Calculating the True Cost of the EPA's Carbon Dioxide Regulations

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About Me

- Isaac Orr is a Policy Fellow at Center of the American Experiment, where he writes about energy and environmental issues, including electricity policy and mining.
- My writings have appeared in The Wall Street Journal, USA Today, the New York Post, and many other publications.
- I grew up on a dairy farm in rural Wisconsin, which is why I am so passionate about standing up for rural America.

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About Center of the American Experiment

- We are Minnesota's leading public policy organization, specializing in energy and environmental research, education, labor, the economy, and taxes.
- We are expanding our operations into North Dakota.
- Our work on energy modeling is leading the nation in calculating the cost of misguided liberal policies.
- Our quarterly magazine *Thinking Minnesota,* has a circulation of over 100,000.
- We aggressively market the materials we produce with billboards, radio ads, tv ads, direct mail and social media.

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The Biden EPA Regulatory Agenda

- The Biden EPA is writing or updating several regulations that will harm America's grid reliability by shutting down reliable power plants and increasing demand:
- Ozone Transport Rule (OTR);
- Coal Combustion and Residual Rule (CCR- not the band);
- Mercury and Air Toxics Standards (MATS);
- Carbon dioxide regulations on new and existing power plants;
- Tailpipe emissions standards that will increase the demand for electricity.

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American Experiment's Modeling: Calculating the Consequences of EPA's Regulations

- This work was done on behalf of the North Dakota Transmission Authority (NDTA).
- We have modeled the impact of EPA's CCR, OTR, and carbon dioxide regulations in the Midcontinent Independent Systems Operator (MISO), and the OTR and CCR regulations in Southwest Power Pool (SPP).
- EPA's regulations will undermine the reliability and affordability of electricity in America's Heartland.
- They are also coming at the worse possible time.

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The State of the Grid

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America’s Electric Reliability is Dwindling. EPA’s Regulations Could Finish the Job

- The North American Electric Reliability Corporation (NERC) warned that 2/3rds of the country was at an elevated risk of blackouts last summer due to the premature retirement of coal plants.
- Many of the areas on this map that were not highlighted for a summer reliability risk had blackouts last Christmas, including much of the Southeast.
- MISO is already operating on thin margins.

Seasonal Risk Assessment Summary	
High	Potential for insufficient operating reserves in normal peak conditions
Elevated	Potential for insufficient operating reserves in above-normal conditions
Low	Sufficient operating reserves expected

Figure 1: Summer Reliability Risk Area Summary

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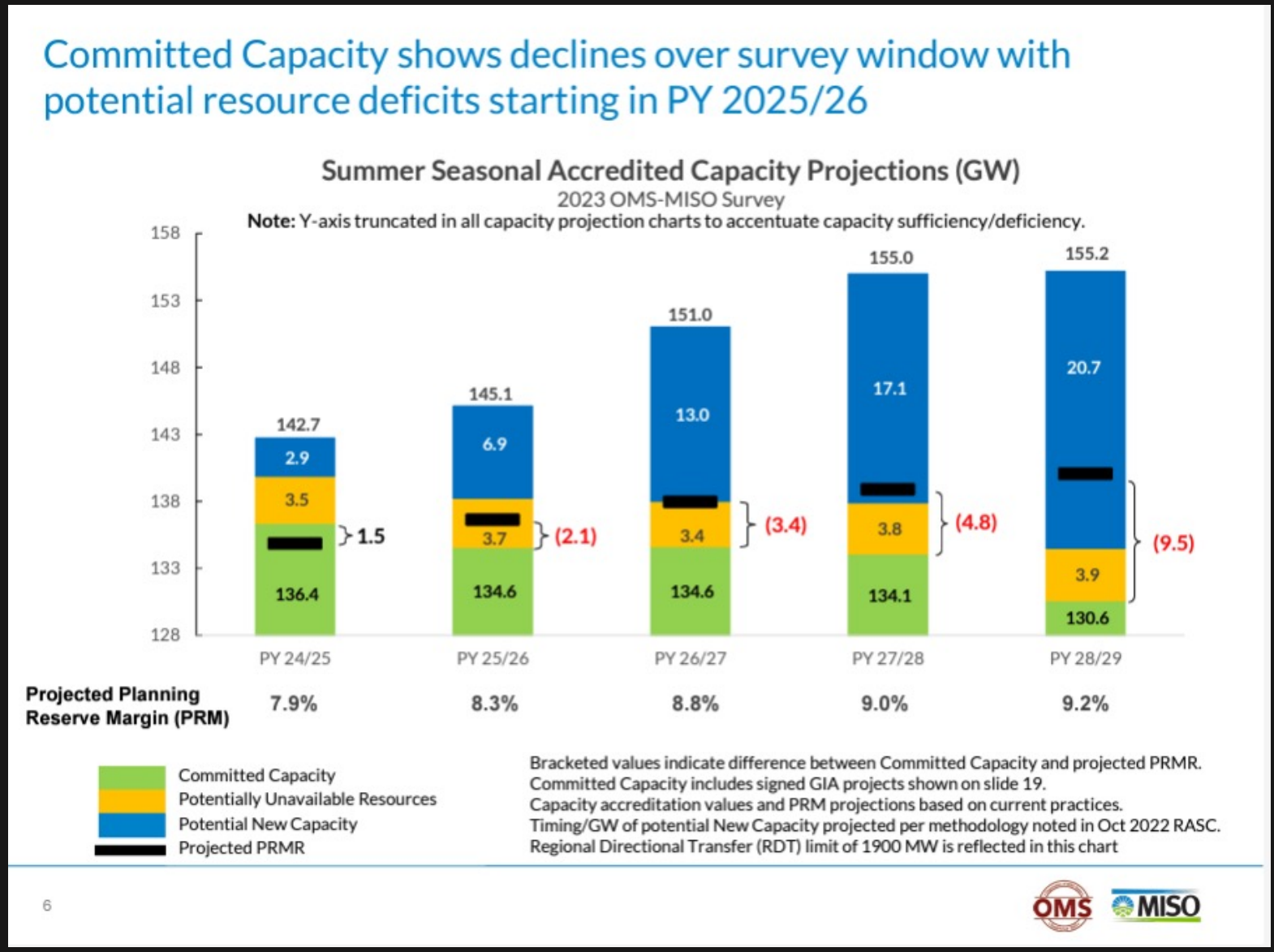
MISO Projects Future Capacity Shortages

- MISO/OMS survey projects a 1,500 MW surplus for Planning Year 2024-2025 because coal retirements have been delayed.
- Without continuation of such actions, a capacity deficit of 2,100 MW is projected for the summer of 2025/26 which grows in subsequent years.
- By PY28/29, MISO could have a 9.5 GW capacity shortfall.
- Source: 2023 OMS/MISO Survey Results.



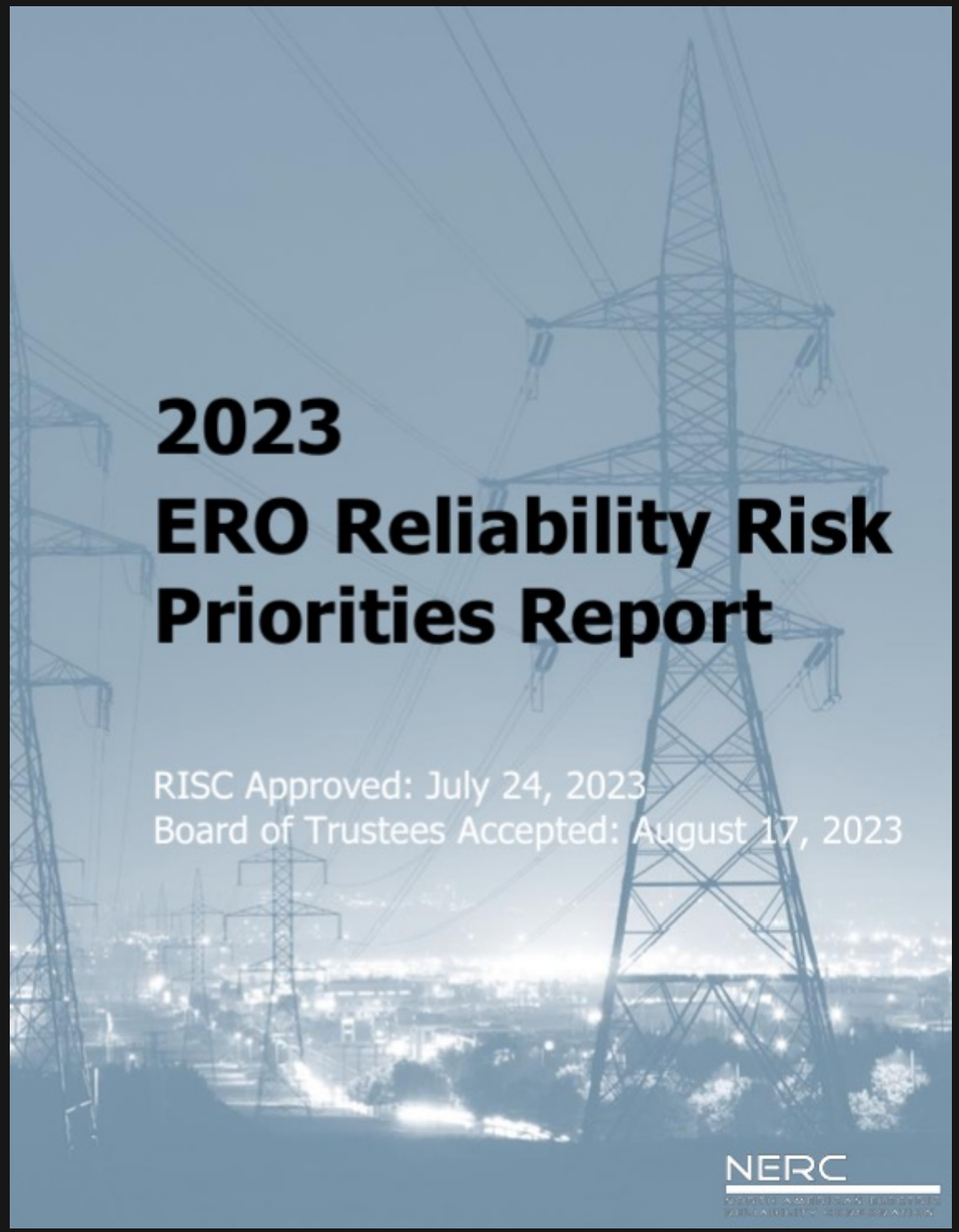
Energy Policy is the Number One Threat to Reliability

Risk Profile #1: Energy Policy

Reliability Impacts of Energy Policy

Policy as a Reliability Risk Factor

Energy Policy can drive changes in the planning and operation of the BPS. Accordingly, policy can affect BPS reliability and resilience and could present risks to its reliable operation. Ensuring reliability during and after policy driven transitions should be a key consideration in setting Energy Policy. The implementation of policy decisions can significantly affect the reliability and resilience of the BPS. Decarbonization, decentralization, and electrification have been active policy areas. Implementation of policies in these areas is accelerating, and, with changes in the resource mix, extreme weather events, and physical and cyber security challenges, reliability implications are emerging. Demonstrated risks, such as energy sufficiency as well as natural gas and electric interdependence, are becoming increasingly critical. Emerging potential risks, such as aggregate DERs, are increasingly concerning. Due to the interdependency of critical infrastructures (i.e., electricity, natural gas, water, transportation, and communications), potential reliability risks are magnified when cross industry segments and agencies act independently to create or implement policy. Development of reliability standards and processes recognizes and respects the jurisdictional authorities setting and implementing policy decisions. It will take strong collaboration and partnerships across a multitude of boundaries to mitigate the emerging risks we face today – state, federal, provincial and private – ensuring reliability of the grid is a prioritized tenet of critical infrastructure.



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EPA's Proposed CO_2 Rules

- EPA issued new proposed regulations in May of 2023 requiring steep CO_2 emissions reductions from new and existing coal and natural gas fired power plants.
- The rules require existing coal plants to install carbon capture and sequestration (CCS) technology on their plants by 2030 or shut down.
- Natural gas plants will also need to use CCS or burn so-called "green hydrogen" to stay in operation.
- These rules have been described as "the biggest, most consequential set of rules to regulate new and existing power plants," by the National Rural Electric Co-op Association.

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American Experiment Analysis of EPA's Proposed CO_2 Rules in MISO

- American Experiment modeled the resource adequacy, reliability, and cost of EPA's proposed CO_2 rules for new and existing fossil fueled power plants.
- We determined EPA's modeled MISO grid under the rules would not meet resource adequacy or reliability.
- Meeting EPA's emissions targets without blackouts would cost MISO ratepayers an additional $246 billion compared to EPA's assumed grid.
- The regulations and IRA subsidies would result in massive rolling blackouts.
- The $246 billion price tag in MISO amounts to $7.7 billion per year, which exceeds EPA's net benefit calculations for the entire country ($5.9 billion).

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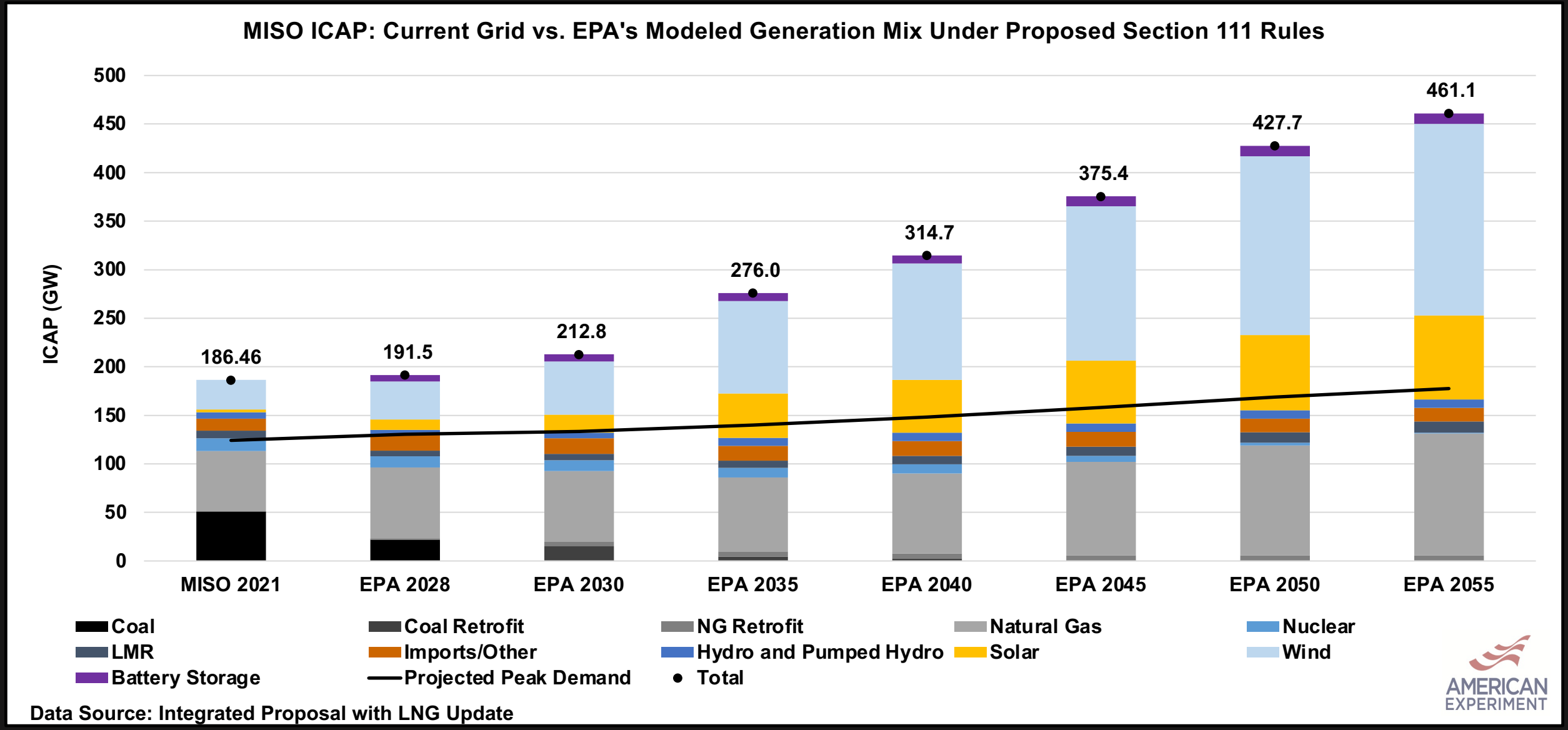
EPA is Assuming Massive Changes to the MISO Grid Due to the IRA and Proposed CO_2 Rules



Data Source: Integrated Proposal with LNG Update

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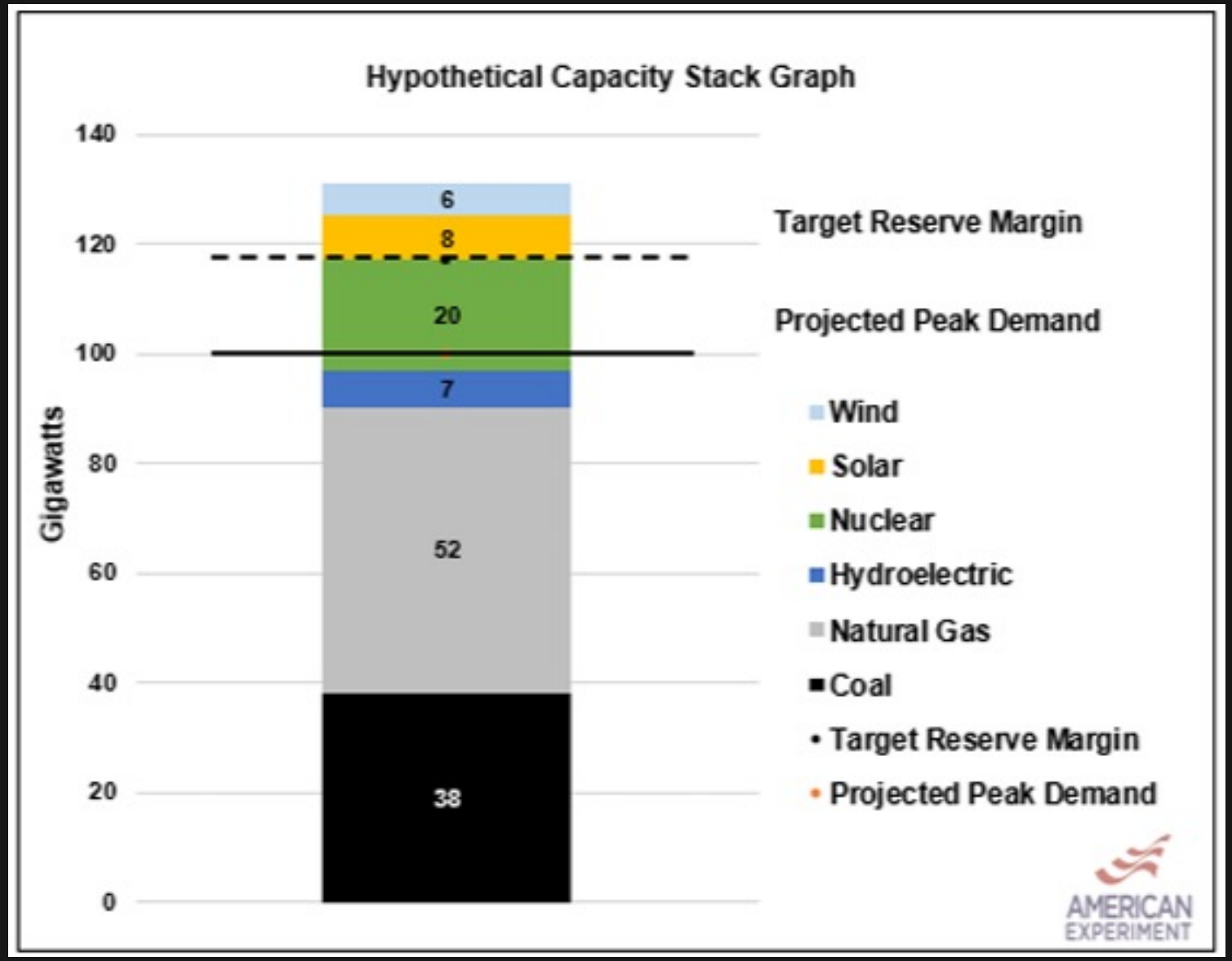
What is Resource Adequacy?

- Resource adequacy is kind of like pole vaulting.
- You need to enough reliable power plants to meet your projected peak electricity demand, plus a margin of safety.

Measuring Resource Adequacy

- Resource adequacy analyses generally takes the form of a “capacity stack,” like the one seen here.
- You need enough reliable power plants to clear the bar of projected peak demand, and the reserve margin.
- EPA is making big assumptions about how the grid will change due to these regulations and the Inflation Reduction Act.



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EPA's Modeled Grid Would Preserve Resource Adequacy Relative to the Base Case, But…

- EPA has narrowly defined the scope of the Regulatory Impact Analysis (RIA) of the regulations to maintain resource adequacy ***compared to its Post-IRA base case.***
- EPA assumes **99 percent** of the emissions reductions in this proposal occur due to the Inflation Reduction Act subsidies in its base case.
- EPA did not evaluate the resource adequacy or reliability of its Post-IRA base case, it simply assumed they are sufficient.

> "The results presented in this document further demonstrate, for the specific cases illustrated in the Regulatory Impact Analysis (RIA), that the implementation of these rules can be achieved without undermining resource adequacy."
>
> "The focus of the analysis is on ***comparing the illustrative proposed rules scenario from the RIA to a base case (absent the proposed requirements) that is assumed to be adequate and reliable." [emphasis added]***
>
> "In this framework, we emphasize the incremental changes in the power system that are projected to occur under the presence of the rules in the 2030, 2035 and 2040 model run years."

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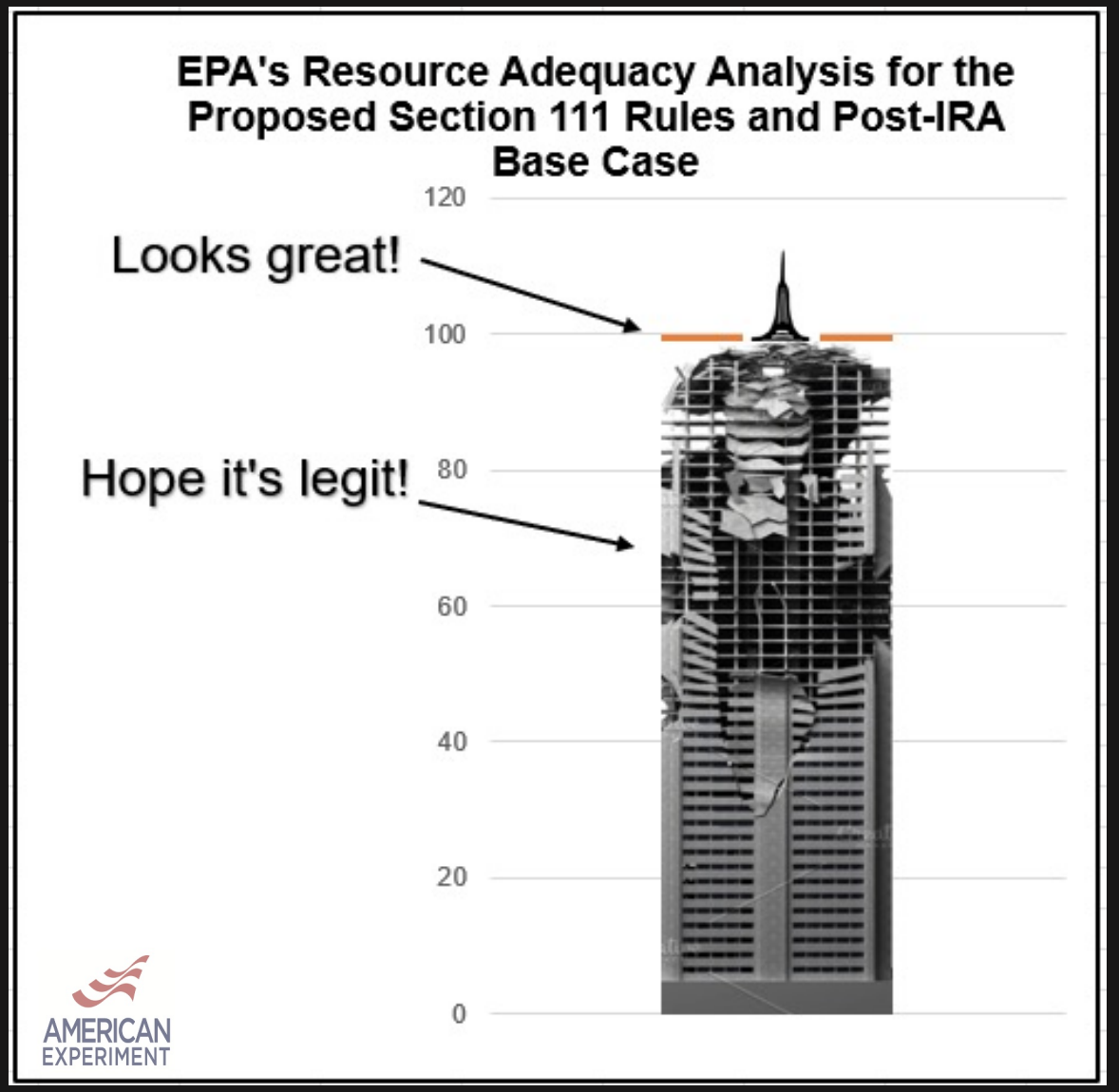
EPA Narrowly Tailors its Resource Adequacy Assessment

- EPA does not conduct a resource adequacy or reliability assessment for its base cases.
- This is the regulatory equivalent of studying the structural integrity of the top floor of a 100-story building without doing so for the preceding 99 floors.



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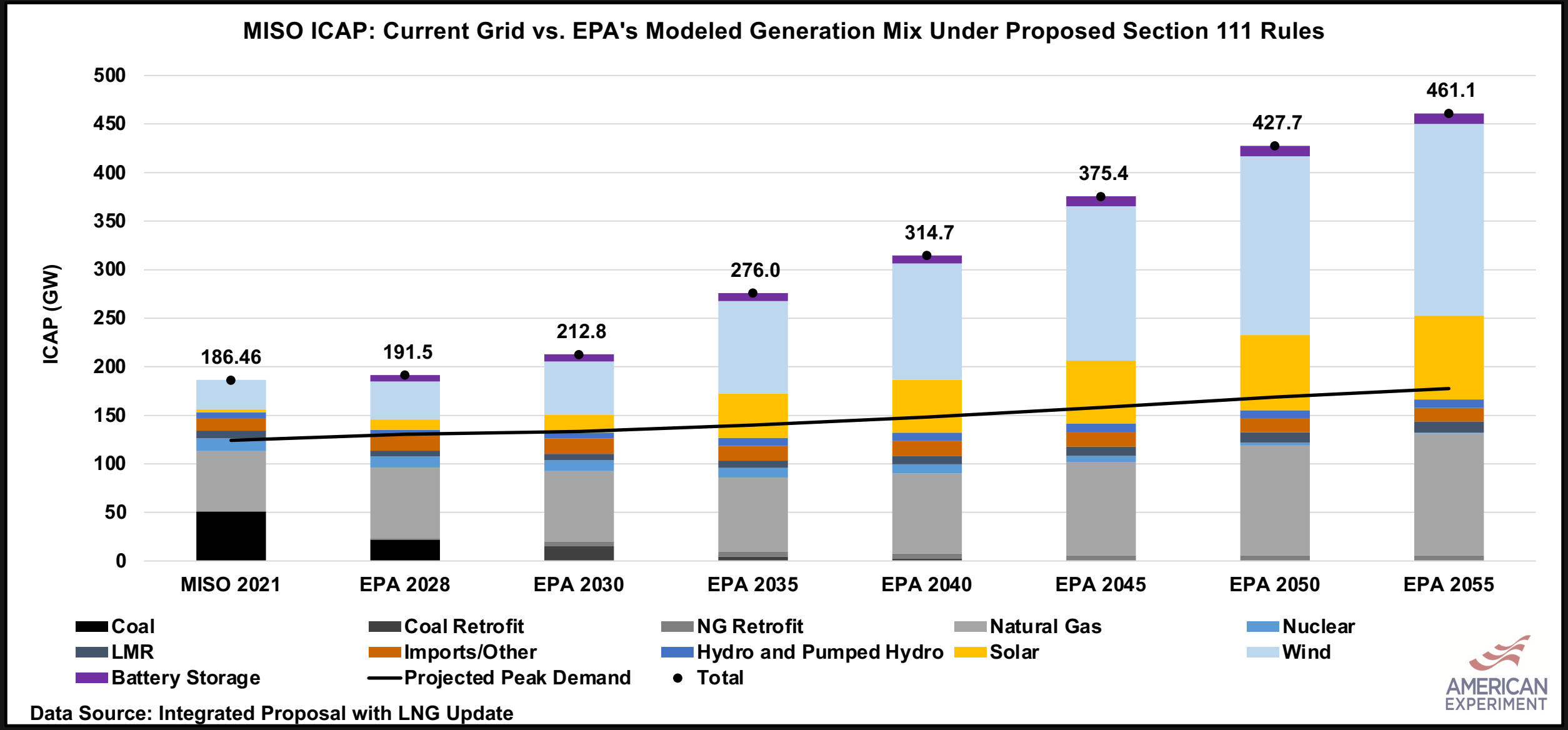

Data Source: Integrated Proposal with LNG Update

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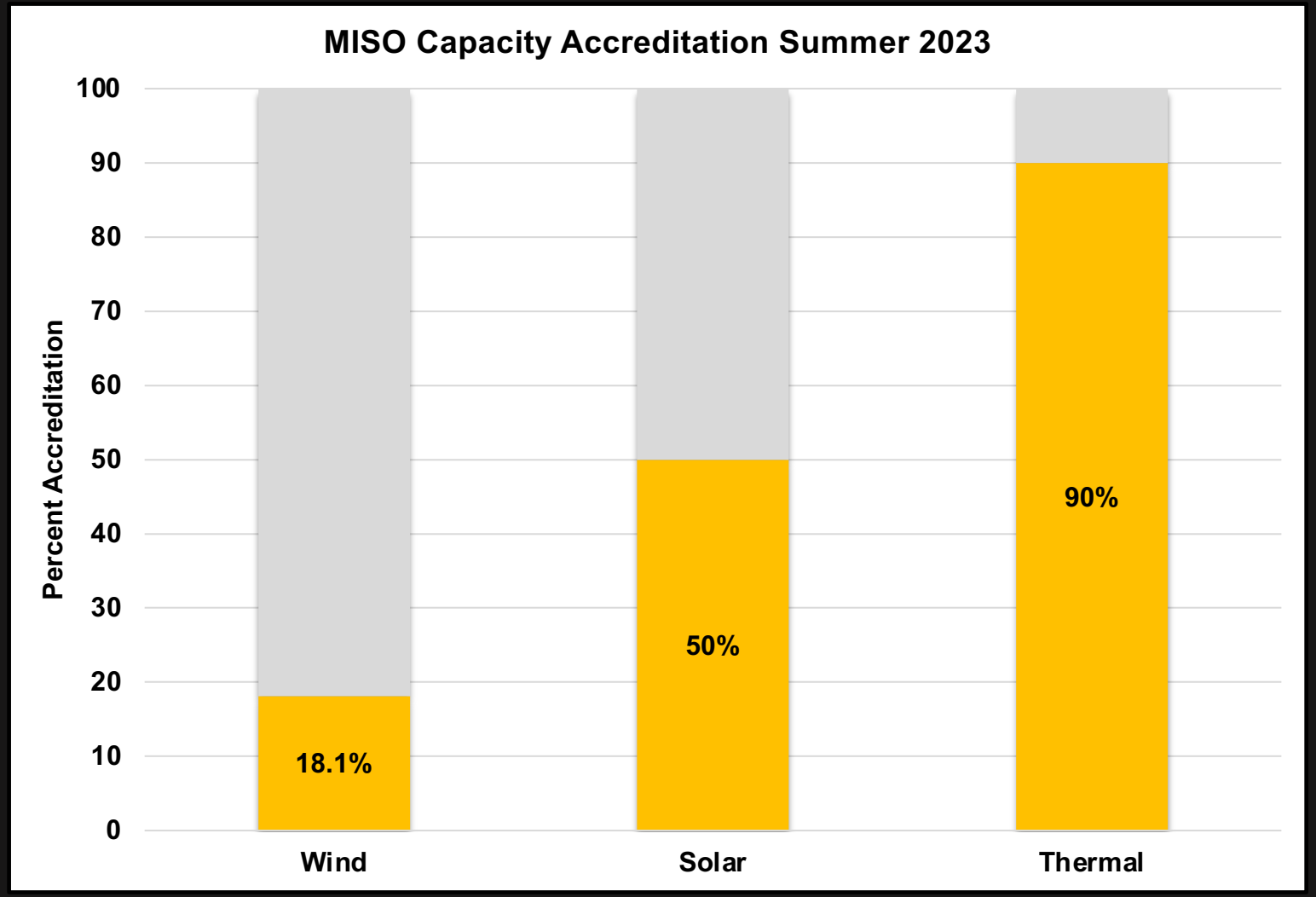
MISO's 2022 Capacity Accreditation by Resource

- Shutting down coal plants means we need to build much more wind and solar to replace it because these technologies are not as dependable.
- Technologies are given different accreditation values based on their reliability during times of peak electricity demand.
- Nuclear, coal, and natural gas get the highest accreditation values.
- Wind and solar get much lower accreditation values.



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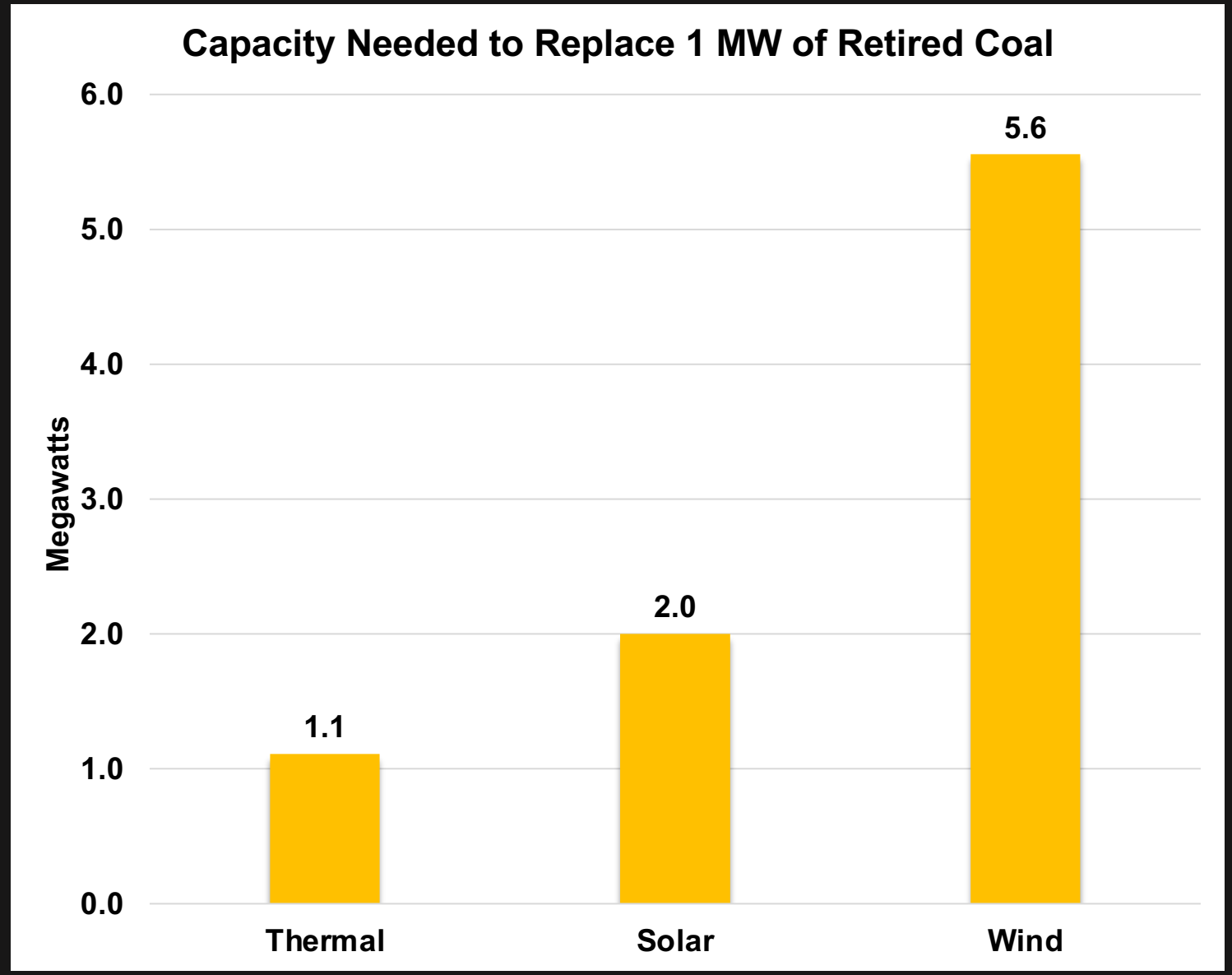
Capacity Needed to Replace 1 MW

- Shutting down 1 MW of coal requires 2 MW of solar to replace it (in theory) and 5.6 MW of wind.
- Solar and wind can't actually replace this capacity, in these increments because sometimes wind and solar produce almost nothing.
- This leads to "overbuilding" to meet demand, which is very expensive.



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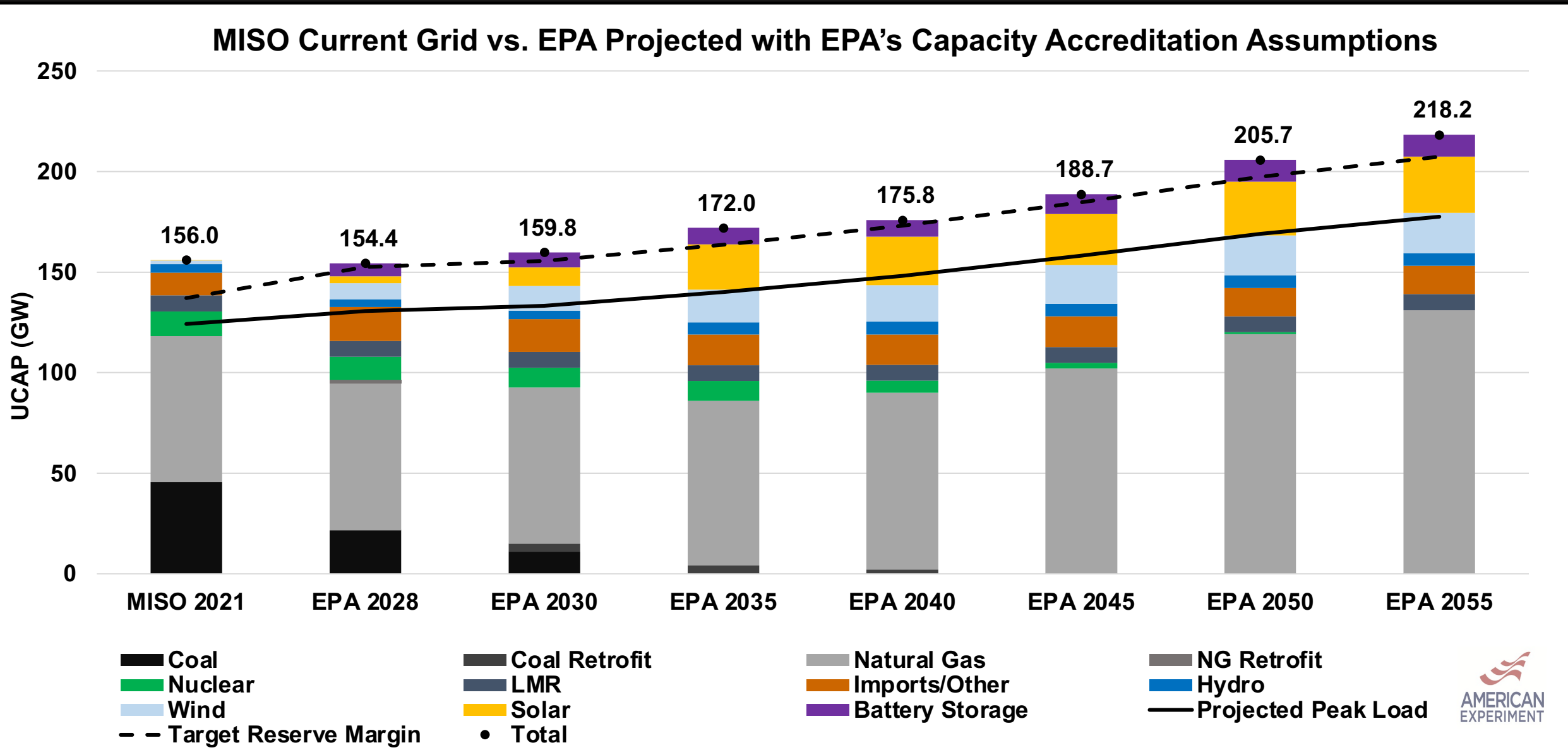
EPA's Modeled Grid Only Meets EPA's Reserve Margin With Generous Wind and Solar Capacity Accreditation and LMR/Import Assumptions

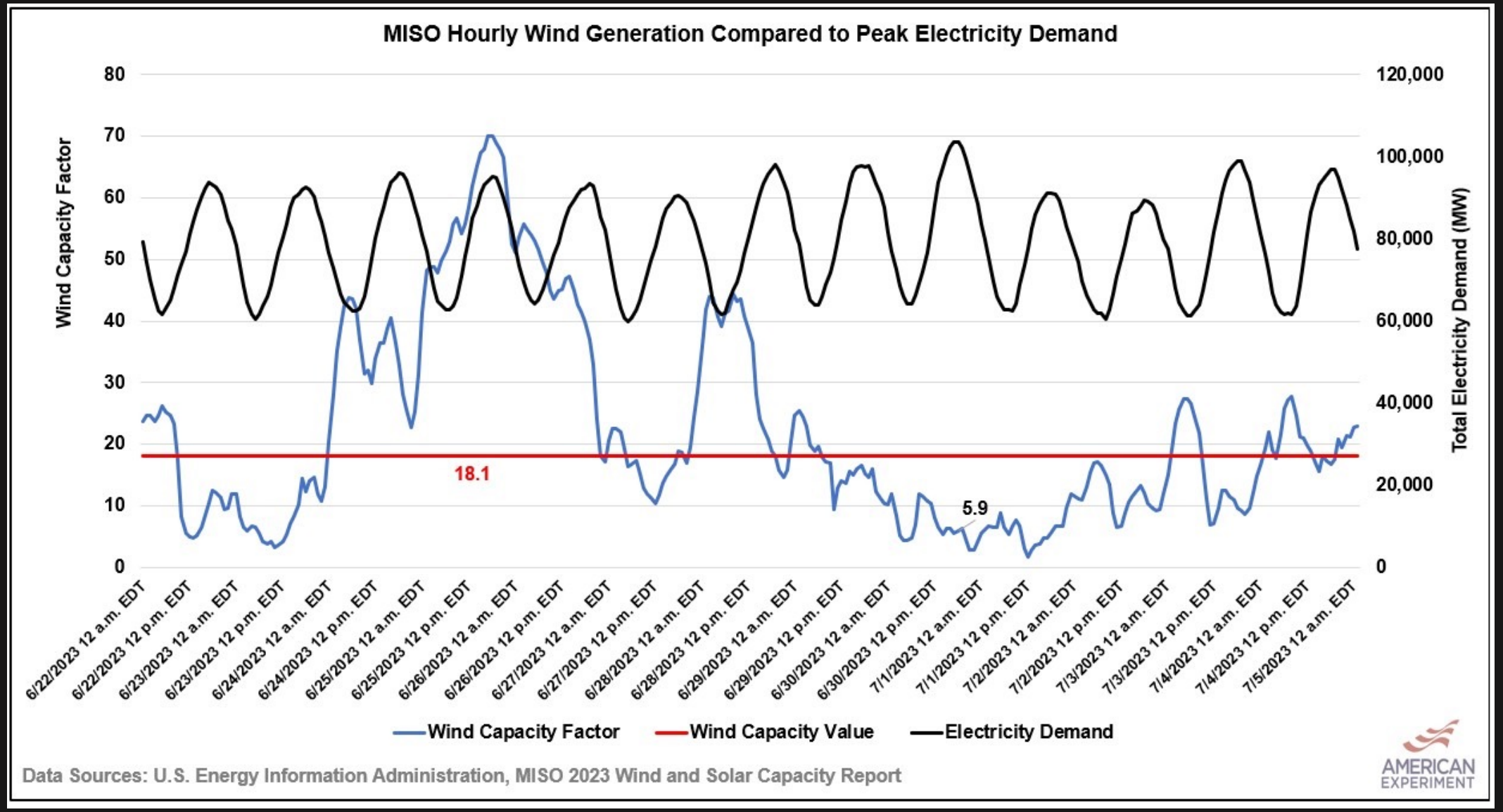


EPA Makes Unreasonably High Estimates for Wind and Solar Reliability.

- EPA is expecting wind and solar to perform at a high level.
- EPA's assumptions are higher than the assumptions used by MISO.
- It also assumes existing thermal resources perform at higher levels than MISO assumes.

EPA's Proposed 111 Regulations	
Resource	EPA's Capacity Accreditation in MISO
Existing Onshore Wind	19%
Existing Solar	55%
New Onshore Wind	9%-25%
New Solar	32%-52%
Existing Thermal	100%
Existing Hydro	56%
New Hydro	65%
Existing Energy Storage	48%
Pumped Storage	95%
New Battery Storage	100%

Unreasonably High Capacity Values Can Result in Energy Shortfalls



Comparing Highest Certainty Deliverability (HCD) Accreditation to the EPA's Capacity Accreditation

EPA APPROACH

EPA's Proposed 111 Regulations	
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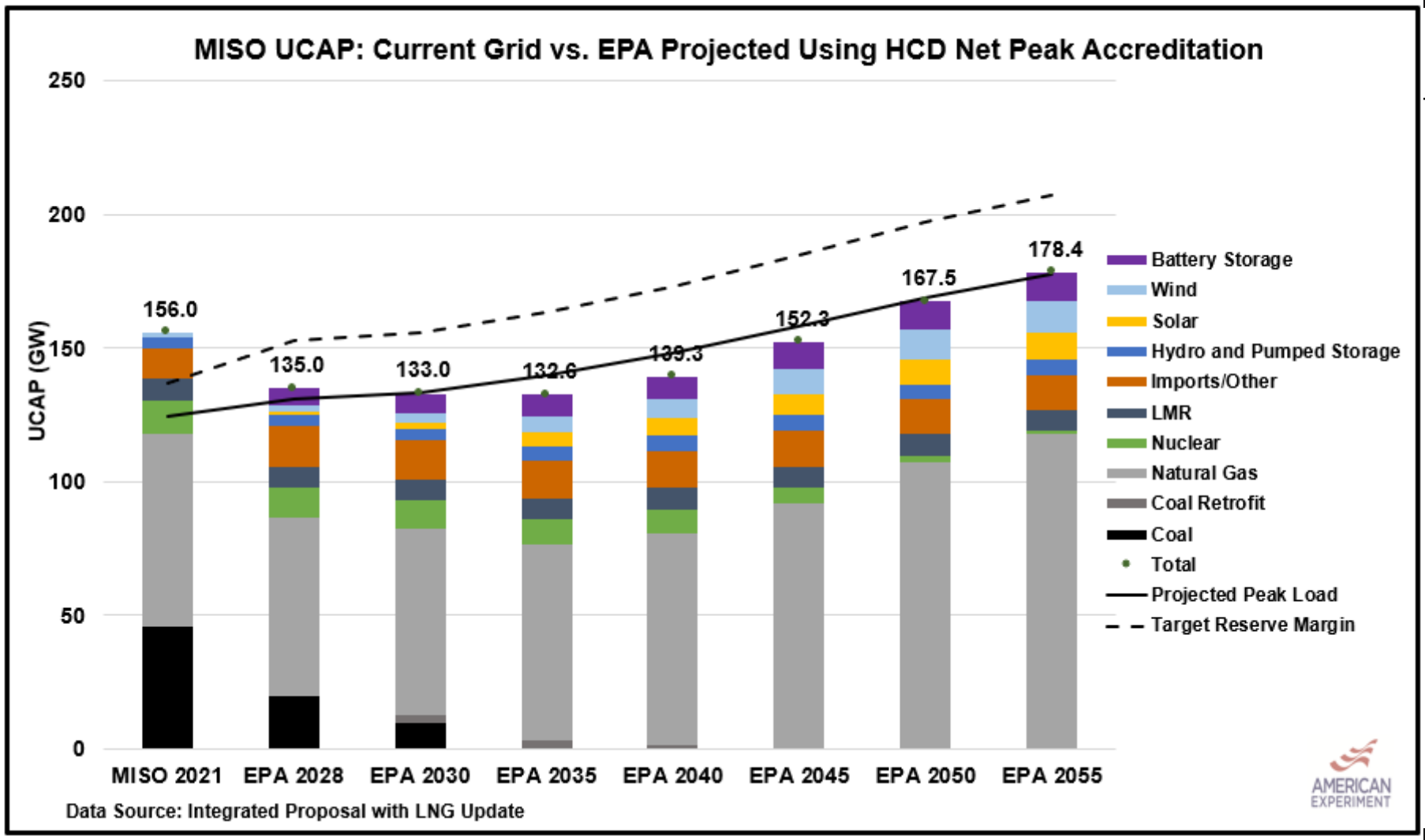
HCD APPROACH

Highest Certainty Deliverability		
Resouce	**Peak Accreditation**	**Net Peak Accreditation**
Wind	7.1%	5.8%
Solar	12.4%	12.0%
Battery Storage	100.0%	100.0%
Thermal	90.0%	90.0%
Reserve Margin	16.8%	16.8%

EPA's Modeled MISO Grid Does Not Meet Resource Adequacy Targets Using Real-World Accreditation Metrics



Year	Reserve Margin
2022	25.6%
2028	3.3%
2030	-.2%
2035	-5.4%
2040	-5.9%
2045	-3.7%
2050	.9%
2055	.5%

Estimated firm capacity using HCD accreditation values for wind, solar, storage, and thermal resources. EPA assumes a 16.8 percent reserve margin. Different than MISO cleared UCAP (unforced [accredited] capacity). Red indicates intermittent generation is necessary to meet Target Reserve Margins.

Assessing Reliability Under EPA's Proposal

- **EPA did not conduct a reliability assessment of its proposals, so we did it for them.**
- Our analysis compared EPA's assumed generation portfolio to the historical hourly electricity demand and hourly capacity factors for wind and solar in 2019, 2020, 2021, and 2022 to assess whether the installed resources would be able to keep the lights on for all hours of the year.
- Hourly demand and wind and solar capacity factors were adjusted upward to meet EPA's peak load, annual generation, and capacity factor assumptions.
  - This assumption is generous to EPA because it increases the annual output of wind and solar generators to levels that are not generally observed in MISO.
  - Additionally, other policies pursued by the EPA may increase peak load even further, but this additional load was not studied in this analysis.
- Will EPA's modeled grid be able to meet demand based on these observed, real-life model inputs?

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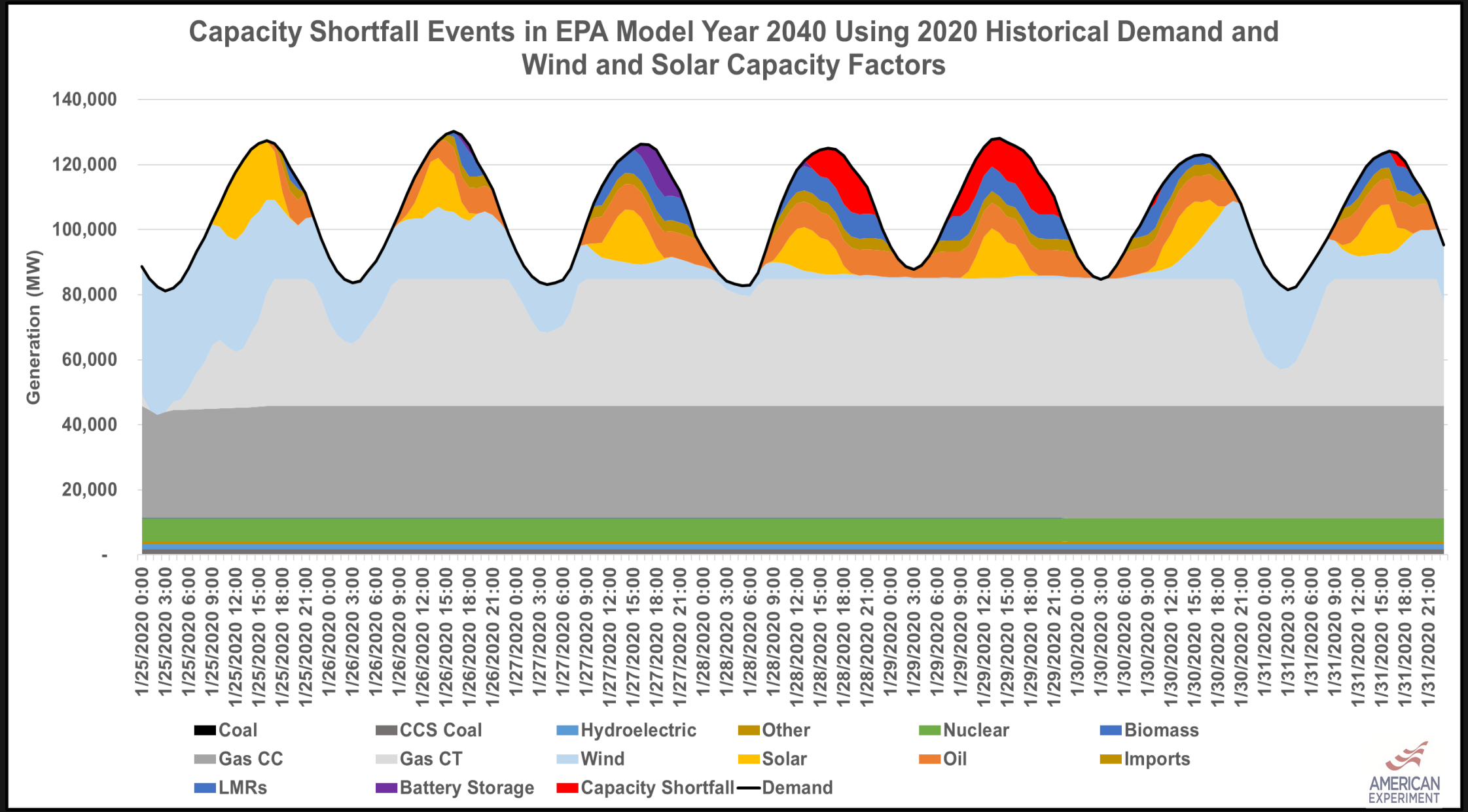
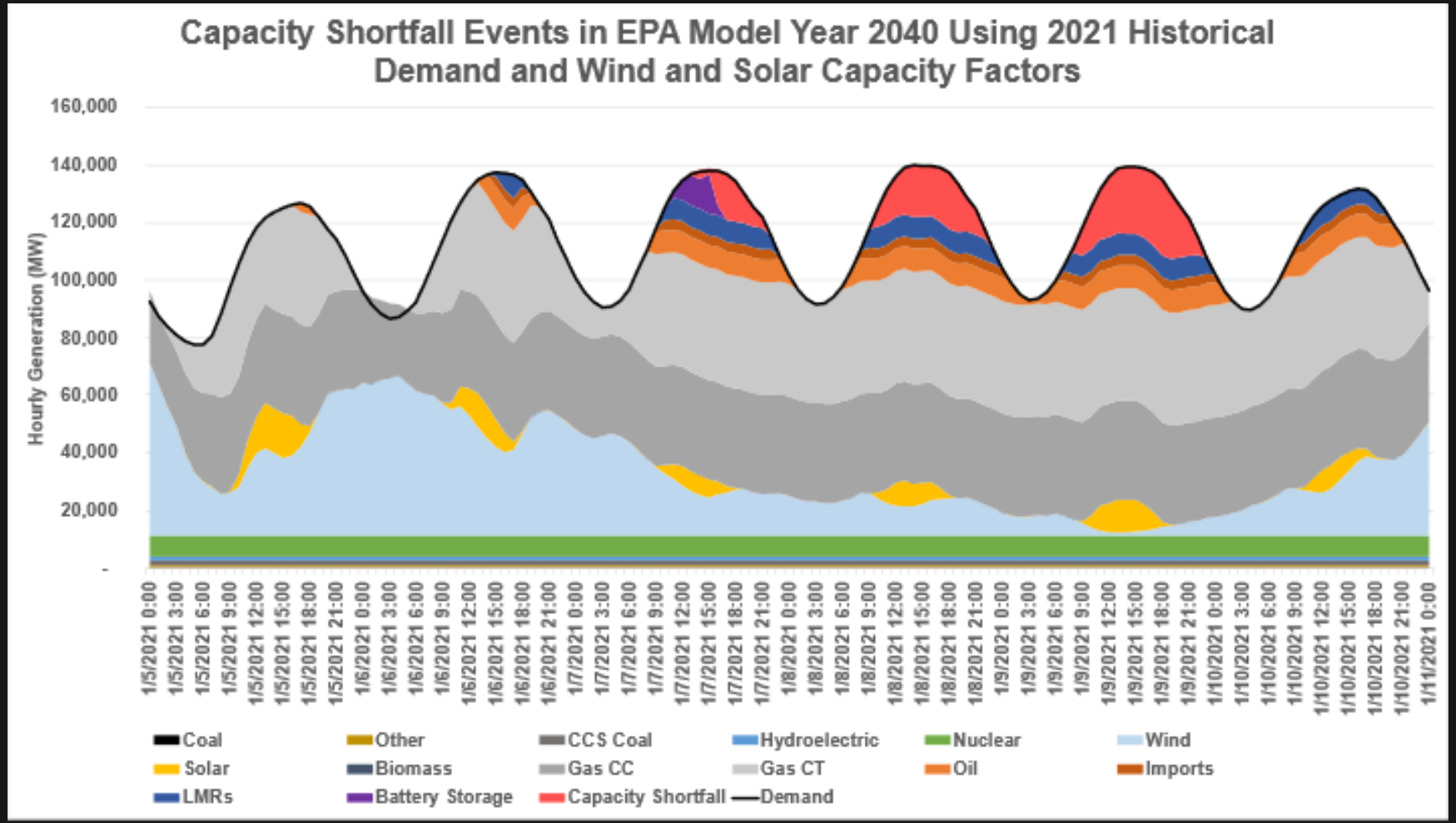
EPA's Modeled Grid Would Result in Blackouts



Assessing Severity of the Blackouts

- The worst capacity shortfall is a 26 GW capacity shortfall that would occur in January 2040 using the 2021 HCY, accounting for 19.5 percent of the electricity demand at the time of the shortfall.
- This is the equivalent of needing to implement a blackout 12 minutes out of every hour.



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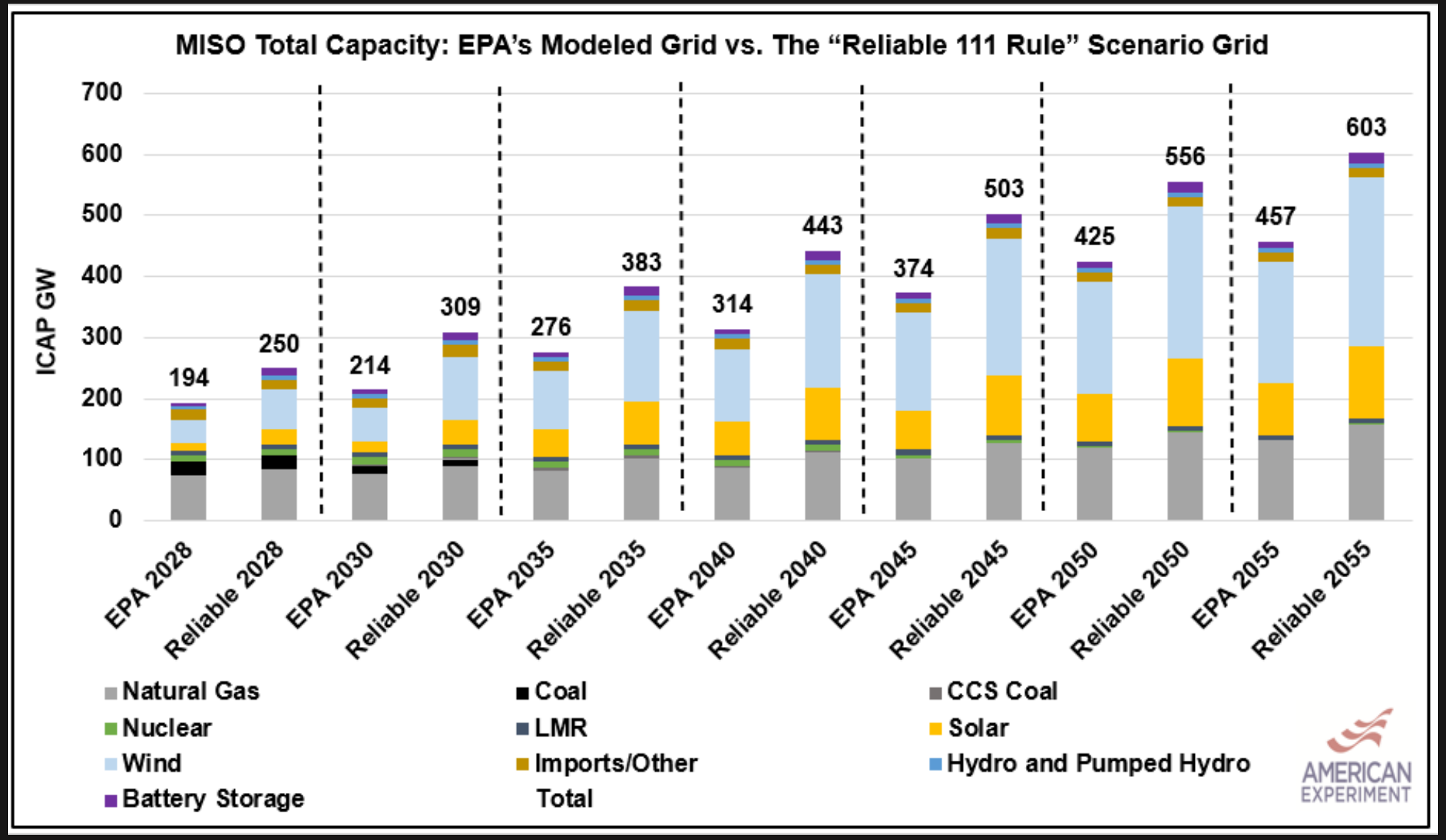
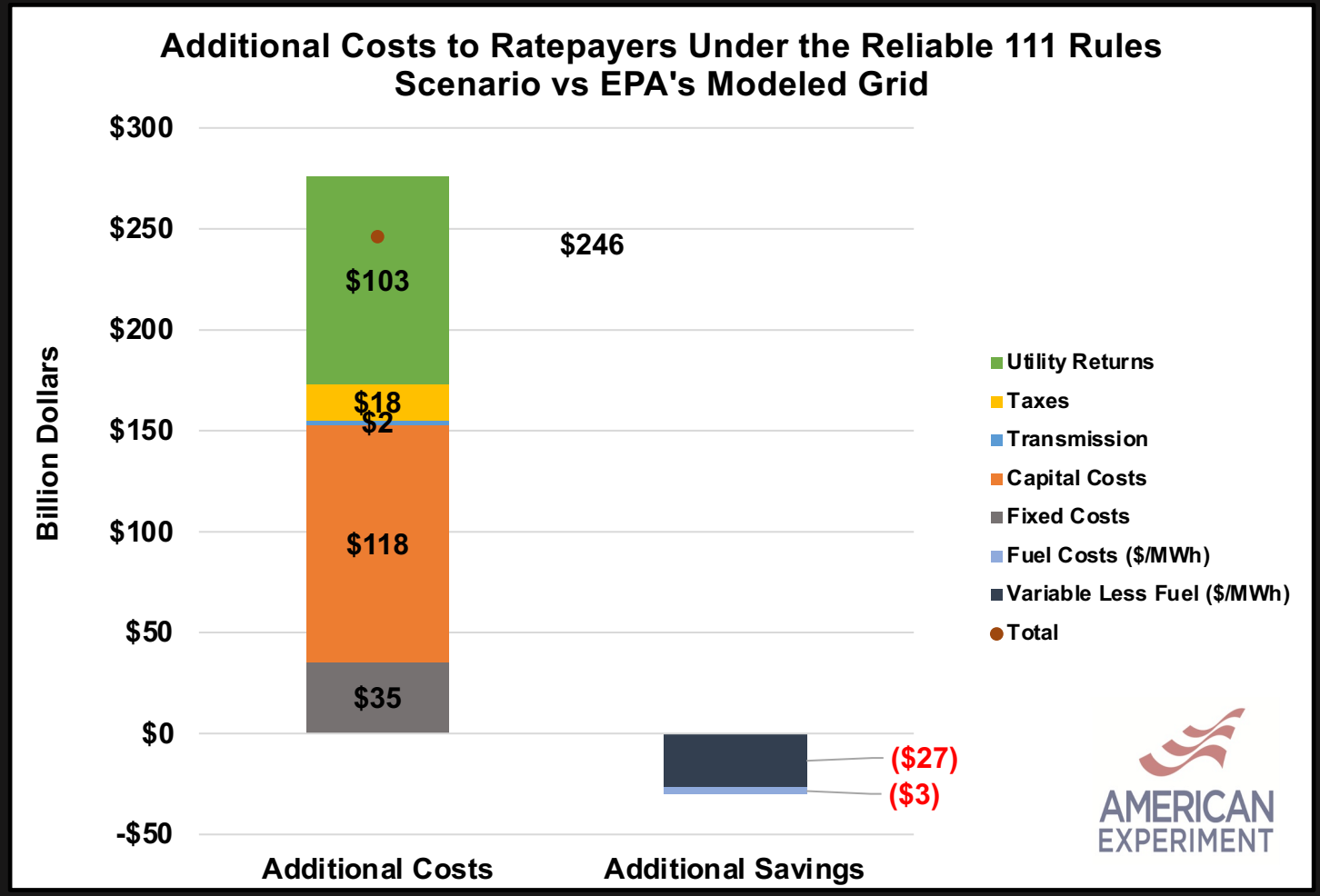
Meeting EPA's Modeled Emissions Targets While Maintaining Reliability Will Require A Significant Increase in Capacity Relative to EPA's Modeled Grid



Executive Summary: Shoring Up EPA's Modeled Grid Would Cost $246 Billion

- Preventing capacity shortfalls while still meeting EPAs emission targets would require large capacity additions.
- These additions would increase the cost of compliance by $246 billion through 2055, or $7.7 billion annually, compared to the cost of EPA's modeled MISO grid in the Integrated Proposal with LNG Update.
- **This figure exceeds EPA's annual net benefit estimate of $5.9 billion for the entire country.**



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Calculating the Cost of Decarbonizing Home Heating and Passenger Vehicles

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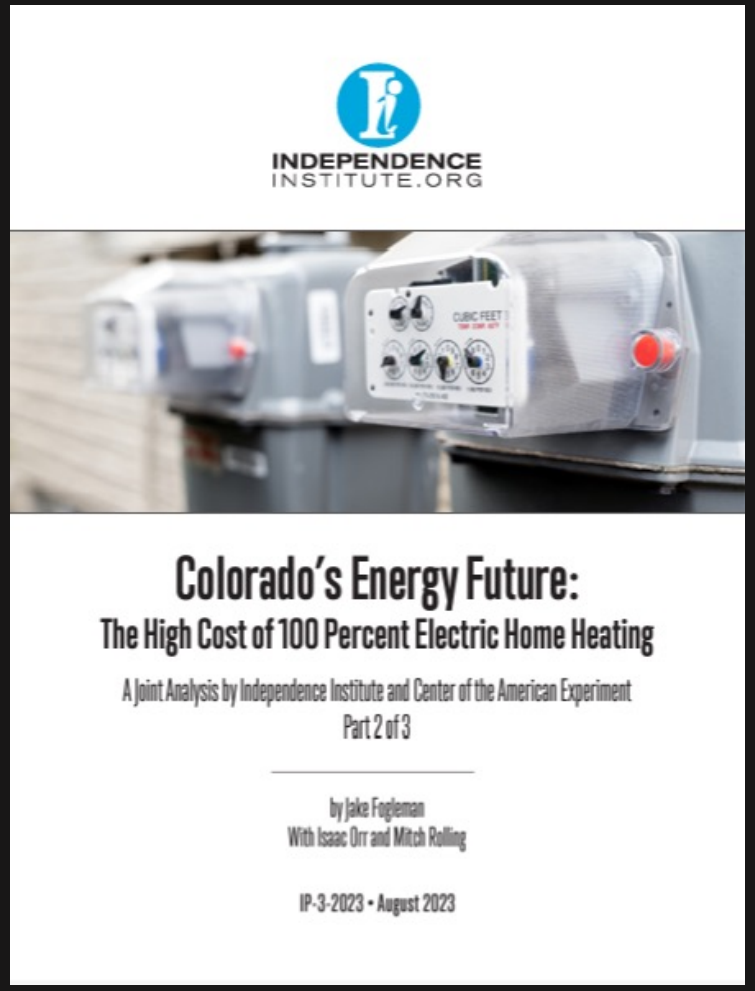
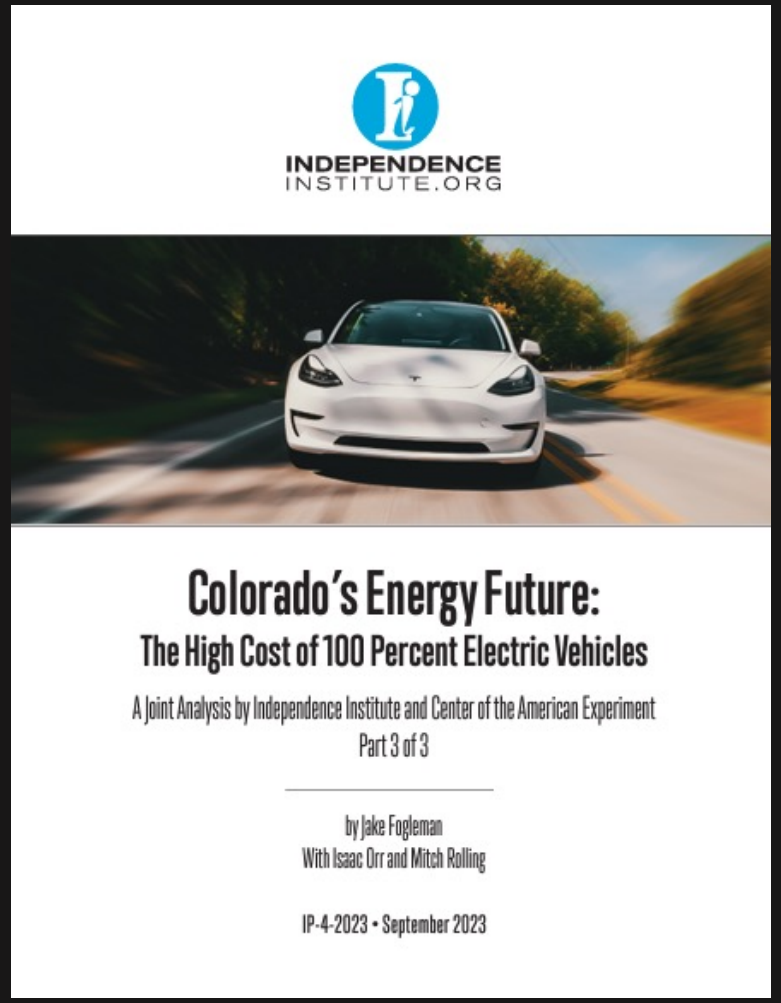
Calculating the Cost of Decarbonizing Home Heating and Passenger Vehicles





Methods: Calculating the Cost of Decarbonizing Home Heating and Passenger Vehicles

- We took hourly natural gas sales from the Colorado Springs public utility and extrapolated them to the state.
- Then we modeled electricity demand for heat pumps, using hourly weather data to account for changing heat pump efficiency at lower temperatures.
- Calculated the cost of meeting demand 8760.
- For EVs, we took hourly charging from Norway, the largest EV market, and scaled it up to reflect the fact that Coloradans drive more than Norwegians.

Methods: Calculating the Cost of Decarbonizing Home Heating and Passenger Vehicles

- Building a grid large enough to accommodate electric heat would cost Colorado an additional $620.7 billion through 2050 if only wind, solar, and battery storage are used to meet demand.
- Increasing the grid to also charge EVs would cost an additional $695.3 billion through 2050.
  - This is a total cost for 100 percent carbon free with wind, solar and storage, heat pumps for residential home heating, and EV charging.

Questions, Comments, Scathing Rebuttal?

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