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August 6, 2018

VIA E-MAIL
VIA U.S. MAIL

Katherine Collier, Esq., Executive Secretary
Mississippi Public Service Commission
501 North West Street, Suite 201A
Jackson, MS 39201

Re: **Mississippi Power Company's Reserve Margin Plan Filing**

Dear Katherine:

On behalf of Mississippi Power Company I have enclosed the original and twelve (12) copies of the Company's Reserve Margin Plan Filing. I have also included a copy of this letter, which I appreciate you file-stamping and returning to me in the enclosed, self-addressed, stamped envelope.

Thank you for your assistance in this matter.

Very truly yours,

Ben H. Stone

BHS:hr

Attachment

cc: All Parties of Record
Mr. Virden Jones
Frank Farmer, Esq.
Chad Reynolds, Esq.
Mr. Billy Thornton
Mr. Stephen Stiglets
Mr. Ben Vance

**MSPSC Electronic Copy ** 2018-AD-145 Filed on 08/06/2018 **

BEFORE THE MISSISSIPPI PUBLIC SERVICE COMMISSION

MISSISSIPPI POWER COMPANY **DOCKET NO. _____**
EC-120-0097-00

IN RE: MISSISSIPPI POWER COMPANY RESERVE MARGIN PLAN FILING

MISSISSIPPI POWER COMPANY'S RESERVE MARGIN PLAN

COMES NOW, Mississippi Power Company ("MPC" or the "Company"), pursuant to RP 10 of the Mississippi Public Service Commission's ("Commission") Public Utilities Rules of Practice and Procedure ("Rules") and the Commission's February 6, 2018 Order Approving Second Amended and Restated Stipulation and files this its Reserve Margin Plan ("RMP") in the above styled and referenced matter. MPC would show unto the Commission the following:

INTRODUCTION

1. Throughout the second half of 2017 and early parts of 2018, the future of MPC's existing infrastructure and the steps necessary to support MPC's continued delivery of reliable and affordable energy in the future were topics of negotiation between MPC, the Mississippi Public Utilities Staff ("Staff"), and multiple intervenors in Docket No. 2017-AD-112. Negotiations between these parties concluded with the execution of MPC's Second Amended and Restated Stipulation ("Stipulation"), which was approved by the Commission in full on February 6, 2018.

2. Ultimately, the Stipulation recognized that it would be beneficial to analyze MPC's current reserve margin and alternatives that the Company proposes to address these reserves in the context of a standalone filing. Thus, this RMP has been developed and is being filed pursuant to commitments made in the Stipulation, and in compliance with requirements in the subsequent order by the Commission approving the Stipulation.

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3. The Commission's Order acknowledged MPC's commitment to file the RMP and referenced the Stipulation's detailed description of the RMP components and process.[1] The Stipulation set forth the following understanding of the RMP's purpose and contents:

> MPC shall, within six (6) months of the Commission's approval of this Stipulation and using the most current data available to MPC, develop, complete, and file with the Commission a Reserve Margin Plan ("Plan") and serve the Plan on all interested parties for evaluation to allow a fully informed and transparent review of MPC's reserve margin.
>
> (a) The Reserve Margin Plan shall include, among other things: forecasting customer load and energy requirements; evaluating the resources available to meet the energy and capacity needs while satisfying strategic considerations; developing, evaluating and implementing demand side management and energy efficiency programs; and assessing the planning for existing and anticipated environmental laws and regulations and any other issues the Mississippi Public Service Commission deems relevant.
>
> (b) MPC's Plan shall also contain: (i) discrete alternatives that the Company proposes to address its current reserve margin; (ii) the timeframe over which each alternative can be implemented; (iii) a preliminary estimate of the costs of implementing each alternative, including any incremental transmission capital investment and any costs associated with retiring any un-depreciated assets; and (iv) any other impacts (financial or otherwise) not specifically prescribed herein that would have a material impact upon the service provided by MPC or the cost to customers.
>
> (c) The Parties agree that MPC shall pay and receive recovery through its Energy Cost Management Clause, Rate Schedule "ECM" for the costs of consultants hired by the Staff to review MPC's Plan and, if necessary, file reports or provide testimony commenting on their findings.[2]

4. As noted above, the Stipulation anticipates a two-phased approach requiring, first, the assessment of alternatives from MPC's perspective and second, an opportunity for review by

[1] Order Approving Second Amended and Restated Stipulation, Docket No. 2017-AD-112, p. 25 (Feb. 6, 2018)
[2] Second Amended and Restated Stipulation, Docket No. 2017-AD-112, pp. 8-9 (Nov. 30, 2017).

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the Public Utilities Staff (the "Staff"), with the aid of consultants, and other interested parties. MPC submits this RMP satisfies the first phase.

MPC'S FILING

5. The RMP provided as Attachment "A" to this pleading describes the steps MPC has taken in order to comply with its Stipulation commitments. As noted therein, MPC developed multiple alternatives by evaluating the economics of each unit in MPC's fleet, the opportunities currently available in the wholesale market, and the operational constraints of the Southern Electric System ("SES"). Despite significant effort over the last several years, MPC has had limited success in finding reasonable opportunities to market MPC's capacity above current reserve requirements.

6. The remaining alternatives available to address MPC's current reserve margin are associated with the Company's generating units that have lower long-term economic benefit to customers. The Company's analysis indicates that ceasing operations of Units 4 and 5 at Plant Watson and Units 1 and 2 at Plant Greene County prior to their current depreciation dates, subject to joint owner approval, is the most economic alternative for MPC's customers.

7. Consistent with the Stipulation, MPC has forecasted load and energy requirements; evaluated resources available to meet its energy and capacity needs while satisfying strategic considerations; and assessed the planning for existing and anticipated environmental laws and regulations. While the Company has not explicitly addressed energy efficiency and demand side management programs in detail, those programs were considered in the underlying analyses. Moreover, the expansion of these programs would not be of any great value to this particular effort, given the fact that expanded energy efficiency or demand side management programs would enlarge, rather than reduce, MPC's reserve margin.

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8. The Company will be able to cease operations of Greene County Unit 1 in 2021, and Greene County Unit 2 and Plant Watson Units 4 and 5 in 2022, at the earliest. Prior to ceasing operations of those units, however, the Company, Commission, and Staff would need to complete the following "next steps":

a. Complete Commission and Staff review of filed RMP;

b. Complete all required regulatory review and approvals applicable to the selection of an alternative, including (if applicable) the issuance of an accounting order authorizing the deferral of the difference between the depreciation expense associated with any units which will no longer be in operation;

c. Complete all necessary transmission projects; and

d. Finalize plans and execute selected alternative.

WHEREFORE, PREMISES CONSIDERED, Mississippi Power Company requests that the Commission receive, file and review this Reserve Margin Plan; that the Staff initiate its formal review of the RMP; and that, following the completion of the Staff's review, the Commission grant any relief it deems necessary or appropriate.

Respectfully submitted, this the 6th day of August, 2018.

MISSISSIPPI POWER COMPANY
BY: BALCH & BINGHAM LLP

BY: _____
BEN H. STONE

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STATE OF MISSISSIPPI

COUNTY OF HARRISON

PERSONALLY appeared before me, the undersigned authority in and for the said County and State, within my jurisdiction, the within named Ben H. Stone, who after being duly sworn on oath acknowledged that he is Attorney for MISSISSIPPI POWER COMPANY and that for and on behalf of the said MISSISSIPPI POWER COMPANY and as its act and deed, he signed and delivered the above and foregoing filing for the purposes mentioned on the day and year therein mentioned, after first having been duly authorized by said MISSISSIPPI POWER COMPANY so to do, and that the statements contained in the foregoing instrument are true and correct to the best of his knowledge, information and belief.

BEN H. STONE

SWORN TO AND SUBSCRIBED BEFORE ME, this the 6th day of August, 2018.

NOTARY PUBLIC

My Commission Expires:

STATE OF MISSISSIPPI NOTARY PUBLIC ID # 88482 TIFFANY LOGAN Commission Expires Feb. 7, 2020 HARRISON COUNTY

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CERTIFICATE OF SERVICE

I, Ben H. Stone, counsel for MPC in the above and foregoing filing made on even date herewith, do hereby certify that in compliance with Rule 6.112 of the Mississippi Public Service Commission's Public Utilities Rules of Practice and Procedure:

(1) An original and twelve (12) copies of the filing have been filed with the Commission by delivery of the same to:

Katherine Collier, Esq., Executive Secretary
Mississippi Public Service Commission
501 North West Street, Suite 201A
Jackson, MS 39201

(2) An electronic copy of the filing has been filed with the Commission via e-mail to the following address:

efile.psc@psc.state.ms.us

(3) In compliance with the requirements of the Second Amended and Restated Stipulation a copy of the filing has been mailed via U.S. Mail and electronic mail to all parties of record in Docket No. 2017-AD-112 as detailed below:

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(4) MPC has complied with all other requirements of this Commission's Rules.

This the 6th day of August, 2018.

BEN H. STONE

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MISSISSIPPI PUBLIC SERVICE COMMISSION
DOCKET NO. _____
MISSISSIPPI POWER COMPANY RESERVE MARGIN PLAN FILING

This Reserve Margin Plan ("RMP" or "Plan") has been developed and is being filed pursuant to commitments made in Mississippi Power Company's ("MPC" or the "Company") Second Amended and Restated Stipulation ("Stipulation"),[1] and in compliance with requirements in the subsequent order by the Mississippi Public Service Commission ("MPSC" or the "Commission") approving the Stipulation. The Plan allows a "fully informed and transparent review of MPC's reserve margin," and presents the Commission alternatives relative to MPC's present reserve margin.[2] The Stipulation anticipates a two-phased approach requiring, first, the assessment of alternatives from MPC's perspective and second, an opportunity for review by the Public Utilities Staff (the "Staff"), with the aid of consultants, and other interested parties.

MPC submits this RMP satisfies the first phase. MPC developed the alternatives by evaluating the economics of each unit in MPC's fleet, the opportunities currently available in the wholesale market, and the operational constraints of the Southern Electric System ("SES"). Despite significant effort over the last several years, MPC has had limited success in finding reasonable opportunities to market MPC's capacity above current reserve requirements. The remaining alternatives available to address MPC's current reserve margin are associated with the Company's generating units that have lower long-term economic value to customers. The results presented in Appendix C are mutually exclusive such that one or more units may be independently considered for a change in long-term operational status.

Should the Staff proceed to hire consultants and review the RMP, MPC commits to collaborating with the Staff to achieve the purpose of the review and would encourage the Staff to establish a scope that includes consideration of, among other things, likely local economic outcomes, changing national and state policies, reliability impacts and related costs specific to any proposed course of action. Upon completion of the Staff's review, the Commission will then be positioned to respond as it deems appropriate, which could require subsequent formal action.

The Plan is divided into five sections: (i) an executive summary, (ii) a section summarizing developments since MPC's last formally-filed Integrated Resource Plan ("IRP"), (iii) a section identifying current projections, (iv) a section discussing the asset valuation process and results, and (v) anticipated next steps. The Plan utilizes many of the same planning components of an integrated resource plan, but specifically focuses on the Company's current reserve margin in its development.

[1] The Second Amended and Restated Stipulation was executed on November 30, 2017, filed with the MPSC on December 1, 2017 in Docket No. 2017-AD-112, and approved by the MPSC on February 6, 2018.
[2] Second Amended and Restated Stipulation, Docket No. 2017-AD-112, pp. 8-9 (Nov. 30, 2017).

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I. EXECUTIVE SUMMARY

MPC's existing reserve capacity is greater than the level required to meet the Company's projected summer peak demand. The primary cause of the Company's increase in generating reserves is a series of gradual and continuing decreases in projected load, largely driven by changes in customer usage. Because reasonable opportunities to market this capacity have not materialized, addressing MPC's current reserve margin requires an evaluation of the economics of continued operation of existing MPC-owned generating units.

MPC's analysis presented herein currently indicates that the most economic alternative is to cease operation of Units 4 and 5 at Plant Watson and Units 1 and 2 at Plant Greene County prior to their current depreciation dates,[3] subject to required joint owner approval.[4] In total, these four units account for almost 1,000 MW of capacity. As detailed in the table below, executing this alternative is estimated to create savings to customers of approximately $190 million,[5] and reduce MPC's reserves to a level approaching targeted reserves six years earlier than if all four units were operated until their current depreciation dates.

Unit	Capacity (MW)	Current Depreciation Dates	Earliest Date to Cease Operations	Approximate Acceleration	Estimated NPVRR Savings
Greene County 1	106	Q4 2025	Q3 2021	4 years	$15 M
Greene County 2	107	Q4 2026	Q3 2022	4 years	$20 M
Watson 4	268	Q4 2023	Q1 2022	2 years	$40 M
Watson 5	516	Q4 2028	Q1 2022	7 years	$115 M
Total	**997**				**$190 M**

[3] Depreciation dates refer to the unit retirement date assumptions used in the last Depreciation Rate Study filed on December 29, 2014 and approved by the MPSC on December 3, 2015.

[4] Units 1 and 2 at Plant Greene County are jointly owned by MPC and Alabama Power Company ("APC"). Any decision to cease operation will require mutual agreement with APC. MPC and APC have agreed to a review of these units in 2021 and 2022, respectively, to determine at that time if ceasing operations is warranted.

[5] The calculated net present value of revenue requirements ("NPVRR") represents the savings to customers (in 2018 dollars) associated with the avoidance of operating costs (maintenance capital, O&M, taxes, and firm gas transportation) for the accelerated time period. The $195 million undepreciated investment for these units and the $26 million budgeted transmission improvements already included in MPC's transmission plan are assumed to be recovered in all scenarios, and therefore, not included in the savings calculation.

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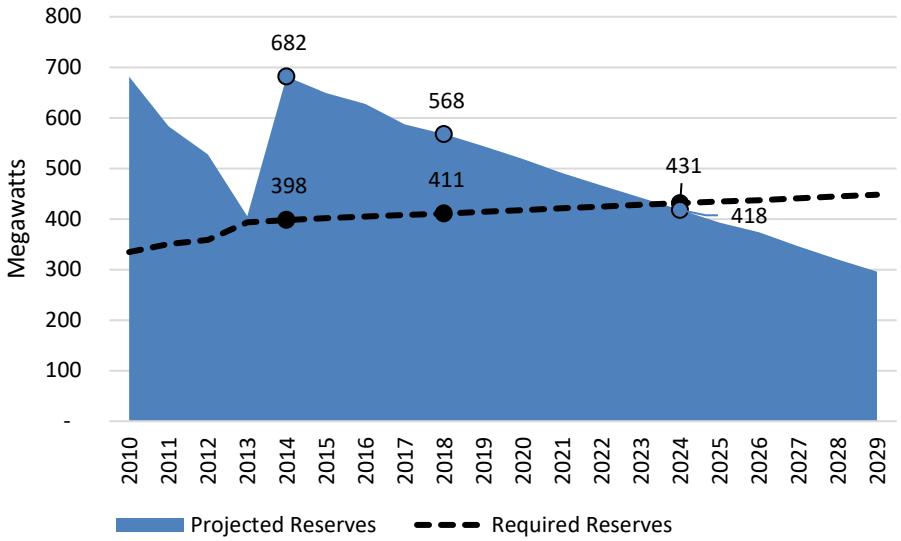
II. CHANGES IN GENERATING RESERVES

For the purposes of this filing, MPC has chosen to make a number of comparisons to the Company's last formally-filed IRP, the 2010 IRP,[6] which was thoroughly examined by multiple parties in two docketed cases.[7] The 2010 IRP incorporated a range of scenarios resulting in an associated range of capacity needs; the lower end of the 2010 IRP's capacity need range resulted from MPC's base case scenario.

In the 2010 IRP base case, MPC's reserves were projected to rise to 682 MW immediately after Plant Ratcliffe was scheduled to be placed in service in 2014. MPC's reserves were projected to gradually decline each year as load grew, with reserves falling to 568 MW in 2018. By 2024, reserves were projected to fall below the Company's reserve requirements for the first time since Plant Ratcliffe was scheduled to be placed in service (see Figure 1).

Figure 1: 2010 IRP Projected Reserves (MW, Summer)



MPC currently has generating reserves greater than what was forecasted in the 2010 IRP. The primary cause of the Company's increase in generating reserves is a series of gradual and continuing decreases in projected load. The effect of these decreases in projected load was only partially offset by reductions in generating capacity, as shown in Figure 2.

[6] MPC's 2010 IRP was initially filed on December 7, 2009 as Exhibit____(DFS-1) in the Company's Third Supplemental Filing in Docket No. 2009-UA-0014 (Kemper IGCC).
[7] MPC's 2010 IRP was also filed in Docket No. 2010-UA-279 (Daniel Scrubber).

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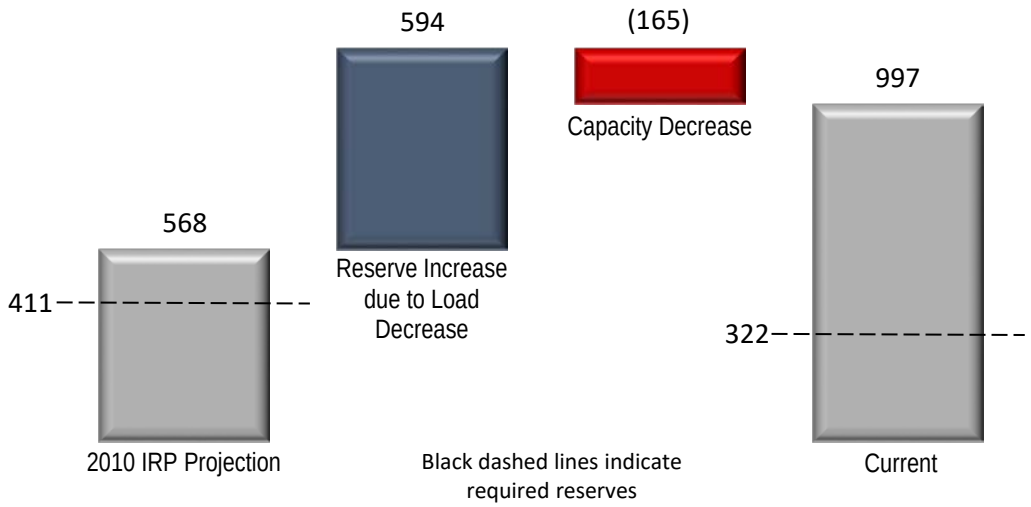
Figure 2: Waterfall Chart of Reserves for Year 2018 (MW, Summer)



An assessment of reserve adequacy must account for considerations other than load projections. One of the drivers for the need identified and approved in the 2010 IRP was the risk associated with changing environmental regulations – primarily the expected future regulation or legislation of carbon emissions. This risk resulted in some scenarios showing capacity needs much greater than the base IRP projections shown in Figure 2. This risk remained and increased since the 2010 IRP and has only recently diminished.[8] During this same period, MPC's load forecast projections were decreasing incrementally over the forecast cycles. Having more generation reserves during this period of uncertainty provided a measure of cushion to absorb what could have been a substantial shortfall in generation capacity. Because the impacts of future carbon emission regulation or legislation on MPC's generating capacity have become less certain and less immediate, the main planning challenge now is identifying the appropriate response to a continuing lack of load growth. Over time, this challenge will be met, and new challenges will be considered and evaluated during each planning cycle.

Changes in Load Forecast

The 2010 IRP load forecast projected a weather-normal summer peak demand of 2,998 MW in the year 2018. The current 2018 weather-normal summer peak demand is projected to be 2,404 MW, a reduction of 594 MW. Figure 3 shows the three main components of this load decrease. First, 163 MW of territorial wholesale load that was served under market-based rates was re-classified to a non-territorial capacity block sale (i.e. no longer a "full requirements" contract). This means that the load is still served by MPC, but the load is now treated as a reduction in generating capacity, such that under MPC's planning criteria, generating reserves for the load are no longer required. Secondly, declines in wholesale usage have resulted in a reduction of 189 MW in wholesale load. The third component is the decline in usage per

[8] Following years of anticipated major environmental regulation, the EPA finalized the Clean Power Plan ("CPP") in October 2015. The CPP, which would have significant impacts to MPC's fleet, has remained in a state of uncertainty ever since its publication; the Supreme Court stayed the EPA's final rule in February 2016, only several months after its passage. In October 2017, the EPA proposed to repeal/withdraw the CPP and is considering a replacement rule. The ultimate future of the CPP and the potential impacts to MPC's fleet, remains unclear.

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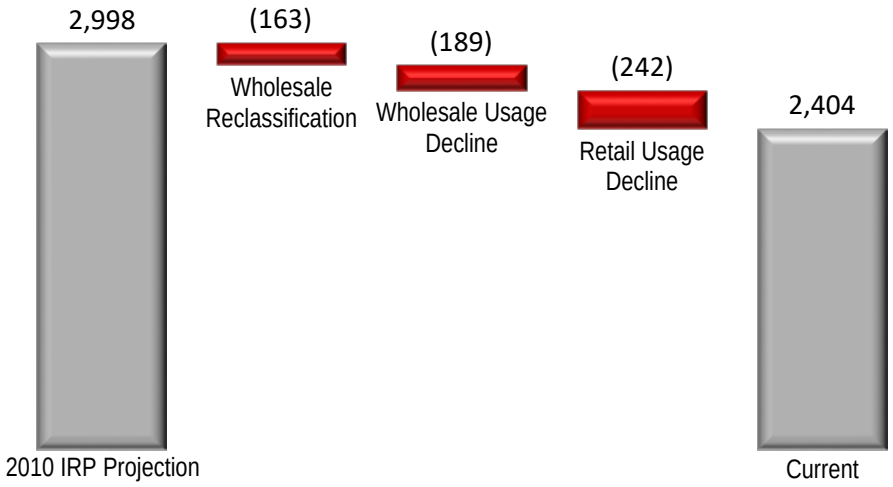
customer in the residential and commercial classes which has resulted in a reduction of 242 MW in retail load.

The usage declines described above can be mostly attributed to common factors observed in both the wholesale and retail sectors. Two common factors are changes in customer behavior and increasing minimum efficiency standards for appliances. Both factors are included in what MPC describes as "organic energy efficiency." Customers have become more aware of their electrical consumption and have been much more receptive to accepting energy efficient technologies and energy conservation behaviors as prices of these technologies have continued to decline. Changes in minimum codes and standards for new equipment such as air conditioners and lighting are also driving declines in use per customer. Another common factor is the sluggish recovery from the 2008 recession which also has affected both wholesale and retail load. Unlike other historical recessions, the recovery from the 2008 recession has taken much longer than what was expected in the 2010 IRP and did not recover the load lost during the economic downturn. These trends in energy efficiency and recession recovery are not isolated to MPC; rather these trends are impacting utility load growth nationwide.[9]

Figure 3: Waterfall Chart of Load for Year 2018 (MW, Summer)



[9] Energy Information Administration, Annual Energy Outlook Retrospective Review, September 19, 2017, Report Number DOE/EIA-0640(2016), https://www.eia.gov/outlooks/aeo/retrospective/.

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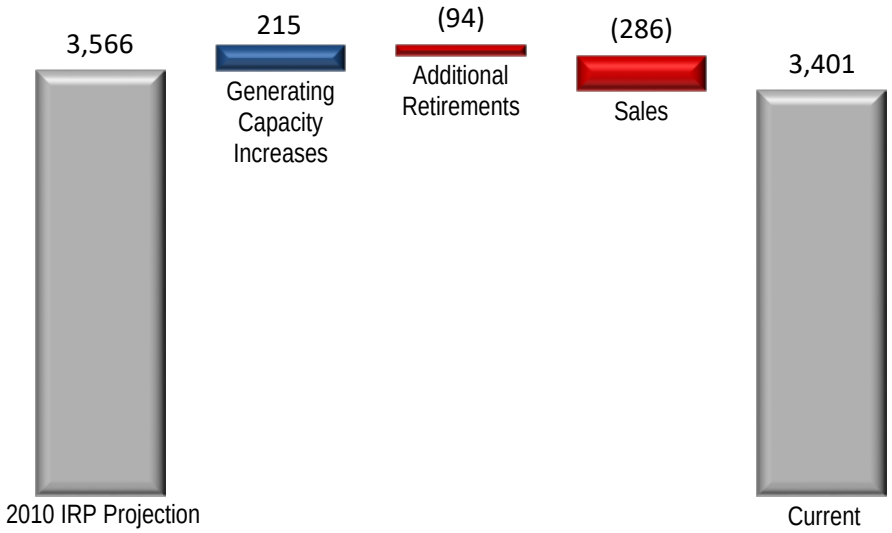
Changes in Generating Capacity

The 2010 IRP projected MPC to have 3,566 MW of capacity resources in 2018. However, current capacity resources total only 3,401 MW.[10] As shown in Figure 4, generating capacity increases were offset by larger capacity reductions, resulting in a net decrease of 165 MW.

Figure 4: Waterfall Chart of Capacity for Year 2018 (MW, Summer)



Of the 215 MW of generating capacity additions identified above, a majority (136 MW) was the result of lower station service (on-site load) due to switching generating units from coal or lignite to natural gas.[11] MPC has switched over three-quarters of its solid-fueled capacity to natural gas – Plant Watson in 2015, Plant Greene County in 2016, and Plant Ratcliffe in 2018.

The Company's increase in generating capacity also includes the capacity associated with long-term renewable energy PPAs. MPC has executed agreements to receive the full output of four solar facilities, three of which are currently in service.[12] While these agreements were sought and evaluated solely for their energy benefits, the three in-service facilities provide 45 MW of equivalent capacity in the summer.[13] This is 37 MW more than the 8 MW of new landfill gas capacity that was projected in the 2010 IRP.

[10] These capacity values reflect the net peak summer capability of MPC's generating resources.
[11] Using solid fuel to generate electricity requires many auxiliary systems to process coal and ash and to control emissions. After switching to natural gas, the net output of the plants increased because the power that was being consumed by the auxiliary loads can now flow to the grid.
[12] MPC receives renewable energy credits (RECs) associated with the energy from the solar projects, which it may use to serve its customers, apply to renewable energy programs, or sell, either bundled with energy or separately, to third parties.
[13] MPC determines equivalent capacity using the Incremental Capacity Equivalent (ICE) method which is consistent with NERC's Equivalent Load Carrying Capability (ELCC) method.

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Over the last seven years, MPC has retired eight older generating units, totaling 444 MW. In the 2010 IRP, only six of these units (totaling 350 MW)[14] were projected to be retired. The additional two retirements reduced MPC's capacity by 94 MW as compared to what was projected in the 2010 IRP.[15]

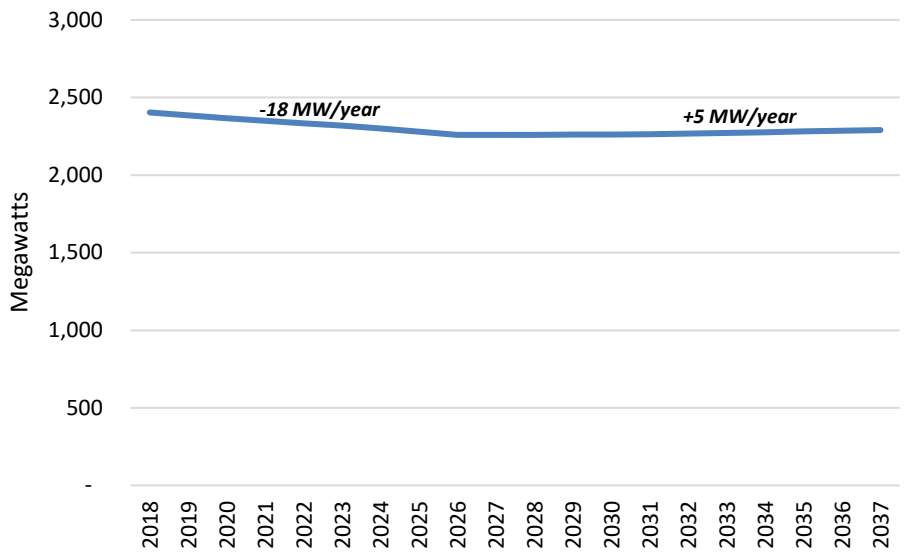
Finally, MPC has entered into capacity sale agreements with Cooperative Energy totaling 286 MW. The reclassification of the market-based rate contract in 2011 as a 10-year generation capacity contract reduced generating capacity by 152 MW. However, due to the fuel conversions and retirements mentioned earlier, the PPA has been reduced to 86 MW per the terms of the contract. This contract is projected to end in March 2021, but there are provisions that would allow for a year-to-year extension. An additional 200-MW short-term sale to Cooperative Energy has recently been executed, is expected to be renewed each year through 2021, and is included in MPC's analysis.

III. CURRENT PROJECTIONS

Load Forecast Projections

The load forecast projections for the coming years reflect a continued downward trend until 2026, followed by minimal annual growth over the long term (as compared to historical trends and forecasts). The continued downturn is due to continued adoption of new efficiency standards that reduce energy consumption and changes in contractual wholesale loads. The combination of these factors is expected to result in a continued summer demand decrease of approximately 18 MW a year through 2026. After 2026, the annual summer demand growth is relatively flat; growth of only approximately 5 MW per year is currently projected. The current summer peak demand forecast is shown in Figure 5 below.

Figure 5: Projected Summer Peak Demand



[14] Between 2012 and 2018, MPC retired 6 older, smaller gas-fired steam units as projected in the 2010 IRP – Plant Eaton Units 1, 2, and 3 in 2012; Plant Watson Units 1 and 2 in 2015; and Plant Watson Unit 3 in 2018.
[15] Plant Sweatt Units 1 and 2 were retired in 2016.

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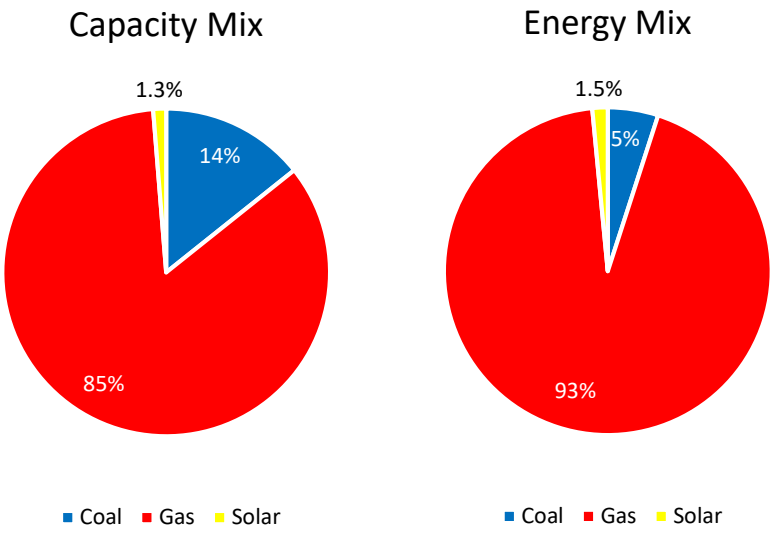
Generation Fleet Projections

MPC's current generation fleet, while predominantly natural gas-fueled, also includes coal-fired units and long-term solar PPAs as shown in Figure 6.

Figure 6: Resource Mix in 2018



MPC's gas-fired units include two combined cycle units at Plant Daniel, located in Jackson County, Mississippi; a combined cycle unit at Plant Ratcliffe, located in Kemper County, Mississippi; two natural gas-fired steam units and one combustion turbine[16] located at Plant Watson in Harrison County, Mississippi; and one combustion turbine at Plant Sweatt,[17] in Lauderdale County, Mississippi. MPC also owns a 40% undivided interest in two natural gas-fired steam units located in Greene County, Alabama, of which APC owns the remaining 60% interest and operates the facility. MPC also co-owns two coal-fired steam generating units at Plant Daniel along with Gulf Power Company; each company owns a 50% undivided interest in the coal-fired units, and all of the Plant Daniel units are operated by MPC. MPC owns and operates the cogeneration facilities located at and dedicated to the Chevron Refinery in Jackson County, Mississippi. Appendix A presents fuel type and the net summer and winter capacity ratings for each of the Company's owned generating units as well as the in-service date and location.

In addition to this owned generating capacity, MPC has executed long-term PPAs for the full output of four solar facilities in Mississippi with a combined nameplate capacity of 158 MW.[18] MPC also has access to Southeastern Power Administration hydroelectric capacity which is allocated to certain of MPC's wholesale customers. MPC's supply resources also include dispatchable demand side options, i.e., interruptible customer demand and customer owned standby generation. In total, these resources bring the current total supply capability available to the Company to 3,401 MW.

[16] The combustion turbine at Plant Watson is a designated black start unit required for system restoration. "Black start" refers to the capability of starting without relying on power from the transmission grid.
[17] The combustion turbine at Plant Sweatt is a black start-capable unit for system restoration.
[18] The combined summer equivalent capacity is 63 MW, of which 45 MW is provided by three operational facilities, and another 18 MW will be provided by a fourth facility that is in early stages of development.

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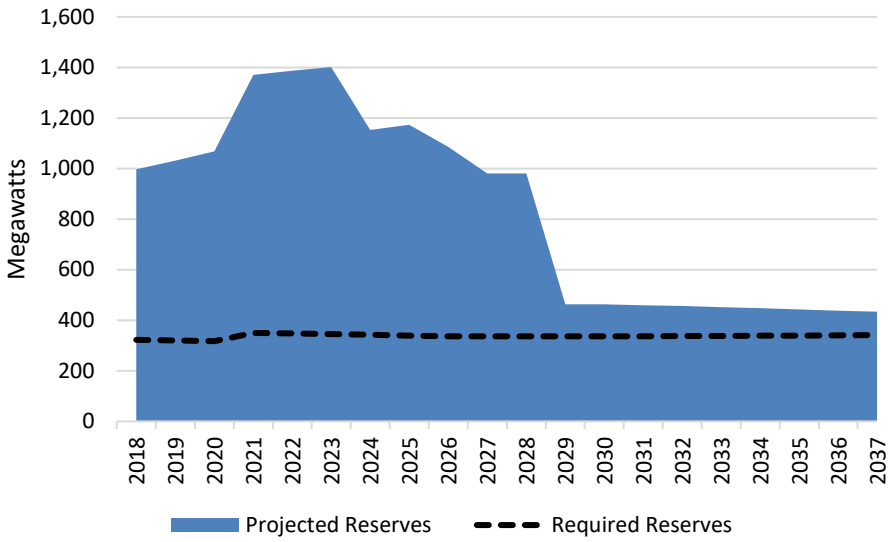
Of the currently owned and contracted generating capacity, only six units have current depreciation dates in the next decade as shown below.

Unit	Depreciation Dates
Sweatt CT	12/31/2018
Watson CT	12/31/2018
Watson 4	12/31/2023
Greene County 1	12/31/2025
Greene County 2	12/31/2026
Watson 5	12/31/2028

Assuming that these units, with the exception of the small combustion turbines at Plant Sweatt and Plant Watson, retire on their current depreciation dates, MPC's generating reserves would trend very close to target reserves by 2029, as shown below in Figure 7. The small combustion turbines are assumed either to continue to operate or to be replaced with similar units given their unique role in system restoration.

Figure 7: Projected Reserves – Current Depreciation Dates (Summer)



Target Reserve Margins

Since 2010, MPC's annual system peak has occurred in the winter season in six of the last nine years (including the most recent winter peak in 2018). Prior to this relatively recent trend, MPC rarely peaked in the winter. MPC's future annual peaks are currently projected to occur in the summer, however, projected summer and winter peaks are converging. Winter temperatures are more variable than summer temperatures as shown in Figure 8. The combination of three things, (1) the naturally-wider variability of winter temperatures, (2) the convergence of weather-normal summer and winter peak forecasts, and (3) the increasing load response to cold temperatures, means that MPC will continue to have the potential to experience actual peak demands in the winter.

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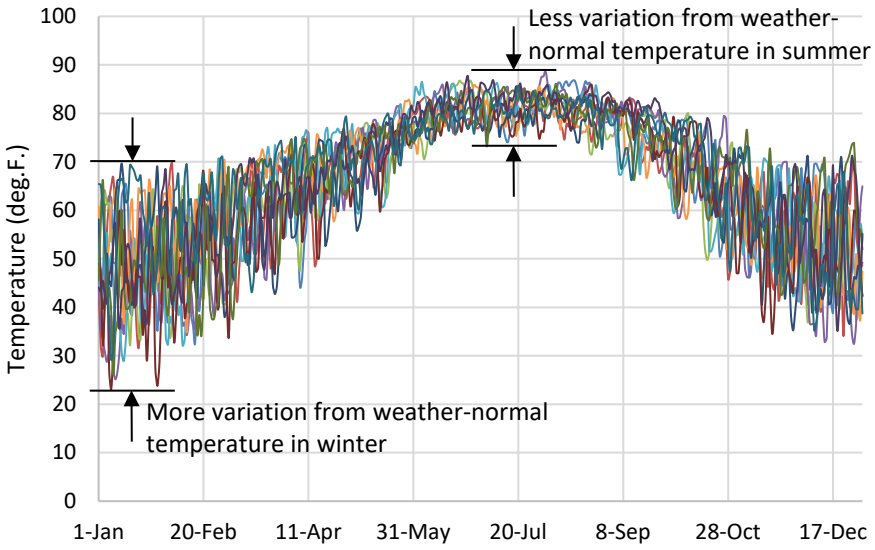
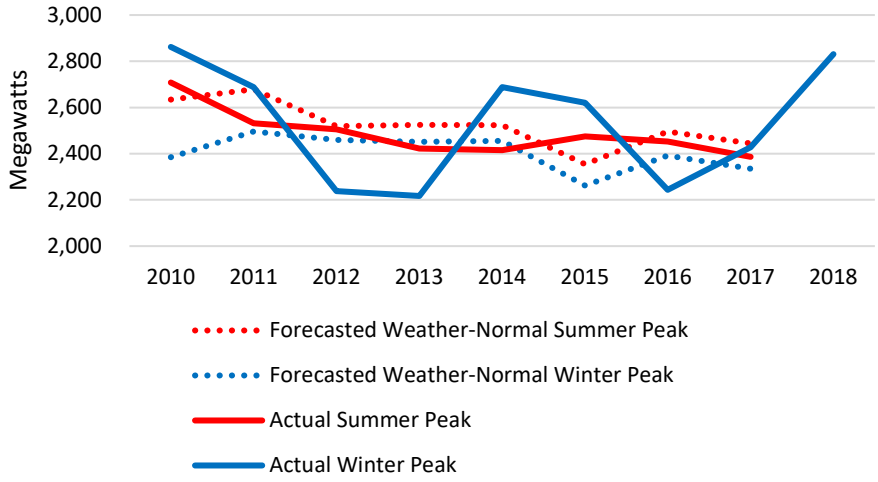
Figure 8: Seasonal Temperature Variation – Daily Average Temperatures



When considering the evolving effects of energy efficiency that primarily affect summer loads (e.g. air conditioning and lighting equipment), summer loads are expected to continue to have a downward trend. Winter loads could have no change and could potentially even have growth due to the use of resistive heat during extreme weather events. Figure 9 shows the actual and projected load trend.

Figure 9: Summer and Winter Peak Demands



Historically, the difference between summer and winter loads meant that as long as summer planning reserves were met, there would be adequate planning reserves in the winter. As winter load projections trend closer to summer load projections, winter impacts become increasingly relevant to reliability planning.

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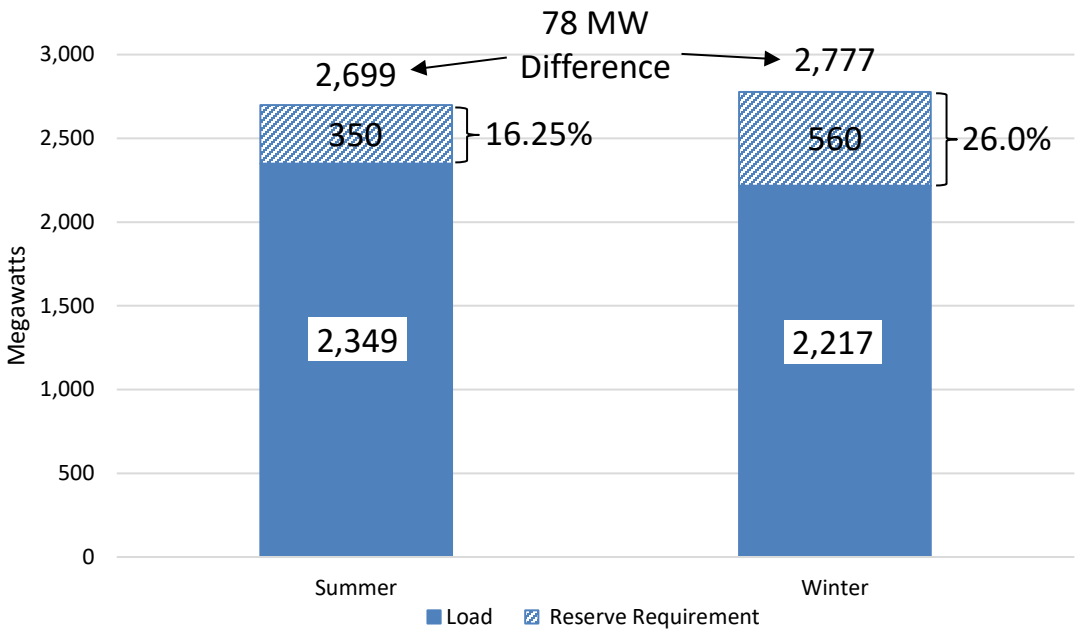
Every three years, MPC, in coordination with the SES, conducts a formal Reserve Margin Study to determine the appropriate target reserve margin. The 2015 study, which benefited from load response information from the 2014 polar vortex and 2015 extreme winter weather, first indicated the significant change in reliability risk in winter. The naturally higher volatility of winter temperatures shown in Figure 8 combined with increasing customer load response to cold temperatures have made it important to study both winter and summer in determining appropriate reserve margins for planning. The 2018 study (which will be used for the 2019 planning cycle) marks a transition to dual planning criteria where both summer and winter values are calculated individually. The 2018 study validates the existing 16.25% summer long-term target reserve margin and establishes 26% as the winter long-term target reserve margin for the SES. Forecasted capacity requirements for winter are now very close to those for summer, as illustrated in Figure 10. Further, while forecasted summer and winter peaks are now converging, these peaks will likely cross over in upcoming planning cycles such that MPC becomes a winter peaking utility. As this trend continues, the spread between MPC's summer and winter capacity requirements will grow.

Figure 10: Summer and Winter Capacity Requirements (Year 2025)[19]



[19] The percentages in Figure 10 are SES target reserve margins shown for illustrative purposes. Due to differing longitudes and customer usage patterns among the operating companies of the SES, their peaks do not occur simultaneously. Therefore, the SES target reserve margins can be achieved with lower reserve margins at each operating company.

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IV. ASSET VALUATIONS

Asset valuations are incremental analyses intended to provide input for decision-making regarding the Company's portfolio of generating resources. During the development of this Plan, the Company conducted asset valuations of each generating unit using current budgets and forecasts. MPC's entire generating portfolio (with the exception of the Chevron Cogeneration Plant) was subjected to an asset valuation process, as described in greater detail below.

As the first step of this process, an asset screen was performed on each generating unit, individually comparing each unit to the same alternative in order to establish rank order of unit values on a $/kW basis. Second, successive reserve margin analyses were conducted to determine the appropriate capacity worth to apply to each unit with the assumption that the least valuable units would be the first units to cease operation. Next, an asset valuation was performed for each unit using the assumptions developed in the previous steps for a 30-year planning horizon. The study incorporates the incremental costs associated with continued operation of the facility. Unit characteristics combined with marginal replacement fuel cost, variable operations and maintenance ("O&M") cost, and emissions costs were used to model projected energy benefits. The transmission improvements avoided due to the units remaining in service were included as a benefit. Costs included projected fixed O&M, maintenance capital expenditures, and environmental capital expenditures.[20] Since the asset valuations were incremental analyses that do not consider sunk costs, it was assumed that recovery of the remaining book balance would occur in a way that would not impact the analyses. From this information, the NPVRR of annual benefits and costs was determined for each unit. Next, other considerations such as system reliability and fuel diversity (described below) were considered. For the units that indicate that there is benefit for ceasing operation versus continuing to operate over the long term, the benefit to customers in NPVRR of ceasing operations as soon as system reliability criteria allows versus continuing to operate the units over the current depreciation dates was calculated. Significant changes in load forecasts (additions or reductions), fuel forecasts, or unit budget profiles (e.g. changes in environmental regulations) could require additional evaluation.

Other Considerations

There are several additional considerations which should be considered in conjunction with the results of MPC's asset valuation. Most importantly, these include system reliability, which is the most significant concern impacting MPC's Plan, and fuel diversity, each of which are discussed below.

System Reliability

In addition to simply supplying power to the grid, generating units must serve many other functions in support of reliable operation of the bulk power system, including:

a. Reliability commitment for NERC[21] compliance (System & Area Protection)
b. Reactive supply and voltage support

[20] The analysis assumes that capital maintenance and O&M spending doesn't change before units cease operations and completely stops after the units cease operations. In actuality, MPC would seek to maintain unit reliability while identifying possible savings opportunities through cost deferral or elimination during the remaining years of operation as well as possible additional costs that would be incurred after ceasing operations.

[21] The North American Electric Reliability Corporation is a regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid, including enforcement of Reliability Standards and assessment of penalties and sanctions for failure to comply.

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c. Regulation and frequency response
d. Operation & recovery support for extreme weather events, e.g. hurricanes
e. Operational flexibility to support generation and transmission maintenance
f. System recovery (black start)

The transmission system has been built up around each power plant in an integrated manner over many years to ensure reliability of the bulk electric system.[22] When generation is removed from the system, the loss of such generation will most likely result in the need for transmission system improvements or the addition of generation to ensure reliability is maintained. The transmission improvement projects required to accommodate any generation retirement are identified as part of the SES transmission planning process. The transmission planning criteria used by the SES is based on NERC Reliability Standards to ensure the system will operate reliably over a broad spectrum of system conditions and following a wide range of probable contingencies, e.g. line and/or unit outages.

The SES transmission improvements, including MPC projects, necessary to support the cessation of operations for all four units in this RMP's most economic alternative have been identified based upon current planning assumptions. Prior to ceasing operations of any unit, MPC plans to ensure the associated SES transmission improvement projects are completed. The major risk in ceasing operation of these generating units prior to the transmission system deficiencies being addressed is having to shed firm load due to certain contingencies, e.g. unplanned line and/or unit outages. The amount of load shed would be dependent on certain line or unit outages and on system conditions, however planning analysis indicates the amount of load shed could be as much as 100 MW or greater.[23] Further, the duration of the load shed could be several hours, either until load declined or until generation resources could be restored. The risk of load shed would exist throughout the entire year but would be of even greater concern during the spring and fall, when generator and transmission line outages are typically scheduled for planned maintenance.

While necessary transmission improvements have been identified, additional operational studies are ongoing to confirm the construction schedule is attainable under existing system constraints and assumptions, e.g. unit and line outage schedules. Changes in the transmission construction schedule could impact the earliest dates to cease operations presented in this Plan.

As noted earlier, generating units serve many functions in support of system reliability. One such function is providing operational and recovery support associated with an extreme event, such as a hurricane. Ceasing operation of Unit 4 and 5 at Plant Watson would result in the bulk of the remaining 1500+ MW of MPC's coastal generation being located at one site – Plant Daniel. For a Category 2 or greater hurricane whose path includes Plant Daniel, load shed may be required eight to 12 hours in advance of the storm making landfall. Load shed is likely to occur due to generation at Plant Daniel having to be shut down for unit protection or isolated from the transmission grid to supply station service. While storm hardening projects have been completed at Plant Daniel to allow the combined cycle units to operate through a Category 1 storm, constraints would still apply in the event of a Category 2 or greater storm. Thus, additional future storm hardening modifications may ultimately be required, such as the installation of standby generators for station service, to allow both coal units to remain connected to the grid and reduce the risk of load shed prior to or during a hurricane. In the event of ceasing operation of any unit, further

[22] Reliable operation of the system is defined by NERC as operating the elements of the bulk power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.
[23] To put the impact of 100 MW of load shed into perspective, it could involve several large industrial customers or multiple communities serving thousands of customers.

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storm hardening analysis will need to be performed for Plant Daniel to ensure the reliable operation of the units and their critical operational and recovery role associated with a hurricane.

Fuel Diversity

With Plant Ratcliffe as a natural gas-fueled plant, over 84% of Mississippi Power Company's generating capacity is now natural gas-fueled. In 2018, Mississippi Power Company expects to generate 94% of all electricity using natural gas. While fuel diversity remains an important factor in utility planning, this is not a concern for the units discussed in the Plan because these particular natural gas units do not provide significant energy benefits.

Study Results

Plant Greene County Units 1 and 2

The current depreciation dates for Units 1 and 2 at Plant Greene County are 2025 and 2026, respectively. Based on the Plan's asset valuation analysis, ceasing operation of Units 1 and 2 at Plant Greene County as compared to continuous operation over the long term would benefit MPC's customers by an estimated $705/kW and $939/kW, respectively. The SES's most recent transmission study identified transmission upgrades on lines within APC that need to be completed before the units cease operations. These projects are currently included in APC's construction schedule for completion in 2021 and 2022. Any decision to cease operations will require mutual agreement between MPC and APC and will be based on the facts and circumstances at that time including the completion of the aforementioned transmission projects. There were no transmission upgrade projects required in MPC's service territory. The estimated earliest date to cease operations and resulting savings considering these reliability constraints as compared to the current depreciation dates are shown below.

Unit	Capacity (MW)	Current Depreciation Dates	Earliest Date to Cease Operations	Approximate Acceleration	Estimated NPVRR Savings
Greene County 1	106	Q4 2025	Q3 2021	4 years	$15 M
Greene County 2	107	Q4 2026	Q3 2022	4 years	$20 M
Total	**213**				**$35 M**

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Plant Watson Units 4 and 5

The current depreciation dates for Units 4 and 5 at Plant Watson are 2023 and 2028, respectively. Based on the Plan's asset valuation analysis, ceasing operation of Units 4 and 5 at Plant Watson as compared to continuous operation over the long term would benefit customers by an estimated $653/kW and $543/kW, respectively. The SES's transmission study indicated that MPC and APC transmission improvement projects will need to be completed prior to ceasing operation of these units. The transmission projects identified for MPC are currently scheduled over the next four years (2018-2021). These transmission projects were already in MPC's budget and also resolve other transmission issues. Therefore, they were not included in the analysis. The estimated cost for the projects within MPC's service territory is $26 million. The identified APC transmission projects are included in APC's construction schedule. The earliest estimated dates to cease operations considering these reliability constraints are shown below in comparison to the current depreciation dates.

Unit	Capacity (MW)	Current Depreciation Dates	Earliest Date to Cease Operations	Approximate Acceleration	Estimated NPVRR Savings
Watson 4	268	Q4 2023	Q1 2022	2 years	$40 M
Watson 5	516	Q4 2028	Q1 2022	7 years	$115 M
Total	**784**				**$155 M**

Plant Daniel Units 1 and 2

MPC's analysis indicates that continued operation of Units 1 and 2 at Plant Daniel would benefit customers with an average of $198 million NPVRR ($394/kW) across all nine scenarios. However, given the continued decline of natural gas price forecasts, the projected energy value of Daniel Units 1 and 2 has substantially diminished as natural gas price forecasts have declined. Based upon the Company's current natural gas forecast, the units have value only as capacity (as compared to energy value) in most of the moderate and low natural gas price scenarios but provide substantial energy benefits in the high natural gas scenarios. These units will be more sensitive to natural gas forecasts, the value of replacement capacity, and significant increases to capital and O&M additions over what was forecasted. As the only coal fired units remaining in MPC's fleet, it is also noteworthy that these units provide the bulk of the remaining fuel diversity for MPC.

Plant Daniel Units 3 and 4 and Plant Ratcliffe

MPC's natural gas combined cycle units – Plant Daniel Units 3 and 4 and Plant Ratcliffe – provide significant benefits to MPC's customers. MPC's analysis indicates that continued operation would benefit customers an average of $1.4 billion NPVRR ($1,265/kW) and $399 million NPVRR ($571/kW), respectively.

Plant Sweatt and Plant Watson CTs

The analysis indicates that continued operation of the small Sweatt and Watson CTs would benefit customers by $15 million NPVRR ($469/kW) and $15 million NPVRR ($455/kW), respectively. The CTs serve an important role in system protection and restoration, as noted in footnotes 16 and 17, and MPC plans for their continued operation. However, at some point in the future, a lack of replacement part availability or vendor support may drive the retirement and replacement with similar type of equipment.

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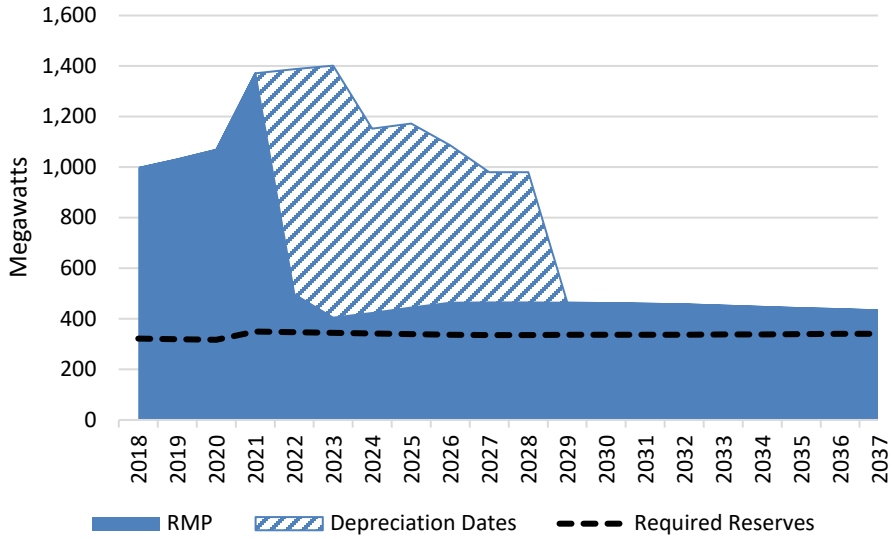
Study Summary

The NPVRR scenario matrices resulting from MPC's asset valuation are presented in Appendices B and C. Ceasing operations of Plant Watson Units 4 and 5 and Plant Greene County Units 1 and 2 prior to their current depreciation dates, as previously described in this section, would provide savings to customers and bring the Company's reserve margin closer to the target sooner than previously projected, as shown in Figure 11.

Figure 11: Projected Reserves – RMP vs. Current Depreciation Dates (Summer)



V. NEXT STEPS

The following specific actions are necessary to execute any of the alternatives presented in the Plan:

1. Commission and Staff review of filed RMP.
2. Complete all required regulatory review and approvals applicable to the selection of an alternative, including (if applicable) the issuance of an accounting order authorizing the deferral of the difference between the depreciation expense associated with any units that will no longer be in operation.
3. Complete necessary transmission improvements.
4. Finalize plans and execute selected alternative.

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APPENDIX A

MPC Owned Generating Units

Plant	Unit No.	Location	Initial Oper.	Fuel	Technology	Net Peak Capability (MW)	
						Summer	Winter
Daniel	1	Jackson County, MS	1977	Coal	Steam	251	251
Daniel	2	Jackson County, MS	1981	Coal	Steam	251	251
Chevron	1	Jackson County, MS	1967	Natural Gas	Cogeneration	15	17
Chevron	2	Jackson County, MS	1967	Natural Gas	Cogeneration	15	17
Chevron	3	Jackson County, MS	1971	Natural Gas	Cogeneration	16	18
Chevron	4	Jackson County, MS	1971	Natural Gas	Cogeneration	16	18
Chevron	5	Jackson County, MS	1994	Natural Gas	Cogeneration	70	80
Daniel	3	Jackson County, MS	2001	Natural Gas	Combined Cycle	538	557
Daniel	4	Jackson County, MS	2001	Natural Gas	Combined Cycle	557	573
Ratcliffe	1	Kemper County, MS	2014	Natural Gas	Combined Cycle	680	742
Sweatt	A	Lauderdale County, MS	1971	Natural Gas	Combustion Turbine	32	41
Watson	A	Gulfport, MS	1970	Natural Gas	Combustion Turbine	33	41
Greene Co.	1	Greene County, AL	1965	Natural Gas	Steam	106	106
Greene Co.	2	Greene County, AL	1966	Natural Gas	Steam	107	107
Watson	4	Gulfport, MS	1968	Natural Gas	Steam	268	268
Watson	5	Gulfport, MS	1973	Natural Gas	Steam	516	516

Notes:

1. Net peak capabilities shown in this table reflect MPC's ownership share of total capabilities and are not reduced for short-term block capacity sales.
2. Units 1 and 2 at Plant Daniel are jointly owned by MPC and Gulf Power Company with each company holding a 50% undivided interest.
3. Units 1 and 2 at Plant Greene County are jointly owned by MPC and Alabama Power Company with MPC holding a 40% undivided interest and Alabama Power Company holding a 60% undivided interest.

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4. Plant Ratcliffe will undergo a Ultra-Low NOX / F6 Hot Gas Path ("ULN / F6 HGP" or "ULN") conversion in fall 2018. Following this conversion, Plant Ratcliffe's net peak capabilities for summer and winter are expected to increase to 699 MW and 790 MW, respectively.
5. All values reflect the net peak capabilities as measured on the low-voltage side of the generator step-up transformers.

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APPENDIX B

Estimated NPVRR of 30-Year Remaining Life:

The values in the tables below are the estimated NPVRR of generating units remaining in service for 30 years compared to immediate retirement and replacement. Amounts are expressed in millions of 2018 dollars. Positive numbers indicate an economic benefit to customers.

Plant Greene County Unit 1

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	($75)	($75)	($75)
Mod Gas	($75)	($75)	($75)
Low Gas	($75)	($75)	($75)
Average	**($75)** *($705/kW)*		

Plant Greene County Unit 2

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	($100)	($100)	($100)
Mod Gas	($100)	($100)	($100)
Low Gas	($100)	($100)	($100)
Average	**($100)** *($939/kW)*		

Plant Watson Unit 4

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	($175)	($175)	($175)
Mod Gas	($175)	($175)	($175)
Low Gas	($175)	($175)	($175)
Average	**($175)** *($653/kW)*		

Plant Watson Unit 5

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	($280)	($280)	($280)
Mod Gas	($280)	($280)	($280)
Low Gas	($280)	($280)	($280)
Average	**($280)** *($543/kW)*		

Plant Daniel Units 1 and 2

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$830	$380	$295
Mod Gas	$215	$5	$0
Low Gas	$30	$10	$15
Average	**$198** *$394/kW*		

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APPENDIX B

Plant Sweatt CT

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$15	$15	$15
Mod Gas	$15	$15	$15
Low Gas	$15	$15	$15
Average	**$15** *$469/kW*		

Plant Watson CT

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$15	$15	$15
Mod Gas	$15	$15	$15
Low Gas	$15	$15	$15
Average	**$15** *$455/kW*		

Plant Ratcliffe

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$260	$190	$340
Mod Gas	$350	$305	$505
Low Gas	$425	$505	$710
Average	**$399** *$571/kW*		

Plant Daniel Units 3 and 4

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$1,100	$975	$1,245
Mod Gas	$1,295	$1,225	$1,610
Low Gas	$1,460	$1,600	$1,955
Average	**$1,385** *$1,265/kW*		

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APPENDIX C

Estimated NPVRR due to Cessation of Operations Prior to Current Depreciation Dates:

The values in the tables below are the estimated NPVRR of ceasing operation of a generating unit upon completion of required transmission improvements compared to retirement on its current depreciation date. Amounts are expressed in millions of 2018 dollars. Positive numbers indicate savings to customers.

Plant Greene County Unit 1

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$15	$15	$15
Mod Gas	$15	$15	$15
Low Gas	$15	$15	$15
Average	**$15**		

Plant Greene County Unit 2

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$20	$20	$20
Mod Gas	$20	$20	$20
Low Gas	$20	$20	$20
Average	**$20**		

Plant Watson Unit 4

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$40	$40	$40
Mod Gas	$40	$40	$40
Low Gas	$40	$40	$40
Average	**$40**		

Plant Watson Unit 5

	$0 CO_2	**$10 CO_2**	**$20 CO_2**
High Gas	$115	$115	$115
Mod Gas	$115	$115	$115
Low Gas	$115	$115	$115
Average	**$115**		

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