Considerations for Future Modeling of a Deep Decarbonization and Electrification Scenario

Comments regarding Duke Energy Indiana's 2024 Integrated Resource Plan

Prepared for Energy Matters Community Coalition

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1. INTRODUCTION

In response to Duke Energy Indiana's (Duke) 2018 IRP, Energy Matters Community Coalition (EMCC) engaged Synapse Energy Economics (Synapse) to prepare a report on the importance of including the risks and costs of climate change in Duke Energy Indiana's long-term planning.[1] This report highlighted the expected environmental and economic consequences and the resulting tens of trillions of dollars in global climate damages from a 1.5 degree Celsius increase in global average temperatures. It concluded that Duke's long-term planning should include one or more scenarios with deep decarbonization and rapid electrification (DDRE).

When Duke did not include such a scenario in either its 2018 or 2021 IRP, EMCC engaged Synapse to conduct modeling of a DDRE scenario.[2] This scenario included the rapid electrification of the building, transportation, and industrial sectors in Duke's Indiana service territory, along with the decarbonization of Duke's system to approximately net-zero by 2050.

In 2023 in response to Duke's decision to update its 2021 IRP, Synapse prepared a report for EMCC titled, *Resource Planning for Deep Decarbonization and Rapid Electrification in Indiana* that critiqued Duke's lack of transparency in its modeling.[3] The Synapse report also re-emphasized the need for Duke to run a DDRE scenario to inform its planning decisions.

With its most recent IRP filed with the Indiana Utility Regulatory Commission (IURC) in November 2024, Duke has finally included a DDRE scenario.[4] EMCC and Synapse worked with Duke in developing the DDRE scenario, and we thank Duke for its effort and for presenting it to the Commission.

In these comments, we evaluate the DDRE scenario in Duke's IRP and provide recommendations for its improvement in the next IRP. We also provide recommendations regarding greenhouse gas (GHG) risk and resource selection. Finally, we argue that in order to treat all resources fairly in long-term planning, Duke must consider replacing its retiring coal plants with non-emitting and renewable generation.

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[1] Synapse Energy Economics. 2019. *Incorporating the Costs of Climate Change in Duke Energy Indiana's 2018 Integrated Resource Plan*. Available at: https://www.in.gov/iurc/files/Duke-2018-IRP-EMCC-Synapse-Report-12-6-19FINAL.pdf.

[2] Synapse Energy Economics. 2022. *Deep Decarbonization and Rapid Electrification in Duke Energy Indiana's Service Territory*. Available at: https://www.in.gov/iurc/files/Synapse-Energy-Economics-Report-re-Deep-Decarbonization-and-Rapid-Electrification-in-DEIs-Service-Territory.pdf.

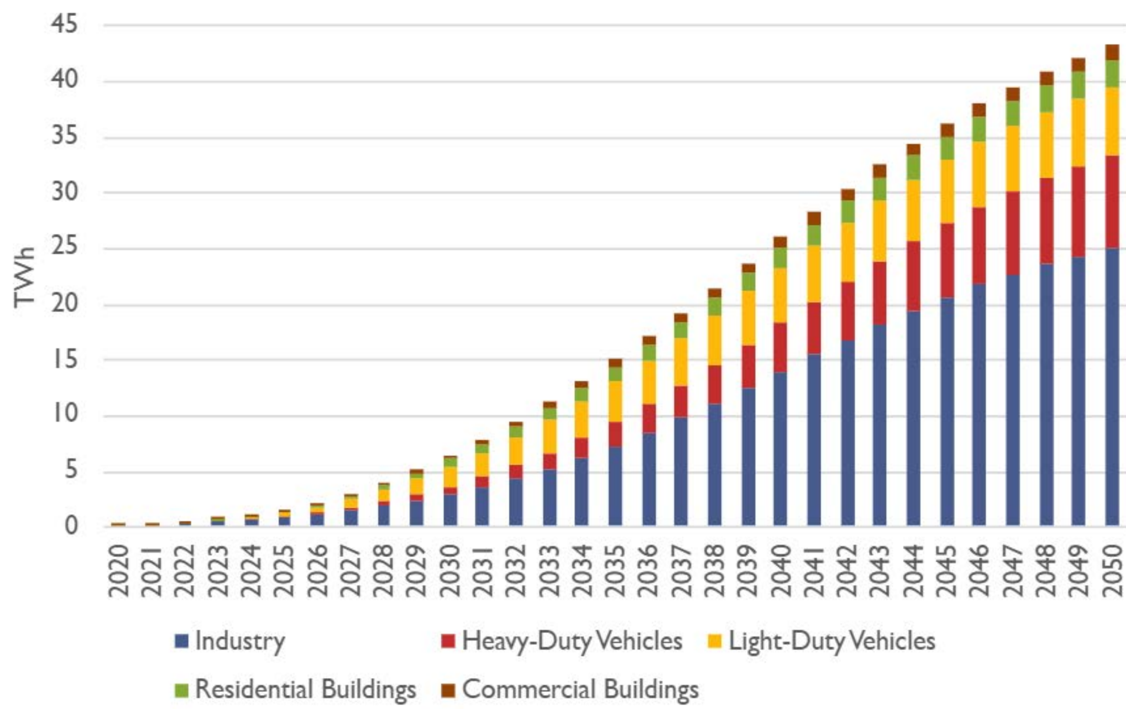
[3] Synapse Energy Economics. 2023. *Resource Planning for Deep Decarbonization and Rapid Electrification in Indiana*.

[4] Duke Energy Indiana 2024 Integrated Resource Plan. November 1, 2024. Page 301.

2. DDRE IN DUKE INDIANA'S 2024 IRP

The DDRE scenario in Duke's 2024 IRP includes a carbon cap that approaches net-zero by 2050 and the electrification of all transportation, building, and industrial energy use within Duke's Indiana service territory during that same timeframe.[5] This allows existing non-emitting technologies such as solar, wind, storage, and demand-side management to decarbonize energy use throughout much of the economy in Duke's service territory. Figure 1 below shows the projected increase in energy demand due to Duke's anticipated electrification load.[6]

FIGURE 1. NEW ELECTRIFICATION LOAD IN DDRE SCENARIO



Source: Synapse Energy Economics. 2022. Deep Decarbonization and Rapid Electrification in Duke Energy Indiana's Service Territory. Figure 7, page 8.

Duke's DDRE portfolio includes unprecedented levels of investment in clean energy resources. Also included are energy efficiency and demand response. Notably, Duke has not included distributed energy resources (DERs) beyond energy efficiency and demand response in its DDRE scenario, although much of

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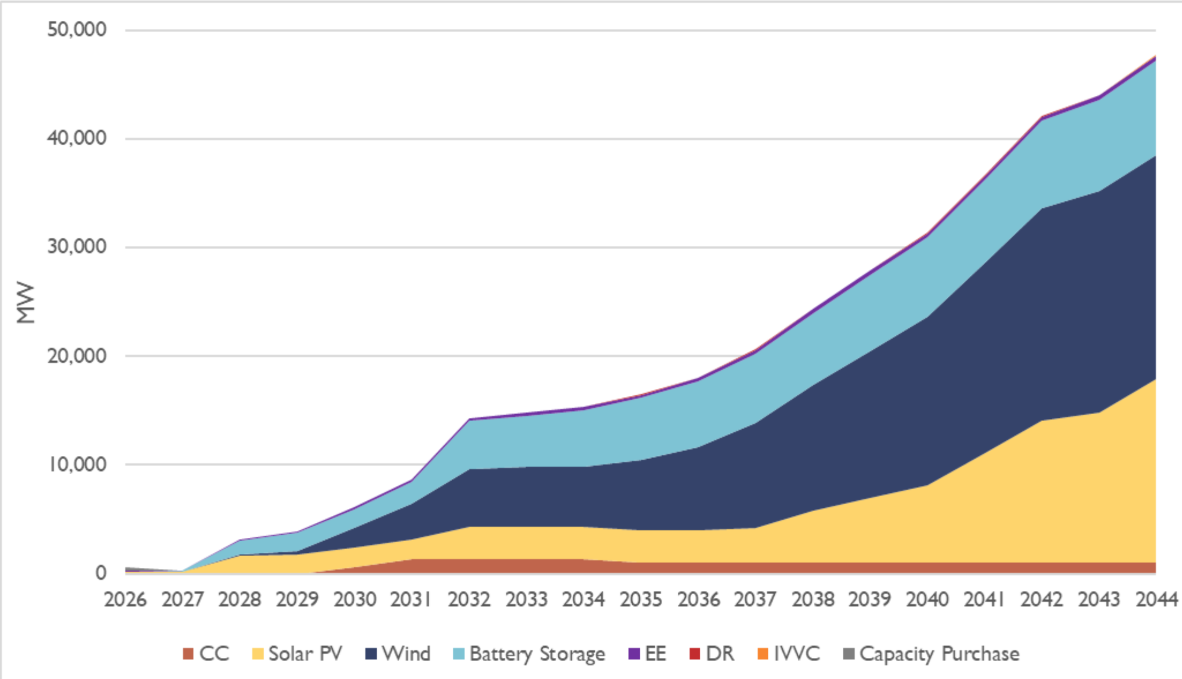
[5] Synapse Energy Economics. 2022. *Deep Decarbonization and Rapid Electrification in Duke Energy Indiana's Service Territory*. Page 8.

[6] Derived from data in Synapse Energy Economics. 2022. Deep Decarbonization and Rapid Electrification in Duke Energy Indiana's Service Territory. Figure 7, page 8.

the renewable energy shown in Figure 2 below could potentially be provided by DERs such as customer-sited solar PV and wind.

Figure 2. New Energy Resources in DDRE portfolio



Source: Derived from Duke Energy Indiana 2024 Integrated Resource Plan. November 1, 2024. Table C-78, page 305.

3. Is the DDRE Scenario Realistic?

The DDRE scenario adds large amounts of renewable energy throughout the planning timeframe. On average, the DDRE portfolio adds about 900 MW solar, 1000 MW wind, and 440 MW of battery each year.[7] One potential issue with this level of new renewable generation is that there could be delays in permitting, siting, and interconnecting this much utility-scale capacity, especially if other utilities are also electrifying and decarbonizing.

Interconnection timelines are frequently cited as a limiting factor to renewable deployment. However, interconnection delays for utility-scale resources should not be seen as a barrier to a DDRE portfolio. MISO is currently working to improve the speed and efficiency of its interconnection process. Additionally, DERs (including distributed generation, energy efficiency, and demand response) can help meet energy and capacity needs when utility-scale resources are not available on the required timeline.

[7] Duke 2024 Integrated Resource Plan. Page 305.

Finally, it is plausible that the increasing impacts and risks of climate change will lead to new GHG regulations for the transportation, buildings, industrial, and the electric sectors within the planning timeframe. Electrification is one of the clearest paths to reducing GHGs for much of the economy. Therefore, while the DDRE portfolio is much different from business as usual, a DDRE scenario is highly relevant to utility planning for a utility as large and important to Indiana as Duke.

3.1. Interconnection timelines

New utility-scale resources on the transmission system generally must go through the MISO interconnection process. The MISO interconnection process currently completes about 7,000 MW of solar interconnection agreements for commercial operation each year. This amount has increased each year since 2020 and will likely continue to grow as the demand for new solar generation increases.[8] However, the MISO interconnection process has lately experienced congestion and delays that could slow utility-scale procurement plans if not remedied.[9]

With the aim of increasing efficiency and reducing delays, MISO recently requested to place a cap on the amount of capacity allowed in its interconnection cluster studies.[10] MISO's initial estimate for the cap was about 77 GW.[11] In comparison, in the 2019 cycle, 44 GW of interconnection studies were requested and only about 19 GW of agreements were completed (Figure 3).[12] With its proposal of a 77 GW cap, MISO clearly sees the potential for its interconnection study process to support substantially larger amounts of capacity in the future.

[8] MISO interconnection queue data. Accessed 1/28/2025 at: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/gi-interactive-queue/.

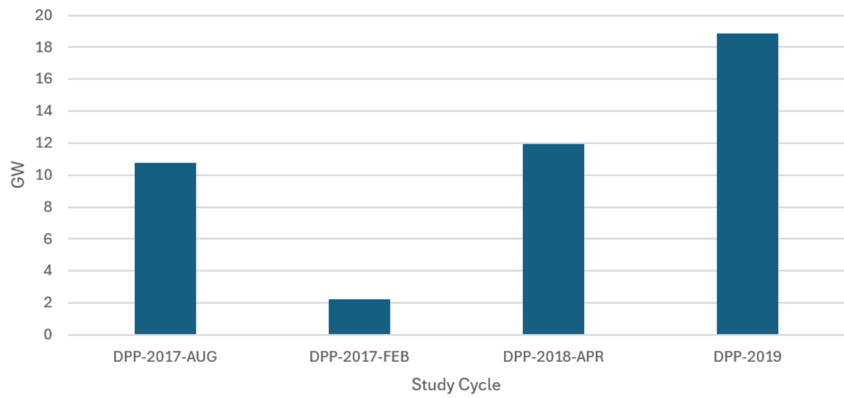
[9] Federal Energy Regulatory Commission. Order Accepting in Part and Rejecting in Part Tariff Revisions. Docket Nos. ER24-340-000 and ER24-341-000. January 19, 2024. Page 47.

[10] Federal Energy Regulatory Commission. Order Accepting in Part and Rejecting in Part Tariff Revisions. Docket Nos. ER24-340-000 and ER24-341-000. January 19, 2024. Page 47.

[11] FERC Docket ER24-341-000. Testimony of Andrew Witmeier. November 3, 2023. Page 44.

[12] MISO interconnection queue data. Accessed 1/28/2025 at: https://www.misoenergy.org/planning/resource-utilization/GI_Queue/gi-interactive-queue/.

FIGURE 3. TOTAL GW OF COMPLETED MISO STUDIES



Source: MISO interconnection queue data as of January 28, 2025.

4. GREATER RESOURCE DIVERSITY CAN FACILITATE A DDRE PORTFOLIO

The Duke DDRE scenario includes about 9 GW of new storage and about 38 GW of new renewable energy through 2050. Although interconnection process improvements are likely to occur, permitting, and siting issues may make utility-scale resources difficult to procure in the large amounts called for in the DDRE portfolio. We note that not all new resources need to be utility-scale, supply-side resources. There are many other resource types available to help serve load in a DDRE scenario, including distributed energy resources.

Duke must continue to evaluate the various ways it can cost-effectively and reliably serve increasing customer demand while decarbonizing its energy supply. The most important resources to study in the next iteration of the DDRE scenario are those that can realistically help diversify the resource portfolio to include a greater variety of supply- and demand-side resources.

4.1. Distributed generation

Distributed generation is typically located near sites of electricity use and include rooftop solar, wind, combined heat and power, microgrids, energy storage, and microturbines.[13] Distributed generation can help meet clean energy requirements with fewer siting, permitting, and transmission requirements.

For example, rooftop solar can be co-located with existing customer facilities on the distribution system, avoiding transmission system costs and delays (although the distribution system can have costs and

[13] National Renewable Energy Laboratory. *An Overview of Distributed Energy Resource (DER) Interconnection: Current Practices and Emerging Solutions.* April 2019. Page 2.

delays of its own). Total rooftop solar technical potential for all buildings in Indiana has been estimated at 26.3 GW, capable of generating about 30 percent of all electric sales in Indiana.[14] Behind-the-meter wind turbines also have the potential to provide economic wind power in the United States, and Indiana is one of the top states in the United States for economic behind-the-meter wind potential.[15]

Virtual power plants can aggregate distributed generation such as solar and storage to provide utility-scale services. Almost 30 GW of virtual power plant deployments are operational in the United States today. An estimated 80 to 160 GW of virtual power plants can be deployed by 2030; this is enough to serve 10–20 percent of peak load.[16]

Clean energy resources can also be sited locally near large industrial customers' facilities. This approach provides clean energy for large industrial customers without the need to transport the energy long distances on transmission lines that can take years to site, permit, and construct. New industrial facilities such as data centers are increasingly likely to attempt to site their own energy resources nearby.[17]

Policies in Indiana and MISO are moving toward a grid with more distributed generation. For example, new opportunities for community solar are available thanks to a recent grant from the U.S. Environmental Protection Agency (EPA). In addition, FERC Order 2222 creates new requirements to allow DERs in MISO energy, ancillary services, and capacity markets.[18]

The DDRE scenario in Duke's IRP does not include a high distributed generation forecast that reflects the full potential of distributed generation to help meet decarbonization and energy requirements in Duke's service territory. Future iterations of the DDRE scenario should consider how much of the portfolio's clean energy requirements can be met with distributed generation.

Recommendation

- In the next iteration of the DDRE scenario, Duke should estimate the amount of distributed generation, including customer-sited solar and wind, that it could include within its service territory by 2050 and report these findings with the DDRE scenario results.

4.2. Demand response, energy efficiency, and flexible load

Demand response, energy efficiency, and flexible load options, such as managed EV charging, industrial curtailment, and managed energy use in buildings, will be valuable for reducing costs to customers in a

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[14] National Renewable Energy Laboratory. Ro*oftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment*. January 2016. Page 36.

[15] National Renewable Energy Laboratory. *Distributed Wind Energy Futures Study*. May 24, 2022. Page 21.

[16] US Department of Energy. Pathways to Commercial Liftoff: Virtual Power Plants 2025 Update. January 2025. Page 19.

[17] Next Era Energy. *Co-located Load and Generation in MISO*. Presentation. April 2024. Page 2.

[18] Midcontinent Independent System Operator (MISO). FERC Order 2222 Compliance Framework. Presentation. April, 2024. Page 7.

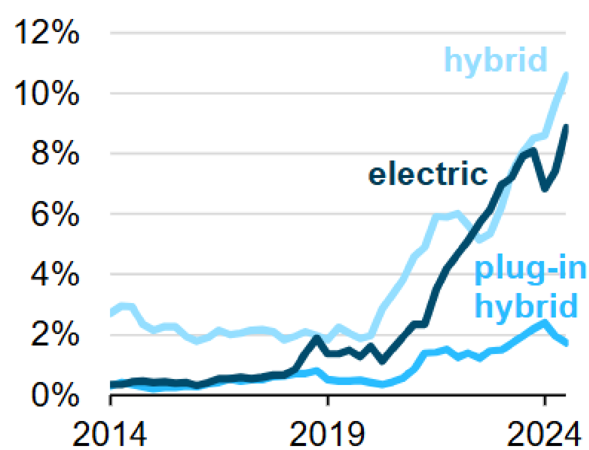
DDRE future. By reducing peak demand, such resources can reduce the need to procure, site, permit, and construct new resources.

The DDRE scenario included some load reduction through demand response and efficiency, about 20 MW each year.[19] Additionally, the DDRE load forecast included some efficiency improvements in electric vehicles, the industrial sector, and buildings. However, the quantity of demand response developed by Synapse was an approximation only, and a much greater amount of demand-side measures would likely be available in a high-electrification future. Further study by Duke is needed to determine the optimal amount of demand-side management. That study should begin now rather than waiting until 2027 in order to assure its completion and the availability of its results at the earliest opportunity.

Managed EV charging

EV sales in the United States have jumped from less than 2 percent of light-duty vehicle sales in 2019 to more than 8 percent in 2024, as shown in Figure 4 below.

FIGURE 4. US EV AND HYBRID SALES PERCENTAGES



Source: U.S. Energy Information Agency. U.S. share of electric and hybrid vehicle sales reached a record in the third quarter. December 2024.

Left unmanaged, new EV load can increase costs by contributing to peak load hours and the need for new capacity resources. However, studies have shown that managed EV charging can reduce the cost of electricity production and EV charging considerably. Delayed home charging and workplace charging use currently available technologies to reduce the cost of serving EV demand. For example, delayed overnight home charging may be able to mitigate almost all of the increase to peak evening load from

[19] Duke 2024 Integrated Resource Plan. Page 305.

EV charging. [20] A recent MISO Electrification Insights study confirmed the finding that managed charging can prevent EVs from increasing peak load.[21] Additionally, workplace charging may be able to reduce solar curtailment by 30 percent in high-renewables portfolios by moving EV load to mid-day.[22]

Recommendations

- In the next iteration of the DDRE scenario, Duke should include an EV load shape that reflects the benefits of managed charging, including substantially reduced peak demand from EVs.
- Duke should study the potential value to customers from reducing peak load through programs that facilitate charging EVs at non-peak times through workplace charging and delayed home charging.

Industrial curtailment

Industrial electrification has the potential to substantially increase load in Duke's service territory by 2050. While industrial electrification is not currently seeing the same rapid growth as transportation electrification, Duke should proactively monitor trends and technologies that have the potential to facilitate industrial electrification in its service territory.

The estimate of industrial electrification included in the DDRE scenario developed by Synapse was an approximation based on Duke's share of the industrial energy in the United States that would convert to electricity in a deep decarbonization scenario without carbon capture utilization and storage (CCUS) technology.[23, 24] In the next iteration of the DDRE scenario, Duke should include a more precise estimate of industrial electrification potential based on the industrial facilities located in its service territory that could be electrified within the planning timeframe.

To generate the most accurate estimate possible, Duke should consider the electrification technologies available for each industrial process, and whether electrification would potentially be the most economic way to decarbonize it.

Recommendation

- In the next iteration of the DDRE scenario, Duke should include a more precise estimate of industrial electrification potential based on the industrial facilities located in its service territory that could be electrified within the planning timeframe.

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[20] Needell, Zachary, Wei Wei, Jessika E. Trancik. "Strategies for beneficial electric vehicle charging to reduce peak electricity demand and store solar energy." *Cell Reports Physical Science*, Volume 4, Issue 3, 2023.

[21] MISO. *Electrification Insights.* 2021. Page 15. https://cdn.misoenergy.org/Electrification%20Insights538860.pdf.

[22] Needell, Zachary, Wei Wei, Jessika E. Trancik. "Strategies for beneficial electric vehicle charging to reduce peak electricity demand and store solar energy." *Cell Reports Physical Science*, Volume 4, Issue 3, 2023.

[23] https://unfccc.int/files/focus/long-term_strategies/application/pdf/us_mcs_documentation_and_output.pdf Page 27.

[24] Synapse Energy Economics. 2022. *Deep Decarbonization and Rapid Electrification in Duke Energy Indiana's Service Territory*. Page 3.

5. DECARBONIZATION AND CLIMATE CHANGE

The International Panel on Climate Change's (IPCC) *Climate Change Synthesis Report* finds that climate change is a threat to human well-being, and that "[t]here is a rapidly closing window of opportunity to secure a livable and sustainable future for all" through GHG mitigation and climate adaptation.[25] The 2023 IPCC Report found that limiting warming to 1.5°C or 2°C would require "rapid and deep and, in most cases, immediate GHG emissions reductions in all sectors this decade."[26] It also concluded that normal operations from existing fossil fuel infrastructure would emit enough GHG to exceed 1.5 degrees of warming, increasing risks, losses, and damages from climate change.[27] Indeed, the European Commission recently reported that global temperatures exceeded 1.5 degrees of warming in 2024 for the first calendar year in human history.[28]

Climate change poses significant risks to Duke Energy's service territories across the country, including Indiana, Ohio, Kentucky, Tennessee, Florida, and the Carolinas, due to its intensifying impact on weather-related disasters. Indiana, for example, has faced 14 federal disaster declarations related to flooding in the past two decades, affecting 87 out of 92 counties.[29] Analysis from Indiana University's Polis Center shows that a 100-year flood could damage buildings across the state, with damages possibly exceeding $5 billion statewide.[30] Furthermore, the analysis projects that statewide precipitation could increase 6–8 percent by mid-century if climate change effects remain unmitigated, which would materially increase the frequency and severity of floods.

Rising temperatures and erratic weather patterns are also projected to reduce yields of critical crops such as corn and soybeans, threatening the agricultural economy that sustains much of Indiana,

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[25] IPCC. *Climate Change 2023 Synthesis Report*. Page 24. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

[26] IPCC. *Climate Change 2023 Synthesis Report*. "Summary for Policymakers." Page 20. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

[27] IPCC. *Climate Change 2023 Synthesis Report*. Page 15.

[28] Copernicus. "2024 is the first year to exceed 1.5°C above pre-industrial level." January 10, 2025. Accessed 1/31/2025 at: https://climate.copernicus.eu/copernicus-2024-first-year-exceed-15degc-above-pre-industrial-level.

[29] Indiana University Polis Center. "Amid Climate Change Extremes, Polis Center Experts Help Indiana Counties Be More Disaster Resilient." Accessed 1/21/2025 at: https://polis.indianapolis.iu.edu/amid-climate-change-extremes-polis-center-experts-help-indiana-counties-be-more-disaster-resilient/.

[30] Indiana University Polis Center. "Flood risk assessment and protection plans." Accessed 1/21/2025 at: https://polis.indianapolis.iu.edu/collaborations/resiliency/flood-risk-assessment-and-protection-plans/.

Kentucky, and Ohio.[31,32,33] These cascading risks align with the IPCC's 2023 Synthesis Report, which warned that every increment of global warming intensifies concurrent hazards and economic damages, creating compounding risks and costs that are more complex and difficult to manage than they would be independently.[34]

Duke Energy's service territories in Florida and the Carolinas are especially vulnerable to hurricanes, which are rapidly intensifying due to warming oceans.[35] In 2024, Hurricane Helene caused almost $80 billion in damages across the southeast and was particularly devastating to North Carolina.[36] Hurricane Ian in 2022 and Hurricane Idalia in 2023 demonstrated the trend of rapid storm intensification, with Ian becoming the costliest hurricane in Florida's history and the second-deadliest storm in the United States after Hurricane Katrina.[37] Florida alone has experienced 94 weather-related disasters exceeding $1 billion in damages since 1980, highlighting the growing financial burden of climate change.[38] Without substantial mitigation measures to decarbonize the energy sector, these impacts are expected to escalate.

Decarbonizing the electric sector is among the most important and practical ways to address climate change. Currently, electric power generation causes about 25 percent of all GHG pollution in the United States.[39] Zero-emissions technologies such as solar, wind, and storage are available to decarbonize electric power generation at a reasonable cost. At the same time, electrification technologies like electric vehicles and heat pumps can meet the energy requirements of industry, transportation, and buildings with non-emitting renewable energy.

Within the next 20 years, the need to address climate change will be increasingly critical. While there are a few non-electrification technologies that may also be able to help reduce emissions from energy use in transportation, industry, and buildings (e.g. renewable natural gas and fuel cells), electrification

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[31] U.S. Environmental Protection Agency. 2016. "What Climate Change Means for Indiana." https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-in.pdf.

[32] U.S. Environmental Protection Agency. 2016. "What Climate Change Means for Kentucky." https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ky.pdf.

[33] U.S. Environmental Protection Agency. 2016. "What Climate Change Means for Ohio." https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-oh.pdf.

[34] Intergovernmental Panel on Climate Change. 2023. "Climate Change 2023 Synthesis Report: Summary for Policymakers." https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf (see p. 11- B.1, p. 14- B.2).

[35] Center for Climate and Energy Solutions. "Hurricanes and Climate Change." Accessed 1/21/2025 at: https://www.c2es.org/content/hurricanes-and-climate-change/.

[36] WRAL News. Jan 15, 2025. "Helene claims hundreds of lives, becomes deadliest hurricane since Katrina." Accessed 1/21/2025 at: https://www.wral.com/weather/hurricane-helene-by-the-numbers-september-2024/.

[37] C. Gramling for Science News. 2023. "What's driving an increasing number of hurricanes to rapidly intensify?" Accessed 1/28/25 at: https://www.sciencenews.org/article/increasing-number-hurricane-rapidly-intensify.

[38] National Centers for Environmental Information. "Florida Summary." Accessed 1/21/2025 at: https://www.ncei.noaa.gov/access/billions/state-summary/FL.

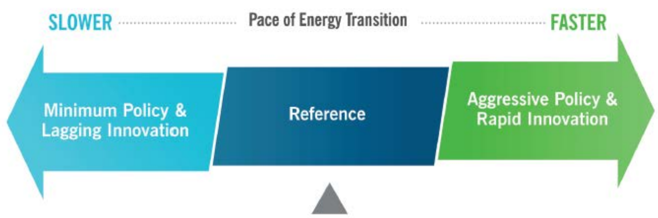
[39] U.S. Environmental Protection Agency. Sources of Greenhouse Gas Emissions. Accessed 1/28/2025 at: https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

and renewable energy provide the clearest and quickest technological pathway to decarbonizing most of the economy at a reasonable cost. Electric utilities generally and Duke particularly should develop the planning, procurement, and operational abilities needed for this pathway to achieve steep, economy-wide GHG reductions.

5.1. GHG risk in the IRP

In the 2024 IRP, Duke considered GHG emissions and regulatory risk through its "aggressive policy and rapid innovation" (aggressive policy) scenario. This scenario includes decreasing costs for non-emitting technologies as well as regulatory policy designed to reduce GHGs. The aggressive policy scenario is one of Duke's three IRP scenarios representing the range of policy and innovation Duke sees as likely in the future (Figure 5).[40]

FIGURE 5. DUKE'S POLICY SCENARIOS



Source: Duke 2024 Integrated Resource Plan. Page 49.

Duke's consideration of an aggressive GHG policy scenario provides valuable information about the resources that would be selected in a future with strong GHG regulation. However, we are concerned that Duke has not incorporated any GHG mitigation in its long-term plan preferred portfolio. While a few scenarios in the IRP consider GHG policy, Duke's preferred portfolio does not appear to make any effort to reduce GHG pollution in response to climate risk or GHG regulatory risk.

Climate risks are escalating. Climate change and extreme weather events decrease reliability for utilities through decreased availability of conventional generators during hot and cold temperatures,[41,42] damages to energy infrastructure including from wildfires and hurricanes,[43,44] and demand spikes

[40] Duke 2024 Integrated Resource Plan. Page 49.

[41] North American Electric Reliability Corporation. 2024. *2024 Summer Reliability Assessment.* Page 9.

[42] Murphy, Sinnott, Lavin, Luke, Apt, Jay. 2020. "Resource adequacy implications of temperature-dependent electric generator availability." *Applied Energy*. Vol. 262.

[43] S&P Global Ratings. *Industry Credit Outlook 2024*. North America Regulated Utilities. Page 5.

[44] U.S. Energy Information Administration. Above-average hurricane activity disrupted U.S. energy infrastructure in 2024. December 17, 2024.

caused by heat waves.[45] A recent North American Electric Reliability Corporation (NERC) report found that "the increased intensity and frequency of extreme weather events has contributed to a gradual rise in the conventional generation forced outage rate in recent years."[46] Another NERC report recently stated, "Over the past several years, a handful of extreme weather events has increasingly been the largest challenge to [bulk power system] reliability, and the unprecedented magnitude of these events has dominated reliability trends."[47] Given that this increasingly volatile weather threatens Duke's system reliability and performance as a utility, it is disappointing that Duke's long-term plan takes no action to mitigate Duke's own contribution to GHG pollution.

In addition, Duke has not considered GHG regulatory risk in its reference case or in portfolio selection. Given the probability of future GHG regulation, it is valuable to customers to include consideration of GHG regulatory risk in the reference scenario and in the portfolio selection.

The "No 111" portfolio, without the EPA's GHG regulations, and the preferred portfolio both include about 3 GW of new gas combined-cycle generation and only 300–500 MW of renewables by 2032. [48] After the addition of 3 GW of gas, 65 percent of Duke's generation is projected to be from gas in 2033 in the preferred portfolio. In the No 111 portfolio, 81 percent of Duke's generation would be from gas in 2033.[49] Including so much gas and so few renewables in the near term causes a lack of resource diversity and a high exposure to both GHG regulatory risk and gas price risk.

In the aggressive GHG policy scenario, new renewables increase to about 2,800 MW, and new gas decreases to about 2,000 MW by 2032.[50] This shows that Duke's preferred portfolio is far from optimal in a future with strong GHG policy.

It does not appear that Duke has evaluated a scenario where it proceeds with procuring 3 GW of gas by 2032, and then strong GHG policy is enacted. Such a scenario is plausible, and Duke should evaluate the risk of such a scenario before it makes a large investment in new emitting resources.

Recommendation

- Before procuring new resources, Duke should evaluate the risk of procuring its preferred resources by 2032 if strong GHG policy is then enacted.
- Duke should consider adding more near-term renewable generation to its portfolio as a hedge to reduce risks to customers.

[45] U.S. Environmental Protection Agency. "Climate Change Indicators: Heat Waves." Accessed on 1/31/2025 at: https://www.epa.gov/climate-indicators/climate-change-indicators-heat-waves.

[46] North American Electric Reliability Corporation. 2023. *2023 State of Reliability Technical Assessment*. Page 3.

[47] North American Electric Reliability Corporation. 2024. *2024 State of Reliability Overview*. Page 5.

[48] Duke 2024 Integrated Resource Plan. Pages 276–277.

[49] EnCompass Outputs workpapers "DEIN 24 IRP 111 Blend 2 - CAY 2x1 PC" and "DEIN 24 IRP 111 Blend 2 - CAY 1x1s PC No 111 Sens."

[50] EnCompass Outputs workpaper "DEIN 24 IRP APRI Blend 2 - CAY 1x1s PC."

5.2. Treating all resources equally

It is important to treat resources equally in long-term planning to identify the best portfolio for customers. In the 2024 IRP, Duke has included an interconnection cost adder for new resources. New combined-cycle and combustion-turbine units are exempted from the interconnection adder before 2032 because they are assumed to interconnect at the sites of retiring coal plants under MISO's generation replacement process and do not require new interconnection investments.

We are concerned that Duke does not include any evaluation in the IRP of its ability to interconnect renewable and non-emitting resources using the interconnection agreements of retiring coal plants. Duke's reference case and No 111 IRP scenarios include about 3 GW of new combined-cycle generators before 2032, and few renewables.[51] This selection of a gas-heavy portfolio is certainly influenced by the ability to avoid $825 million dollars ($0.275/W) of interconnection costs by locating 3 GW of new combined-cycle generation at the sites of retiring coal plants.[52] We would like to raise the question of whether Duke has given non-emitting resources due consideration for replacing retiring coal plants using existing interconnection agreements.

Combined-cycle units are expected to cost $1,159/kW in 2030, meaning that procuring 3 GW of these new units will be a $3.5 billion dollar decision.[53] Yet we see no evidence that Duke has considered whether it can site non-emitting resources using these same no-cost interconnection rights to reduce costs to customers.

Clean energy is cost-competitive with traditional resources and helps to diversify a resource portfolio. While renewable energy currently has higher upfront capital costs than gas, it has zero fuel costs and reduces GHG regulatory risk for customers. Duke should show that it has considered whether it can reduce costs to customers by siting renewable and non-emitting resources under the interconnection agreements of retiring coal plants, either instead of or in combination with conventional generation.

To show that Duke is treating all resources equally in its search for a resource portfolio that most benefits customers, we request that Duke provide additional information regarding whether it may be able to locate renewable and non-emitting resources near the sites of retiring coal plants under existing interconnection agreements. Duke has a responsibility to customers to evaluate whether it can use cost-effective, non-emitting resources to replace retiring coal plants under existing interconnection agreements.

Recommendations

- Given the ability to avoid interconnection costs by siting new resources near retiring coal plants, and the need to treat all resource types fairly in Duke's planning process, Duke should respond

[51] Duke 2024 Integrated Resource Plan. Pages 276–277.

[52] Duke 2024 Integrated Resource Plan. Page 94.

[53] National Renewable Energy Laboratory. *Annual Technology Baseline*. 2024.

to these comments regarding the potential to locate non-emitting resources near retiring coal plants utilizing existing interconnection rights.

- If the Duke has not already evaluated the potential to site non-emitting generation under the interconnection agreements of retiring coal plants, it should propose a plan to evaluate this potential and report its findings to the Commission and stakeholders before a Certificate of Public Convenience and Necessity is granted for replacement generation at any retiring coal plant.

6. LIST OF RECOMMENDATIONS

In summary, EMCC's recommendations regarding the DDRE scenario and future resource procurement are:

- In the next iteration of the DDRE scenario, Duke should estimate the amount of DERs that could be included within its service territory by 2050 and report these findings with the DDRE scenario results.
- In the next iteration of the DDRE scenario, Duke should include an EV load shape that reflects the benefits of managed charging, including substantially reduced peak demand from EVs.
- Duke should study the potential value to customers from reducing peak load through programs that facilitate charging EVs at non-peak times through workplace charging and delayed home charging.
- In the next iteration of the DDRE scenario, Duke should include a more precise estimate of industrial electrification potential based on the industrial facilities located in its service territory that could be electrified within the planning timeframe.
- Before procuring new resources, Duke should evaluate the risk of procuring its preferred resources by 2032 if strong GHG policy is then enacted.
- Duke should consider adding more near-term renewable generation to its portfolio as a hedge to reduce risks to customers.
- Given the ability to avoid interconnection costs by siting new resources near retiring coal plants, and the need to treat all resource types fairly in Duke's planning process, Duke should respond to these comments regarding the potential to locate non-emitting resources near retiring coal plants utilizing existing interconnection rights. If Duke has not already evaluated the potential to site non-emitting generation under the interconnection agreements of retiring coal plants, it should propose a plan to evaluate this potential and report its findings to the Commission and stakeholders before a Certificate of Public Convenience and Necessity is granted for replacement generation at any retiring coal plant.