BEFORE THE
ALABAMA PUBLIC SERVICE COMMISSION
MONTGOMERY, ALABAMA

IN RE: Petition for a Certificate of	)	
Convenience and Necessity by	)	Docket 32953
Alabama Power Company	)	

PUBLIC VERSION

Direct Testimony of
Rachel S. Wilson

On behalf of
Sierra Club

December 4, 2019

Table of Contents

I. INTRODUCTION AND QUALIFICATIONS 1

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS 3

III. ALABAMA POWER'S PROPOSED GAS UNITS OVERBUILD RELATIVE TO ITS FUTURE CAPACITY NEED 6

IV. ALABAMA POWER HAS NOT DEMONSTRATED THAT ITS PROPOSED GAS UNITS ARE NEEDED, OR THAT THEY ARE LEAST-COST 14

A. Alternative least-cost resource options 14

B. Barry 8 is high risk compared to DSM and renewables 16

C. Commission actions to protect Alabama customers 18

V. PROPOSED GAS UNITS WOULD EXPOSE CUSTOMERS TO UNNECESSARY RISK 19

A. Winter fuel supply risks 20

B. Stranded asset risk 21

C. Carbon dioxide price risk 26

VI. THE PROPOSED GAS UNITS WOULD CAUSE COSTLY CLIMATE DAMAGES 29

VII. CONCLUSIONS AND RECOMMENDATIONS 30

Table of Exhibits

RW-1	Rachel Wilson Resume
RW-2	Sierra DR-1 I-14.
RW-3	Hoffman, et al. 2018. The Cost of Saving Electricity Through Energy Efficiency Programs Funded by Utility Customers: 2009-2015. Lawrence Berkeley National Laboratory.
RW-4	Wilson, R. and B. Biewald. 2013. Best Practices in Electric Utility Integrated Resource Planning. Prepared for the Regulatory Assistance Project.
RW-5	Binz, R. et al. 2014. Practicing Risk-Aware Electricity Regulation: 2014 Update. Prepared for Ceres.
RW-6	Georgia Public Service Commission. Order Adopting Stipulation as Amended. Docket No. 42310. July 29, 2019.
RW-7	Union of Concerned Scientists. 2015. Rating the States on their Risk of Natural Gas Overreliance.
RW-8	U.S. Energy Information Administration. 2014. Northeast and Mid-Atlantic power prices react to winter freeze and natural gas constraints.
RW-9	CONFIDENTIAL Sierra Club DR-1 I-01 Attachment O APSC Staff Q&A.
RW-10	Rocky Mountain Institute. 2019. The Growing Market for Clean Energy Portfolios.
RW-11	Parnell, John. 2019. FPL to replace aging gas power plants with the world's largest battery. Forbes.
RW-12	Utility Dive. March 15, 2018. Arizona regulators move to place gas plant moratorium on utilities.
RW-13	Utility Dive. February 11, 2019. Arizona extends gas plant moratorium, punts on PURPA reforms.
RW-14	Utility Dive. April 25, 2019. Indiana regulators reject Vectren gas plant over stranded asset concerns.
RW-15	Utility Dive. October 1, 2019. Minnesota rejects Xcel's 720 MW Mankato gas plant purchase over stranded asset concerns.
RW-16	Direct Testimony of John A. Putnam before the Alabama Public Service

	Commission. Docket No. 26115.
RW-17	CONFIDENTIAL Sierra DR-1 I-05 Attachment Y – APC 2023 RFP Final Ranking MG0.
RW-18	Conservation Law Foundation. 2014. Conservation Law Foundation Announces Settlement with Footprint Power Plant on Salem Natural Gas Facility.
RW-19	Agreement between Connecticut Fund for the Environment, Inc. and NTE Connecticut, LLC. August 27, 2019.
RW-20	Interagency Working Group (August 2016), "Technical Support Document – Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866."

I. INTRODUCTION AND QUALIFICATIONS

Q. STATE YOUR NAME, BUSINESS ADDRESS, AND POSITION.

A. My name is Rachel Wilson and I am a Principal Associate with Synapse Energy Economics, Incorporated ("Synapse"). My business address is 485 Massachusetts Avenue, Suite 2, Cambridge, Massachusetts 02139.

Q. DESCRIBE SYNAPSE ENERGY ECONOMICS.

A. Synapse Energy Economics is a research and consulting firm specializing in electricity industry regulation, planning, and analysis. Synapse's clients include state consumer advocates, public utilities commission staff, attorneys general, environmental organizations, federal government agencies, and utilities.

Q. SUMMARIZE YOUR WORK EXPERIENCE AND EDUCATIONAL BACKGROUND.

A. At Synapse, I conduct analysis and write testimony and publications that focus on a variety of issues relating to electric utilities, including integrated resource planning, resource adequacy, electric system dispatch, environmental regulations and compliance strategies, and power plant economics.

I also perform modeling analyses of electric power systems. I am proficient in the use of spreadsheet analysis tools, as well as optimization and electricity dispatch models to conduct analyses of utility service territories and regional energy markets. I have direct experience running the Strategist, PROMOD IV, PROSYM/Market Analytics, PLEXOS, EnCompass, and PCI Gentrader models, and I have reviewed input and output data for several other industry models.

Prior to joining Synapse in 2008, I worked for the Analysis Group, Inc., an economic and business consulting firm, where I provided litigation support in the form of

research and quantitative analyses on a variety of issues relating to the electric industry.

I hold a Master of Environmental Management from Yale University and a Bachelor of Arts in Environment, Economics, and Politics from Claremont McKenna College in Claremont, California.

A copy of my current resume is attached as Exhibit RW-1.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of the Sierra Club.

Q. HAVE YOU TESTIFIED BEFORE THE ALABAMA PUBLIC SERVICE COMMISSION?

A. No.

Q. HAVE YOU TESTIFIED BEFORE OTHER STATE REGULATORS CONCERNING THE SOUTHERN COMPANY ELECTRIC SYSTEM?

A. Yes. I submitted testimony in Georgia in the 2019 Integrated Resource Plan docket, No. 43210, and in the 2019 Rate Case docket, No. 42516. I also submitted testimony in Mississippi in Docket No. 2019-UA-116.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present my analysis of Alabama Power Company's petition for a certificate of convenience and necessity for proposed resource additions totaling 2,436 megawatts (MW). My evaluation focuses on the relevant factors used by this Commission, and state regulators across the country, to decide whether to issue such a certificate, and if so, with what conditions. These relevant factors include: (1) whether there is a capacity and/or energy need, and if so, the magnitude and nature of that need; and (2) whether a utility's proposed resource

additions are the least-cost way to meet that need as compared to other options available to that utility. Other options would include targeted, incremental investments to reduce or defer the identified need.

Q. IDENTIFY THE DOCUMENTS ON WHICH YOU BASE YOUR ANALYSIS.

A. My analysis focuses on the Company's petition and its pre-filed direct testimony and discovery responses. I use the Clean Energy Portfolio tool developed by the Rocky Mountain Institute to compare the costs of Barry Unit 8 to a replacement portfolio of energy efficiency and renewable resources. I also refer to other documents such as filings and orders in utility dockets and industry publications.

II. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. SUMMARIZE YOUR PRIMARY CONCLUSIONS.

A. In its petition, Alabama Power points to a projected winter peak load—the hour of maximum electrical power demand—as the driver for a corresponding projected winter capacity deficit, in which the Company's current generating capacity (in MW) is not sufficient to meet projected peak load plus a reserve margin.[1] To resolve this capacity deficit, Alabama Power proposes to add 2,236 MW of supply-side resources to its system, of which 1,896 MW are new or existing gas units.

The proposed gas units are a mismatch for Alabama Power's projected need. The winter peak identified in 2023-2024 is driving the proposed resource additions; however, peak declines after that year and drops by [redacted]

[1] A reserve margin is (capacity minus demand) divided by demand, where capacity is the expected maximum available supply and demand is expected peak demand. Utilities have supply resources in excess of expected demand to ensure system reliability.

[redacted] Alabama Power has provided no evidence that it cannot rely on excess capacity from the other Southern Company operating companies to meet at least a portion of the projected winter peak need prior to [redacted]

Alabama Power has not demonstrated that its proposed resource portfolio is least-cost to customers. Rocky Mountain Institute's Clean Energy Portfolio tool shows that a replacement resource portfolio made up of 50 percent demand-side management (DSM) measures and 50 percent renewable resources has a lower levelized cost of energy (LCOE) at $39.34/MWh than building and operating Barry Unit 8 at an LCOE of $45.54.

There are wide-ranging risks associated with gas units. Reliance on gas as a fuel subjects a generator to risk of fuel price volatility and fuel supply disruption, particularly in the winter. Alabama Power's projected need is, in part, a result of the Company's current reliance on gas, and to meet that need with more gas is illogical. In addition, downward pressure on the prices of renewable technologies leads to substantial stranded asset risk for gas generators, particularly new units with longer expected service lives. These units also face the risk of carbon dioxide regulation, which would result in increased operating costs that are passed on to customers.

The social cost of carbon is a value used to measure climate damages associated with emissions of CO_2. Using a mid-range value developed by the United States Interagency Working Group on the Social Cost of Greenhouse Gases, I calculate that the climate damages associated with the proposed gas units total $3.9 billion in net present value terms over their anticipated service lives.

Q. PLEASE SUMMARIZE YOUR PRIMARY RECOMMENDATIONS.

A. I make several recommendations. First, I recommend approval of the proposed solar-and-storage projects because, as Mr. M. Brandon Looney demonstrates in his Direct Testimony, there is a clear cost benefit to customers.[2]

Instead of the proposed gas units, Alabama Power should seek to obtain capacity from the other Southern Company operating companies, to the extent it can, [redacted] Further, the Company should be required to conduct a new DSM potential study and undertake all cost-effective DSM to reduce any remaining capacity deficit. The Company should also be required to procure additional renewable resources consistent with the recommendations of Sierra Club witness Mark Detsky, which are described in his Direct Testimony. The proposed gas units should be rejected or at least deferred until the results of the DSM potential study and the renewable resource procurement are known.

However, if the Commission does grant the certificate to the proposed gas units rather than deferring that decision, it should impose three conditions on that approval to protect customers from the significant risks associated with those units: (1) Alabama Power's shareholders, rather than its customers, should bear the costs of the proposed gas units becoming stranded assets; (2) The proposed gas units should be required to operate under enforceable annual declining greenhouse gas emissions limits; and (3) Alabama Power should submit a retirement-replacement study for the vulnerable fossil steam units on its own system.

[2] CONFIDENTIAL Exhibit MBL-1.

III. ALABAMA POWER'S PROPOSED GAS UNITS OVERBUILD RELATIVE TO ITS FUTURE CAPACITY NEED

Q. DESCRIBE ALABAMA POWER'S PROPOSED RESOURCE ADDITIONS.

A. In his Direct Testimony, Mr. John B. Kelley describes Alabama Power's proposal to add 2,236 MW of supply-side resources and 200 MW of demand-side resources.[3] The proposed supply-side resources are: (1) power purchase agreements (PPAs) for the five proposed solar-and-storage projects with a cumulative capacity of 340 MW; (2) the new 743 MW combined-cycle Barry Unit 8; (3) the 238 MW PPA with the combined-cycle Hog Bayou Energy Center; and (4) acquisition of the 915 MW combined-cycle Central Alabama Generating Station.[4] The proposed demand-side resources are 200 MW of demand-side management (DSM) and distributed energy resources.[5]

Q. WHAT NEED ARE THE PROPOSED RESOURCE ADDITIONS SUPPOSED TO MEET?

A. In short, a projected capacity need. The Company's 2019 IRP projected growing winter peak loads and corresponding winter capacity deficits over the next 10 years.[6] In his Direct Testimony, Mr. Kelley explains that the Company needs approximately

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[3] Demand-side resources are those that change customer demand, saving energy in a given hour or range of hours. Supply-side resources are electric generators that produce energy to meet customer demand.

[4] Direct Testimony of John B. Kelley. Page 19, lines 15-24. Note that Alabama Power's petition includes a request for blanket authorization to build supporting transmission infrastructure and facilities for the transport, handling, treatment, processing, and delivery of fuel.

[5] Direct Testimony of John B. Kelley. Page 20, lines 1-3.

[6] Direct Testimony of John B. Kelley. Page 10, lines 20-22.

2,400 MW of additional resources on its system by 2023–2024 because of those projected winter peak loads and capacity deficits.[7]

Q. DO YOU AGREE THAT THE COMPANY NEEDS 2,400 MW OF ADDITIONAL RESOURCES ON ITS SYSTEM BY 2023–2024?

A. No, I disagree. In its integrated resource planning process and, specifically, in its 2018 Reserve Margin Study, the Company developed a new methodology for projecting winter peak load. This methodology appears to be the main driver of its projected winter capacity deficits. However, my analysis does not delve into the details of this new methodology and accepts, without affirming, the Company's calculations.

My analysis instead critiques the Company's leap from its projection of a winter capacity deficit to the conclusion that the solution is to add 1,896 MW of gas capacity to its system all at once. Even if the Commission accepts the Company's projected winter capacity deficits, it should draw different conclusions about the size and timing of needed resource additions.

Q. WHAT CONCLUSIONS ABOUT NEED SHOULD THE COMMISSION DRAW INSTEAD?

A. The Company's projected winter peak and corresponding capacity deficit [redacted]

[7] Direct Testimony of John B. Kelley. Page 14, lines 17-18.

[redacted] However, the projected capacity deficit in 2023–2024 [redacted] [redacted] [redacted] [redacted][8] [redacted] [redacted] Reliance on the Southern Company system to meet demand in that year would affect the size and timing of the necessary resource additions.

Alabama Power and the other Southern Company subsidiaries "operate their systems on a coordinated basis to achieve economies of scale and other available efficiencies."[9] If one looks at the coordinated Southern Company system, the capacity additions needed for Alabama Power to meet the winter reserve margin are lower than what the Company is proposing in this docket.[10] Alabama Power asserts that it cannot rely on the capacity of the other operating companies in the 2023–2024 timeframe because much of what is available comes from older fossil steam units that cannot be counted on to meet future resource need.[11] However, there is no legally enforceable obligation to retire any of those units.[12] Alabama Power is thus building and acquiring new resources to make up for the capacity on the Southern Company system that has not yet committed to retire.

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[8] CONFIDENTIAL Exhibit JBK-1. Alabama Power 2019 Integrated Resource Plan. Page 21.

[9] Direct Testimony of John B. Kelley. Page 4, lines 17-19.

[10] Direct Testimony of John B. Kelley. Page 12, lines 1-4.

[11] Direct Testimony of John B. Kelley. Page 13, lines 10-14.

[12] Exhibit RW-2. Sierra DR-1 I-14.

Q. SHOULD ALABAMA POWER CONSIDER THE SOUTHERN COMPANY SYSTEM RESOURCES TO MEET ITS PROJECTED NEED?

A. Yes. Alabama Power should consider relying on resources in the Southern Company system to meet at least a portion of its projected need, [redacted][13] Georgia Power is the largest of the Southern Company subsidiaries. The 2019 IRP Summary Report states that Georgia Power still experiences a summer peak, and that, coupled with its size relative to the other Southern Company operating companies, "is the reason the winter need shown for the collective system is considerably less, as Georgia Power currently has capacity on its system that can be used to help support the winter requirements of Alabama Power's customers."[14] While the Company states in its 2019 IRP that "[redacted]"[15] it has not presented any evidence that it could not rely on excess Southern Company capacity [redacted]

Q. WHY WOULD ALABAMA POWER HAVE TO RELY ON THE SOUTHERN COMPANY SYSTEM RESOURCES ONLY THROUGH WINTER OF [redacted]?

A. The 2,400 MW of projected need in 2023 is the [redacted]. From [redacted], the forecasted winter peak [redacted].[16] The capacity need in [redacted]

[13] CONFIDENTIAL Exhibit JBK-1. Alabama Power 2019 Integrated Resource Plan. Page 3.

[14] Direct Testimony of John B. Kelley. Page 12, lines 10-14.

[15] Exhibit JBK-1. Alabama Power 2019 Integrated Resource Plan. Page 3.

[16] Exhibit JBK-1. Alabama Power 2019 Integrated Resource Plan. Page 21.

[redacted] which is almost [redacted] than the identified need in 2023. [redacted]

[redacted]

[redacted], as shown in Confidential Table 1.

Confidential Table 1. Alabama Power projected peak demand, capacity, and capacity deficit

Year	Peak Demand (MW) (A)	Total Capacity (MW)	Capacity Required to Meet APC Target (MW)
2019	[redacted]		
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
2031			
2032			
2033			
2034			
2035			

Source: CONFIDENTIAL Sierra DR-1 I-14 Attachment A.

If Alabama Power moves forward with its proposed resource acquisition, it will have [redacted]

[redacted]

[redacted]

[redacted] Total future capacity under Alabama Power's current proposal is shown in Confidential Table 2.

Confidential Table 2. Alabama Power winter capacity with proposed resources and capacity deficit/surplus

Year	Target Winter Reserves (MW)	Capacity w/ Proposed Projects (MW)	Capacity (Deficit) Surplus (MW)
2019	[redacted]		
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
2031			
2032			
2033			
2034			
2035			

Source: CONFIDENTIAL Sierra DR-1 I-14 Attachment A.

Q. WHAT ARE THE IMPLICATIONS OF A CAPACITY [redacted] ?

A. In short, wasted money. That [redacted] reflects a mismatch between the Company's projected need and its proposed resource additions. The large, lumpy gas units are problematic because for years after their in-service date they are not projected to be fully used and useful. Rather than building a gas new unit or acquiring one or more existing gas units, Alabama Power could instead rely on the Southern Company system, as described above, and acquire additional DSM and renewable resources in smaller increments to meet its projected capacity deficit in the winter of 2023–2024. The Company could cancel or delay the build of Barry 8 and/or the acquisition of Central Alabama Generating Station and the PPA with Hog Bayou, depending on the outcome of the upcoming 2020 renewable resource procurement. Recommendations for effectively conducting that procurement are described in the Direct Testimony of Sierra Club witness Mark Detsky.

Q. WHAT ABOUT THE STATEMENT OF ALABAMA POWER WITNESS MR. JOHN B. KELLEY IN HIS DIRECT TESTIMONY THAT IT CANNOT RELY ON THE CAPACITY OF THE OTHER OPERATING COMPANIES FOR WINTER RELIABILITY?

A. I do not believe that Mr. Kelley or any other Company witnesses have demonstrated that Alabama Power cannot rely on the other Southern operating companies for capacity, at least in the year of greatest need. Mr. Kelley's reasoning behind Alabama Power's inability to rely on the Southern Company system resources is that "much of the capacity that gives rise to the higher reserve levels at the other retail affiliates

comprises older fossil steam resources."[17] He notes certain economic challenges associated with these units and he mentions Bowen Units 1 and 2 specifically. However, Georgia Power has not publicly announced an intent to retire these units at any point in the future, and in fact, [redacted].[18]

Q. DO YOU DISAGREE WITH MR. KELLEY'S ASSERTION THAT OLDER STEAM UNITS FACE ECONOMIC CHALLENGES?

A. No, and I have testified on that issue in several other jurisdictions. However, I note that certain of these older steam units that can operate uneconomically during certain parts of the year are beginning to switch to seasonal operation, in which they are only available during months of peak demand. That would be an option available to the Southern operating companies.

Q. ARE THE ECONOMICS OF THESE OLDER STEAM UNITS AFFECTING ALABAMA POWER'S PROJECTED NEED IN ANY OTHER WAY?

A. Yes. Alabama Power provides a load and resource table in "CONFIDENTIAL Sierra DR-1 I-14 Attachment A." This attachment shows [redacted], indicating it has not yet committed to it, and yet it is contributing to the Company's projected capacity need deficit. [redacted]

[17] Direct Testimony of John B. Kelley. Page 13, lines 10-11.

[18] Direct Testimony of John B. Kelley. Page 13, lines 21-22.

IV. ALABAMA POWER HAS NOT DEMONSTRATED THAT ITS PROPOSED GAS UNITS ARE NEEDED, OR THAT THEY ARE LEAST-COST

Q. IN ADDITION TO RELYING IN PART ON THE SOUTHERN POOL, WHAT OTHER RESOURCES SHOULD ALABAMA POWER PROCURE TO MEET ITS CALCULATED CAPACITY DEFICIT IN WINTER 2023–2024?

A. A combination of demand-side resources, such as energy efficiency and distributed energy, and supply-side renewable resources, in that order. These resources can be procured in smaller increments over time, helping to meet Alabama Power's calculated capacity deficit in winter 2023–2024 without overbuilding.

A. Alternative least-cost resource options

Q. WHY DO YOU RECOMMEND THOSE RESOURCES IN THAT ORDER?

A. Alabama Power should first expand its DSM programs, such as those that make homes and businesses more energy efficient, to reduce peak load and annual energy usage. Energy efficiency measures are commonly referred to as the "first fuel," meaning that these measures should be considered first when adding new resources to a portfolio because they generally are the least-cost option. A recent report by Lawrence Berkeley National Laboratory found that the average cost of kWh saved by energy efficiency programs in the United States is 2.5 cents.[19]

Alabama Power does the opposite in its petition, however, filling in the remaining capacity need with DSM and distributed energy resource (DER) measures only after

[19] Exhibit RW-3. Hoffman, et al. 2018. *The Cost of Saving Electricity Through Energy Efficiency Programs Funded by Utility Customers: 2009-2015*. Lawrence Berkeley National Laboratory. Available at: http://eta-publications.lbl.gov/sites/default/files/cose_final_report_20180619_1.pdf.

seeking to procure 2,236 MW of supply-side resources.[20] As described in a widely-cited report that I authored for the Regulatory Assistance Project, attached as Exhibit RW-4, best practices in resource planning dictate that utilities use analytical tools to fairly evaluate the costs and benefits of both demand- and supply-side resources as part of a future resource portfolio because of the documented cost savings associated with demand-side resources.[21]

Q. WHAT SUPPLY-SIDE RESOURCES SHOULD ALABAMA POWER PROCURE, AFTER CONSIDERING COST-EFFECTIVE DSM MEASURES?

A. Alabama Power's supply-side resource procurement should include additional PPAs for solar and battery storage resources, either on a standalone or paired basis, as well as PPAs for wind resources with neighbors operating in the Southwest Power Pool and as part of the Midcontinent Independent System Operator. This type of procurement serves two purposes. First, it allows Alabama Power to make incremental resource investments[22] to meet any remaining need. Second, it allows Alabama Power to capture cost savings associated with renewables regardless of whether there is a capacity need.

This approach is supported, for instance, by a 2014 report from the Ceres Investor Network, attached as Exhibit RW-5, which finds that large base load fossil fuel

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[20] Direct Testimony of John B. Kelley. Page 10, lines 1-3.

[21] Exhibit RW-4. Wilson, R. and B. Biewald. 2013. *Best Practices in Electric Utility Integrated Resource Planning.* Prepared for the Regulatory Assistance Project.

[22] By "incremental investments," I mean procurement of a smaller number of MW of resources on a more frequent basis, rather than the lumpier addition of large gas plants in a single year that can result in oversupply situations in subsequent years.

generators are the riskiest resource additions for utilities.[23] By contrast, the report identifies renewables resources as the least-cost and least-risk supply-side resource additions.[24]

B. Barry 8 is high risk compared to DSM and renewables

Q. IS THERE OTHER SUPPORT FOR YOUR RECOMMENDED APPROACH?

A. Yes. My own analysis illustrates that customers can save money if the Company procures demand-side resources and supply-side renewables instead of its proposed gas units. The Rocky Mountain Institute developed a Clean Energy Portfolio tool that compares the costs of a new combined-cycle unit with a replacement resource portfolio that meets peak demand in the top 50 hours in the year, monthly total energy requirements, and ramp requirements of a combined-cycle unit. I used this tool to compare Barry 8 with a portfolio of DSM and renewables under five different scenarios. The results are shown in Figure 1.

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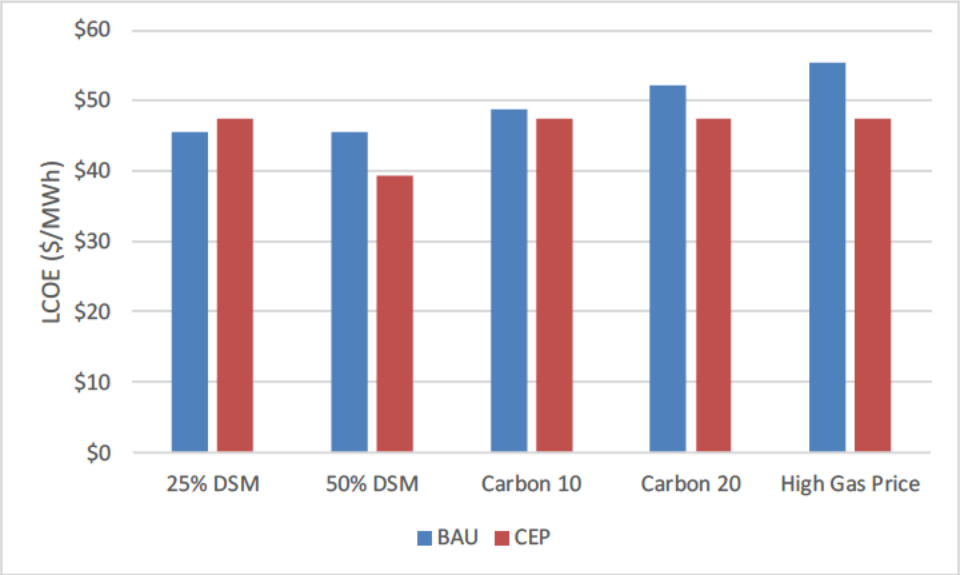
[23] Exhibit RW-5. Binz, R. et al. 2014. *Practicing Risk-Aware Electricity Regulation: 2014 Update*. Page 3. Prepared for Ceres.

[24] Exhibit RW-5. Binz, R. et al. 2014. *Practicing Risk-Aware Electricity Regulation: 2014 Update*. Page 4. Prepared for Ceres.

Figure 1. Levelized cost of energy (LCOE)



In the "50% DSM" scenario, demand-side measures can make up 50 percent of the replacement resource portfolio (just over 370 MW) with the other 50 percent being renewables. A clean energy portfolio consisting of half DSM and half renewables at an LCOE of $39.34/MWh is a cost-effective replacement portfolio for Barry Unit 8 (at an LCOE of $45.54) and would save customers money.

Under the "25% DSM" scenario, demand-side measures can make up only one-quarter of the replacement resource portfolio. This is the only scenario that I examined in which Barry Unit 8 was less expensive than the replacement portfolio. However, the "Carbon 10," "Carbon 20," and "High Gas Price" are sensitivities on the "25% DSM" scenario, in which I increase the price of carbon dioxide (CO_2) emissions and gas. In each of these sensitivity cases, which provide a measure of the emissions and fuel price risks, the clean energy replacement portfolio is less expensive than Barry Unit 8.

Q. WHY IS YOUR ANALYSIS FOCUSED ON BARRY UNIT 8?

A. It is a new unit that has not been built yet, and it would have the longest service life of the three gas units that the Company proposes to add to its system. Barry Unit 8 therefore presents the greatest risk to customers, as discussed in Section V, below.

C. Commission actions to protect Alabama customers

Q. WHAT WOULD YOU RECOMMEND THE ALABAMA PUBLIC SERVICE COMMISSION DO WITH RESPECT TO THE COMPANY'S PROPOSED RESOURCE ADDITIONS?

A. Alabama Power has not demonstrated that its proposed gas units are needed or that they are the least-cost to customers. My analysis using the Clean Energy Portfolio tool illustrates that there are likely other combinations of DSM and renewable resources that are lower cost than one or more of those gas units. Therefore, the proposed gas units should be rejected or at least deferred until the Company has fully and fairly evaluated additional DSM and renewable resources.

I recommend approval of 200 MW of DSM and distributed energy resources now. Further, the Company should be required update its energy efficiency potential study and undertake all cost-effective DSM in order to reduce its projected capacity deficit. Similarly, I recommend that the Commission approve the proposed solar-and-storage projects because there is a clear cost benefit to customers. Alabama Power will perform another resource procurement for renewable energy resources in 2020 and should adjust its procurement process in the ways described in the Direct Testimony of Sierra Club witness Mark Detsky. The Commission should deny, or at least defer, the petition for the proposed gas units until the results from this new procurement are known.

Q. CAN YOU PROVIDE AN EXAMPLE WHERE A STATE UTILITY COMMISSION REQUIRED A UTILITY TO INCREASE ITS PROCUREMENT OF RENEWABLES OR DEMAND-SIDE MANAGEMENT?

A. Yes. In the recent 2019 Georgia Power IRP, Docket No. 42310, the Georgia Public Service Commission ordered Georgia Power to increase its utility-scale solar procurement to 2,000 MW from the 950 MW initially proposed by the Company. The Commission also ordered the Company to increase its procurement of distributed generation[25] to 210 MW from the initial 50 MW. Further, the Commission ordered Georgia Power to increase the energy savings targets for its residential and commercial energy efficiency programs by 15 percent above the Company's proposed amounts.[26]

V. PROPOSED GAS UNITS WOULD EXPOSE CUSTOMERS TO UNNECESSARY RISK

Q. HOW WOULD YOU CHARACTERIZE THE LEVEL OF RISK TO CUSTOMERS ASSOCIATED WITH ALABAMA POWER'S PROPOSED GAS UNIT ADDITIONS?

A. A 2015 report from the Union of Concerned Scientists, attached as Exhibit RW-7, examined states' risks of overreliance on gas in five categories, rating each on a scale

[25] Distributed generation is another term for distributed energy resources.

[26] Exhibit RW-6. Georgia Public Service Commission. Order Adopting Stipulation as Amended. Docket No. 42310. July 29, 2019. Pages 18-19.

of low/moderate/high.[27] According to this report, Alabama is already over-reliant on gas units and is subjecting its customers to all the risks described in this section, below, as the state ranks high in four out of five risk categories, and moderate in the remaining category.[28]

A. Winter fuel supply risks

Q. ARE LARGE GAS UNITS THE BEST OPTION FOR ALABAMA POWER TO MEET PROJECTED WINTER PEAK?

A. No. There are several reasons that large gas units are ill-suited to meet Alabama Power's projected winter peak. First, there are risks associated with gas supply in the winter months. Cold weather leads to increased demand for gas for electric power and heating, and gas supply is dependent on pipeline capacity. If winter demand exceeds pipeline capacity, there is a scarcity of supply. This occurred at the Massachusetts Hub in mid-December 2013 when day-ahead, on-peak power prices rose above $200/MWh during a cold spell.[29] In early January 2014, Northeast

[27] Those categories include: (1) gas generation as a share of in-state electricity production (2014); (2) increase in percent of in-state electricity generation fueled by gas (2008-2014); (3) gas capacity as a share of power plants being built (2014-2017); (4) total projected gas capacity in 2017; and (5) power sector carbon dioxide emissions (2013).

[28] Exhibit RW-7. Union of Concerned Scientists. 2015. *Rating the States on their Risk of Natural Gas Overreliance*. Available at: https://www.ucsusa.org/sites/default/files/attach/2015/12/natural-gas-overreliance-analysis-document.pdf.

[29] Exhibit RW-8. U.S. Energy Information Administration. 2014. *Northeast and Mid-Atlantic power prices react to winter freeze and natural gas constraints.* Available at: https://www.eia.gov/todayinenergy/detail.php?id=14671.

generators again struggled to procure gas supplies during a freeze, driving prices even higher.[30]

[redacted][31]

B. Stranded asset risk

Q. YOU NOTED THAT THERE ARE RISKS ASSOCIATED WITH THE LONG SERVICE LIVES OF THE PROPOSED GAS UNITS. HOW LONG ARE THE EXPECTED SERVICE LIVES OF THE COMPANY'S PROPOSED GAS UNITS?

A. The new unit, Barry 8, has the longest expected service life: 40 years.[32] The two existing gas units have shorter service lives—23 years for the Central Alabama Generating Station[33] and 19 years for Hog Bayou.[34]

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[30] Exhibit RW-8. U.S. Energy Information Administration. 2014. *Northeast and Mid-Atlantic power prices react to winter freeze and natural gas constraints.* Available at: https://www.eia.gov/todayinenergy/detail.php?id=14671.

[31] Exhibit RW-9. CONFIDENTIAL Sierra Club DR-1 I-01 Attachment O APSC Staff Q&A.

[32] Direct Testimony of M. Brandon Looney. Page 4, line 3.

[33] This is the remaining useful life if Alabama Power acquires Central Alabama in 2023 as it proposes to do. Direct Testimony of John B. Kelly. Page 22, line 23.

[34] This is the term of the proposed PPA for Hog Bayou, which starts in 2020. Direct Testimony of John B. Kelley. Page 22, line 2.

Q. WHAT ARE THE RISKS ASSOCIATED WITH SERVICE LIVES THAT LONG?

A. As I noted, there are wide-ranging risks, including the risk that these gas units become stranded assets. The costs of the three proposed gas units are tied directly to both the capital cost to build them as well as their fuel cost, that is gas needed to operate them. Generation from renewable energy has zero fuel cost, and the capital costs have been declining over time and are expected to continue to do so. Recent trends show that it can be cheaper today to build new renewable-plus-storage units than to build ***new*** gas units. Forecasts suggest that in the future, it will be cheaper to build new renewable-plus-storage units than to continue operating ***existing*** gas units.[35] This means that new and existing gas units are likely to become stranded assets.

Q. WHAT IS A STRANDED ASSET?

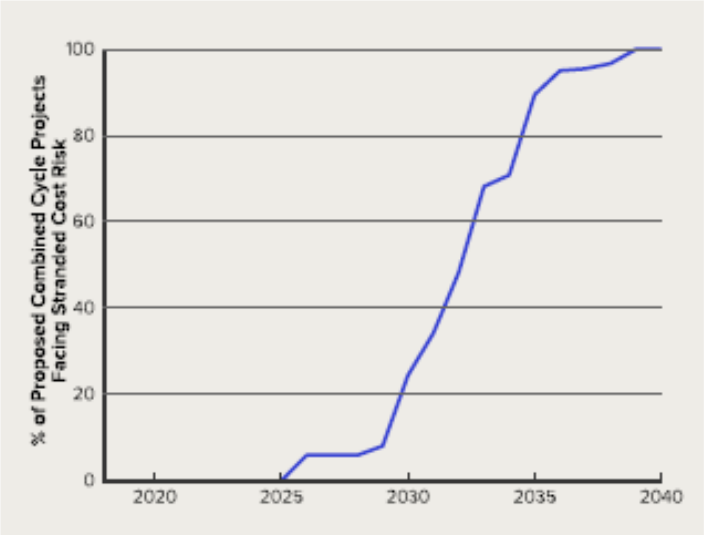
A. A stranded asset is one that no longer has value or produces income. It is important to consider stranded asset risk for large gas units, like those Alabama Power proposed to add to its system, because the costs to construct them are usually recovered by utilities from their customers over many decades—in this case 40 years for Barry Unit 8. If conditions in the electric sector cause Barry 8 to no longer be "used and useful," either the Company's customers or its shareholders will be burdened with the costs of a non-performing unit for the remainder of its depreciable life.

[35] Exhibit RW-10. Rocky Mountain Institute. 2019. *The Growing Market for Clean Energy Portfolios.*

Q. WHAT IS THE LIKELIHOOD THAT NEW GAS PLANTS WILL BECOME STRANDED ASSETS?

A. According to an extensive, nationwide analysis that the Rocky Mountain Institute completed this fall, attached as Exhibit RW-10, the likelihood is increasing over time and will jump dramatically starting in 2029. As shown in Figure 2, by 2035, nearly all currently proposed gas capacity will have operating costs higher than new renewable and storage resources due to expected price declines in these technologies. "The clear implication is that utilities or investors that move ahead with proposed plants face significant financial risk; consumer savings and/or market competition will dictate that the plants be shut down while book life remains. In short, combined-cycle investors face significant stranded asset risk."[36]

Figure 2. Percent of proposed combined-cycle units facing stranded asset risk, 2020-2040



Source: Rocky Mountain Institute. 2019. *The Growing Market for Clean Energy Portfolios.* Page 35.

[36] Exhibit RW-10. Rocky Mountain Institute. 2019. *The Growing Market for Clean Energy Portfolios.* Page 35.

By 2040, RMI's analysis shows that all the gas units currently proposed will become stranded assets. If constructed, Barry Unit 8 will have been operating for only 17 years in 2040. Given its 40-year expected useful life, there is significant risk that either customers or shareholders will be saddled with the costs of this unused plant for an additional 23 years, at least.

Q. IS THERE EVIDENCE THAT UTILITIES ARE CHOOSING OTHER RESOURCE ADDITIONS OVER GAS UNITS?

A. Yes. As just one example, Florida Power & Light is building the Manatee Energy Storage Center, which is a 409 MW storage system (the world's largest) that will replace two existing gas units. An existing solar plant will charge the battery, and the resulting savings to customers are expected to total $100 million.[37]

Q. IS THERE EVIDENCE THAT OTHER STATE REGULATORS ARE MAKING DECISIONS ABOUT NEW GAS UNITS BASED ON THE RISK THAT THEY WILL BECOME STRANDED ASSETS?

A. Yes, especially in recent cases, state regulators are regularly citing stranded asset risk as one of the main reasons why they have rejected proposed gas units:

- In March 2018 the Arizona Corporation Commission rejected the integrated resource plans of the state's utilities due to their reliance on gas units and the associated risk of stranded assets. The Commission placed a nine-month moratorium on new gas units larger than 150 MW while the utilities modeled scenarios with high

[37] Exhibit RW-11. Parnell, John. 2019. *FPL to replace aging gas power plants with the world's largest battery.* Forbes. Available at: https://www.forbes.com/sites/johnparnell/2019/03/31/fpl-to-replace-aging-gas-power-plants-with-the-worlds-largest-battery/#640ab4812ebb

penetrations of renewables and storage.[38] That moratorium was then extended for an additional six months.[39]

- In April 2019 the Indiana Utility Regulatory Commission (IURC) rejected an 850 MW gas plant proposed by Vectren, citing concerns that the plant could become a stranded asset as cost of renewables declines and customer demand changes. The IURC directed Vectren to evaluate alternatives to a large, centralized generating station.[40]
- In October 2019 the Minnesota Public Utilities Commission rejected a proposal from Xcel Energy to purchase the 720 MW Mankato combined-cycle gas plant due to stranded asset concerns if the plant were to close early due to the decline in renewable and storage costs.[41]

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[38] Exhibit RW-12. Utility Dive. March 15, 2018. *Arizona regulators move to place gas plant moratorium on utilities.* Available at: https://www.utilitydive.com/news/arizona-regulators-move-to-place-gas-plant-moratorium-on-utilities/519176/.

[39] Exhibit RW-13. Utility Dive. February 11, 2019. *Arizona extends gas plant moratorium, punts on PURPA reforms.* Available at: https://www.utilitydive.com/news/arizona-extends-gas-plant-moratorium-punts-on-purpa-reforms/548072/.

[40] Exhibit RW-14. Utility Dive. April 25, 2019. *Indiana regulators reject Vectren gas plant over stranded asset concerns.* Available at: https://www.utilitydive.com/news/indiana-regulators-reject-vectren-gas-plant-over-stranded-asset-concerns/553456/.

[41] Exhibit RW-15. Utility Dive. October 1, 2019. *Minnesota rejects Xcel's 720 MW Mankato gas plant purchase over stranded asset concerns.* Available at: https://www.utilitydive.com/news/minnesota-rejects-xcels-720-mw-mankato-gas-plant-purchase-over-stranded-as/564029/.

Q. IS THERE ANYTHING THIS COMMISSION COULD DO TO REDUCE THE STRANDED ASSET RISK TO CUSTOMERS IF THE PROPOSED GAS UNITS WERE APPROVED?

A. Yes. It could condition the approval of any of the gas with the provision that, in the event the units become stranded assets, Alabama Power's shareholders will bear the costs rather than customers.

Q. IS THERE A PRECEDENT FOR SUCH AN ACTION?

A. Yes. Alabama Power requested a similar certificate of convenience and necessity for combined-cycle units Barry 7 and 8 in docket 26115. In response to concerns about stranded asset risk, Mr. John A. Putnam submitted Direct Testimony stating that the Company was willing to commit that any stranded costs resulting from these units would be borne by Alabama Power's shareholders rather than its customers.[42] His testimony in that docket is attached as Exhibit RW-16.

C. Carbon dioxide price risk

Q. WHAT ARE THE EXPECTED CARBON DIOXIDE EMISSIONS OVER THE EXPECTED USEFUL LIVES OF THE COMPANY'S PROPOSED GAS UNITS?

A. Building and operating Barry 8 will result in a large volume of greenhouse gas emissions for decades. Based on the unit's heat rate, assumed capacity factor of [redacted] percent,[43] and its expected service life of 40 years, the lifetime emissions of Barry 8

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[42] Exhibit RW-16. Direct Testimony of John A. Putnam before the Alabama Public Service Commission. Docket No. 26115. Page 13, line 7.

[43] Exhibit RW-17. CONFIDENTIAL Sierra DR-1 I-05 Attachment Y – APC 2023 RFP Final Ranking MG0.

will be approximately 74 million tons of CO_2. Hog Bayou will emit approximately 7 million tons of CO_2, assuming a capacity factor of [redacted] percent[44] and a remaining useful life of 19 years. Central Alabama will release 27 tons of CO_2, assuming a capacity factor of [redacted] percent[45] and a remaining useful life of 23 years. These plants will be responsible for the emission of a total of 108 million tons of CO_2 over their remaining lifetimes. This is equivalent to 239,549,994,132 miles driven by an average passenger vehicle.[46]

Q. IS THIS CONSISTENT WITH SOUTHERN COMPANY'S ANNOUNCED GREENHOUSE GAS REDUCTION GOAL?

A. No. Southern Company has set an intermediate goal of a 50 percent reduction in CO_2 emissions from 2007 levels by 2030, and a long-term goal of low- to no-CO_2 emissions by 2050.[47]

Q. DOES THE UNITED STATES CURRENTLY HAVE A PRICE ON EMISSIONS OF CARBON DIOXIDE FROM ELECTRIC POWER PLANTS?

A. No. Even a modest price on carbon dioxide would impose additional costs on customers and exacerbate the stranded asset risk described in the section above. Alabama Power considered this risk and evaluated the proposed gas units under a CO_2 sensitivity. The Company's results show that with a CO_2 price, costs to

[44] Exhibit RW-17. CONFIDENTIAL Sierra DR-1 I-05 Attachment Y – APC 2023 RFP Final Ranking MG0.

[45] Exhibit RW-17. CONFIDENTIAL Sierra DR-1 I-05 Attachment Y – APC 2023 RFP Final Ranking MG0.

[46] Exhibit RW-18. U.S. EPA. 2018. *Greenhouse Gas Equivalencies Calculator*. Available at: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

[47] Exhibit RW-19. Southern Company. *Climate*. Accessed November 26, 2019. Available at: https://www.southerncompany.com/corporate-responsibility/environment/air-and-climate.html.

customers of the proposed gas additions increase. Demand-side measures and incremental renewable resource additions pose no such risk to customers.

Q. WHAT CAN THE COMMISSION DO TO REDUCE THE CO_2 EMISSIONS RISK TO CUSTOMERS IF THE PROPOSED GAS UNITS WERE APPROVED?

A. The Commission could condition its approval on those units operating under enforceable annual declining emissions limits. In conjunction, the Commission could also set a retirement date at the units. The developers of the Footprint gas combined-cycle project in Massachusetts agreed to decreasing annual emissions limits and a retirement date of no later than January 1, 2050, to comply with state laws calling for reductions in greenhouse gases.[48] Similarly, when requesting a similar certificate of need in Connecticut, NTE Energy made a voluntary commitment to reduce greenhouse gas emissions at its proposed Killingly Energy Center (a new combined-cycle unit) at least 80 percent below initial operating levels by 2050, and retiring or operating the facility with zero net greenhouse gas emissions after that date.[49]

[48] Exhibit RW-20. Conservation Law Foundation. 2014. *Conservation Law Foundation Announces Settlement with Footprint Power Plant on Salem Natural Gas Facility.* Available at: https://www.clf.org/newsroom/conservation-law-foundation-announces-settlement-footprint-power-plant-salem-natural-gas-facility/.

[49] Exhibit RW-21. Agreement between Connecticut Fund for the Environment, Inc. and NTE Connecticut, LLC. August 27, 2019.

VI. THE PROPOSED GAS UNITS WOULD CAUSE COSTLY CLIMATE DAMAGES

Q. WHAT IS THE SOCIAL COST OF CARBON?

A. The social cost of carbon is a value used to measure the climate damages—the monetized value of the net impacts—associated with CO_2 emissions. It values the incremental damages done by an additional ton of emitted CO_2 and discounts this number to the present value. Climate damages include property damage from floods and changes in agricultural productivity to extinction of endangered species and loss of unique environments.

Q. DOES THE UNITED STATES HAVE A VALUE FOR THE SOCIAL COST OF CARBON?

A. Yes. Between 2010 and 2016, the U.S. government's Interagency Working Group on the Social Cost of Greenhouse Gases developed estimates of the social cost of carbon. The estimates use three different discount rates and two different measures of climate sensitivity, which is defined as a measure of how fast the world is warming in response to rising concentrations of greenhouse gases. The final estimation of the social cost of carbon occurred in August 2016. The federal estimates ranged from $15 to $152/ton in 2020, rising to between $32 and $262 in 2050. Values are in $2019 per metric ton.[50]

[50] Exhibit RW-22. Interagency Working Group. 2016. Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866. Available at: https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

Q. WHAT ARE THE TOTAL CLIMATE DAMAGES ASSOCIATED WITH THE PROPOSED GAS UNITS, APPLYING THE SOCIAL COST OF CARBON?

A. Climate damages were calculated using the Interagency Working Group's mid-value for the social cost of carbon of $52/ton in 2020 that rises to $85/ton in 2050 at a discount rate of 3 percent. This results in climate damages of $3.9 billion in net present value terms over the anticipated lives of the gas units.

Q. DID ALABAMA POWER CONSIDER CLIMATE DAMAGES IN ITS EVALUATION OF THE PROPOSED GAS UNITS?

A. No. I have not seen any such consideration or valuation of climate damages like the one I describe above. Nonetheless, they are relevant to the Commission's decision. The Company's failure to consider these damages reinforces my conclusion that it has not demonstrated that the proposed gas units are least-cost.

VII. CONCLUSIONS AND RECOMMENDATIONS

Q. SUMMARIZE YOUR CONCLUSIONS.

A. In its petition, Alabama Power points to a projected winter peak load—the hour of maximum electrical power demand—as the driver for a corresponding projected winter capacity deficit, in which the Company's current generating capacity (in MW) is not sufficient to meet projected peak load plus a reserve margin.[51] To resolve this capacity deficit, Alabama Power proposes to add 2,236 MW of supply-side resources to its system, of which 1,896 MW are new or existing gas units.

[51] A reserve margin is (capacity minus demand) divided by demand, where capacity is the expected maximum available supply and demand is expected peak demand. Utilities have supply resources in excess of expected demand to ensure system reliability.

The proposed gas units are a mismatch for Alabama Power's projected need. The winter peak identified in 2023-2024 is driving the proposed resource additions; however, [redacted] Alabama Power has provided no evidence that it cannot rely on excess capacity from the other Southern Company operating companies to meet at least a portion of the projected winter peak need prior to [redacted]

Alabama Power has not demonstrated that its proposed resource portfolio is least-cost to customers. Rocky Mountain Institute's Clean Energy Portfolio tool shows that a replacement resource portfolio made up of 50 percent DSM measures and 50 percent renewable resources has a lower LCOE at $39.34/MWh than building and operating Barry Unit 8 at an LCOE of $45.54.

There are wide-ranging risks associated with gas units. Reliance on gas as a fuel subjects a generator to risk of fuel price volatility and fuel supply disruption, particularly in the winter. Alabama Power's projected need is, in part, a result of the Company's current reliance on gas, and to meet that need with more gas is illogical. In addition, downward pressure on the prices of renewable technologies leads to substantial stranded asset risk for gas generators, particularly new units with longer expected service lives. These units also face the risk of carbon dioxide regulation, which would result in increased operating costs that are passed on to customers.

The social cost of carbon is a value used to measure climate damages associated with emissions of CO_2. Using a mid-range value developed by the United States Interagency Working Group on the Social Cost of Greenhouse Gases, I calculate that

the climate damages associated with the proposed gas units total $3.9 billion in net present value terms over their anticipated service lives.

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS.

A. I make several recommendations. First, I recommend approval of the proposed solar-and-storage projects because, as Mr. M. Brandon Looney demonstrates in his Direct Testimony, there is a clear cost benefit to customers.[52]

Instead of the proposed gas units, Alabama Power should seek to obtain capacity from the other Southern Company operating companies, to the extent it can, [redacted] Further, the Company should be required to conduct a new DSM potential study and undertake all cost-effective DSM to reduce any remaining capacity deficit. The Company should also be required to procure additional renewable resources consistent with the recommendations of Sierra Club witness Mark Detsky, which are described in his Direct Testimony. The proposed gas units should be rejected or at least deferred until the results of the DSM potential study and the renewable resource procurement are known.

However, if the Commission does grant the certificate to the proposed gas units rather than deferring that decision, it should impose three conditions on that approval to protect customers from the significant risks associated with those units: (1) Alabama Power's shareholders, rather than its customers, should bear the costs of the proposes gas units becoming stranded assets; (2) The proposed gas units should be required to operate under enforceable annual declining greenhouse gas emissions

[52] CONFIDENTIAL Exhibit MBL-1.

limits; and (3) Alabama Power should submit a retirement-replacement study for the vulnerable fossil steam units on its own system.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

BEFORE THE
ALABAMA PUBLIC SERVICE COMMISSION
MONTGOMERY, ALABAMA

IN RE: Petition for a Certificate of Convenience and Necessity by Alabama Power Company	)))	Docket 32953

DIRECT TESTIMONY OF RACHEL WILSON ON BEHALF OF SIERRA CLUB

Rachel Wilson, being first duly sworn, deposes and says she has read the foregoing prepared testimony and states the matters and things set forth therein are true and correct to the best of her knowledge, information, and belief.

Rachel Wilson

Signed and sworn to before me on

this 4 day of December, 2019.

JANICE CONYERS
Notary Public
Commonwealth of Massachusetts
My Commission Expires
July 11, 2025

Notary Public