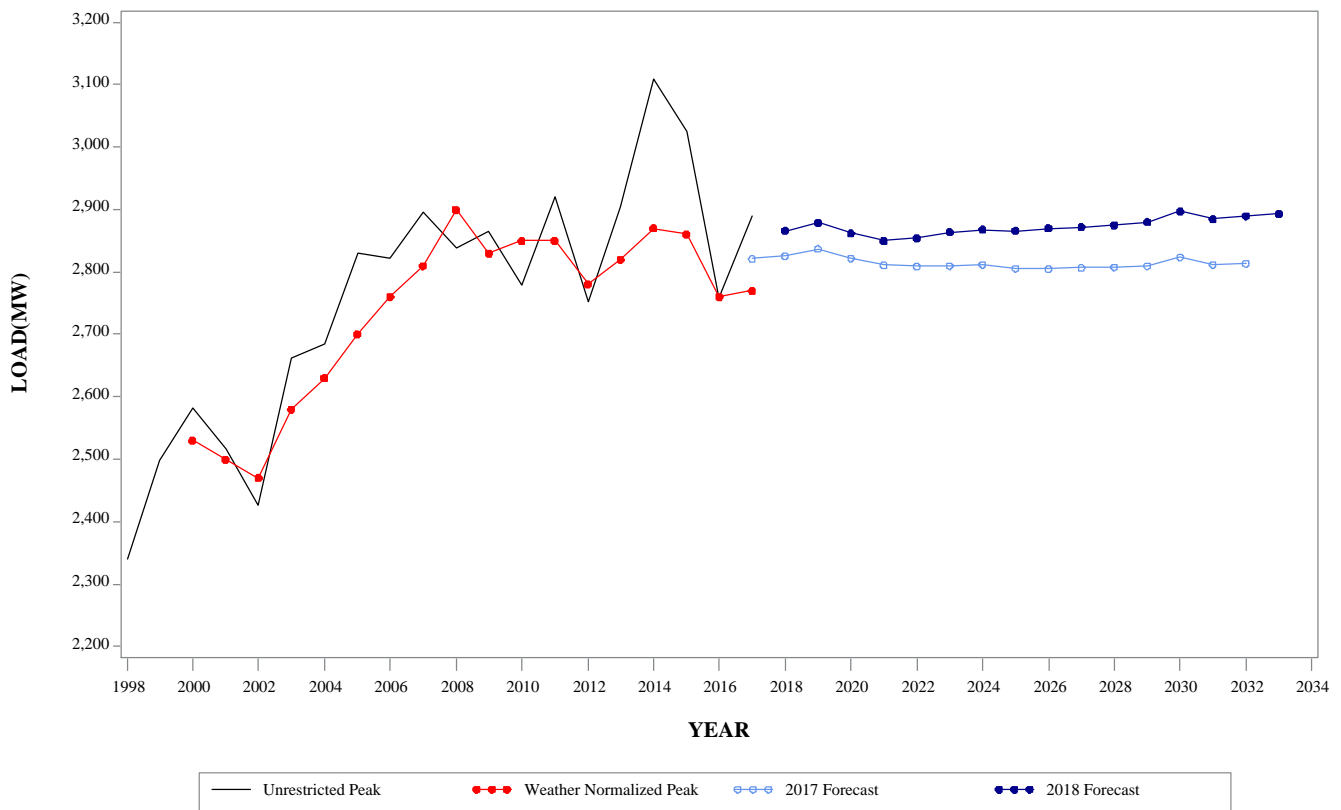
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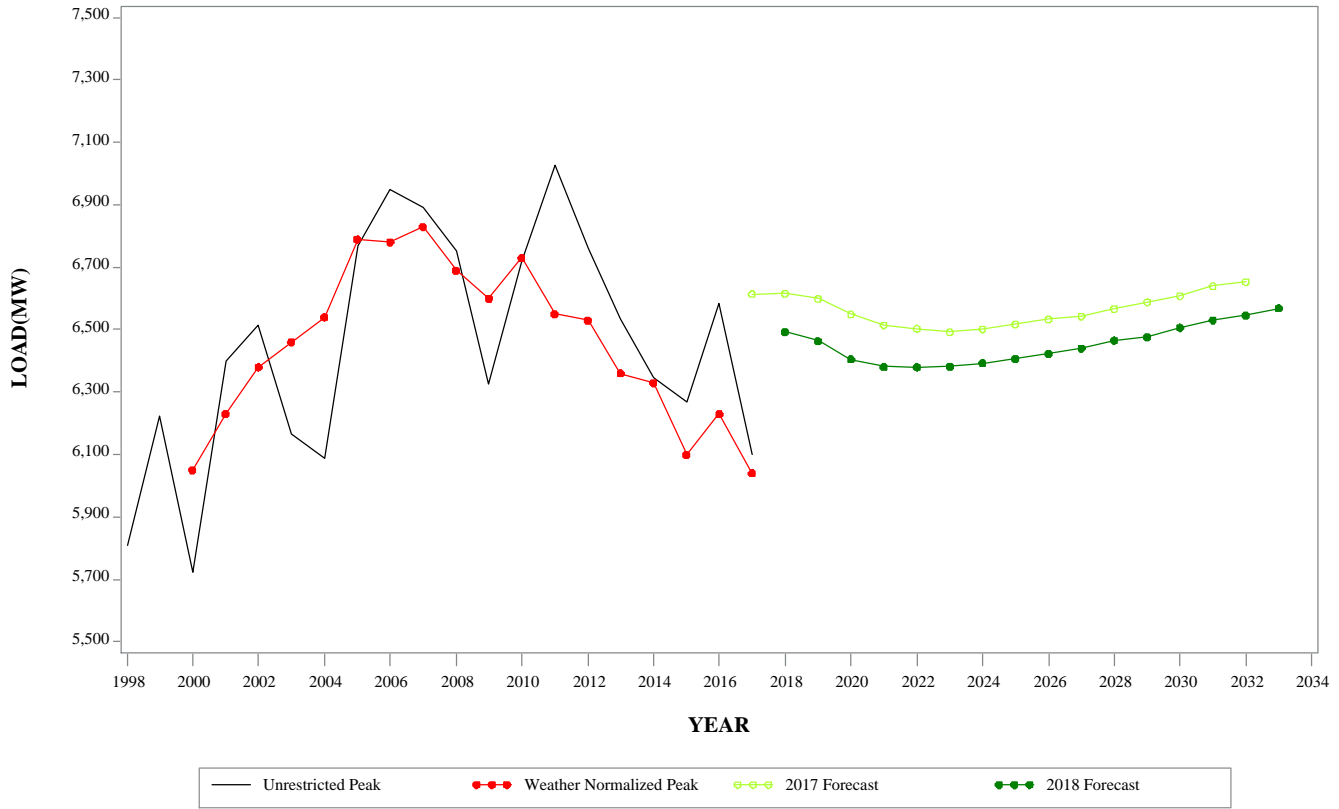
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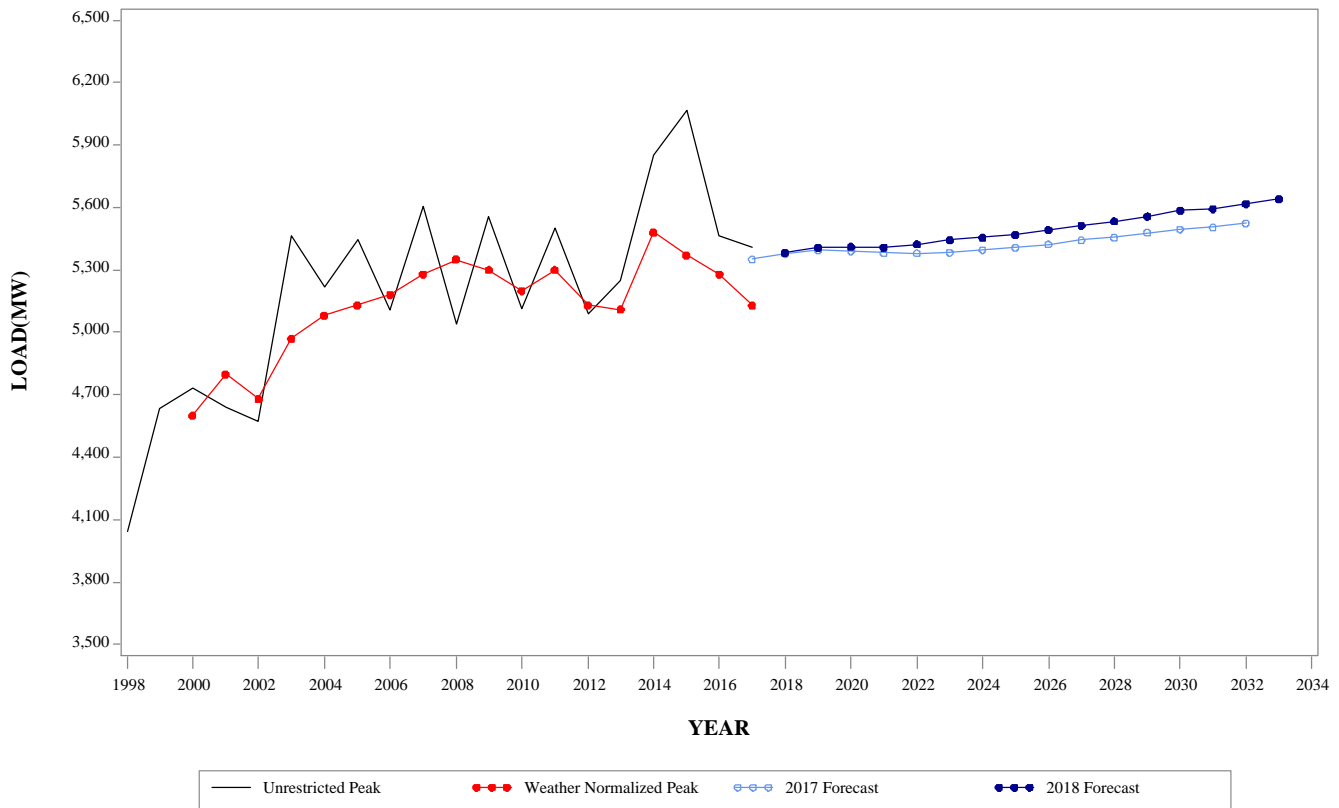
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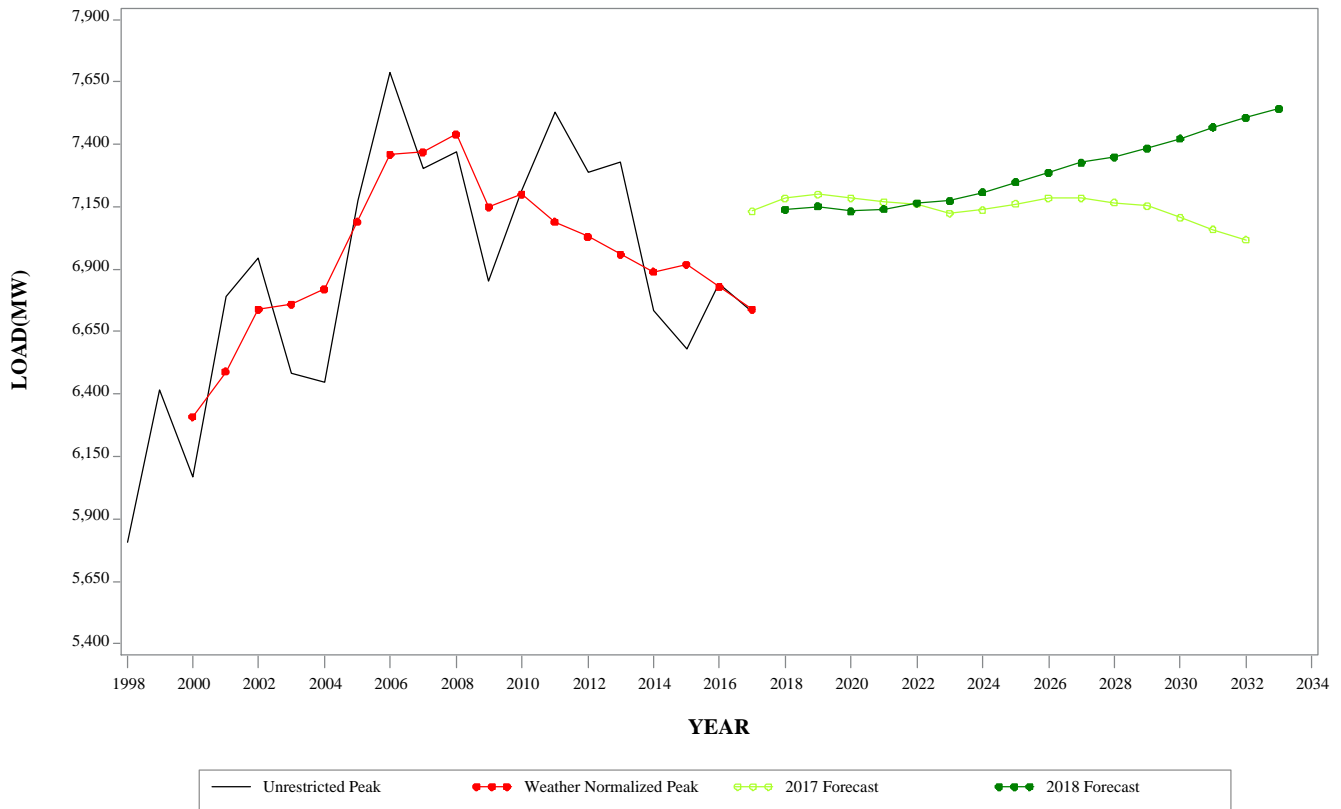
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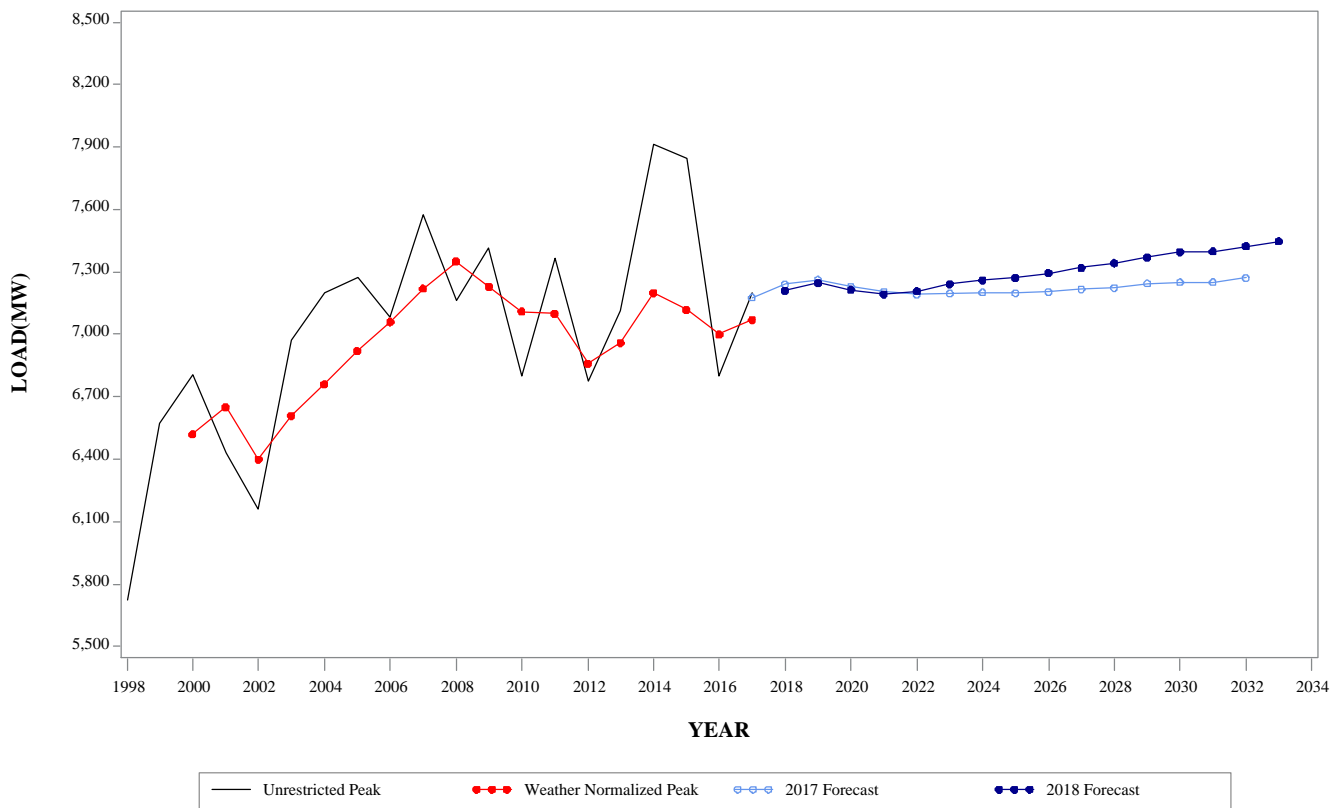
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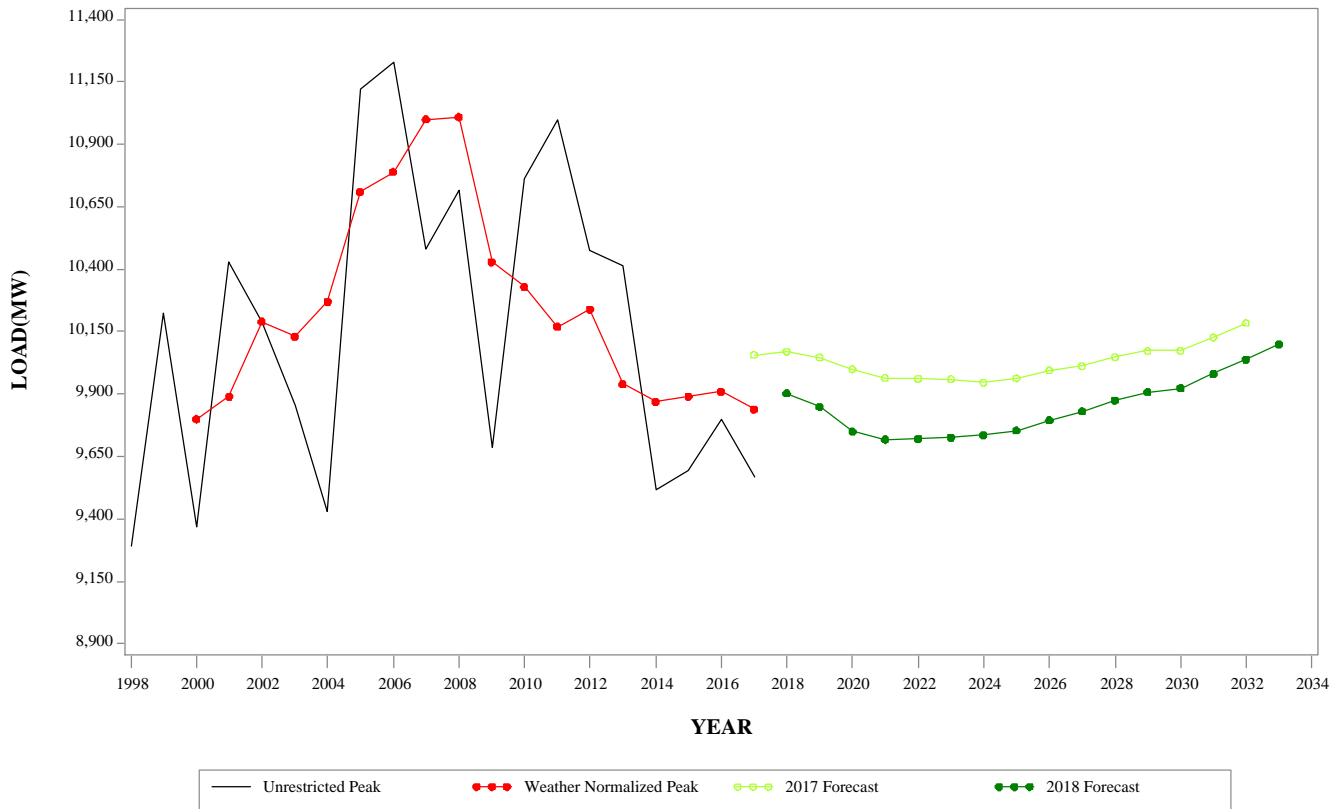


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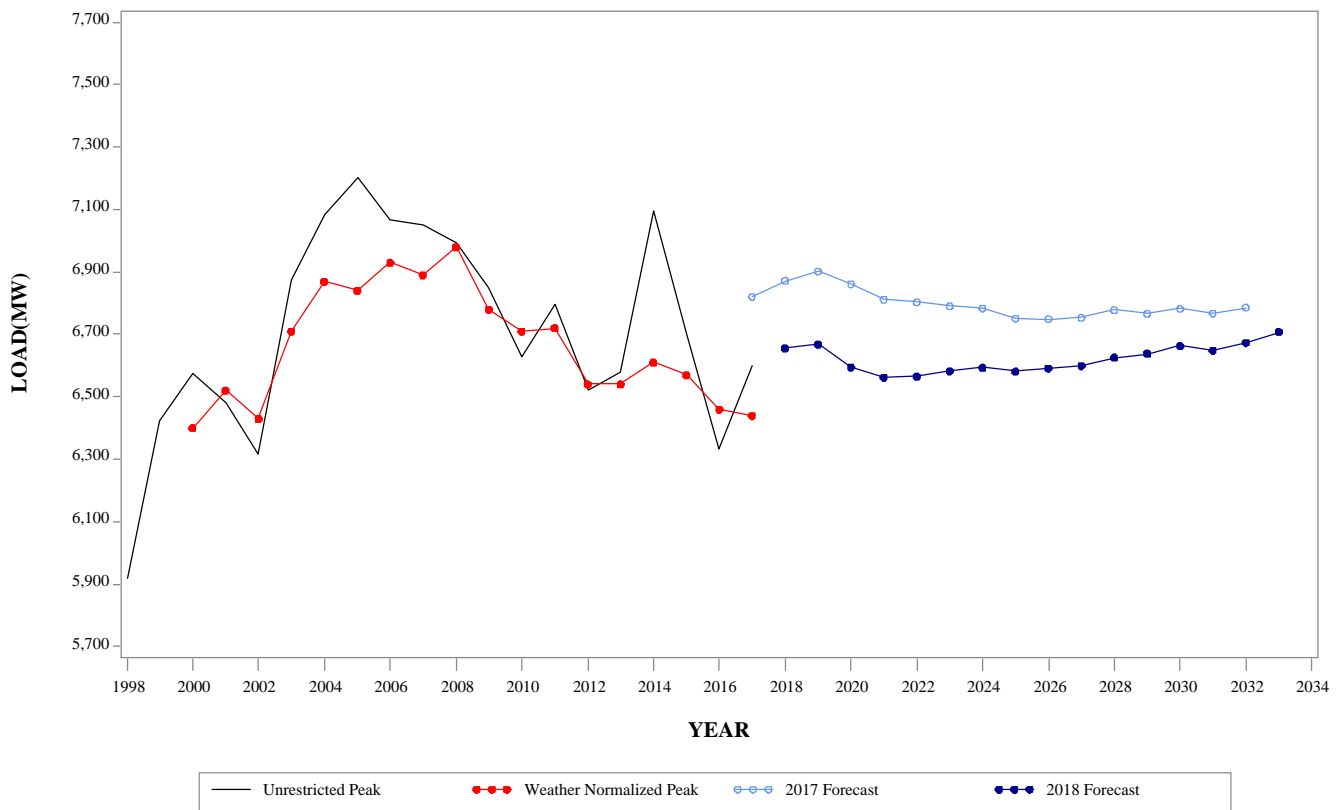




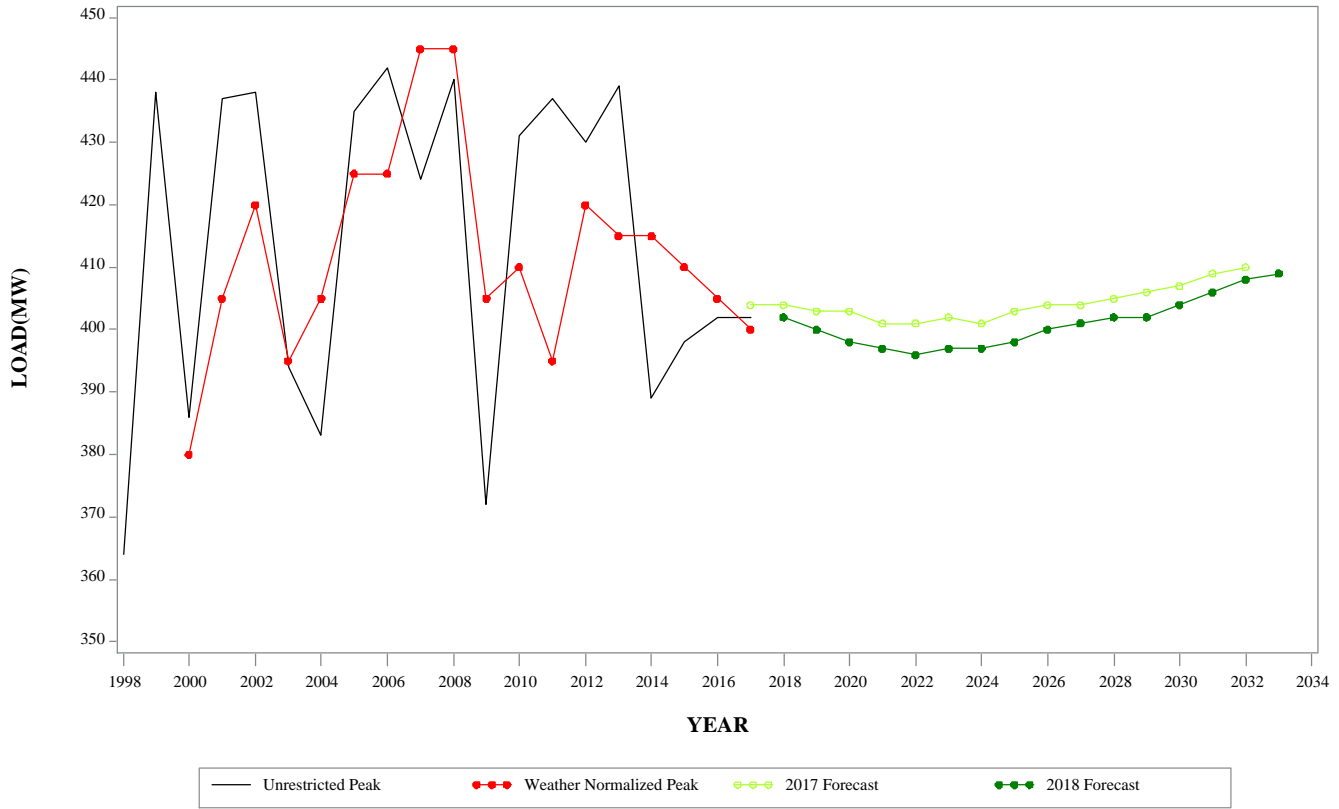
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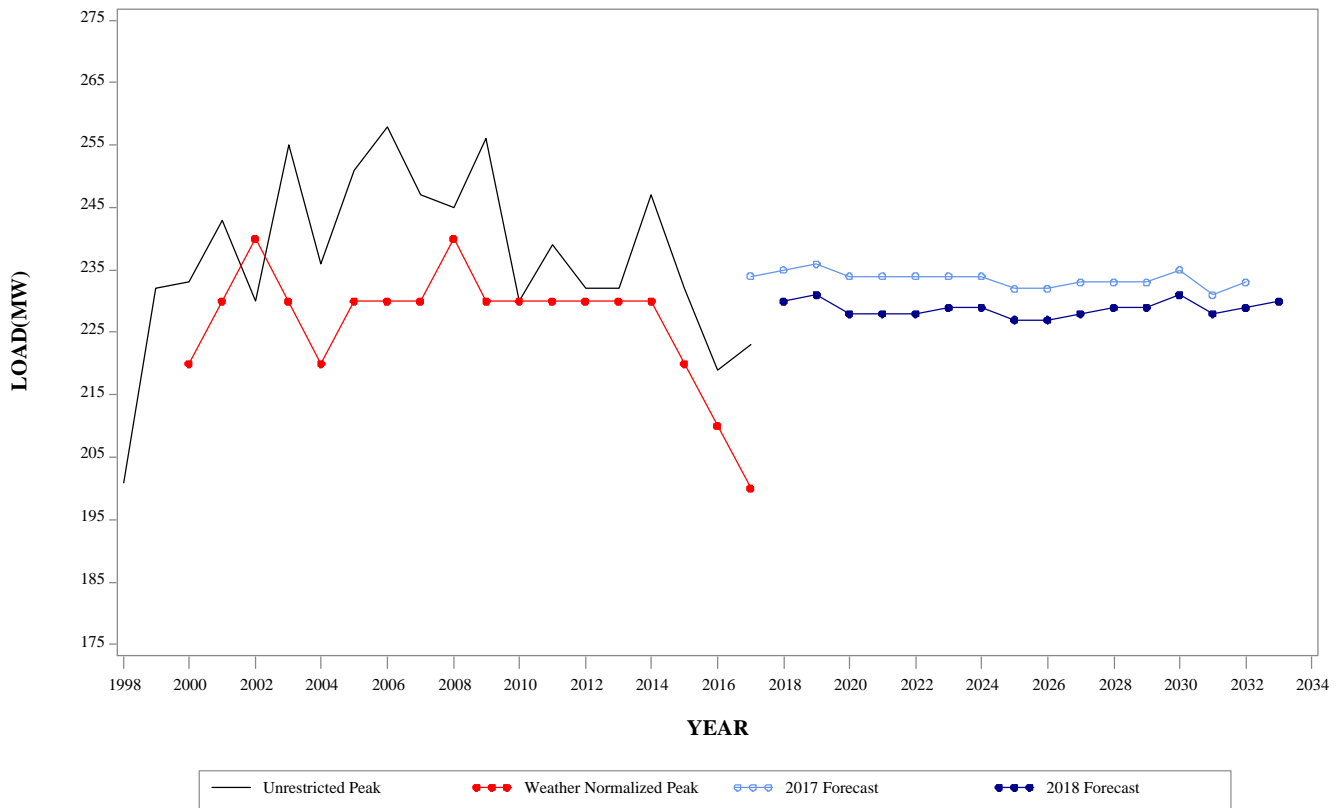
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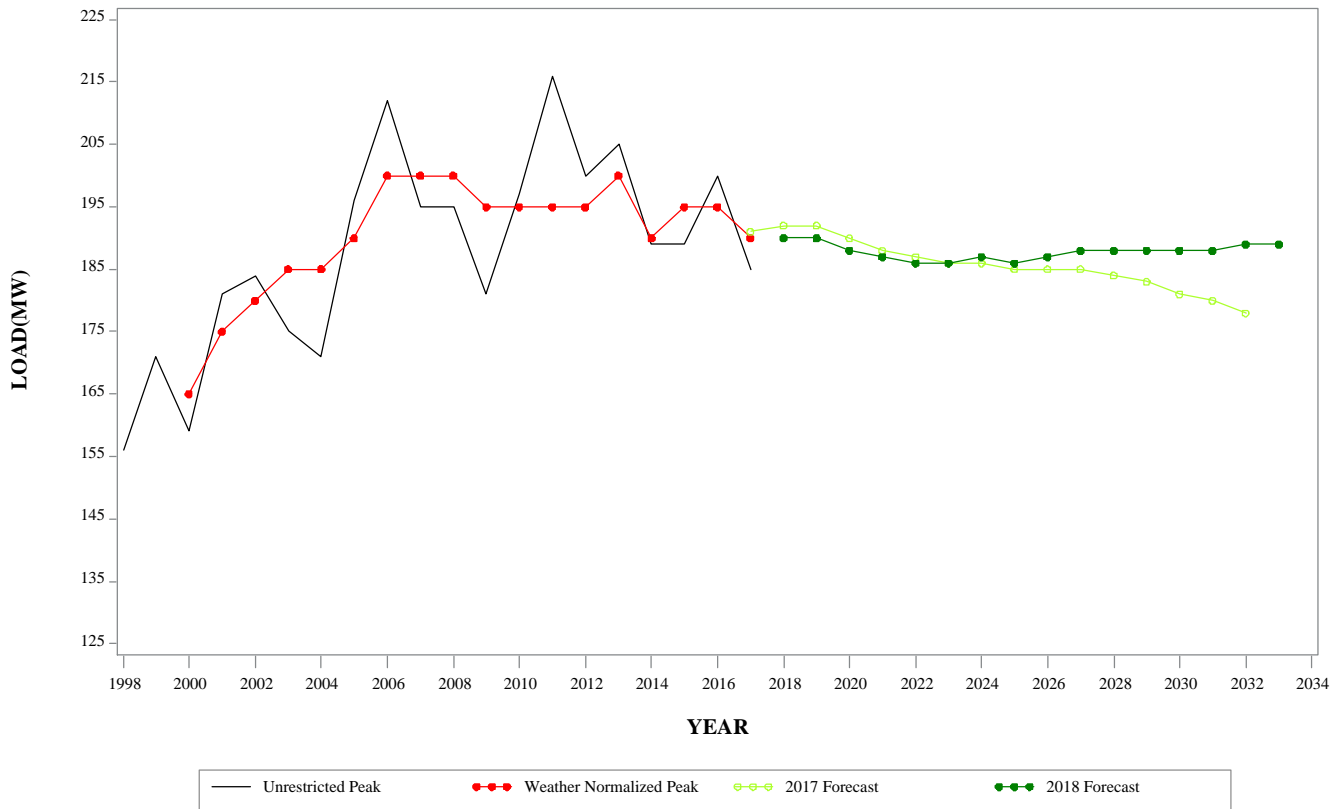
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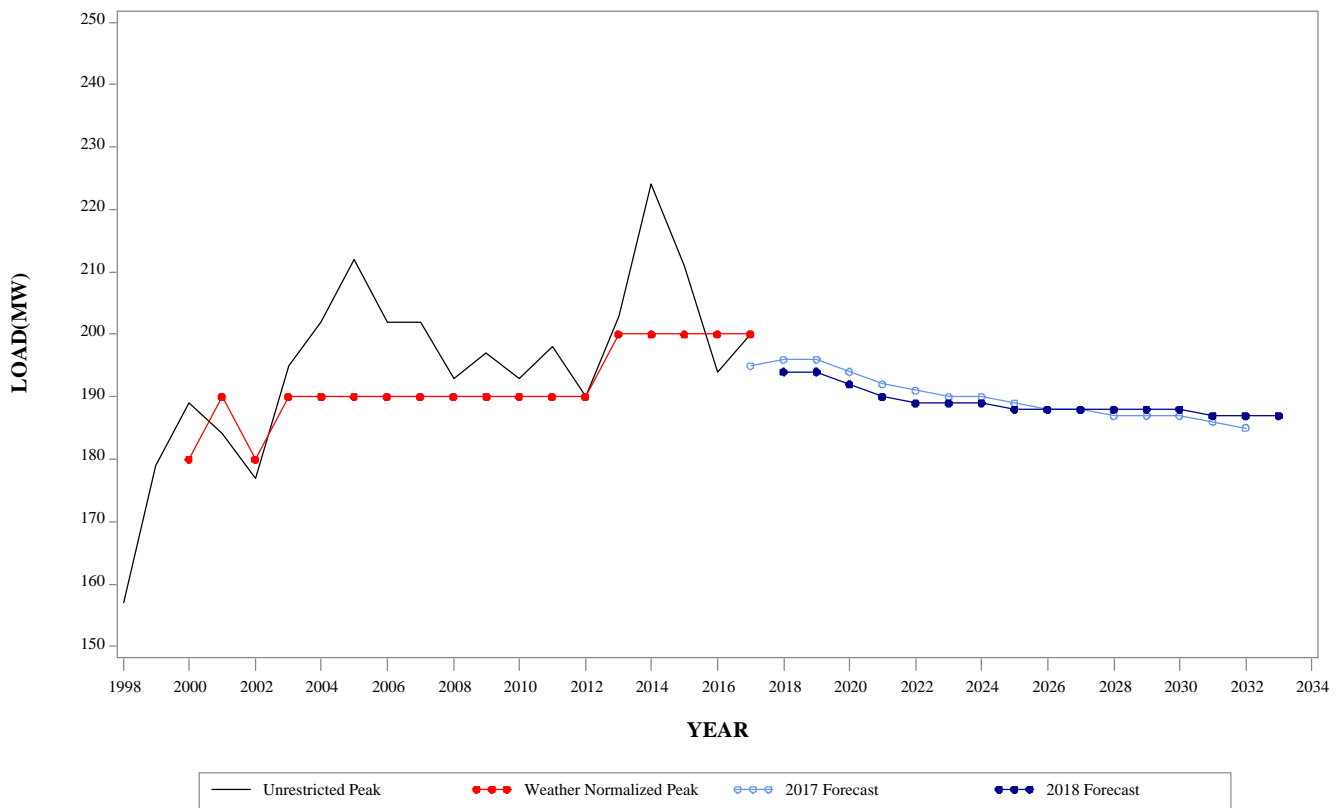
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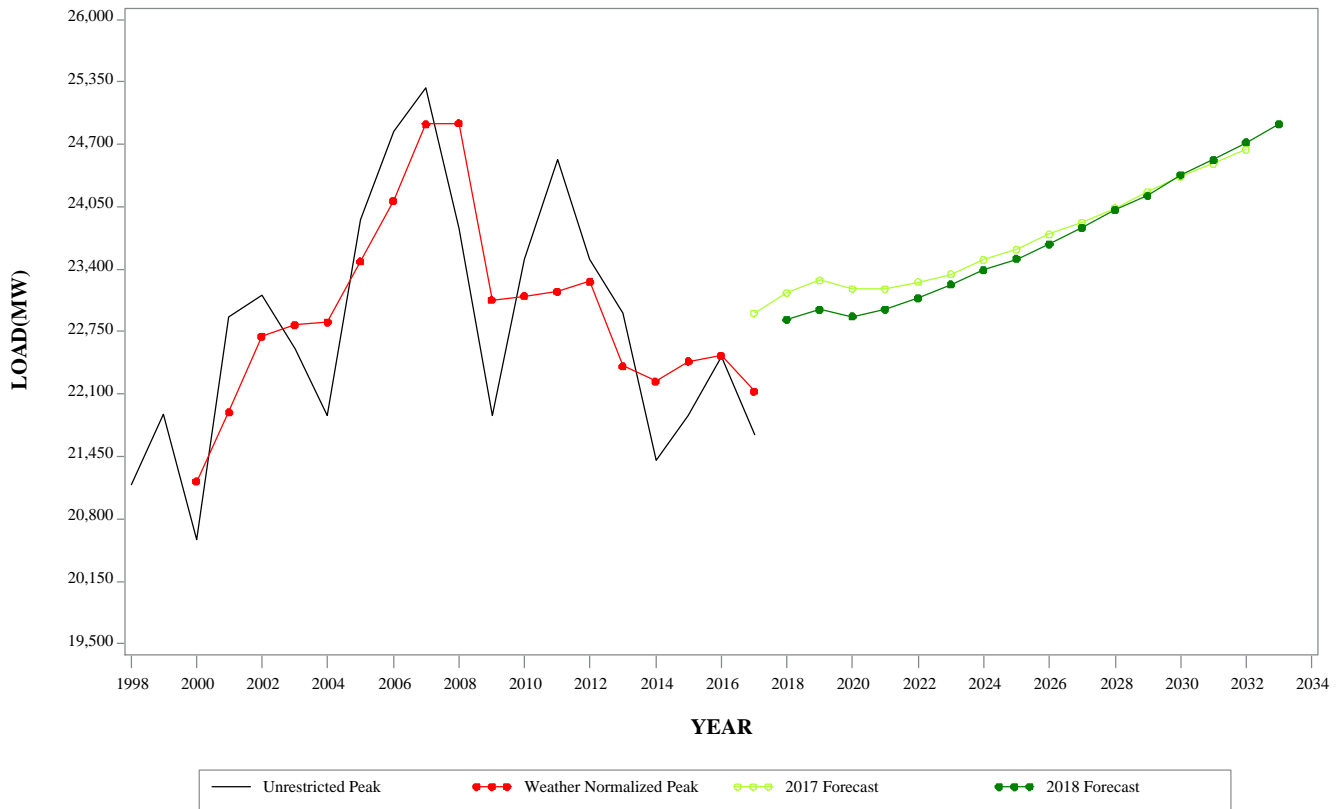
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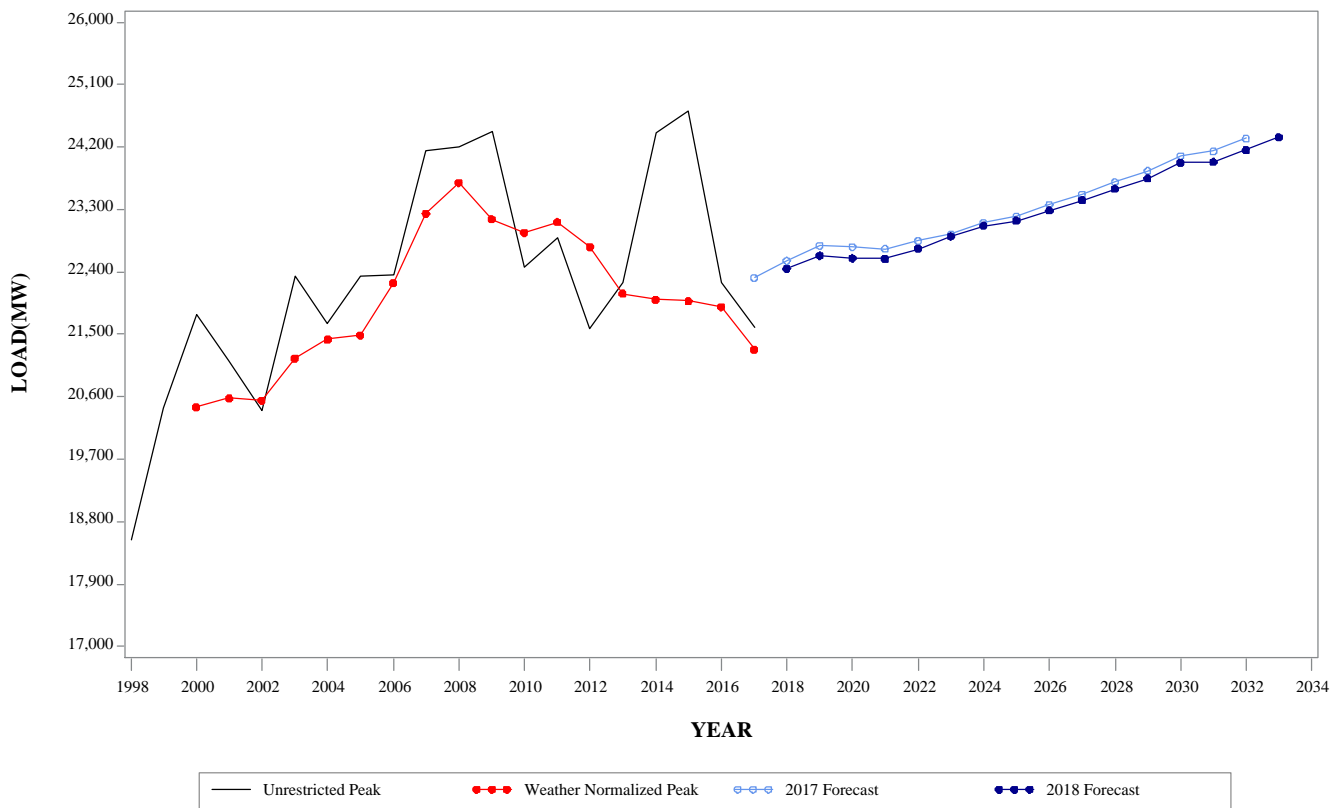
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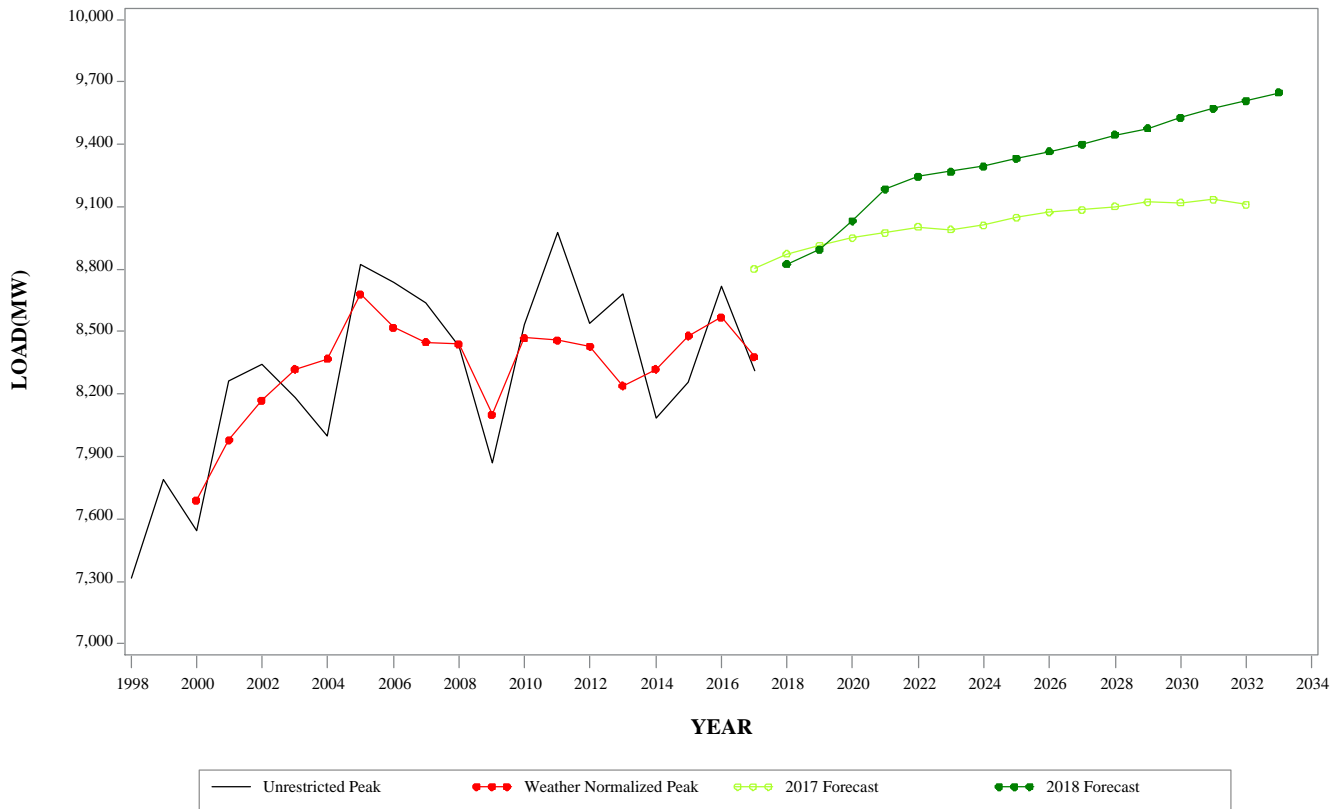
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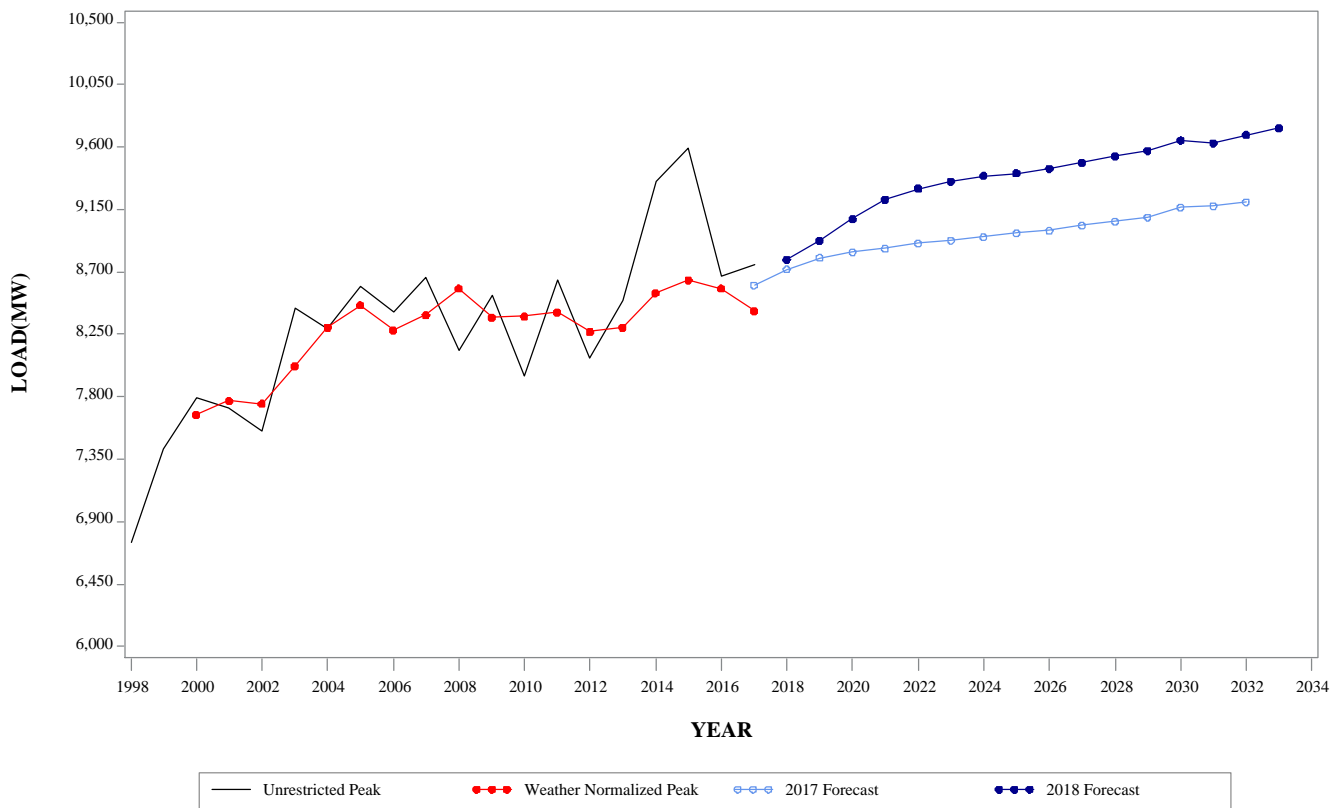
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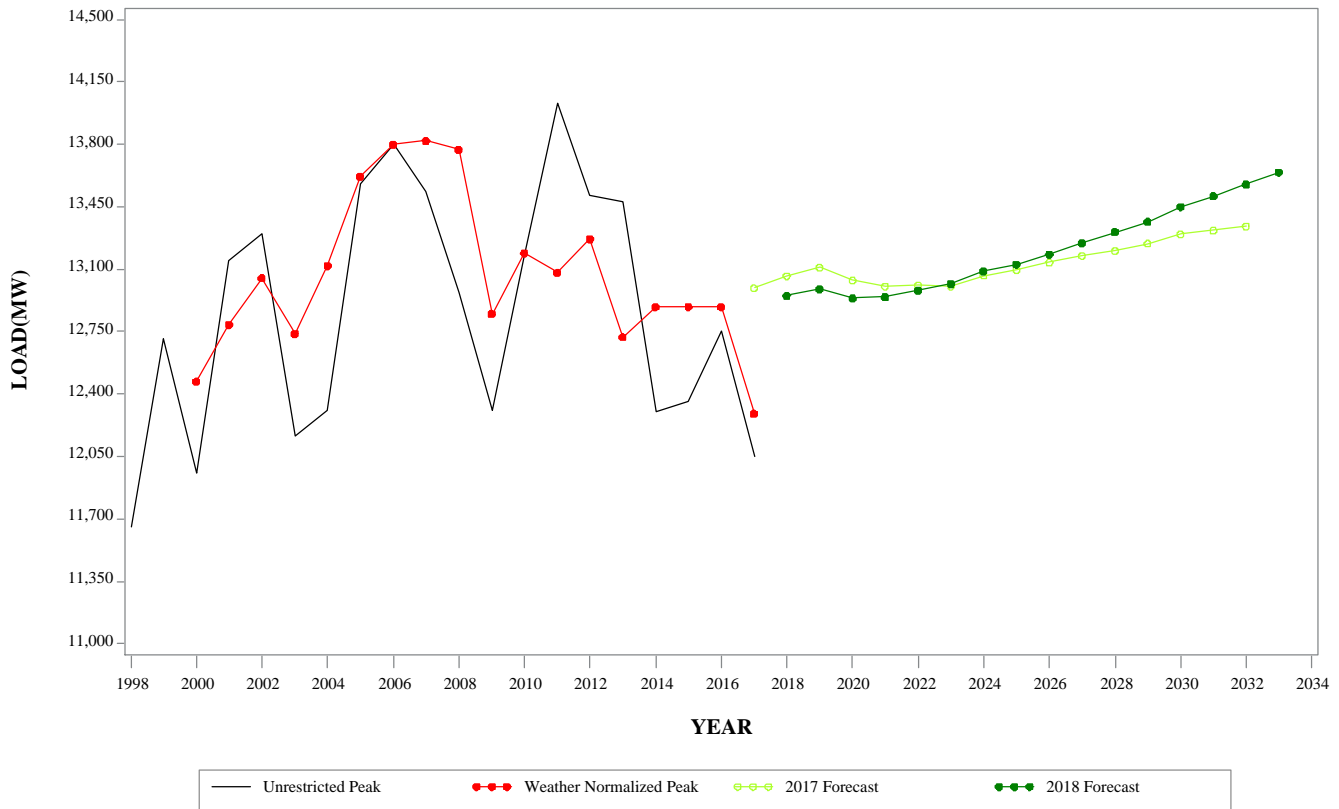
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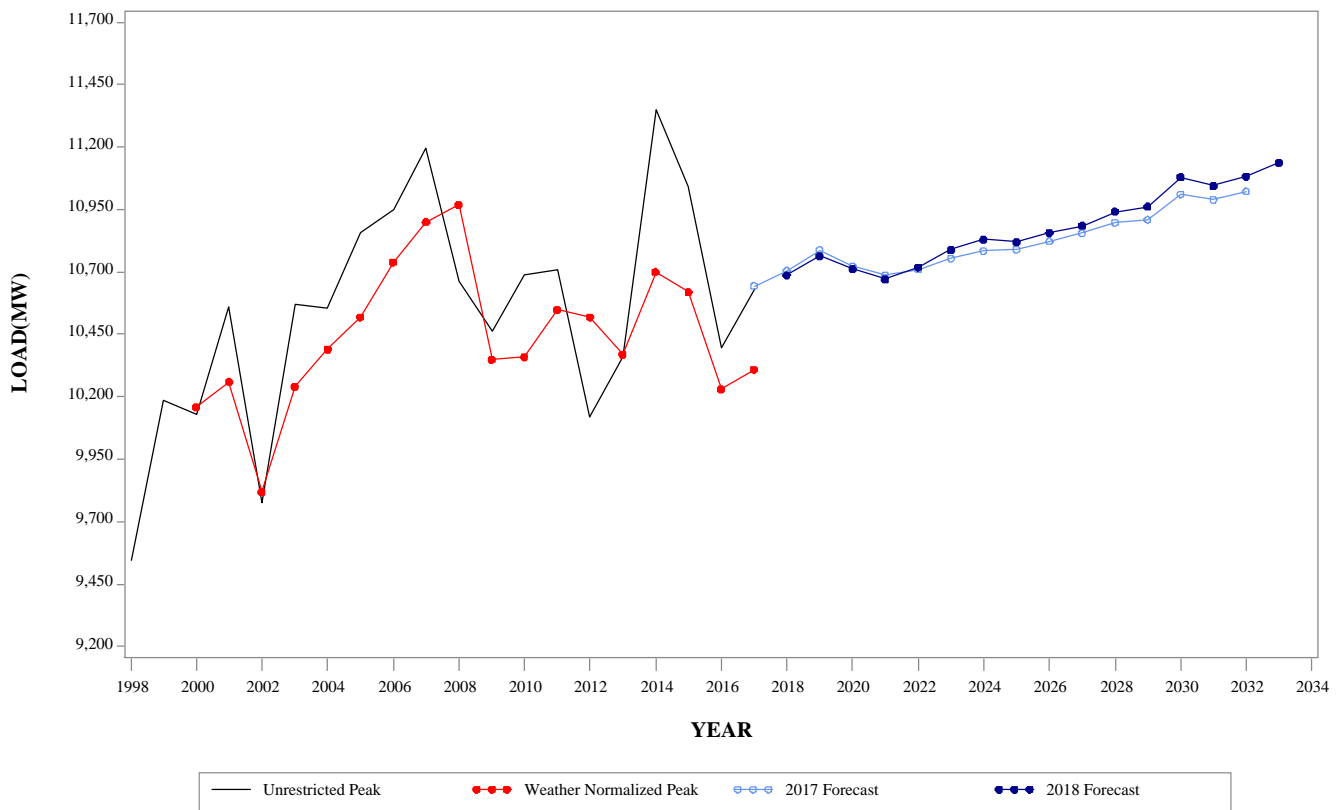
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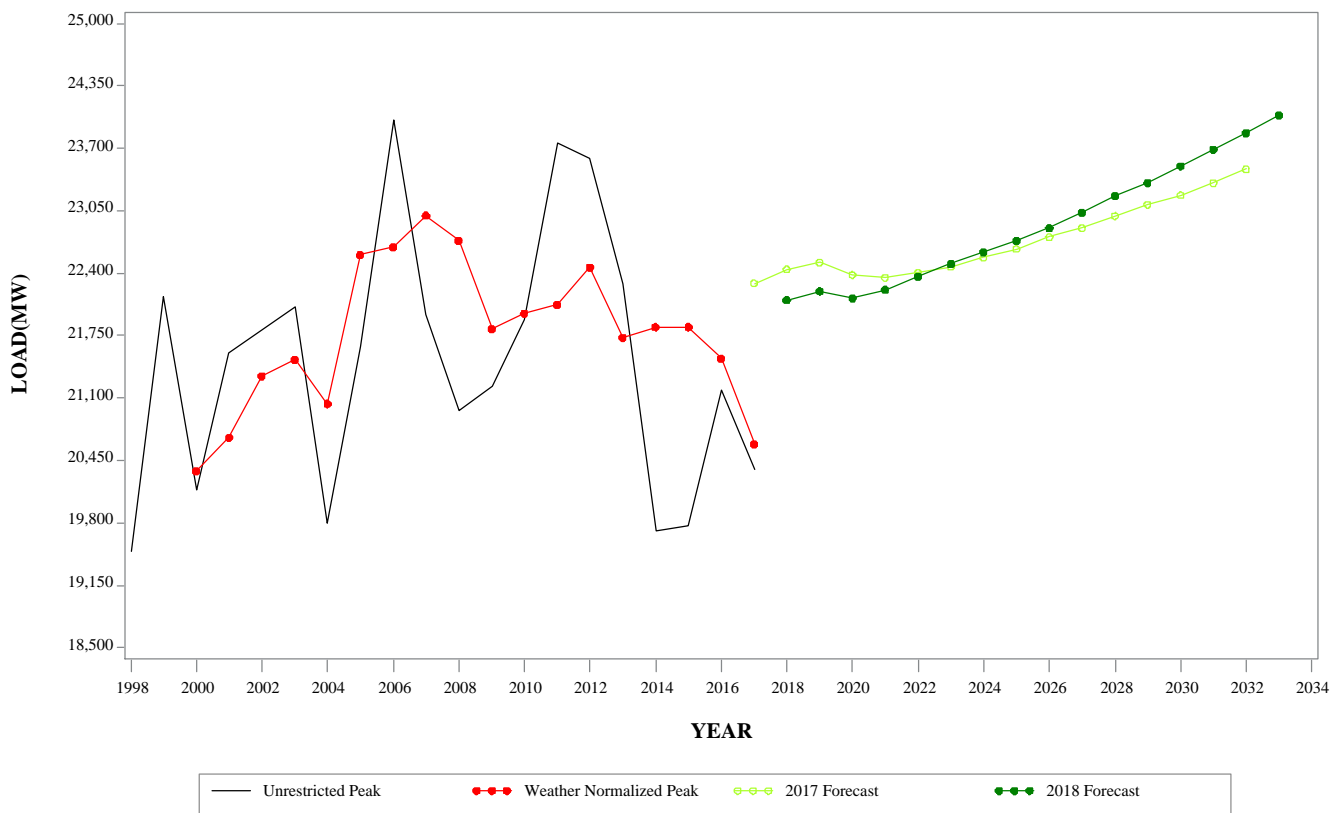
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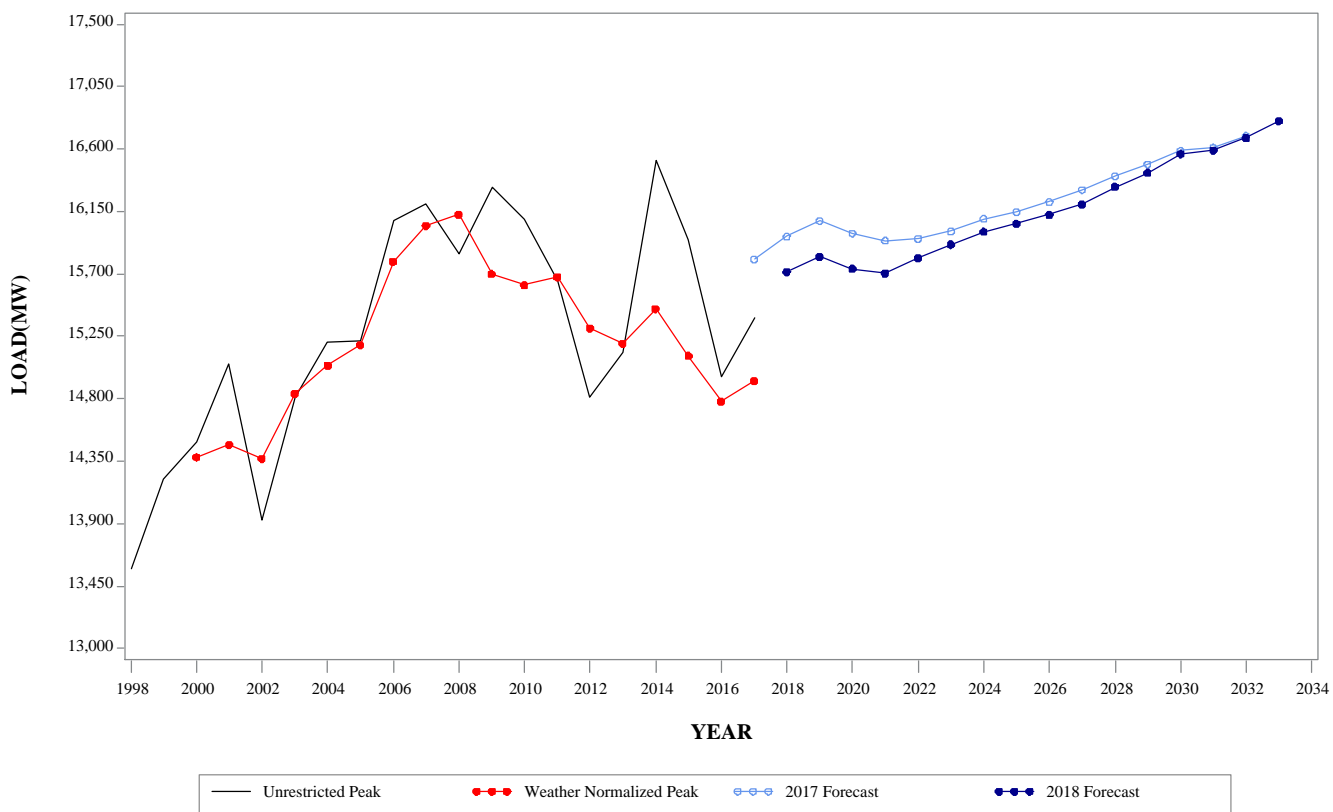
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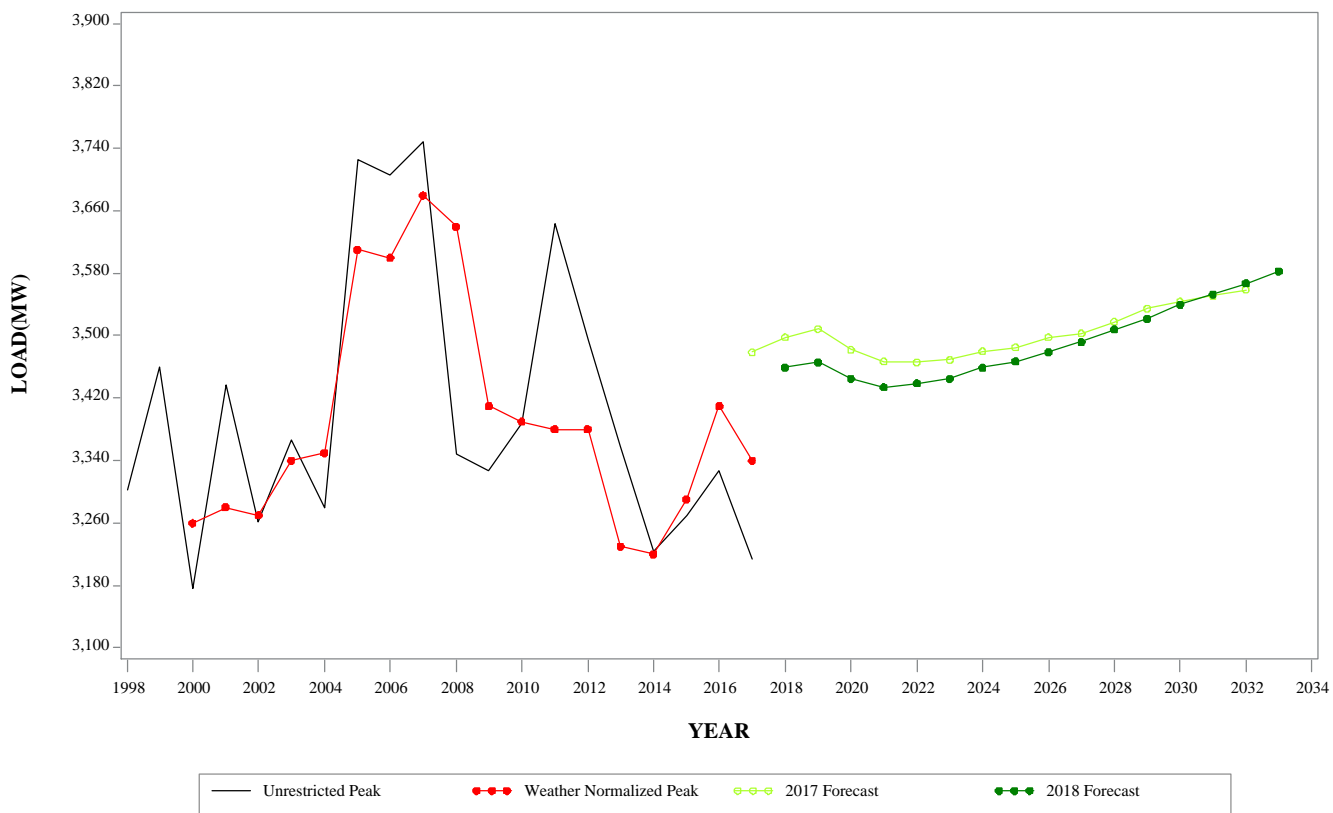
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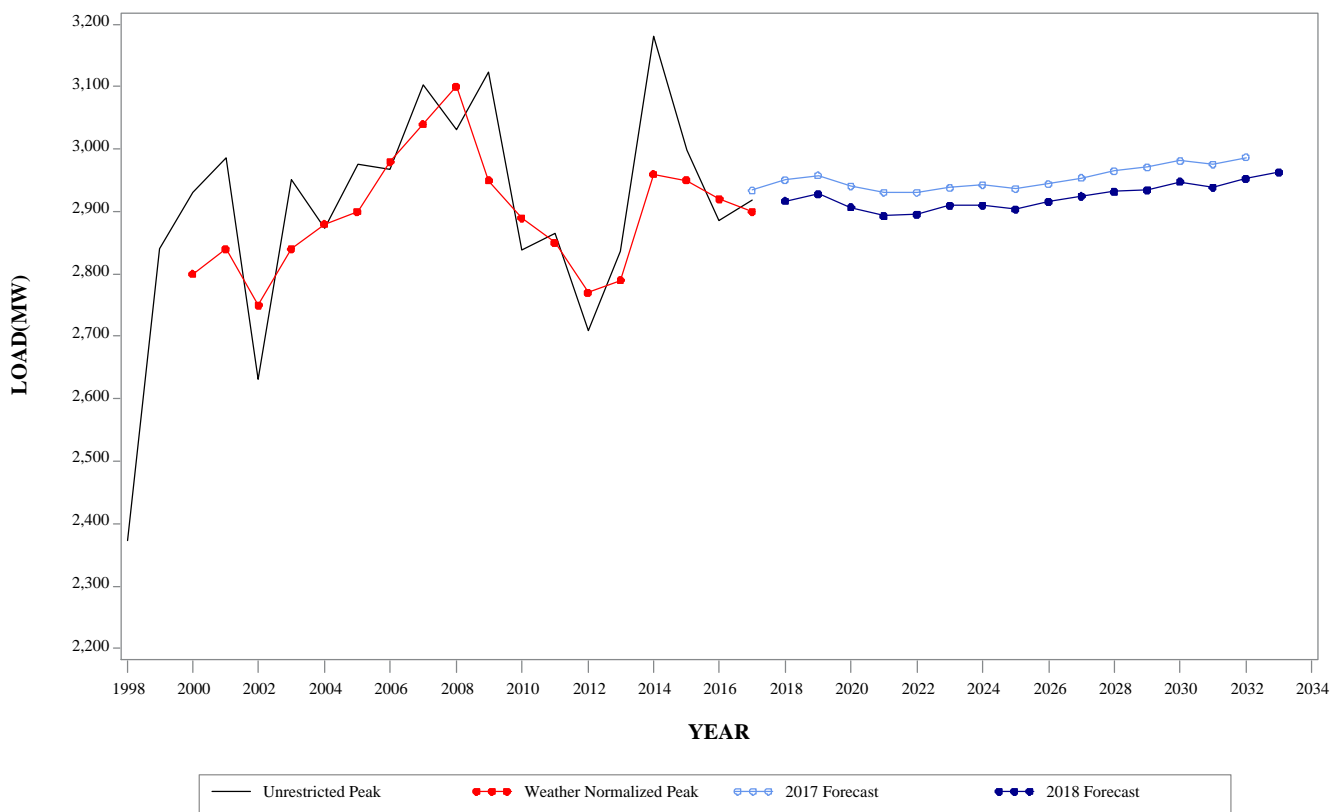
### WINTER NON-COINCIDENT PEAK DEMAND FOR COMED GEOGRAPHIC ZONE



### SUMMER NON-COINCIDENT PEAK DEMAND FOR DAYTON GEOGRAPHIC ZONE

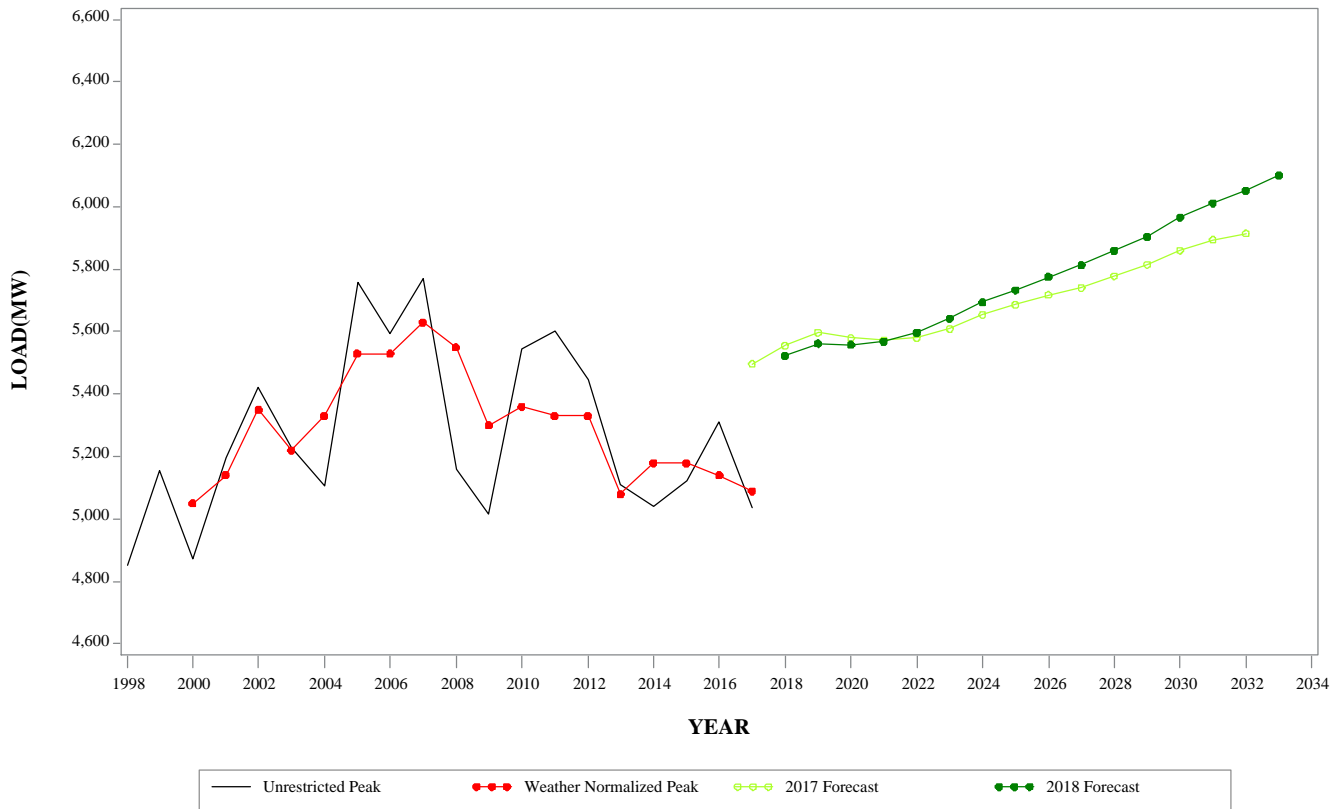


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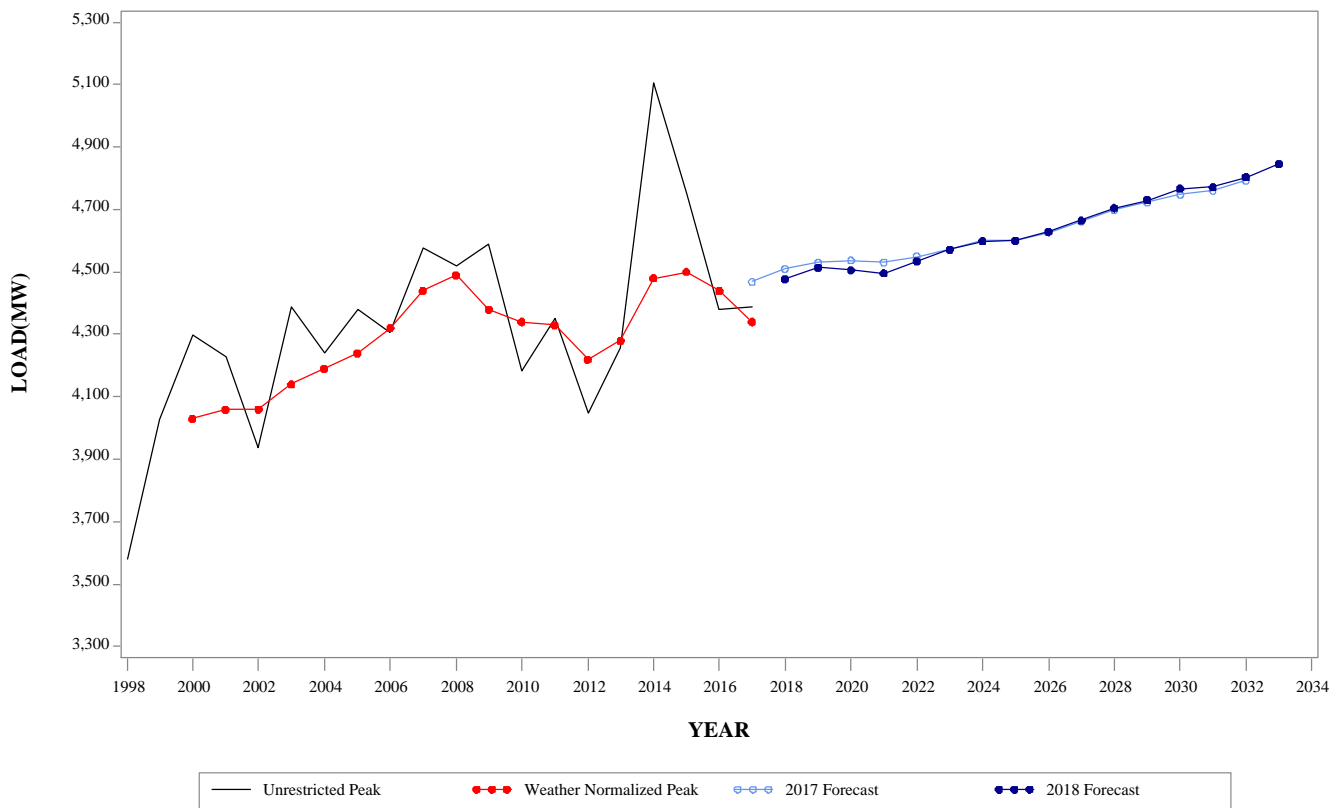




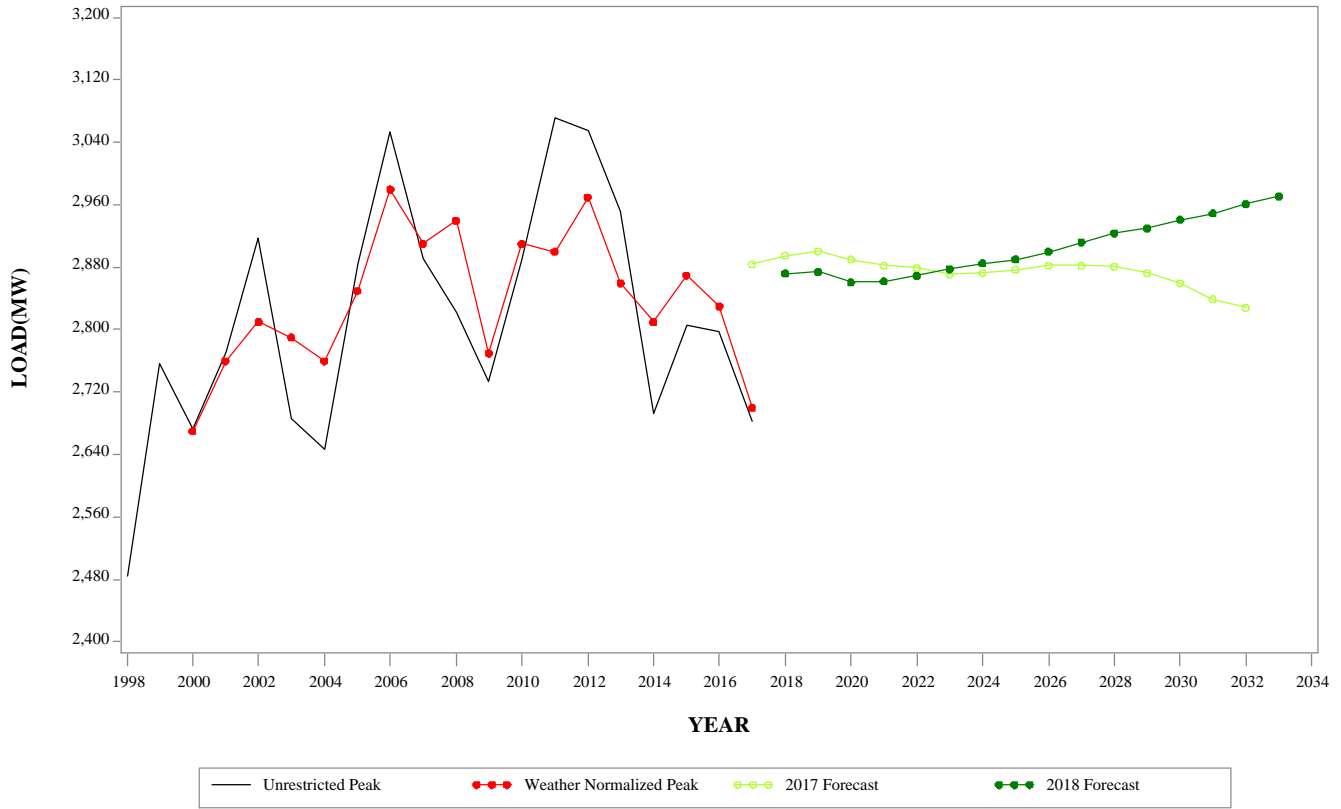
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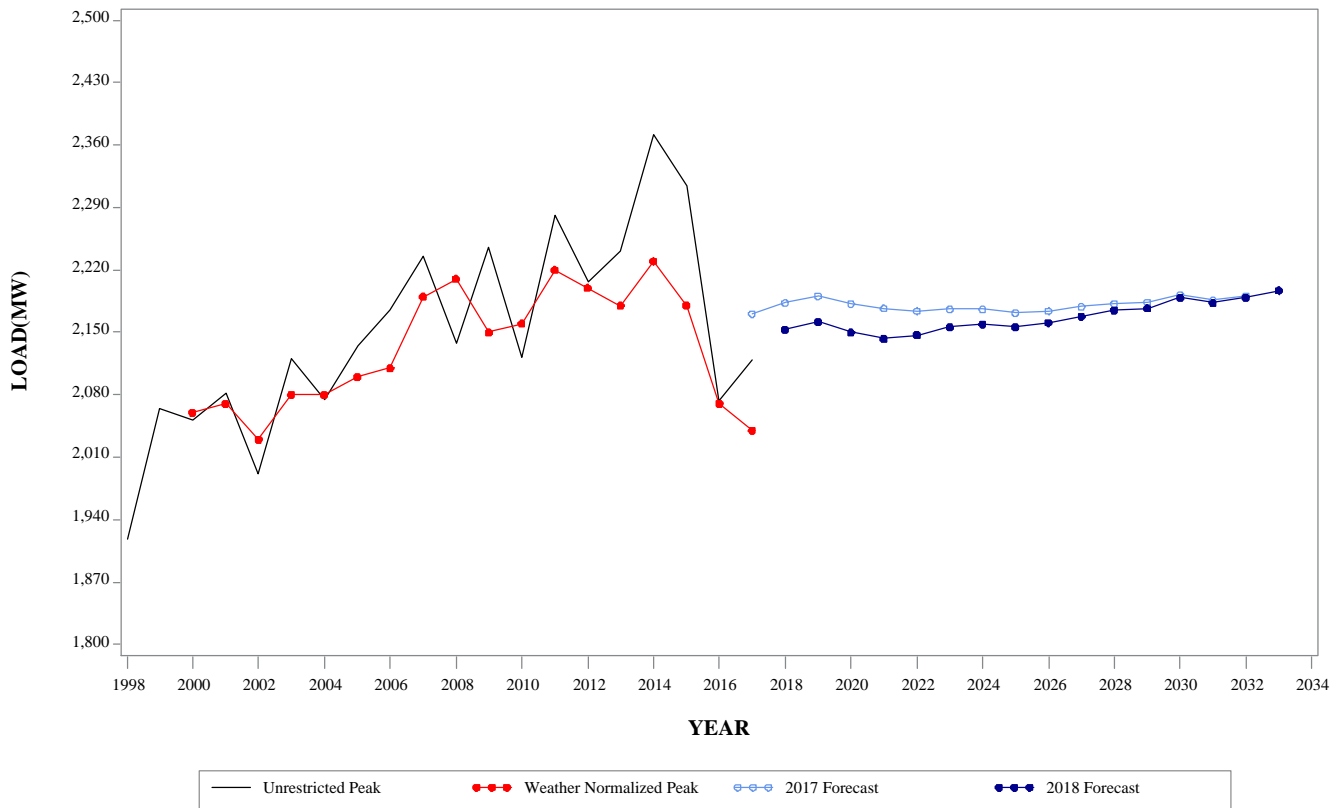
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### SUMMER NON-COINCIDENT PEAK DEMAND FOR DLCO GEOGRAPHIC ZONE



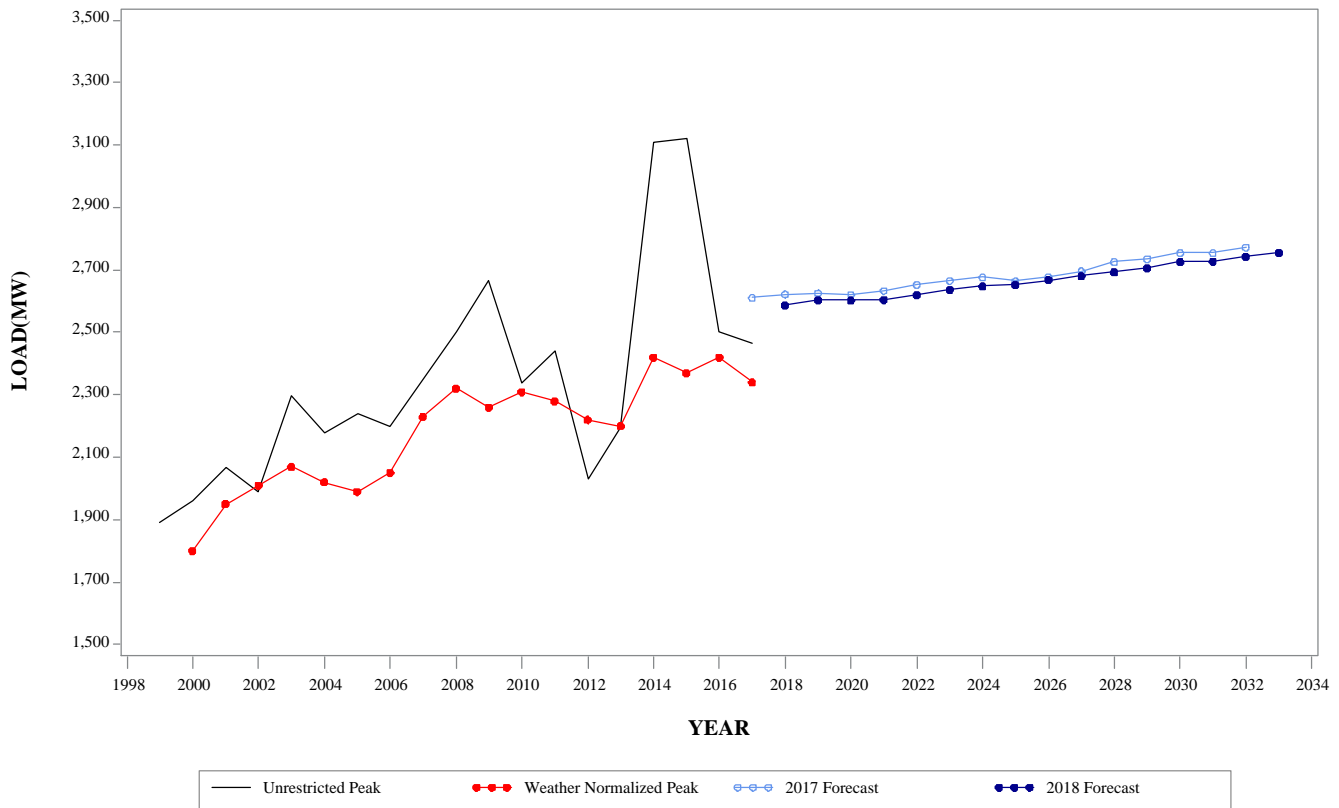
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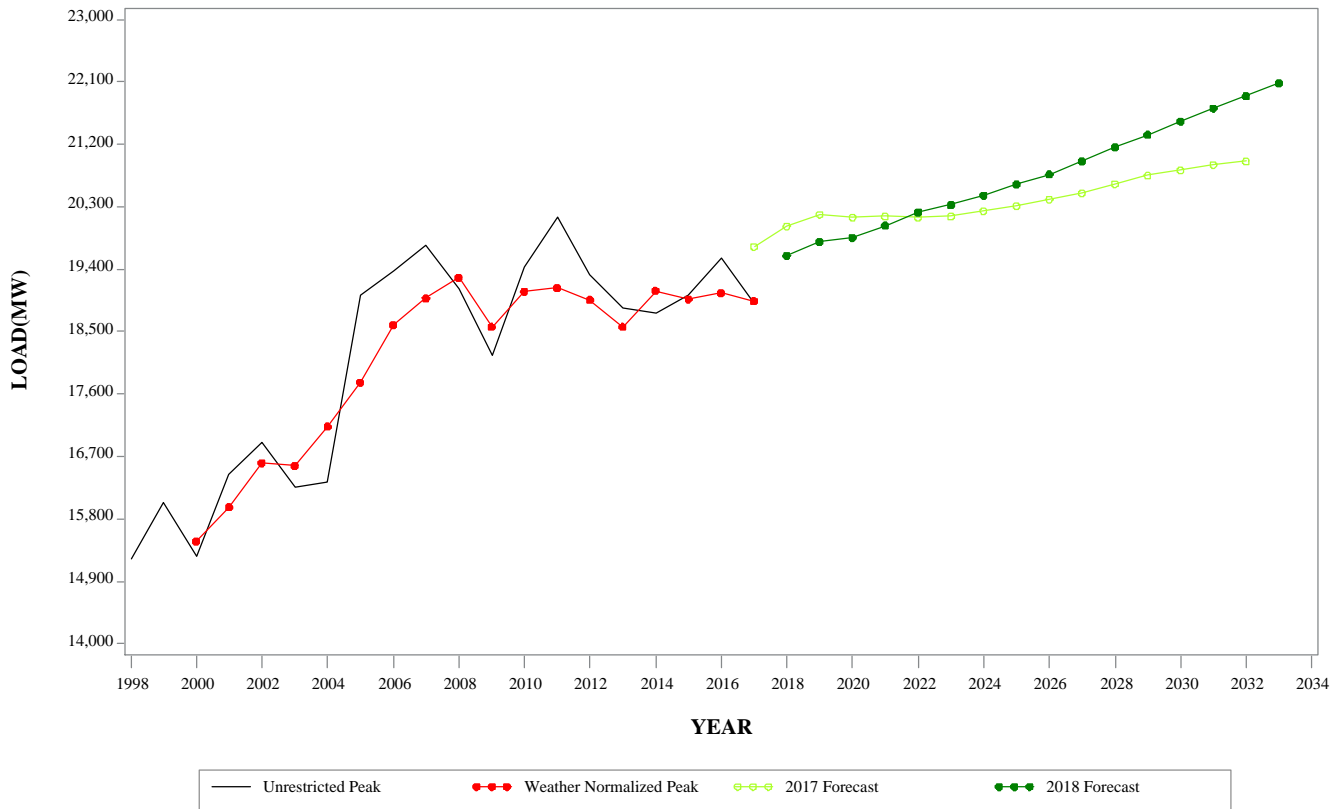
**SUMMER NON-COINCIDENT PEAK DEMAND FOR EKPC  
GEOGRAPHIC ZONE**



**WINTER NON-COINCIDENT PEAK DEMAND FOR EKPC  
GEOGRAPHIC ZONE**



### SUMMER NON-COINCIDENT PEAK DEMAND FOR DOM GEOGRAPHIC ZONE



### WINTER NON-COINCIDENT PEAK DEMAND FOR DOM GEOGRAPHIC ZONE

