COMMENTS

BY

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ON

MIDAMERICAN ENERGY COMPANY'S FINAL RESOURCE EVALUATION STUDY REPORT

PUBLIC VERSION

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I. Introduction

MidAmerican's Resource Evaluation Study (RES) marks the first time in over fifteen years that MidAmerican has made a long-term resource plan publicly available. Resource planning is a foundation of any public utility operation, but for years, MidAmerican has not shared any of its resource planning publicly, and has even resisted Commission attempts at oversight. In that context, a public resource plan is a step forward for transparency. Yet, even as MidAmerican takes this important step forward, the limitations of this process and this resource plan are apparent. MidAmerican's control of the current RES process and input assumptions skewed the results, and therefore, limited their usefulness for long-term planning purposes.

Despite its shortcomings, the RES is significant for transparency into MidAmerican's resource planning and future plans. For example, the RES allows the public to see how MidAmerican's actions are aligned (or misaligned) with the Company's publicly announced net zero goal by 2050 (for which MidAmerican has no plan or roadmap).[1] With such a goal in place, MidAmerican should be working towards retirement dates for coal plants. But through the RES process we can see that MidAmerican's assumptions around coal plant retirement and new fossil resource additions do not put it on track to meet its 2050 net zero goal. Specifically, in the RES, MidAmerican's reference case used retirement dates of 2035 for Neal 3, 2040 for Louisa, 2041 for Ottumwa, 2042 for Neal 4, 2043 for Walter Scott 3, and 2049 for Walter Scott 4.[2]

Another benefit of the public process is that it provides a benchmark to evaluate future plans, particularly if assumptions and dates change. Importantly, it allows those impacted by

[1] MidAmerican, Destination Net Zero, www.midamericanenergy.com/net-zero-greenhouse-emissions (last visited Jan. 21, 2025).
[2] M-0156, Resource Evaluation Study Report, at 41 (filed Nov. 1, 2024) (hereafter RES).

MidAmerican's plans—whether that be communities that host generation, workers at plants, or co-owners of a generating unit—to start making their own planning decisions.

This public resource plan is also significant in its findings related to solar deployment. Specifically, the model selects a large amount of solar generation as an immediate next step. The RES identifies 750 MW of solar generation as a near-term addition to MidAmerican's resource generation mix.[3] This is not an unexpected result for resource planning. Solar has featured prominently in nearly all of the modeled scenarios as part of this RES process and in other planning processes conducted by MidAmerican and others prior to the RES. Specifically, in 2019, MidAmerican conducted a Zero Emissions Study (ZES)—which was not publicly shared until years later—that recommended the addition of significant solar generation resources in order for MidAmerican to reach its publicly announced net zero goal.[4] The addition of new solar resources is also consistent with resource planning results that Environmental Intervenors (EI) filed in Wind PRIME, and it is consistent with the modeling that stakeholders involved in this process conducted. The Company's failure to conduct transparent and robust resource planning analysis as part of the Wind PRIME or any other recent dockets delayed its understanding of the role of solar as part of a least cost portfolio and therefore its deployment of solar. While MidAmerican has one of the largest wind fleets in the country, it has a nominal amount of solar.[5] The addition of a significant solar resource will diversify MidAmerican's fleet, and is a no-regrets next step for MidAmerican's

[3] RES at 84.
[4] RPU-2022-0001, MidAmerican Zero Emissions Study (filed Feb. 17, 2023) (ZES).
[5] MidAmerican's language around renewables obscures the lack of diversity to date in its renewable investments. In the RES, for example, MidAmerican states: "In 2023, wind and solar energy accounted for 60.5% of the company's owned energy production," but wind represents 98% of that renewable energy production. RES at 4.

generation. The main barrier to solar deployment to date has been MidAmerican's lack of resource planning and modeling.

MidAmerican's plan is also significant for its flaws. MidAmerican's modeling inputs and assumptions inflate the cost of solar, wind, and battery storage resources. This is particularly true over the long-term as MidAmerican's plan assumes both high and static pricing—assumptions that are out of step with other utilities and industry-leading sources. MidAmerican set artificial barriers for the amount of solar that can be added even if the solar is cost-effective. Finally, at the last phase of the resource plan, MidAmerican used non-transparent selection criteria that created a bias towards gas and nuclear and away from renewables and battery storage. As a result, customers may assume higher costs and risks without justification.

As the RES process is concluding, MidAmerican has an opportunity to review feedback from stakeholders and the Commission and outline commitments to improve future resource planning processes. To accomplish this goal, we offer several recommendations. MidAmerican should pursue an aggressive near-term solar acquisition strategy as a no-regrets solution - and one that modeling by MidAmerican and stakeholders consistently selected across scenarios. Next, MidAmerican should incorporate changes in its modeling approach and portfolio selection approach, as discussed below.

II. Summary of Recommendations

A. MidAmerican should make future Resource Evaluation Study processes more transparent and collaborative

We appreciate the improvements that MidAmerican made to the transparency and accessibility of its RES process based on participant feedback. Much of MidAmerican's RES process reflected an effort to host RES meetings that were accessible to as many participants as reasonably possible and to provide information with enough time for participants to provide

meaningful feedback. We encourage the Company to be open to changing course in response to feedback from participants. Additionally, we encourage MidAmerican to increase transparency around the methodologies used in the RES.

B. MidAmerican should revise modeling inputs and assumptions to reduce bias and allow the model to optimize

MidAmerican's RES modeling methodology and results show a concerning number of fixed or static inputs and non-industry-standard assumptions. These inputs and assumptions create a bias toward new gas resources over clean energy resources. We recommend improvements to the RES modeling to remove resource bias and allow the model to build an optimized portfolio. We also highlight additional studies and sensitivities that MidAmerican should run to identify opportunities to reduce cost and risk to customers. Specifically, we recommend the following changes.

1. MidAmerican should remove annual resource build limits that bias the modeling results towards certain resource types.

2. MidAmerican should use industry-standard resource cost decline trajectories.

3. MidAmerican should evaluate more resource options as part of its resource planning process.

4. MidAmerican should evaluate additional retirement dates for certain coal units and allow endogenous retirement when reasonably practical.

5. MidAmerican should include a scenario without fixed inputs for renewable additions and resource retirements to allow the model to build an optimized portfolio.

C. MidAmerican should reconsider the preferred portfolio and scoring methodology

MidAmerican does not follow best practice in selecting its preferred portfolio during the final stage of the RES process. We are concerned that MidAmerican's practices in designing the portfolio may not result in a least-cost portfolio that meets customer needs. Specifically,

MidAmerican added an expensive nuclear small modular reactor (SMR) plant to its Preferred Portfolio without justification, and its scorecard is biased in favor of portfolios with nuclear SMR.

D. MidAmerican should focus its near-term actions on procuring as much cost-effective solar as the market will provide

Even though MidAmerican uses inflated solar costs, the Company's model identified solar PV as a cost-effective near-term resource option in nearly all of the Company's portfolios. This result aligns with the findings from our independent Aurora modeling. However, we are concerned that MidAmerican placed unnecessary limitations on its near-term procurement of solar energy. MidAmerican should not apply any of its modeling limits (i.e., the assumption that only 300 MW of solar will be available each year, or the assumption that solar will not be available until 2028) to its active solar procurement efforts. Instead, we recommend that MidAmerican procure all available, cost-effective solar available in the near term.

III. Background on MidAmerican's Resource Planning

The significance of MidAmerican's Resource Evaluation Study becomes apparent when looking at MidAmerican's past history of vigorous resistance to providing any resource planning analysis in a variety of dockets. Whether this RES is a step toward more regular, comprehensive, and transparent resource planning or a one-off exercise and update mandated by a settlement will determine whether this RES process has a lasting impact for the benefit of Iowa consumers.

A. Wind VII: MidAmerican's most recent resource plan with capacity expansion modeling

MidAmerican last presented a resource plan that included capacity expansion modeling in Wind VII (filed in 2009).[6] In the intervening years, resource planning decisions received very little attention as MidAmerican built a significant amount of low-cost wind generation.

[6] RPU-2009-0003, Direct Testimony of O. Dale Stevens, II at 13-14 (filed March 25, 2009).

B. Wind XI and Wind XII: 100% renewable energy vision, but no resource planning

In 2016, MidAmerican announced its 100% renewable vision in conjunction with Wind XI, a 2 GW wind generation investment. However, MidAmerican's renewable energy vision did not come with transparency on what the vision entailed. Nor did it come with a long-range plan for how MidAmerican intended to achieve its goal. At first, Environmental Intervenors were enthusiastic about the 100% renewable vision, but grew concerned as MidAmerican's addition of renewable generation did not lead to coal plant retirements nor, in some years, a reduction in pollution from its large coal fleet.[7] Furthermore, MidAmerican seemed to change the definition of the 100% renewable vision. In fact, MidAmerican's 100% renewable vision does not get any mention in the final RES report, but MidAmerican does note that "[t]he energy generated from MidAmerican's wind and solar resources, as well as nuclear energy from the Quad Cities Clean Energy Center, is equal to 100% of MidAmerican's Iowa retail customers' usage on an annual basis with carbon-free energy."[8]

In Wind XII, filed in 2018, ELPC and IEC argued that MidAmerican had not adequately considered feasible alternatives such as energy efficiency, demand response, and solar as part of its resource comparison.[9] These resources may be more economic, help diversify MidAmerican's resource portfolio, and reduce the need for fossil fuel generation. Sierra Club argued that it is difficult to assess the reasonableness of MidAmerican's proposed project without a broader

[7] Iowa Environmental Council, Iowa Electric Generation Condition of the State, at 1 (Oct. 2020) (noting "[p]ower sector greenhouse gas emissions increased by 5% between 2016 and 2017 for the first time in years, and again by 16% in 2018.").
[8] RES at 5.
[9] RPU-2018-0003, Final Decision and Order at 10 (filed Dec. 4, 2018).

analysis of MidAmerican's portfolio.[10] In other words, MidAmerican did not provide resource planning to support its proposal to build new wind generation. MidAmerican's response was to argue that Iowa law does not require an integrated resource plan.[11]

C. 2020 Emissions Plan and Budget Docket and Docket SPU-2021-0003: the Commission intensified pressure on MidAmerican to conduct resource planning

MidAmerican's lack of resource planning came up again in the 2020 Emission Plan and Budget (EPB) docket.[12] MidAmerican did not provide evidence in support of its pollution control plan compared to other compliance options. The Office of Consumer Advocate (OCA) specifically argued for an integrated resource plan to provide an analysis of least-cost options for managing regulated emissions, while ELPC, IEC, and Sierra Club provided evidence that several coal units were uneconomic and that the cost-effective path forward for complying with emissions requirements was to retire the units.[13] The parties argued that "MidAmerican should be required to look at multiple options, including retirement of coal facilities, as part of the analysis of the balancing factors outlined in Iowa Code § 476.6(19)(c)."[14] The Commission approved MidAmerican's EPB update without evaluating evidence of uneconomic coal plants or requiring resource planning to support MidAmerican's EPB.[15]

The Iowa Supreme Court ultimately overturned the Commission's EPB ruling and found that the parties' evidence of alternative emissions compliance options, including coal plant

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[10] *Id.* at 11.
[11] RPU-2018-0003, Final Decision and Order at 11.
[12] *See generally In re: MidAmerican Energy Co.*, EPB-2020-0156.
[13] EPB-2020-0156, Order Approving Emissions Plan Budget Update, Denying Joint Motion and Non-unanimous Settlement Agreement, and Canceling Hearing, at 7-8 (filed Mar. 24, 2021).
[14] *Id.* at 9.
[15] *Id.* at 9-10.

retirements and the need for MidAmerican to provide planning analysis, was "relevant and should have been considered by the [commission].[16] As the EPB case was pending before the Iowa Supreme Court, MidAmerican successfully lobbied the legislature to change the EPB updates from biennial requirements to voluntary dockets the utility could submit for cost recovery of new pollution controls at its discretion.[17] The legislative change avoided regular review of MidAmerican's coal plant environmental compliance costs and any related resource planning decisions. The Commission used its order in MidAmerican's 2020 EPB to note that it agreed with stakeholders that "an analysis of a utility's long-term resource needs, including consideration of least-cost options for generation, environmental requirements, reliability, and economic development potential, is appropriate."[18] The Commission announced that it would be opening a special investigatory docket "to evaluate the reasonableness and prudence of MidAmerican's procurement and contracting practices related to the acquisition of fuel for use in generating electricity, and . . . to address a forecast of future gas requirements or electric generating needs."[19]

The Commission opened Docket SPU-2021-0003 on May 13, 2021. In the order opening the docket, the Commission requested initial information from MidAmerican including "information about its plans to address anticipated resource needs."[20] The information requested by the Commission covered the type of information and analysis found in a robust integrated resource plan.[21] MidAmerican filed some responsive documents to the Commission order, but it

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[16] *Environmental Law & Policy Ctr. v. Iowa Utilities Bd.*, 989 N.W.2d 775, 784 (Iowa 2023).
[17] H.F. 248, 90th General Assembly (Iowa 2023).
[18] 2020 EPB Order at 12.
[19] *Id.*
[20] *In re: MidAmerican Energy Co.*, SPU-2021-0003, Order Opening Docket and Proposal to Take Official Notice, at 2 (issued May 13, 2021).
[21] *Id.* at 3.

withheld documents claiming attorney-client or attorney-work product privilege and refused to provide confidential filings to any parties other than the Commission and OCA.[22] This led to efforts by the parties to receive the confidential information culminating in motions to compel.[23] The Commission assigned a presiding officer to address the issues including MidAmerican's claims of privilege. The Commission ultimately rejected an attempt by MidAmerican to disqualify the presiding officer and have an ALJ or special master appointed, and then ordered MidAmerican to produce the documents claimed to be privileged under seal for review by one Commissioner.[24] MidAmerican filed a Petition for Interlocutory Judicial Review in Iowa District Court, and the Commission granted a stay of the SPU docket.[25]

D. Wind PRIME: Environmental Intervenors conducted resource planning; the parties entered the settlement that created RES

MidAmerican's lack of resource planning resurfaced in the Wind PRIME docket when Environmental Intervenors issued discovery for the Company's planning analysis. MidAmerican resisted providing that analysis and withheld documents, claiming privilege. Environmental Intervenors had to file a motion to compel simply to get MidAmerican to provide a privilege log identifying documents that MidAmerican claimed to be privileged. Eventually, MidAmerican disclosed two planning documents: the Zero Emissions Study (ZES) and the Siemens Study.[26] Neither study was a comprehensive integrated resource plan, and both studies recommended

[22] SPU-2021-0003, Order Addressing Presiding Officer's Recommendations Regarding Issue of Privilege, at 1 (issue Dec. 16, 2021).
[23] *Id.* at 2-5.
[24] *Id.* at 15.
[25] SPU-2021-0003, Order Granting Stay (Issued Feb. 28, 2022).
[26] RPU-2022-0001, MidAmerican Zero Emissions Study (ZES) (filed Feb. 17, 2023); RPU-2022-0001, Siemens, Coal Plant Economics Assessment: MidAmerican Energy Company February 2020 (filed Feb. 17, 2023) (Siemens Study).

resource planning to identify generation resources.[27] MidAmerican did not conduct any additional resource planning, so the studies represented the extent of the planning analysis MidAmerican had access to.

Environmental Intervenors attempted to fill the planning gap left by MidAmerican's failure to conduct integrated resource planning. Independent expert consultants, Devi Glick and Chelsea Hotaling, conducted capacity expansion modeling to identify the resource mix that would provide the greatest benefits and integrate into MidAmerican's existing wind fleet. This industry-standard modeling quantitatively identifies the best resource mix to cost-effectively meet a utility's needs on an hourly basis throughout the year, including both existing and new possible resource additions. Ms. Glick and Ms. Hotaling were the only experts in the docket to present capacity expansion modeling.[28] That modeling identified 4-hour battery storage and solar as resources that would integrate with existing wind resources to reliably meet MidAmerican's energy and capacity needs at lower cost than MidAmerican's Wind PRIME proposal.[29]

In its initial final order in Wind PRIME, the Commission concluded that MidAmerican never conducted an appropriate study of which resource types would best address its eventual capacity needs.[30] The Commission found that MidAmerican's ZES was its most recent study to identify future capacity needs, and the ZES found that solar, not wind, would provide greatest value to MidAmerican's system.[31] Specifically, the ZES found that solar would provide capacity

[27] ZES at 15; Siemens Study at 12.
[28] RPU-2022-0001, Final Decision and Order at 47 (filed Apr. 27, 2023) (hereafter Wind PRIME Initial Final Order).
[29] RPU-2022-0001, Glick Supp. & Reply Testimony at 40-57; Hotaling Direct Testimony at 4-29.
[30] Wind PRIME Initial Final Order at 29-30
[31] *Id.* at 30.

during the summer peak hours, when MidAmerican's existing wind fleet experiences shortfalls.[32] While MidAmerican sought to discredit the continued usefulness of the ZES study, the Commission found it was "the best available study from the utility in the record."[33] MidAmerican had the tools at its disposal to undertake industry standard capacity expansion modeling to correctly identify the resources to meet its long-term resource needs, and simply chose not to use it—despite its own internal studies from 2019 recommending that the utility do so.[34] The Commission found "the quantitative analysis of reliability performance offered by Ms. Glick to be useful and persuasive. The analysis provides meaningful information regarding the need for solar generation as a more appropriate renewable resource to support reliability, and the potential for battery storage to bolster the reliability of MidAmerican's current wind-centric electric generation fleet."[35]

However, the Commission reconsidered its Wind PRIME order, and the OCA, Environmental Intervenors, IBEC, and MidAmerican entered a settlement that created this Resource Evaluation Study (RES) process.[36] The settlement agreement required completion of an RES within 24 months of the final order, four stakeholder meetings, sharing of data, consideration of early coal plant retirements, and stakeholder access to the modeling software used by

[32] *Id.* (citing ZES at 2).
[33] *Id.* at 30.
[34] RPU-2022-0001, Tr. and Exh. from Hearing Held Feb. 20-24, 2023, at 317-318, 327, 338-340 (filed Mar. 15, 2023) (MidAmerican did not conduct follow up studies after ZES);Tr. at 412,908-909 (MidAmerican had AURORA but did not use capacity expansion function); ZES at 15 (recommending capacity expansion modeling to identify optimized resource additions) and Siemens study at 12 (recommending studying replacement options for uneconomic coal units); EI Hearing Ex. 18 (no follow up studies were conducted).
[35] Wind PRIME Initial Final Order at 34.
[36] RPU-2022-0001, Exhibit A to Revised Stipulation and Agreement: Resource Evaluation Study Terms and Conditions (filed August 9, 2023).

MidAmerican.[37] MidAmerican further agreed to publicly file the RES in an informational docket and to complete an update within three years.[38]

IV. Summary of Environmental Intervenors' Modeling

In June 2024, MidAmerican provided their Aurora planning model to stakeholders as part of the RES. The Aurora model included MidAmerican's view of the MISO system, existing resources, interchange limits, new build candidate resources, among other system details. Aurora allows users to develop and evaluate economically optimal resource plans with both long-term capacity expansion and operational dispatch study options. Having MidAmerican's planning model significantly improves process transparency and stakeholder engagement in the RES. Our modeling introduces an alternative perspective to the process that would otherwise be missing without robust, independent intervention.

We reviewed MidAmerican's model and aligned its inputs with the assumptions presented in the RES. We then conducted both long-term capacity expansion (LTCE) and standard zonal (SZ) production cost modeling simulations of MidAmerican's base model scenario, benchmarking the results against those in the RES. Input assumptions were subsequently modified in accordance with industry literature and best practices, and further LTCE and SZ studies were performed to review results and analyze the impact of these modifications on system build decisions and overall performance. Our modeling efforts centered around the retirement schedule of MidAmerican's coal fleet and the costs MidAmerican adopted for clean energy resources.

Our modeling illustrates how MidAmerican can achieve a clean, reliable resource plan where (1) solar energy resources are a cornerstone resource for all future portfolios, particularly in

[37] *Id.*
[38] *Id.*

the near term; (2) earlier coal retirement avoids significant CO2 emissions; (3) wind and battery resources can be built to provide capacity as aging thermal resources retire; and (4) costs stay reasonable. The resource builds identified in EI scenarios bolster previous findings in the Wind PRIME docket that battery storage and solar resources can effectively integrate with existing wind resources to reliably meet MidAmerican's energy and capacity needs.

V. Recommendations

A. MidAmerican should make future Resource Evaluation Study processes more transparent and collaborative

The Wind PRIME settlement laid out the Resource Evaluation Study process that MidAmerican was to follow. The process represents a step forward in transparency and stakeholder involvement in resource planning for MidAmerican. The process also seeks to incorporate diverse viewpoints in planning to help realize a fair and informed resource plan.

Some parts of the process worked well and MidAmerican deserves credit for effectively implementing them. MidAmerican worked with stakeholders to identify meeting times that allowed for stakeholder participation, and provided opportunities for remote participation, review of meeting materials, and stakeholder presentations. MidAmerican facilitated access to the modeling software and responded to data requests on a timely basis. MidAmerican also made available its resource planning team to help troubleshoot issues with the Aurora software and modeling process. Participants also had the opportunity to make comments after each meeting.[39] MidAmerican provided a response to most comments. These aspects of the resource planning process represent baseline best practices for resource planning processes and should be repeated in future resource planning.

[39] The EI have attached their comments and stakeholder presentations submitted as part of the process as Attachments 1-4.

There are other parts of the RES process that MidAmerican should improve in the future. These elements are inconsistent with best practices seen in other planning processes across the country and outlined in best practices resources guides.

MidAmerican dictated the overall timing of the RES and created a process timeline that was neither transparent nor accessible. The settlement provided until December 18, 2025 (24 months from MidAmerican's acceptance of the Commission's order) to complete the RES.[40] MidAmerican never provided an overall timeline for the RES, making it harder for stakeholders to plan and allocate resources. MidAmerican had an introductory meeting on February 7, followed by the four meetings required by settlement on March 7, June 19, September 5, and October 29. MidAmerican filed the RES on November 1, 2024, more than 13 months before the settlement deadline.

MidAmerican did not provide model output workbooks until the third RES meeting on September 5. These outputs are critical for stakeholders to benchmark their own modeling. Accordingly, the timeline to evaluate the Aurora model results, conduct benchmarking, test and develop alternative system futures was compressed into the final three months of the year. The last two meetings and MidAmerican's plan filing happened in less than two months. This compressed a significant amount of the RES, leaving stakeholders feeling rushed at the end due to the abrupt conclusion and limiting transparency and collaboration.

MidAmerican made little effort to incorporate feedback that stakeholders provided, treating stakeholder comments as a check-the-box exercise, while inaccurately characterizing the RES

[40] RPU-2022-0001, Revised Stipulation and Agreement, Ex. A, at 2 (filed Aug. 9, 2023). MidAmerican accepted the ratemaking principles on December 18, 2023. RPU-2022-0001, Acceptance of Advance Ratemaking Principles (filed Dec. 18, 2023).

process as collaborative.[41] The disregard of stakeholder feedback was evident throughout the process. One example was the timing of the last stakeholder meeting and MidAmerican's filing of its final RES. The final stakeholder meeting on MidAmerican's Preferred Portfolio occurred on October 29, 2024, and MidAmerican filed its RES on November 1, 2024—just three days later. MidAmerican set a deadline for stakeholder feedback from the final meeting of November 22, 2024. MidAmerican filed its final RES three weeks before receiving stakeholder feedback on the final meeting, indicating that MidAmerican did not value incorporating stakeholder feedback in the RES process. Another example was when participants identified in comments on March 29, 2024 that MidAmerican's cost trajectories for renewable resources and storage were out of line with other industry estimates.[42] Environmental Intervenors, as well as most other intervening parties in the RES process, felt this was a particularly important point and raised it throughout the process, and other stakeholders agreed.[43] The Company did not modify its cost estimates or provide meaningful additional justification for their use. In fact, MidAmerican rationalized this decision by stating "[a]lthough resource costs may change over time, to ensure the initial resource evaluation study is completed within the allotted time, MidAmerican plans to use the cost estimates it developed at the outset for the duration of the study."[44] Stakeholders identified this concern in March after the first meeting in this process, which concluded over a year before the process needed to be completed, yet MidAmerican used timely completion of the process (using a self-imposed, accelerated deadline nearly a year earlier than originally anticipated) as an excuse for

[41] Final RES at 7.
[42] Attachment 1, IEC, ELPC, and Sierra Club Comments – Input Assumptions, at 2-3 (submitted March 29, 2024).
[43] Attachment 2, IEC, ELPC, and Sierra Club Post-June 19 Meeting Comments, at 1-4 (submitted July 23, 2024)
[44]Attachment 5, MidAmerican Response to EI Meeting 2 Comments at 10.

why it could not incorporate feedback on modeling inputs. MidAmerican repeatedly used this justification for failing to incorporate reasonable feedback and recommendations from stakeholders.

Additionally, some of MidAmerican's methodologies require more transparency. For example, the Company provided minimal explanation of its portfolio scoring methodology. Given that the Company is using its scorecard to justify a portfolio that is $830 million more expensive than the Reference Case, the burden should be on the Company to explain the scoring methodology and why this combination of scoring metrics was chosen to score portfolios. Similarly, the Company did not provide a thorough explanation of the annual limits on solar and wind resource procurement until it was requested in discovery. MidAmerican's future long-term plans should feature a more thorough explanation for major planning assumptions. The Company should provide workpapers for key methodologies, including new resource cost and availability estimates. The burden should not be on participants to request supporting documentation, but on the Company to provide the information in support of its long-term plan.

Recommendations

- Publish and follow an overall timeline for the RES to allow stakeholders to plan accordingly, using the allowed time to ensure a collaborative, not rushed, stakeholder engagement process.
- Provide model input and output workbooks as early as possible in the process so that stakeholders can benchmark their own modeling. It is best practice to give intervenors at least three months to appropriately analyze Company inputs/outputs and develop their own modeling analysis.
- Plan ample time for feedback after stakeholder meetings and before filing deadlines, and incorporate stakeholder feedback into filings.
- Provide sufficient support and information to explain and justify modeling assumptions and methodologies.

B. MidAmerican should revise modeling inputs and assumptions to reduce bias and allow the model to optimize

i. MidAmerican should remove annual resource build limits that bias the modeling results towards certain resource types

MidAmerican places restrictive limits on the addition of clean energy resources, including solar, but not on traditional fossil resources. Specifically, while only 300 MW of solar are allowed to be added each year, over 9,000 MW of gas is allowed to be added each year. [45] Our Aurora modeling results show that in many years the annual limits on solar installations are reached under both MidAmerican and Environmental Intervenor scenarios (*see* Section VII). These limits create bias in favor of gas generators, without a strong basis demonstrated for the assumption.[46, 47]

ii. MidAmerican's solar limit calculation relies on outdated interconnection queue data

The Company claims that it limits solar acquisition based on "The maximum annual interconnection queue amount with a Request Status of "Done" per the MISO interconnection queue."[48] However, our review of MidAmerican's workpapers shows that MidAmerican's study uses the completed interconnection agreement data for 2022, [redacted]

[45] MidAmerican RES Report at 31.
[46] Attachment 2, IEC, ELPC and Sierra Club Post June 19 Meeting Comments at 8.
[47] FERC, Fact Sheet | Improvements to Generator Interconnection Procedures and Agreements (July 27, 2023), https://www.ferc.gov/news-events/news/fact-sheet-improvements-generator-interconnection-procedures-and-agreements.
[48] Attachment 6, MidAmerican response to EI DR 2.24.
[49] *Id.*

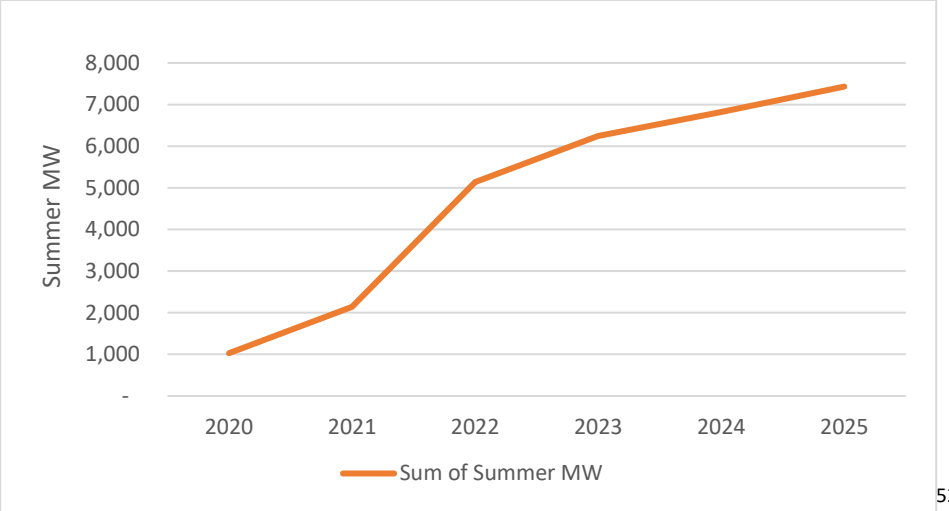
[redacted] as shown in Figure 1 below.[50] [redacted]

[redacted]

Figure 1. Completed MISO Solar Interconnection Agreements (MidAm DR 2.24)

MidAmerican's RES therefore includes the implicit assumption that new solar interconnection agreements in MISO will not increase from 2022 rates when, in fact, they have already surpassed those levels and are increasing year by year. This shows that MidAmerican's forecast of solar interconnection agreements is unreasonably low. Using updated MISO interconnection queue data shows that MidAmerican's 5,000 MW estimate for solar interconnections in MISO has already been surpassed by the 7,432 MW of completed solar interconnections for 2025 (Figure 2).[51]

[50] Attachment 7, Attachment EI 2.24-Confidential to MidAmerican's response to EI DR 2.24.
[51] https://www.misoenergy.org/planning/resource-utilization/GI_Queue/gi-interactive-queue/#



[52]

Figure 2. Completed MISO Solar Interconnection Agreements (Updated Queue Data as of 12/30/2024)

MidAmerican's own methodology, informed by the most recent MISO interconnection data, would allocate 500 MW of solar to MidAmerican per year. And there is reason to believe that interconnection and permitting constraints will improve over the mid-to-long-term. Processes are being revised and improved in response to changes in the energy industry. With notable recent actions by MISO, PJM, and the Federal Energy Regulatory Commission (FERC) to reform the interconnection process, signs point towards more efficient and lower cost processes in the future.[53, 54]

Additionally, MidAmerican should be taking actions to more efficiently use the wires and transmission system that it already has through Grid Enhancing Technologies (GET) and reconductoring. This can free up additional transmission capacity, reducing congestion and

[52] Attachment 8, Environmental Intervenors' Workpaper "GI Interactive Queue Dec 2024 EI" (xlsx).
[53] FERC, Fact Sheet | Improvements to Generator Interconnection Procedures and Agreements, (July 27, 2023) https://www.ferc.gov/news-events/news/fact-sheet-improvements-generator-interconnection-procedures-and-agreements.
[54] MISO Generator Interconnection Queue Improvements (PAC-2023-1) - Interconnection Process Working Group (IPWG) (Jan. 30 2024).

allowing additional renewable resources to interconnect without the need for new greenfield transmission development. GETs are increasingly being deployed across the country as utilities seek to maximize throughput of their existing transmission system, improve reliability, and interconnect new generating resources faster.

iii. Interconnections can now be streamlined through surplus generation and generator replacement processes with FERC

Additionally, the interconnection process can be streamlined using surplus interconnection and generator replacement. Both methods can allow projects to interconnect more quickly and at a lower cost than they could historically. Surplus interconnection was recently approved by FERC and allows new resources to avoid lengthy interconnection queues by interconnecting at the site of an operational resource using an existing interconnection agreement, as long as total output capacity does not exceed that of the original agreement. [55, 56] This means that MidAmerican can locate solar at the site of an existing plant without going through the usual interconnection queue process.

FERC has approved a generator replacement process for MISO allowing new generators to replace old generators without going through the interconnection queue.[57] MidAmerican could locate new solar generation at the site of a retiring generator without going through the lengthy interconnection queue process. In fact, as of January 2025, MISO has completed requests for over

[55] FERC Order No. 845 at 269.
[56] FERC Order No. 845 at 8.
[57] FERC, ORDER ACCEPTING TARIFF REVISIONS, Docket No. ER19-1065-000, (May 15, 2019) https://elibrary.ferc.gov/eLibrary/idmws/file_list.asp?accession_num=20190515-3059 (last visited Jan. 31, 2025).

2 GW of new resources in its Surplus Interconnection Service queue.[58] Researchers at UC Berkeley estimate that there are over 850 GW of new generation that could technically and cost-effectively be connected at existing generation sites.[59]

Within the planning timeframe, MidAmerican should be able to reduce costs and acquire resources more quickly by utilizing existing interconnection agreements and infrastructure for new resources. And as an additional benefit, projects located at the sites of operational or retiring coal plants may also be eligible for the energy communities adder (i.e. bonus tax credits) under the Inflation Reduction Act (IRA), as they may be located in an energy community as defined by the IRA.[60]

Recommendations

- MidAmerican should increase its estimate of potential annual solar interconnections to at least 500 MW, based on the recent increases in solar interconnection agreements, expected improvements in the interconnection processes, and the potential to utilize the interconnection agreements of existing resources.
- MidAmerican should evaluate the potential to use surplus interconnection and generation interconnection to expedite the interconnection process for new solar resources.
- MidAmerican should evaluate Grid Enhancing Technologies and reconductoring to increase transmission capacity for new solar resources.

C. MidAmerican should use industry-standard resource cost decline trajectories

MidAmerican's clean energy cost estimates are substantially higher than estimates used by other utilities and leading industry sources including the National Renewable Energy Laboratory (NREL), the United States Energy Information Administration (EIA), and Lazard. Specifically,

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[58] GridLab, Surplus Interconnection Service: Unlocking Grid Reliability and Rapid Energy Deployment, (Feb. 21, 2025) https://surplusinterconnection.s3.us-east-1.amazonaws.com/2025-02-21_GridLab_Surplus_Interconnection_Issue_Brief.pdf.

[59] *Id.*

[60] US Department of the Treasury. Energy Communities, https://energycommunities.gov/energy-community-tax-credit-bonus/.

the Company's starting costs are high, and its assumption that resources will experience no cost decline throughout the planning period has a disproportionate impact on clean energy resources relative to fossil resources. Multiple parties highlighted concerns with MidAmerican's approach through the RES process. EI highlighted our resource cost trajectory concerns in detail in our comments on MidAmerican's RES meeting 2 and the Tech Customers highlighted their similar concerns during their Presentation at RES meeting 4.

We conducted a detailed review of MidAmerican's cost assumptions and found that the Company's costs for renewables and storage are higher than other utility cost estimates and higher than leading industry cost estimates. In fact, MidAmerican's forecasts for renewable resources are the highest of all utilities we reviewed. As seen in Figure 3, MidAmerican's starting 2024 starting cost assumptions are on average [redacted] percent higher than NREL's and EIA's estimates for wind, [redacted] percent higher for solar, and [redacted] percent higher for battery energy storage systems.[61]

[61] MidAmerican states that its 4-hour storage costs are sourced from NREL ATB with adjustments to include Off-Site Transmission costs, substation costs, and Real Estate costs. Attachment 9, MidAmerican Response to Environmental Intervenors Request 1a (Mar. 14, 2024).

Figure 3. 2024 Capital cost of solar, wind and BESS for MidAmerican compared to industry sources

MidAmerican's high resource cost assumptions become more pronounced in future years because MidAmerican assumes that there is no technological learning effect, and resource costs do not decline over time.[62] While other utilities assume that the cost of clean energy will decrease over time due to technological learning, MidAmerican holds the cost for these technologies flat. That assumption disadvantages clean energy resources in MidAmerican's modeling. The combination of inflated starting costs and flat learning curves results in cost inputs for wind, solar, and BESS that are significantly higher than industry standard projections, and the pattern becomes even more pronounced further out in the study period. As shown in Figure 4 below, by 2040, MEC's cost estimate for solar is [redacted] the EIA and NREL estimates. Figure 5 and 6 below show similar patterns for Wind and BESS.

[62] Attachment 9, MidAmerican Response to Environmental Intervenors Request 1b (Mar. 14, 2024).

Figure 4. Solar cost trajectories for MidAmerican compared to other utilities and industry sources

Figure 5. Wind cost trajectories for MidAmerican compared to other utilities and industry sources

Figure 6. BESS cost trajectories for MidAmerican compared to other utilities and industry sources

Ignoring expected cost decreases from technological learning creates a strong bias against clean energy. Clean energy resources are newer technologies and there is a wide industry consensus that there is still substantial room for technological advancement and efficiency improvements in the supply chain and for soft costs to come down. Gas generators are generally considered mature technologies. While there is some room for future technological developments and learnings, there is consensus that the cost of gas plants will only gradually decline going forward.

Figure 7 below compares MidAmerican, NREL and EIA projections for both BESS and CTs. NREL and EIA cost projections show BESS costs falling through 2049 until the cost of BESS is close to the cost of CTs. In MidAmerican's modeling however, BESS remains [redacted] for the entire study period. By removing technological advancement,

MidAmerican's modeling is biased against BESS compared to a projection that considers technical learning.

Figure 7. CT and BESS cost projections

Table 1 below compares NREL and EIA new resource costs to MidAmerican's cost assumptions for 2024 and 2040. MidAmerican's solar cost estimate starts out [redacted] and [redacted] percent above NREL and EIA projections, respectively. By 2040, it is [redacted] and [redacted] percent higher than NREL and EIA estimates. For comparison, the Company's CT cost estimate is within the range of the NREL and EIA estimates.

Table 1. *Comparison between MidAmerican, NREL and EIA new resource cost assumptions (2023 $/kW capital cost)*

Resource	2024			2040		
	MEC	NREL	EIA AEO	MEC	NREL	EIA AEO
Solar PV	[redacted]	$1,516	$1,340	[redacted]	$806	$911
Wind	[redacted]	$1,641	$1,381	[redacted]	$1,243	$1,175
BESS	[redacted]	$1,903	$1,461	[redacted]	$1,225	$826
Combustion Turbine (CT)	[redacted]	$1,299	$773	[redacted]	$1,146	$636

Recommendation

- MidAmerican should adopt new resource cost trajectories that incorporate reasonable technological learning curves for all new resources.

D. MidAmerican should evaluate more resource options as part of its resource planning process

MidAmerican considered a limited set of resource options as part of its RES, notably excluding long duration energy storage (LDES) and demand side management (DSM) resource options. By limiting its replacement options, MidAmerican introduced bias into its modeling while limiting its opportunities to identify lower cost portfolios. Figure 8 below shows the replacement resource options that MidAmerican considered.

FIGURE 5: CANDIDATE RESOURCE INPUTS

New resource	Overnight Cost ($/kW)	Fixed O&M ($/kW-year)	Variable O&M ($/MWh)	Book/Tax Life (Years)	Partial Builds MEC/MISO	Size for MEC (MW blocks)	Location	First/Last Year Available for MEC
CT-Large Frame	1,045	6.5	1.26	30/15	No/No	233	MISO-wide	2028
CCCT–Large Frame	1,207	12.54	2.87	30/20	No/No	727	MISO-wide	2028/2034
Utility-scale Wind	2,006	18.44	-	40/5	No/Yes	170	MISO-wide	2024
Utility-scale Solar	1,778	21.74	-	30/5	No/Yes	50	MISO-wide	2024
Storage, 4-hour	2,003	46.25	-	20/5	No/Yes	60	MISO-wide	2024
Nuclear-SMR	7,690	118.8	3.13	40/15	No/No	345	MISO-wide	2035

[63]

Figure 8. Candidate Resource Inputs

i. Long Duration Energy Storage

The exclusion of LDES from the 20-year study is particularly concerning given the importance of firm capacity to address load growth, meet MidAmerican's sustainability goals, and

[63] MidAmerican Resource Evaluation Study Report at 31.

replace legacy fossil units. LDES includes a variety of technologies such as flow batteries, compressed air energy storage, and hydrogen-based storage. It also covers a range of durations spanning 10 hours all the way up to 100 hours or more. LDES technology is already being deployed and piloted today, and there may be economic opportunities for hundreds of GW of LDES storage by 2050.[64,65]

Many types of LDES are emerging technologies that are commercially ready for the planning period and have been procured by utilities and approved by state regulators. For example, Georgia Power has announced a 15 MW/1.5 GWh iron-air battery;[66] Xcel in Minnesota has received approval for a 10 MW/1 GWh battery;[67] Puget Sound Energy is exploring a 10 MW/1 GWh battery;[68] and Dominion Energy in Virginia has received the Commission's approval to pilot three non-lithium technologies with two of them being LDES.[69] As a best practice, long term resource plans should treat emerging technologies fairly and consistently and avoid showing preference among emerging technologies without justification.[70] By including emerging nuclear SMR technology and excluding other forms of emerging technology like LDES, MidAmerican is

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[64] McKinsey & Company. Net-zero power: Long duration energy storage for a renewable grid, at 7, 11 (Nov. 2021).
[65] National Renewable Energy Laboratory. Storage Futures Study Key Learnings for the Coming Decades at 3.
[66] Michael Schoeck, Form Energy to deploy 100-hour iron-air battery system in Georgia, PV-Magazine (June 12, 2023), https://pv-magazine-usa.com/2023/06/12/form-energy-to-deploy-100-hour-iron-air-battery-system-in-georgia/.
[67] Ethan Howland, Minnesota PUC Approves Xcel's Plan to Install a 10-MW/1,000-MWh Form Energy Battery System, Utility Dive (July 7, 2023), https://www.utilitydive.com/news/minnesota-puc-xcel-form-energy-battery-sherco-solar/685460/.
[68] Kavya Balaraman, Puget Sound Energy, Form Energy explore 10-MW, 100-hour iron-air battery pilot, Utility Dive (Jan. 9, 2024), https://www.utilitydive.com/news/puget-sound-energy-form-energy-long-duration-iron-battery/704026/.
[69] Patrick Larsen, VPM, Dominion approved for 3 long-term battery storage pilots (May 16, 2024), https://www.vpm.org/news/2024-05-16/dominion-approved-for-3-long-term-battery-storage-pilots.
[70] Attachment 10, Synapse Energy Economics and Lawrence Berkeley National Laboratory. Best Practices in Integrated Resource Planning at 37-40 (hereafter Synapse IRP Best Practices).

favoring one type of emerging technology over others. Customers are missing out on potential opportunities to benefit from LDES resources, while another, potentially high-cost and high-risk emerging technology nuclear plant, has been hard-coded into the preferred portfolio.

To improve the fairness of MidAmerican's long-term planning, the Company should include several LDES technologies as resource options in its capacity expansion modeling. Other utilities are already modeling LDES resource options in long-term planning.[71] For example, PacifiCorps' Draft 2025 IRP modeled candidate resources that included 8-hr li-ion batteries, 8-hr gravity-based LDES, 12-hour compressed air energy storage, 100-hour iron-air energy storage, 10-hour pumped hydro energy storage, and 10- and 24-hour thermal energy storage resources.[72] In its draft preferred portfolio results for 2030, PacifiCorp identified the need for 656 MW of long-duration storage (100-hour iron air batteries).[73]

Given the relative nascency of LDES, it can be difficult to capture the full value of LDES in capacity expansion modeling. There are emerging best practices on how to model LDES. In the Aurora model, MidAmerican can use model settings with sufficient temporal granularity to identify the synergies between renewables and storage.[74] Using increased temporal granularity gives the model the ability to better realize the value of LDES. Additionally, MidAmerican can evaluate additional sensitivities or scenarios that study the effects of adding LDES resources. Running additional sensitivities or scenarios can help test the value of LDES when hard coded into a portfolio. For example, an additional sensitivity could test whether adding LDES to the preferred

[71] *Id.* at 38.
[72] PacifiCorp, 2025 Integrated Resource Plan (Draft), Vol. 1 (Dec. 31, 2024).
[73] *Id.* at 221.
[74] *See* Attachment 11, Modeling Multi-day Storage in Aurora - Version 10.30.24.

portfolio in place of a gas generator could provide a reliable system with lower emissions and lower costs.

Recommendations

- MidAmerican should include several LDES technology options in its next long-term plan.
- MidAmerican should use best practices that accurately reflect the value of LDES, including: 1) enabling Aurora model settings sufficiently granular to identify the synergies between renewables and storage, and 2) evaluating additional scenarios that study the effects of adding LDES resources.

ii. Demand Side Management

In the RES, MidAmerican assumes that historical levels of DSM investment will continue going forward without any incremental improvements. MidAmerican did not evaluate the potential for additional efficiency and demand response to reduce long-term system costs.[75] This approach may miss valuable contributions that DSM resources can make to lower costs and displace the need for new generation on MidAmerican's system.

We understand that the Company has a separate process for evaluating energy efficiency, but best practices in resource planning include modeling of DSM as part of the resource planning process. One way to effectively incorporate DSM in long-term planning is through the inclusion of various DSM measures or portfolios as resource options that compete with supply-side options in capacity expansion modeling.[76, 77] For example, MidAmerican could include a scenario that considers demand response as a resource option in the Aurora model. If the model selects demand response, it would provide policymakers and stakeholders with valuable information about the potential value of increasing the amount of demand response on MidAmerican's system.

[75] MidAmerican RES Report at 20.
[76] Synapse IRP Best Practices at 40-44.
[77] Lawrence Berkeley National Laboratory. Methods to Incorporate Energy Efficiency in Electricity System Planning and Markets, at 14 (2021).

Alternatively, MidAmerican could use the DSM potential study as part of the energy efficiency plan development to identify cost effective DSM investment levels during the study period and reflect the DSM potential as load reductions in the Aurora model.

Recommendation

- MidAmerican should utilize DSM potential study that is part of the energy efficiency planning process to model increased deployment of cost-effective DSM as part of its next resource planning process.

E. MidAmerican should evaluate additional retirement dates for certain coal units and allow endogenous retirement when reasonably practical

MidAmerican's long-term planning process should include evaluation of early retirement of the Company's coal units, especially those previously identified as potentially uneconomic. MidAmerican has not provided a comprehensive early retirement scenario, nor did it look at a range of options for early retirements or allow the model to make endogenous coal retirement decisions. As a result, MidAmerican has a limited view of the economics of its coal fleet.

MidAmerican had agreed in the settlement to "consider a reference case and examine various planning scenarios for comparison purposes, including early coal plant retirements."[78] MidAmerican's modeling included one scenario studying early coal plant retirements for two units. While this met the technical requirements of the RES settlement term, it does not meet the spirit of the negotiated term. In Scenario 2, MidAmerican evaluates the retirement of Neal 3 at the end of 2029 (instead of 2035) and Louisa at the end of 2031 (instead of 2040.) The Company states that these dates were selected to align with the next major maintenance overhaul scheduled at each unit, and to allow time for interconnection queue studies and construction of replacement resources. However, the limits that MidAmerican placed on the retirement dates for these units are

[78] RPU-2022-0001, Revised Stipulation and Agreement, Ex. A, at 2.

unnecessarily restrictive. Units can be retired years in advance of a major overhaul and still benefit from avoiding overhaul costs. And MidAmerican can construct new resources at the sites of existing or retiring assets to avoid the costs and delays of the interconnection queue[79] or else look to the market for resources with interconnection studies already in progress. Another option MidAmerican should consider more broadly is whether it is economic to convert its coal units to operate on gas. MidAmerican considered conversion of coal units to gas only in the EPA scenario, despite conversion being possible in any scenario. For plants near existing gas pipelines with surplus firm capacity, conversion to gas can reduce costs and reduce emissions while maintaining the resource's capacity.

We understand that allowing the model to select from a variety of coal retirement dates can increase model runtime. On the other hand, programming the model to consider a more limited, yet robust and representative, set of potential retirement dates can help simplify the modeling process by reducing decision points, leading to a smaller problem size and quicker solutions. Optimized analysis provides critical data on cost-effective resource options and optimal economic resource plans. MidAmerican should reevaluate retirement of its coal fleet, especially those units identified as uneconomic. The 2019 internal study conducted by MidAmerican identified two units as uneconomic, as did a separate study conducted on its behalf, which provides a strong justification for the Company to re-evaluate these dates.[80,81] Further, even if the Company didn't want to do optimized modeling it could have tested a variety of retirement dates, rather than just a

[79] Attachment 1, Environmental Intervenors. IEC, ELPC and Sierra Club Comments – Input Assumptions, at 2 (Mar. 29, 2024).
[80] RPU-2022-0001, MidAmerican Zero Emissions Study, at 13 (filed Feb. 17, 2023) (identifying Louisa and Ottumwa as uneconomic coal units).
[81] RPU-2022-0001, Siemens, Coal Plant Economics Assessment: MidAmerican Energy Company, February 2020, at 11 (filed Feb. 17, 2023) (identifying Ottumwa and Neal as uneconomic coal units).

single scenario (as recommended below). This alternative would have provided more information than a single hard-coded scenario. A robust and representative set of retirement scenarios can offer a valuable supplement to optimized modeling. MidAmerican's decision on retirement scenarios left a major gap in its RES.

Recommendation

- We recommend that MidAmerican expand its evaluation of early retirement scenarios with additional retirement dates and allow the model to endogenously retire thermal units rather than programming in restrictive retirement dates.
    - Evaluate the retirement of Neal 3 and Louisa by 2027
    - Evaluate the retirement of Neal 3, Louisa, and the Company's share of Ottumwa by 2027/2028 or another similar year under a staggered retirement schedule.
    - Model the retirement of Neal 3 by the end of 2027, Louisa prior to the end of 2029, and Neal 4 by the end of 2030.
    - Evaluate the economics of converting the Company's coal plants to operate on gas in all scenarios (not just the EPA compliant scenario).

F. MidAmerican should include a scenario without fixed inputs for renewable additions and resource retirements to allow the model to build an optimized portfolio

MidAmerican should model an additional scenario that removes the restrictive limits that it has on its current scenarios. Specifically, the Company should model a scenario that increases annual procurement limits on renewable resources and allows for endogenous coal retirements. This scenario would evaluate the potential to reduce system costs by 1) procuring more cost-effective clean energy resources if they are available from the market and 2) retiring coal generation if it is uneconomic.

As shown by our independent modeling and the independent modeling of the Tech Customers, MidAmerican's portfolios focus on a low-end estimate of the cost-effective clean energy that could be procured by the Company.

Long-term planning can be important not just for the Company, but also for communicating to the market what the Company needs. If the additional scenario shows, for example, that more solar resources are selected when available, that sends a valuable message to the market. If solar developers see that MidAmerican is committed to procuring as much cost-effective solar as the market can provide, this could increase options available on the market and decrease costs for customers.

Recommendation

- MidAmerican should include a scenario in its RES update to study both coal retirements and procurement of replacement resources. The scenario should include:
    - A higher limit, or no limit, on annual procurement of solar energy, and
    - A reasonable range of coal retirement dates that can be selected by the model (as outlined in the section above).

VI. MidAmerican should reconsider the preferred portfolio and scoring methodology

MidAmerican's Preferred Portfolio is the second most expensive of the portfolios and sensitivities MidAmerican modeled in the RES. Figure 9 below shows that it is ten percent ($830 million) more expensive than the Reference Case portfolio.[82]

Scenario	20 Year NPV (in 2024 $000)	NPV 20 Difference from Scenario 1 (%)
cenario 1 – Reference Case	8,047,236	0.0%
cenario 2 – Early Retirement	8,558,544	6.4%
cenario 5 – DLOL	8,842,088	9.9%
cenario 7 – EPA	9,349,465	16.2%
ombined Cycle Sensitivity	8,165,524	1.5%
MR Sensitivity	8,766,309	8.9%
MR with Salt Storage Sensitivity	8,743,983	8.7%
attery Storage Sensitivity	8,633,471	7.3%
referred Portfolio	8,876,796	10.3%

Figure 9. MidAmerican's RES scenarios and NPV calculations

[82] MidAmerican RES Report at 73.

The only difference between the Preferred and Reference portfolios is that the Preferred Portfolio adds a nuclear plant with salt storage in 2036 to replace a similar amount of solar and gas that the model selected in the Reference Case. MidAmerican hard-coded the nuclear plant into the portfolio and has not provided adequate justification for adding a speculative SMR at an estimated additional cost to customers of $830 million.

We are concerned that MidAmerican's portfolio scoring methodology, which shows the Preferred Portfolio scoring highly in comparison to other portfolios, is biased toward the Preferred Portfolio.[83] Generally, there are a few ways the methodology creates bias.

First, MidAmerican weights each scoring metric equally so the methodology implicitly under-values the least-cost metric of 20-year present value revenue requirement (PVRR).

The 20-year PVRR metric, while not the only consideration relevant to resource planning, is the most important of MidAmerican's scoring metrics. 20-year PVRR is commonly used by utilities as a basis for evaluating and selecting portfolios. The modeling outputs are designed to meet customer demand and reliability needs, so all portfolios should satisfy those minimum requirements. While other cost and risk metrics are also important in selecting a Preferred Portfolio, portfolio cost over the model study period generally receives the highest consideration.

Second, MidAmerican does not appear to consider risks associated with nuclear fuel availability. As we noted in response to the fourth RES meeting, only five percent of uranium used domestically in the US was sourced domestically in 2023.[84] And in 2024, global uranium prices

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[83] Our comments on MidAmerican's fourth RES meeting describe the many problems with MidAmerican's scoring metrics. *See* Attachment 4, Environmental Intervenors' Comments on MidAmerican's Fourth Resource Evaluation Study (RES) Meeting, at 6-10 (Nov. 22, 2024).

[84] EIA 2023 Uranium Marketing Annual Report, at 2, https://www.eia.gov/uranium/marketing/pdf/2023%20UMAR.pdf (last visited Jan. 6, 2025).

increased sharply, from an average of $48.98/lb in 2023 to $70.56/lb in 2024.[85] Given the history of volatile prices and dependence on foreign markets, it is unclear why portfolios with nuclear resources received higher scores in the "foreign market" and "fuel abundance" categories.

Third, MidAmerican does not consider the risk and uncertainty of SMR costs. Most metrics in MidAmerican's scorecard seen in Figure 10 below would be unchanged even if costs jumped by an order of magnitude. Only the 20-year PVRR metric and the 20-year CAGR metric would change, but not by enough to change the Portfolio's relative rankings. Portfolios including SMR would continue to be the "best" portfolios under MidAmerican's scoring methodology even at 100 times the current cost estimate.

▸ 1 (most preferred) to 3 (least preferred)

Criteria	Metric	Preferred Portfolio	Scenario 1 – Reference Case	Scenario 2 – Early Retirement	Scenario 5 – DLOL	Scenario 7 – EPA	Combined Cycle Sensitivity	SMR Sensitivity	SMR with Salt Storage Sensitivity	Battery Storage Sensitivity
Affordability	NPV 10-Year	1	1	3	3	3	2	1	1	3
	CAGR Cost 10-Year	1	2	3	2	3	1	1	1	2
	NPV 20-Year	2	1	2	2	3	1	2	2	2
	CAGR Cost 20-Year	2	2	1	1	2	1	2	2	1
	High/Low Gas	1	2	3	2	2	2	1	1	1
	Foreign market	1	2	2	1	2	2	2	1	1
	Fuel Abundance	1	2	2	3	2	3	1	1	1
Reliability	Market Purchases	2	2	3	2	3	1	2	2	2
	Uncovered load	1	2	2	1	2	1	2	2	3
	Fuel Diversity	1	3	3	2	3	2	2	1	2
	Conventional + Storage	2	2	2	1	2	2	2	2	2
Sustainability	CO_2 (10 year)	2	2	1	2	1	3	2	2	2
	CO_2 (20 year)	2	2	1	3	1	3	2	2	2
	Jobs	1	2	3	1	2	1	1	1	2
Total Score		20	27	31	26	31	25	23	21	26

Figure 10. MidAmerican's RES scenario scorecard

Portfolio scorecards can be useful planning tools, even if they are not directly used to select a preferred portfolio.[86] While MidAmerican's scorecard provides an interesting and sometimes useful view of how MidAmerican's portfolios compare, the Company's scoring methodology does

[85] https://fred.stlouisfed.org/series/PURANUSDM
[86] Synapse IRP Best Practices, at 72-73.

not minimize cost and risk to customers, and it should not be used to justify the selection of the Preferred Portfolio.

Recommendations

- MidAmerican's current portfolio scoring methodology should not be used to select a Preferred Portfolio.
- MidAmerican should provide an explanation and justification for how scores were calculated for each metric.
- MidAmerican should evaluate risk and uncertainty in advanced technology costs as part of its modeling or score card.

VII. MidAmerican should focus its near-term actions on procuring as much cost-effective solar as the market will provide

At MidAmerican's fourth RES meeting in October 2024, the Company stated that it plans to acquire 750 MW of solar by 2029. This result is supported by MidAmerican's modeling, which found large amounts of near-term solar to be cost-effective across all RES scenarios and sensitivities, as shown in Table 2 below.[87] The independent modeling of the Tech Customers and Environmental Intervenors confirms the finding that near-term solar is cost-effective and will reduce long-term costs to customers.[88, 89]

Table 2. *Solar Builds by Scenario/ Sensitivity*

Year	Ref.	Early Ret.	Low Gas	High Gas	DLOL	High Load	EPA	*CC*	*SMR*	*SMR + Stor.*	*Batt*	*Ret.*
2024	50	50		50	50	300	50	50		50	200	50
2025	300	300	200	300	100	300	300	300	300	300	200	300
2026	300	250	250	250	200	300	250	250	200	100	250	250
2027	100	100	50	100	100	300	100	100	50	100	100	100

[87] MidAmerican's RES Report at 64.
[88] Tech Customers, Final Report of the Tech Customers on the 2024 MidAmerican Resource Evaluation Study, at 31 (Nov. 2024).
[89] Attachment 12, Environmental Intervenors, MidAmerican RES Modeling: Alternative Modeling from Environmental Intervenors (Feb. 27, 2025.

Total	750	700	500	700	450	1200	700	700	550	550	750	700

But 750 MW is likely an underestimate of the amount of cost-effective, near-term solar on MidAmerican's system in the reference case scenario. This estimate is based on the Company's RES modeling solar cap of 300 MW a year. As shown above, the model selects 300 MW of solar in 2025 and 2026 in the Reference Case, indicating that the model would have selected more solar as a least-cost resource in those years if it wasn't limited.[90]

MidAmerican has also expressed skepticism that it can feasibly bring online any new solar PV before 2028.[91] But the Company's RES modeling results show that solar additions before 2028 are economic across scenarios and sensitivities.

Our modeling results suggest that solar additions over the full study horizon are economic across Environmental Intervenor scenarios. MidAmerican's system, as modeled, demonstrates a significant appetite to build solar resources up to, and possibly beyond, the annual build limit imposed in the model. By default, MidAmerican adopted a 300 MW annual build limit for solar. In two of our scenarios, we explored build decisions in a future in which up to 500 MW solar can be built each year (per Recommendation (B)(i) in Section V). Figures 11 and 12 below illustrate the solar build realized by the model as a percent of the annual build limit imposed. Except for two outlier years and scenarios, we found the model built at least 90% of the annual solar build limit across all years and scenarios.

[90] MidAmerican's RES Report at 64.
[91] MidAmerican's RES Report at 86.

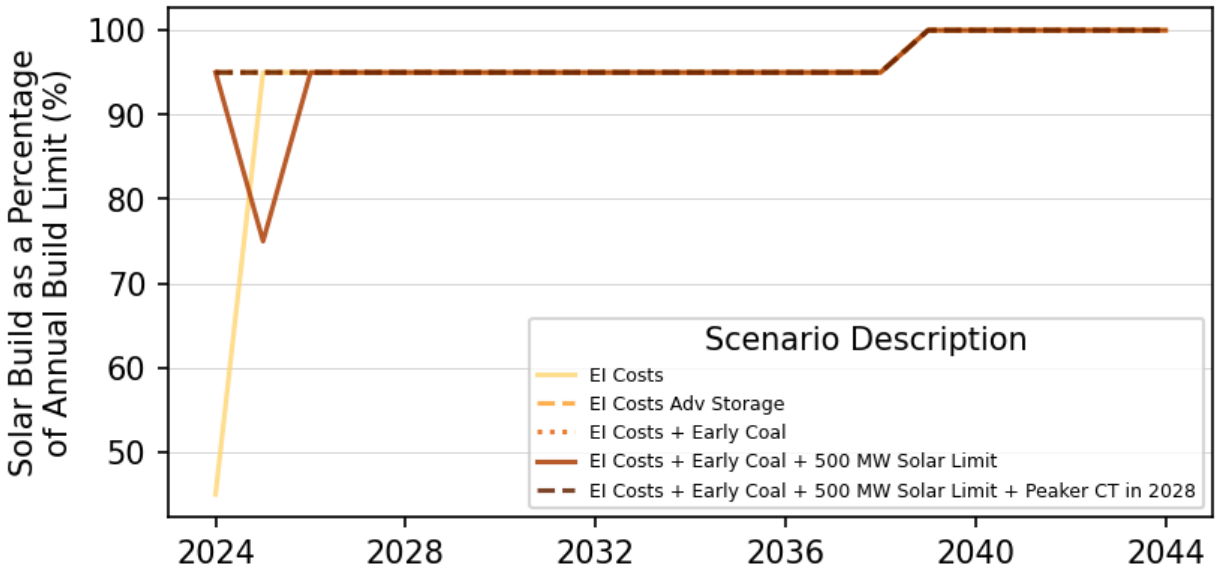

Figure 11. Solar built by model (2024-2044)

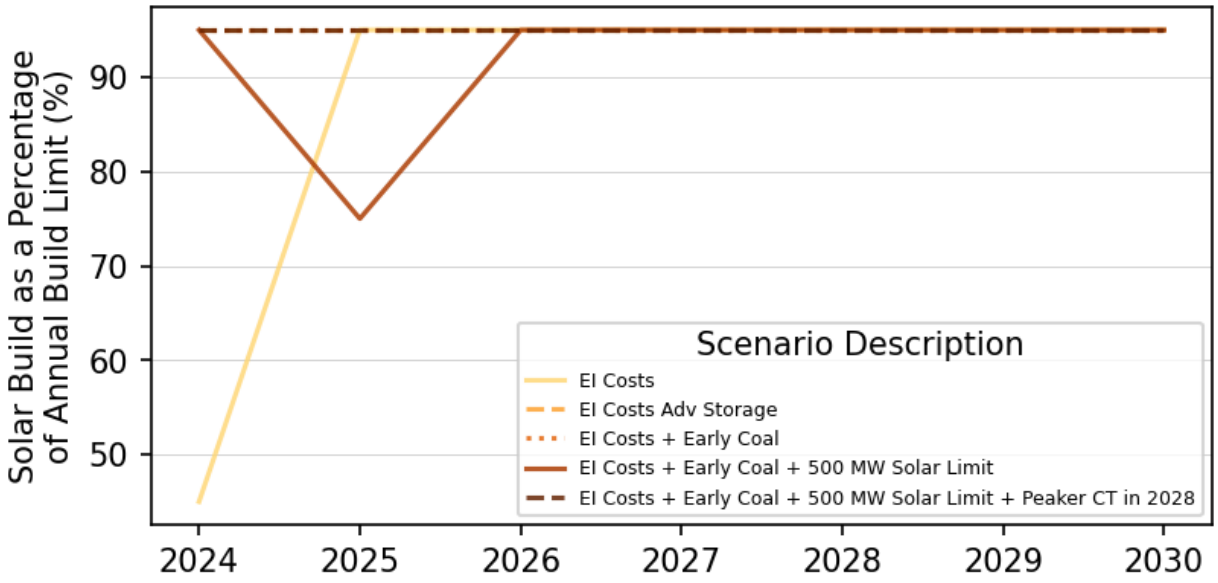

Figure 12. Solar built by model in short term (2024-2030)

MidAmerican can reduce total system costs, especially fuel costs, and reduce regulatory risk from future carbon regulations through near-term solar acquisition. Given the results of its modeling, MidAmerican should not limit its near-term procurement efforts based on timeline or quantity but instead seek as much cost-effective solar as the market will provide over the next few

years. Specifically, MidAmerican can look to the market for solar that may already have interconnection studies and permitting requirements in progress and may be available before 2028.

Recommendations

- MidAmerican should procure as much cost-effective solar as the market will provide, without limiting acquisition based on the limit MidAmerican set of 300 MW each year.
- MidAmerican should specify in a competitive market procurement that it is looking for solar resources as soon as possible, consistent with the results of the RES. MidAmerican should not limit its search to solar achieving commercial operation after 2028.

VIII. Environmental Intervenors' modeling demonstrates a clean, reliable, and low-cost future is possible

MidAmerican provided participants with three Aurora model archives as part of the RES. The first model archive (Base), delivered in April 2024, comprised the necessary data to run MidAmerican's Base, Early Retirements, Low Gas and High Gas scenarios. Then, in June of 2024, MidAmerican provided an updated Base archive with portfolio sensitivities. MidAmerican's scenarios and sensitivities are activated within the model by enabling the appropriate Aurora changesets. In August of 2024 MidAmerican published its EPA scenario model archive. The design of the EPA scenario model diverges from the Base model archive in such a way that it warranted a second, stand-alone, Aurora model archive. In the EPA scenario model archive, MidAmerican updated resource candidate availability and added model constraints to approximate the potential impacts of the EPA 111(d) regulations on coal and natural gas generators. We began our model development with MidAmerica's EPA scenario because that scenario best aligns with regulatory policy as it exists today. Recognizing that regulatory environments may change, we also developed alternative futures based on the original Base scenario to capture futures with and without these regulations.

We appreciate the opportunity to work with MidAmerican's models directly. Doing so greatly enhances our understanding of MidAmerican's planning perspective, constraints, and resource expansion options. In receiving access to both the Aurora model and the MidAmerican Aurora archives, we were able to bring unique and informed perspectives to the resource planning process. This step toward transparency and collaboration is becoming increasingly common in Integrated Resource Planning and similar proceedings across the country. In recent years, for example, numerous Public Utilities Commissions – including Commissions in Oregon, Arizona, Michigan, South Carolina, Kentucky, and New Mexico – have adopted new rules requiring utilities to enable intervenor access to Company planning models or greater stakeholder input into the modeling process. These models empowered us to develop alternative views of the system by testing how certain input decisions and key assumptions impact the long-term resource plan while remaining grounded in MidAmerican's core assumptions. Our approach to understanding MidAmerican's system and developing alternative perspectives involved the following steps:

1. Review MidAmerican's model and align inputs with assumptions presented in the RES.
2. Conduct both long-term capacity expansion (LTCE) and standard zonal (SZ), (production cost modeling), simulations of MidAmerican's base model scenario.
3. Benchmark the results against those presented in the RES.
4. Modify input assumption(s) consistent with industry literature and best practices.
5. Conduct LTCE and SZ studies, review results and analyze the impact of input modifications on system build decisions and performance.

Our modeling work concentrated on understanding how fundamental assumptions regarding resource costs, resource retirement decisions, and binding long-term constraints impact MidAmerican's long-term resource plan. Because these assumptions significantly influence

decisions in long-term resource planning models, they are critical components for review. During model review and benchmarking, we found MidAmerican's resource cost assumptions to be out of step with industry standard assumptions for clean, non-emitting resources and found the model would build solar capacity up to the limit allowed by an annual build constraint (as discussed in Section (V)(B)(i)). Additionally, we adopted alternative assumptions around coal resource retirements in the MidAmerican territory. Doing so allowed us to (1) identify the candidate resources that could most economically replace aging coal assets and (2) evaluate the impact of earlier coal retirements on emissions and cost to ratepayers, as well as related reliability implications.

The EI Reference scenario we developed adopts industry-standard costs sourced from the latest NREL ATB for wind, solar and battery resource candidates that are lower than those analyzed by the Company, earlier coal retirements, and an increased limit on annual solar builds. We recognize that changes to resource costs have a significant impact on model build decisions and system NPV. Accordingly, we ran the MEC Base scenario with the updated EI reference scenario resource costs to enable a like-for-like comparison of the future systems realized from these modeling scenarios. We refer to this cost-adjusted MEC Base scenario as our "MEC Reference" scenario.[92] While we ran the MEC Aurora model over several dozen iterations through benchmarking, testing, development and the creation of additional scenarios, Table 3 highlights a side-by-side comparison of the MEC Reference scenario and the EI Reference Scenario.

[92] The MEC Reference scenario is a replica of MEC's Reference Case scenario, re-optimized utilizing the costs of new renewable resources adopted in the EI Reference scenario. The resulting portfolio is commensurate with MEC's Reference Case scenario resource decisions, but lower cost as a result of lower renewable prices.

Table 3. *Comparison of MEC Reference and EI Reference Scenarios*

Metric	MEC Reference (with EI Resource Costs)	EI Reference	Comparison
System NPV ($B)	$5.77B	$6.33B	↑ 9.70%
Market Purchases (% of load)	11.50%	16.48%	↑ 4.98%
Total CO2 Emissions (mmT)	232.80 mmT	112.49 mmT	↓ 51.67%

With the adoption of EI resource costs, the MEC Reference and EI Reference scenarios differ in their annual solar build limits and coal retirement assumptions. The EI Reference scenario increases the annual build limit for solar generators from 300 MW per year up to 500 MW based on our evaluation of recent MISO interconnection queue performance (as discussed above). The EI Reference scenario retires Neal 3 in 2027, Louisa in 2028, Ottumwa in 2029, Neal 4 in 2030 and the Walter Scott units in 2035. This retirement represents a 10 year acceleration in the coal retirement fleet—nearly 2.5 GW of nameplate capacity. Taken together, the EI Reference scenario explores how the MidAmerican system can rapidly remove coal generation and the associated emissions and regulatory risk from their system. The EI Reference scenario results in a system that removes 120 mmT of CO2 pollution from the system, a reduction of over 50%. System NPV increases in the EI Reference by 10% as additional solar and storage resources are built earlier to replace retiring coal generators. Taken together, the EI Reference scenario removes CO2 pollution from the system at a cost of $4.65/ton. The opportunity to remove CO2 pollution from the Iowa airshed at a cost of $4.65/ton represents a significant benefit to the Iowa community when compared to societal costs of carbon estimated to be $64/ton.[93]

[93] Technical Support Document: Technical Updated of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, Aug 2016. Value referenced from Table ES-1, year 2020, 3% discount rate, adjusted to 2024 dollars.

The EI Reference scenario makes modest adjustments to key input assumptions in order to test the sensitivity of those variables. Much like the MEC Reference scenario, this alternative results in significant new solar builds to meet rising demand in the near term. Whereas the MEC Reference scenario relies on significant new natural gas combined cycle resources, the EI Reference scenario instead results in significantly higher solar and battery storage deployments. Over the course of the study period, the EI Reference scenario builds 1 GW of battery storage, 0.5 GW of new wind, and 10 GW of new solar capacity. As a result of cheaper renewable cost projections that rely on industry standard learning curves for those resources, this portfolio is far cheaper on an NPV basis than the MEC Base scenario.

We developed two additional scenarios to evaluate the influence of the solar annual build limit and the addition of a firm resource to the MidAmerican resource plan. Table 4 below outlines the assumptions adopted for each of the scenarios we modeled. In all three of our scenarios, indicated by "EI," we assume an early coal retirement schedule as previously outlined. In the EI Less Solar scenario, we adopt MidAmerican's 300 MW per year build limit on new solar resources. In the EI Add Firm resource, we program in the addition of a 220 MW gas peaker resource to coincide with the year in which the largest coal retirement occurs before 2030.

Table 4. *Comparison of assumptions by scenario*

Scenario Name	EI Costs	Early Coal	500 MW Solar Build Limit	Additional Peaker CT in 2028
MEC Reference	✔			
EI Reference	✔	✔	✔	
EI Less Solar	✔	✔		
EI Add Firm	✔	✔	✔	✔

The influence of industry standard resource costs, sourced from the NREL ATB, for wind, solar and battery have a pronounced impact on the model's resource selection. The MEC Base scenario comprises natural gas and solar resources exclusively. Once the EI adopted industry standard resource costs are introduced, we observe more diverse builds that encompass solar, wind, battery storage and some gas. The composition of these builds, more non-emitting resources, is present in both futures with MidAmerican's default coal retirement schedule, MEC Reference*, and all EI scenarios with earlier coal retirements. The addition of non-solar resources occurs predominantly in years in which coal or natural gas resources retire.

In our modeling, both the MidAmerican portfolios and the EI portfolios demonstrate a significant need for new capacity. In both cases, new solar is viewed as a key near-term resource addition. As seen in Figure 13, across all scenarios, MEC Reference included, solar capacity is limited by the annual build limit over several years. This result persists even when the annual build limit is increased from 300 MW to 500 MW per year, as in the EI Reference and EI Add Firm scenarios. The system has a greater appetite to build new solar capacity and benefits from its low cost energy, more so than is permitted by MidAmerican's annual build limit constraint.

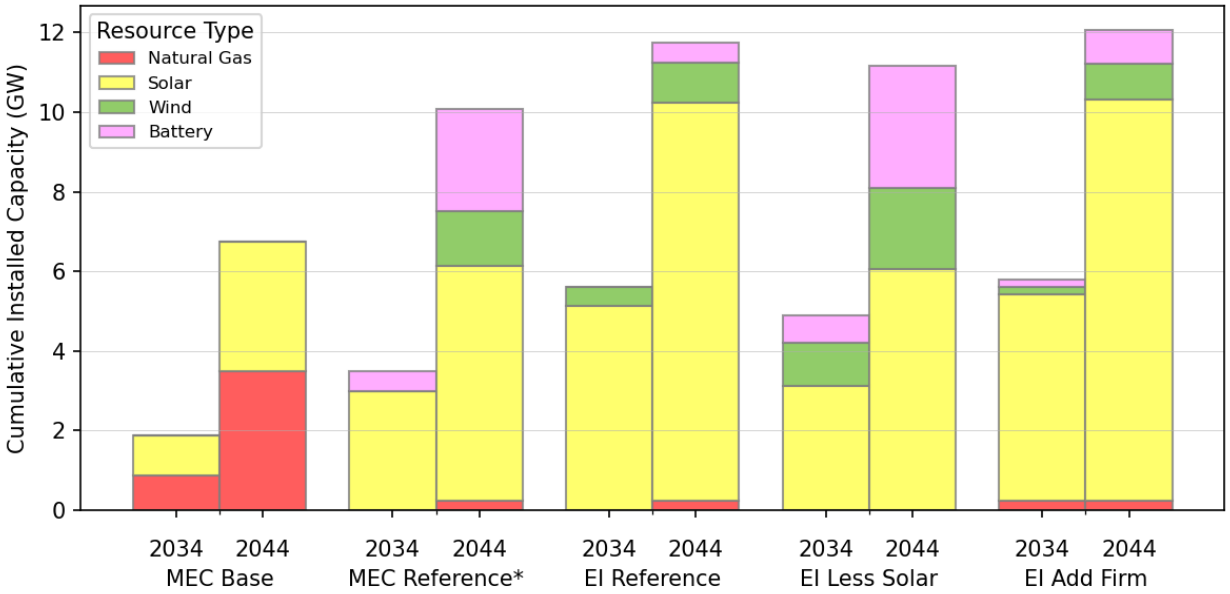

Figure 13. Resource builds by scenario

By retiring coal units earlier and building more clean energy resources, all EI scenarios realize a less-polluting future for Iowans. All three alternative EI scenarios remove at least 156 MMT of CO_2 from the Iowa airshed when compared to MidAmerican's Preferred plan, a reduction of 58%. Even the MEC Reference plan, in which updated resource costs are adopted with MidAmerican's coal retirement schedule, reduces system emissions by 13%. While early retirement of coal generators is the most effective means to reduce CO2 emissions, there is value in building new clean energy resources alongside existing emitting resources. The EI scenarios reduced emissions by an additional 33% beyond MidAmerican's EPA scenario.

The lower emissions, clean energy-heavy EI scenarios are more reliant on market purchases than the MidAmerican scenarios. Market purchases support hour-to-hour energy demands of the MidAmerican system, but do not contribute to the systems planning reserve margin. All modeled scenarios build enough firm capacity as required by the minimum planning reserve margin (PRM) defined by MidAmerican. As the EI scenario portfolios result in more clean energy resources, with lower firm resource accreditation than portfolios with more thermal

resource, the EI scenarios result in generation fleets with higher nameplate capacities to serve this minimum PRM. Consequently, as seen in Figure 14, the EI scenarios rely more heavily on market purchases than the MidAmerican scenarios. Particularly through the out years of 2035 to 2040, our modeling suggest that a clean energy future will serve 20-25% of their gross demand with imports, where the MEC Base and MEC Preferred scenarios import approximately 8-10% of gross energy demands and the MEC EPA scenario lies in the middle. By the end of the study horizon, the EI scenarios, MEC Base, and MEC EPA imports 25-30% of annual energy from the market. The MEC Preferred scenario, with the addition of a small modular reactor unit with salt storage, is the least reliant on market imports, 20% in 2044.

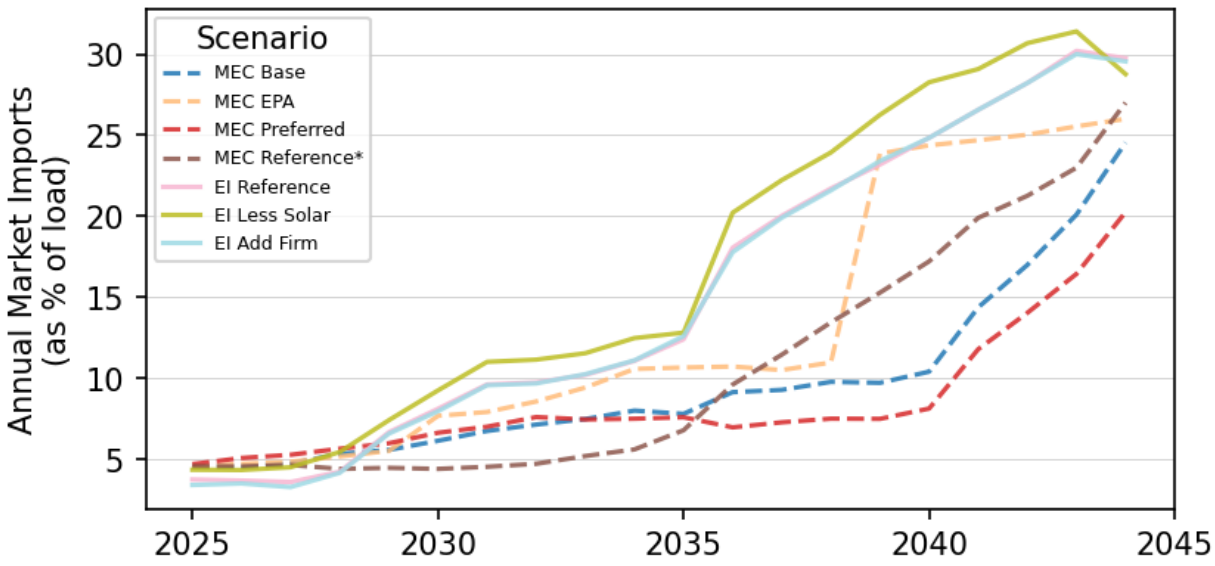

Figure 14. Annual market imports by scenario

In total, the EI scenarios realize a diverse set of futures that compliment MidAmerican's modeling. Among these long term capacity expansion model runs, we observe a few key trends in resource selection. First, solar capacity builds should be pursued without regrets. Across all EI scenarios, the system builds nearly 300 MW of solar on average for every year of the study. In MEC's core scenarios, 150 MW of solar is built on average for every year of the study. Second,

under industry-standard cost assumptions, non-emitting resources can be built to replace thermal resources.

Table 5. *Capacity expansion build results by resource type and scenario*

Resource Builds (GW)	MEC Reference*	EI Reference	EI Less Solar	EI Add Firm
Thermal	0.22	0.22	0	0.22
Solar	5.92	10.0	6.06	10.1
Wind	2.55	0.51	3.06	0.85
Battery	1.38	1.02	2.04	0.90
Total	10.07	11.75	11.16	12.07

The consequences of these scenario builds can be observed in the production cost, or dispatch, modeling results. EI scenarios result in a slight cost increase compared to the MEC Reference*, but the increase in EI Reference and Add Firm scenarios is less than the difference between MidAmerican's reference case and preferred portfolio. Importantly, the EI scenarios maintain this low cost while attaining a 50% reduction in total CO2 emissions. While the total CO2 emissions produced in the EI scenarios differ slightly, they are largely aligned. Each of these scenarios adopt the same coal retirement schedule suggesting that coal retirements offer the strongest means to remove CO2 pollution regardless of new resource composition. Finally, while market imports are higher in the clean energy heavy EI scenarios, we observe a slight reduction in imports when even more solar is brought on to the system.

Table 6. *Portfolio performance metrics from dispatch*

Summary Metrics	MEC Reference*	EI Reference	EI Less Solar	EI Add Firm
Total System NPV ($B)	5.77	6.33	6.86	5.95
Market Purchase (% of load)	11.50	16.48	18.00	16.41
Total CO2 Emissions (MMT)	232.80	112.49	111.72	112.41

The EI scenarios offer a perspective on MidAmerican's resource plan that is driven by our goals to improve environmental quality and protect our natural resources. Our modeling illustrates how MidAmerican can achieve a clean, reliable resource plan where (1) solar energy resources are a cornerstone resource for all future portfolios, particularly in the near term; (2) earlier coal retirement avoids significant CO2 emissions; (3) wind and battery resources can be built to provide capacity as aging thermal resources retire; and (4) costs stay reasonable when compared to the MEC Reference.* The resource builds identified in EI scenarios bolster previous findings in the Wind PRIME docket that battery storage and solar resources can effectively integrate with existing wind resources to reliably meet MidAmerican's energy and capacity needs.

IX. Conclusion

MidAmerican's RES is an important first step towards a more transparent, robust, and accountable approach to resource planning. MidAmerican should build upon the RES process by further increasing transparency, enhancing collaboration and changing course based on stakeholder feedback, and improving modeling inputs, assumptions, and evaluation to reduce bias and allow for optimized results.

Environmental Intervenors modeling addressed flaws in MidAmerican's inputs and assumptions. The results of Environmental Intervenors modeling demonstrate that a clean, reliable, low cost future is possible. Significant new solar generation resources were a part of every scenario modeled by MidAmerican and EI and represent a no-regrets immediate path forward. MidAmerican should pursue a no-regrets strategy of acquiring as much solar generation as possible in the near term. MidAmerican should work with stakeholders to update and improve its resource planning in order to achieve a cost-effective clean future.

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Respectfully submitted,

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