

The Energy Council

Grand Forks, ND

June 8, 2024

Jackson Walker LLP

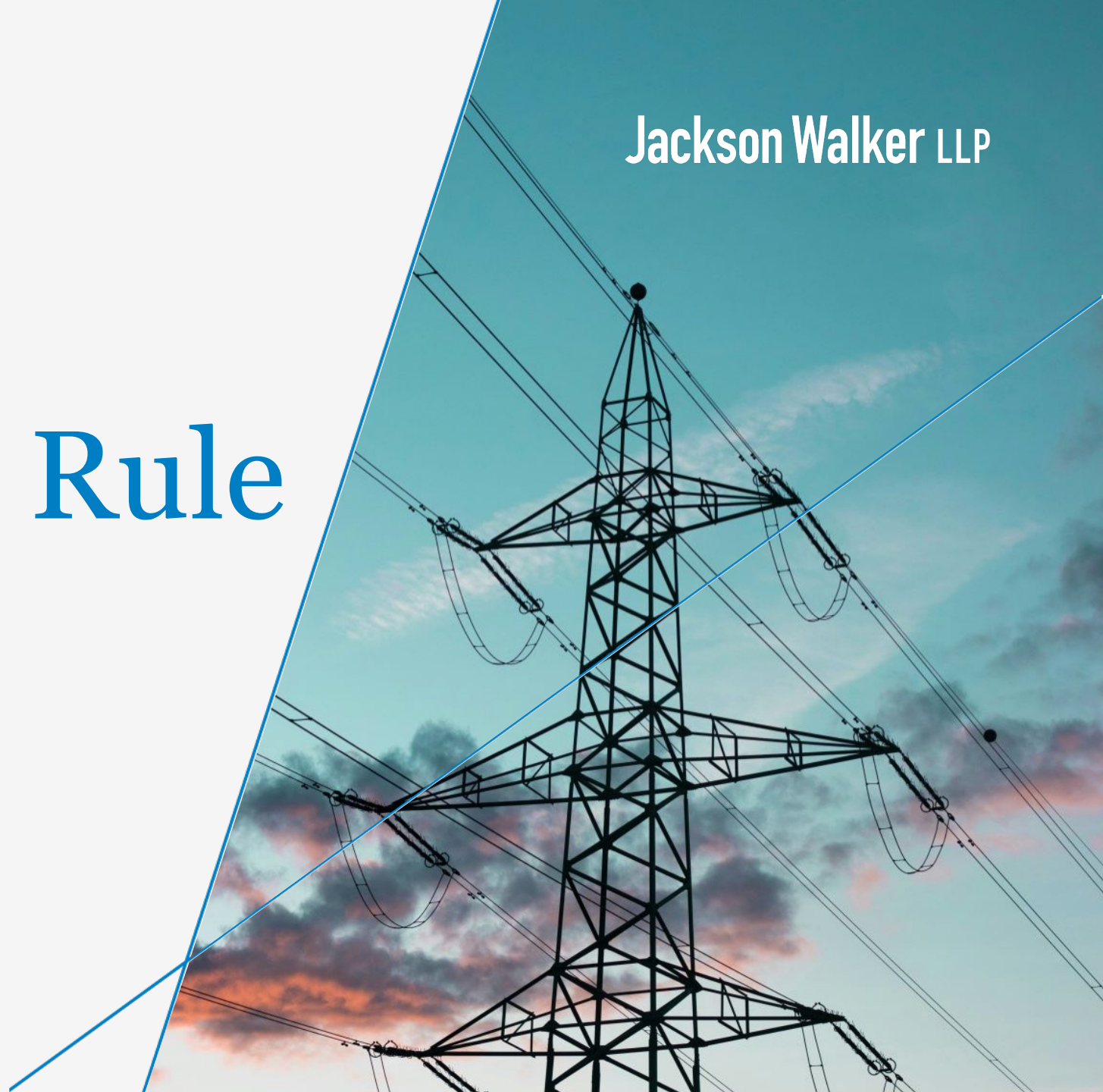
EPA Carbon Rule Update

Jonathan Fortner,

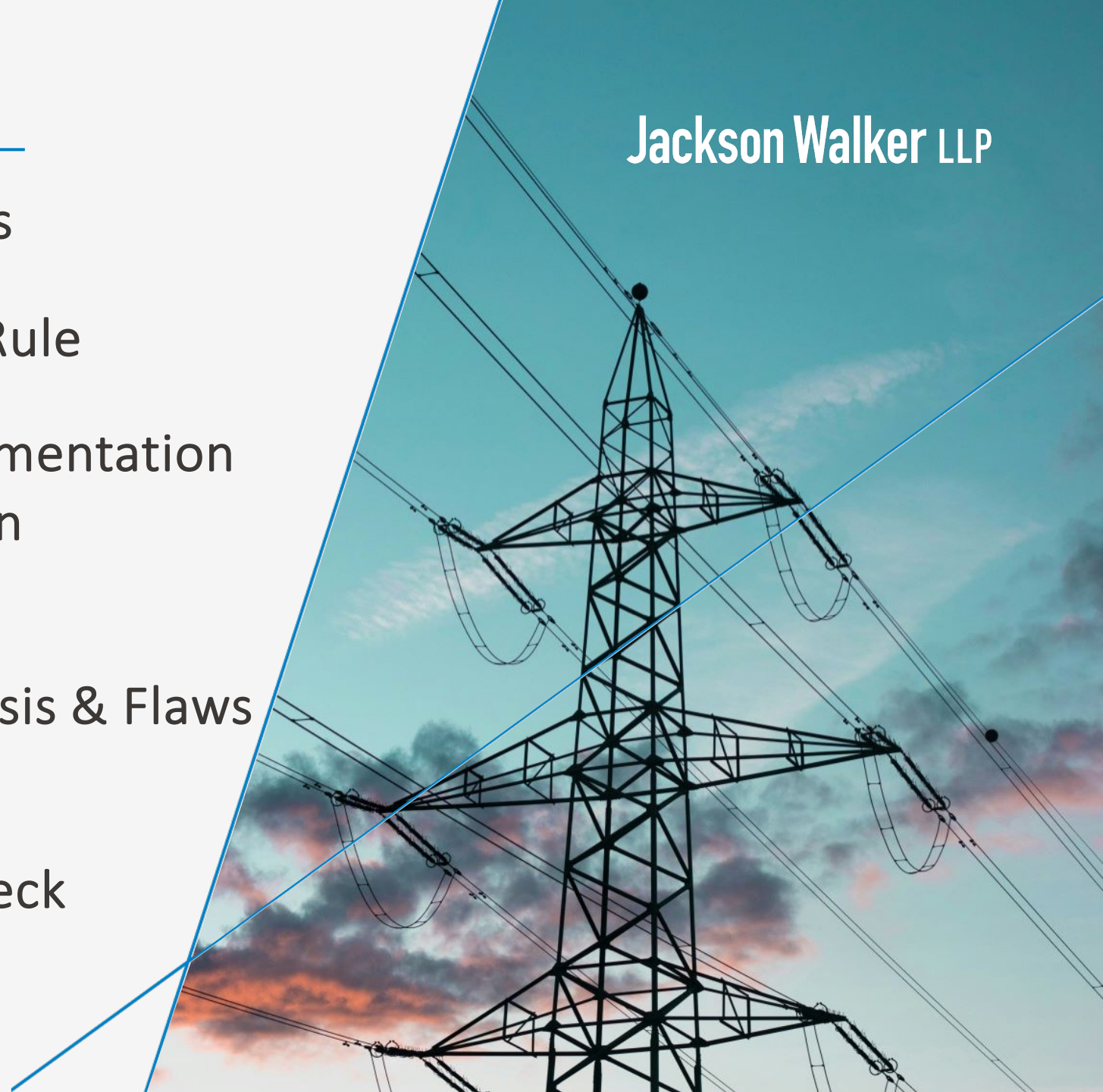
Lignite Energy Council

Mike Nasi

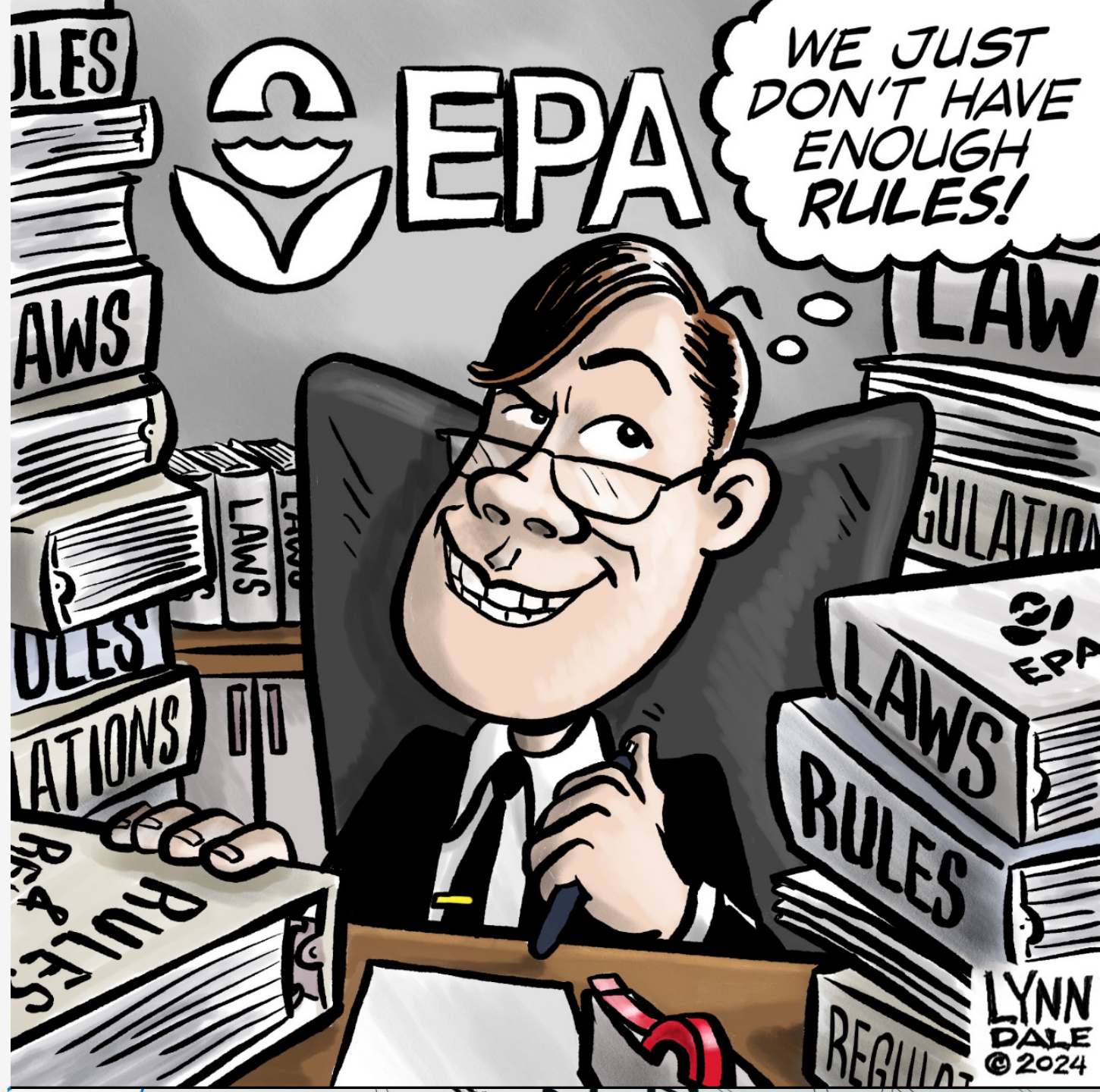
Partner, Jackson Walker LLP



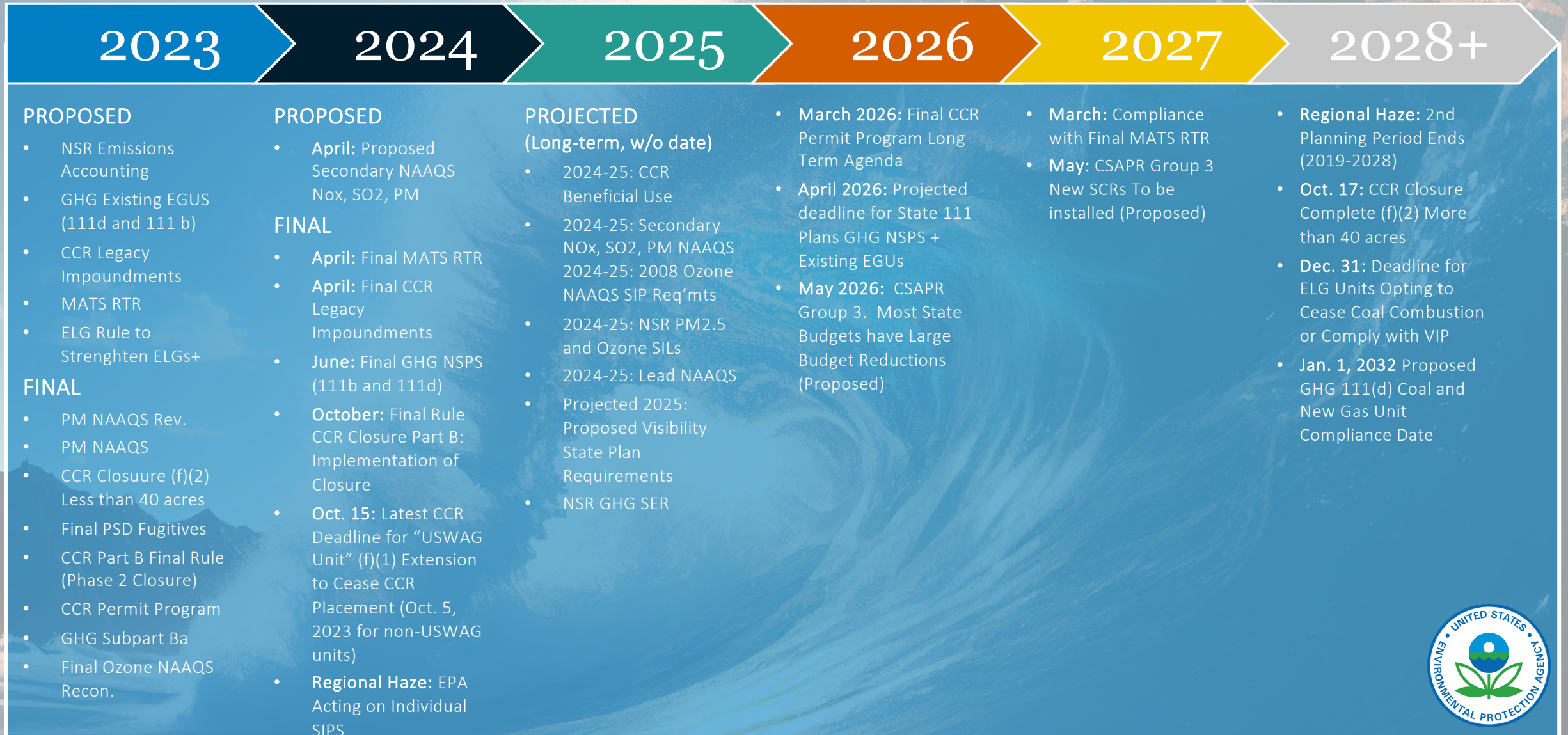
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- I. EPA's Power Sector Regulations
 - II. Deep Dive: EPA § 111 Carbon Rule
 - III. What is an "Achievable" Implementation of the "Best System of Emission Reduction"
 - IV. The Coming Grid Reliability Crisis & Flaws in EPA's Grid Modeling
 - V. Geopolitical Energy Reality Check



EPA's Power Sector Environmental Regulations



New wave of grid-threatening regulations



Five major rulemakings coming all at once



March

Ozone Transport

April

CCR

MATS

111 Carbon Rule

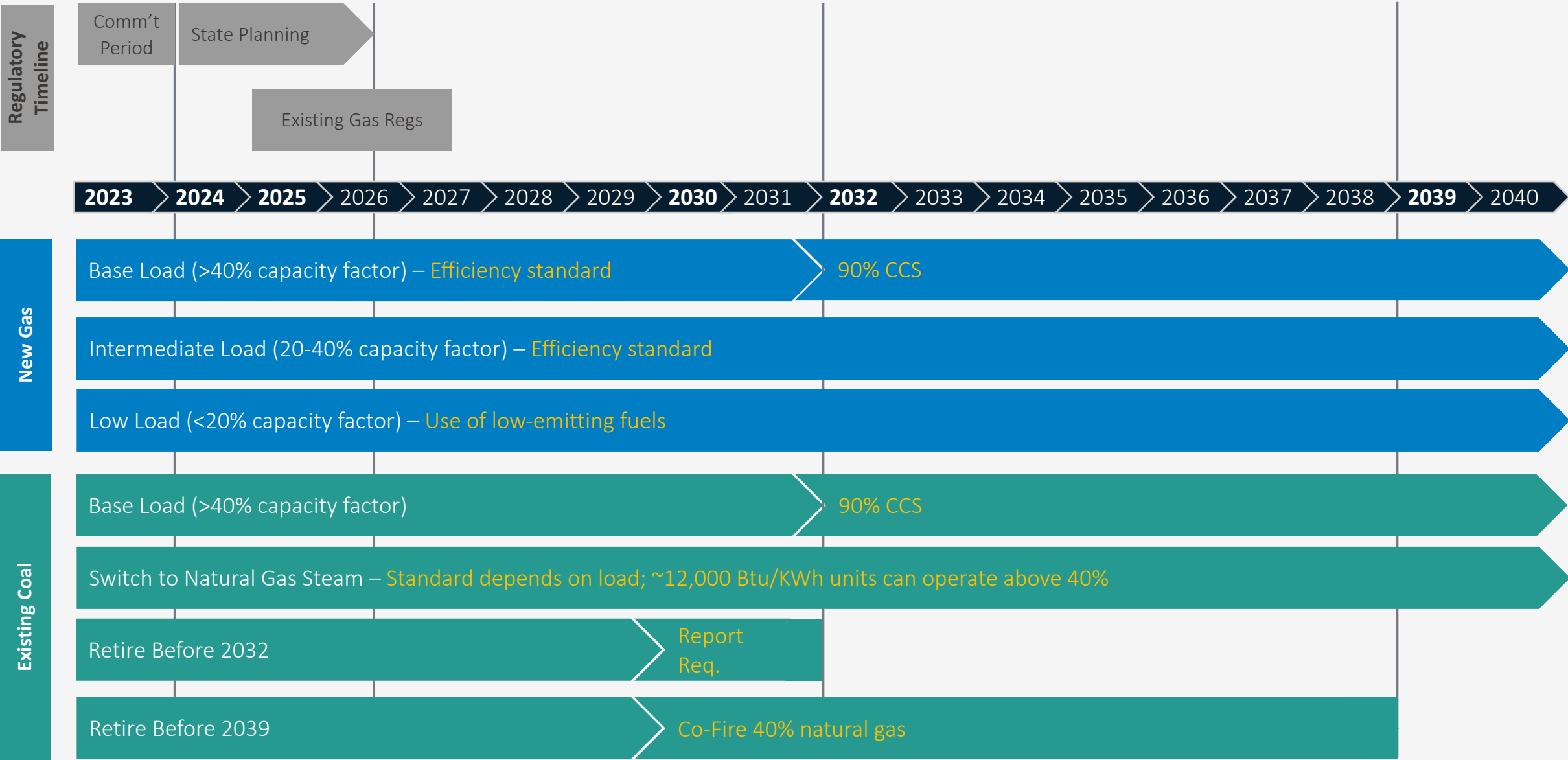
ELG

May

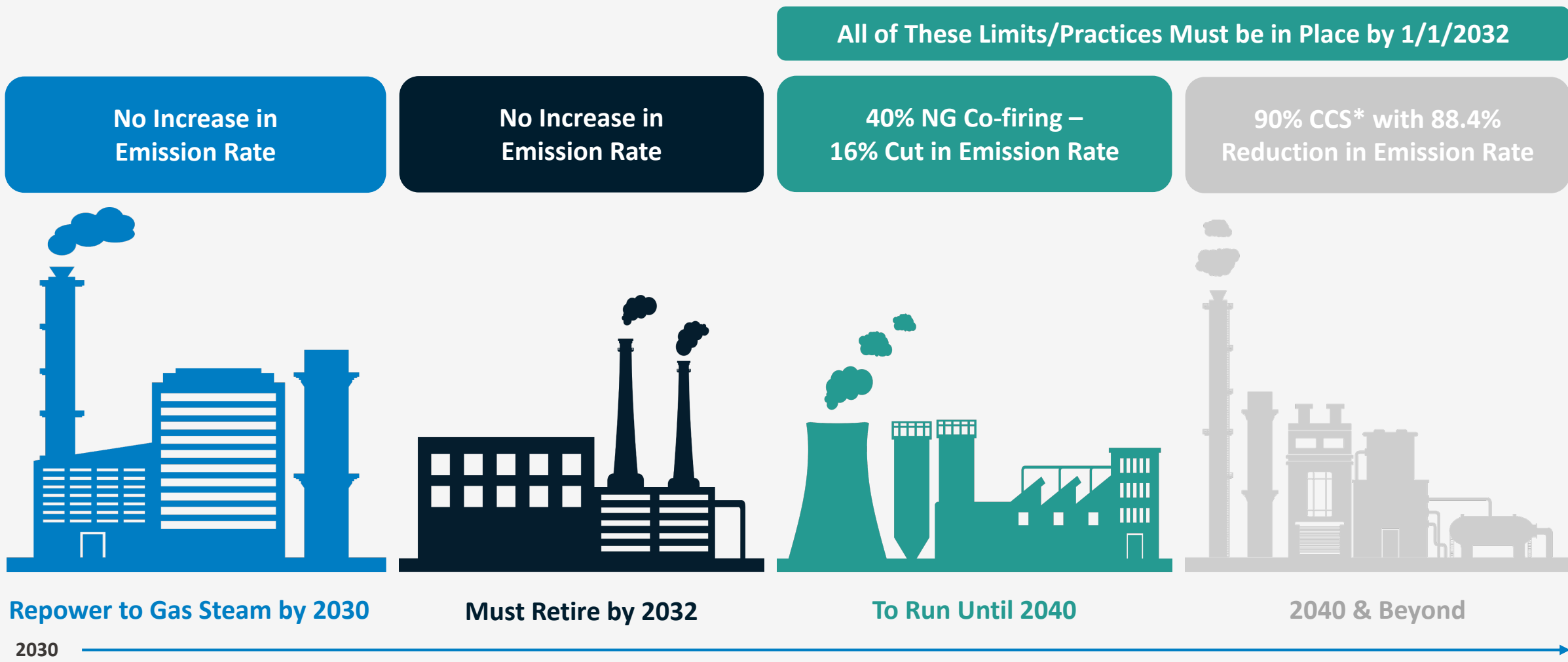
April–May:

Congressional Review Act (CRA) “Look-Back” Period for Vacating Regulations Ends

111 Carbon Rule Coal & Gas Standard & Regulatory Timeline



New & existing coal: Standards based on remaining life



*EPA uses “CCS” & not “CCUS” (utilization projects [like EOR] may not qualify)

Analysis of legal issues with Clean Power Plan 1.0 and 2.0 & ACE

Legal Issue	Illegally forces <u>“generation shifting”</u> <i>WV v. EPA</i>	Standard of performance is <u>“achievable”</u> CAA § 111(d)	BSER is <u>“adequately demonstrated”</u> CAA § 111(a)(1)	Respect State authority – <u>remaining useful life and other factors</u> (RULOF)
CPP (Obama)	✗	—	—	✗
ACE (Trump)	✓	✓	✓	✓
CPP 2.0 (Biden)	?	✗	✗	?

Three-part BSER for carbon capture and storage

Three-part BSER: EPA MUST GO 3-FOR-3 ON ALL ELEMENTS OF BSER – In other words, it must show that all aspects of CCS are “adequately demonstrated” in order for it to be BSER for the power sector. In reality, none of these parts are adequately demonstrated and, even if they were, they cannot be assumed to be “achievable” at full

1. **Carbon capture:** While technology has come a long way, carbon capture of 100% of flue gas from a power plant has never even been attempted. Slipstream projects had a number of unexpected challenges to maintain 90% capture rate.
2. **Transportation:** Today, only 5,339 miles of CO₂ pipeline exist. Industry estimates 66,000 miles will be needed to support CCS nationwide. This is not feasible in the next 10 years.
3. **Storage:** Major storage options are concentrated in the Permian Basin, Rockies, and Great Plains, with 20 states have little or no CO₂ storage capacity. EPA has only issued two Class VI permits for storage operations (only one of these projects was constructed). These permits took three years to obtain.

FIRST ELEMENT: Capture (a minimum of 7 yrs just for this)

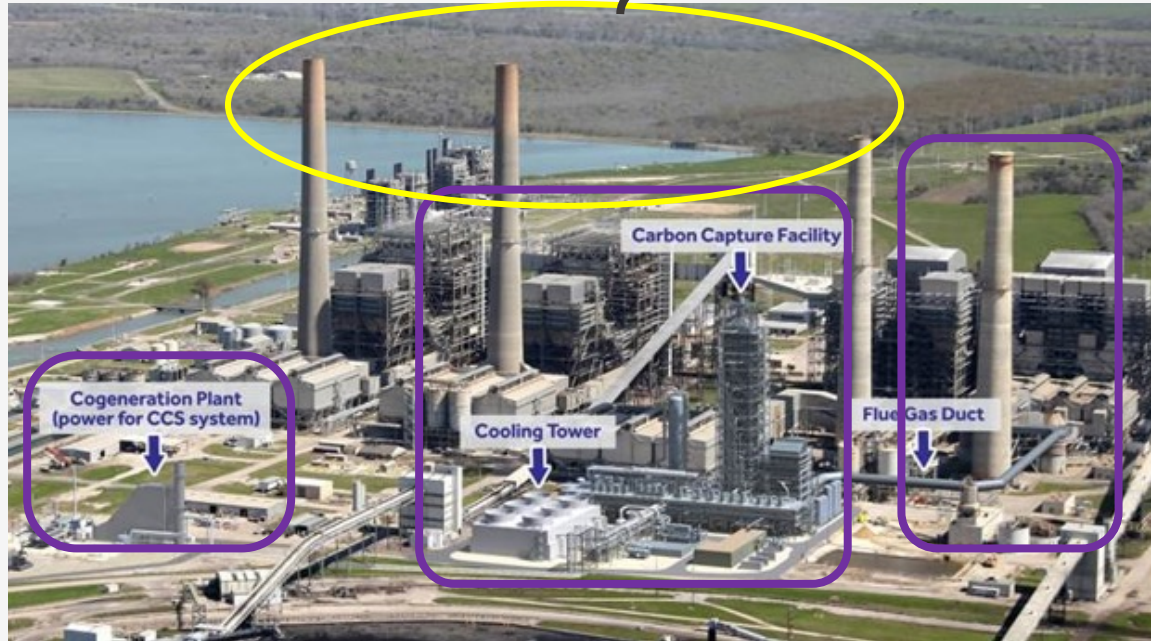
No.	Description	Baseline Duration	Extended Duration	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Project Development										
1	Feasibility Evaluation (Technical and Economic Analysis)	24 weeks	36 weeks							
2	FEED Study (Pre-FEED and/or Full-FEED)	52 weeks	78 weeks							
3	Technical / Commercial Arrangements (Project Financing)	39 weeks	39 weeks							
4	Permits	52 weeks	52 weeks							
Project Implementation										
5	Detailed Engineering and Procurement	104 weeks	104 weeks							
6	Site Work/Mobilization	26 weeks	26 weeks							
7	Construction	104 weeks	104 weeks							
8	Startup, Commissioning, and Testing	60 weeks	60 weeks							
9	Commercial Operation	Milestone (325 weeks from project start)	Milestone (364 weeks from project start)							

“This schedule is for the on-site CCS system only and does not include the scope associated with the development of the CO2 off-take / storage (including transportation, sequestration, enhanced oil recovery utilization, and/or utilization).”

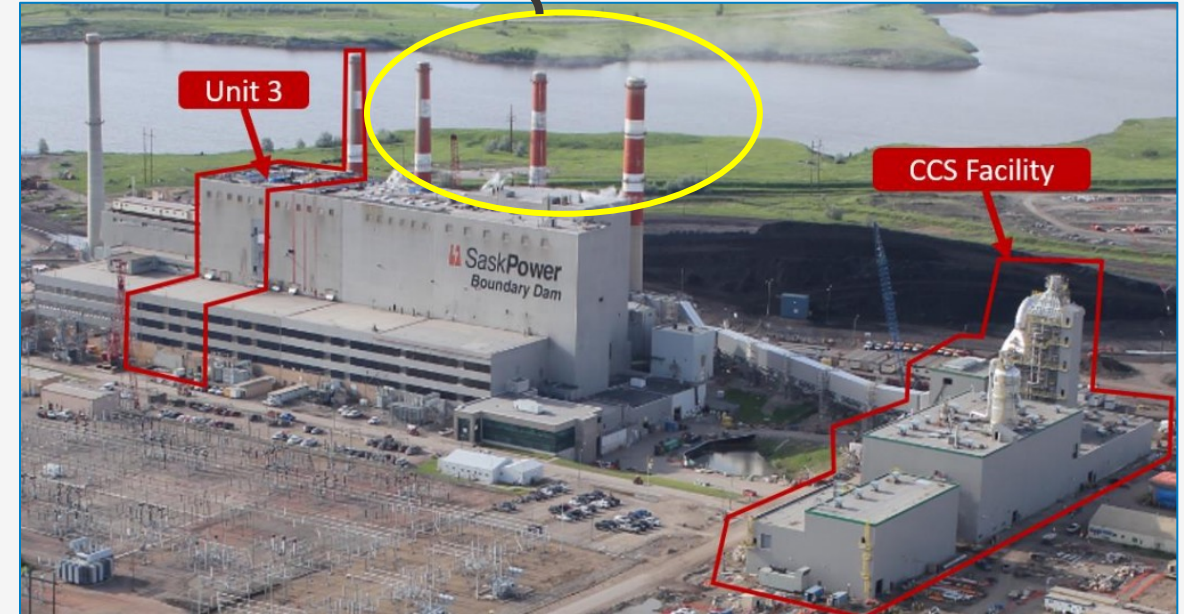
CCS Schedule Sargent and Lundy 2023, from EPA Technical Support Document

FIRST ELEMENT: Capture projects have been narrow “slipstreams”

UNCONTROLLED PORTIONS

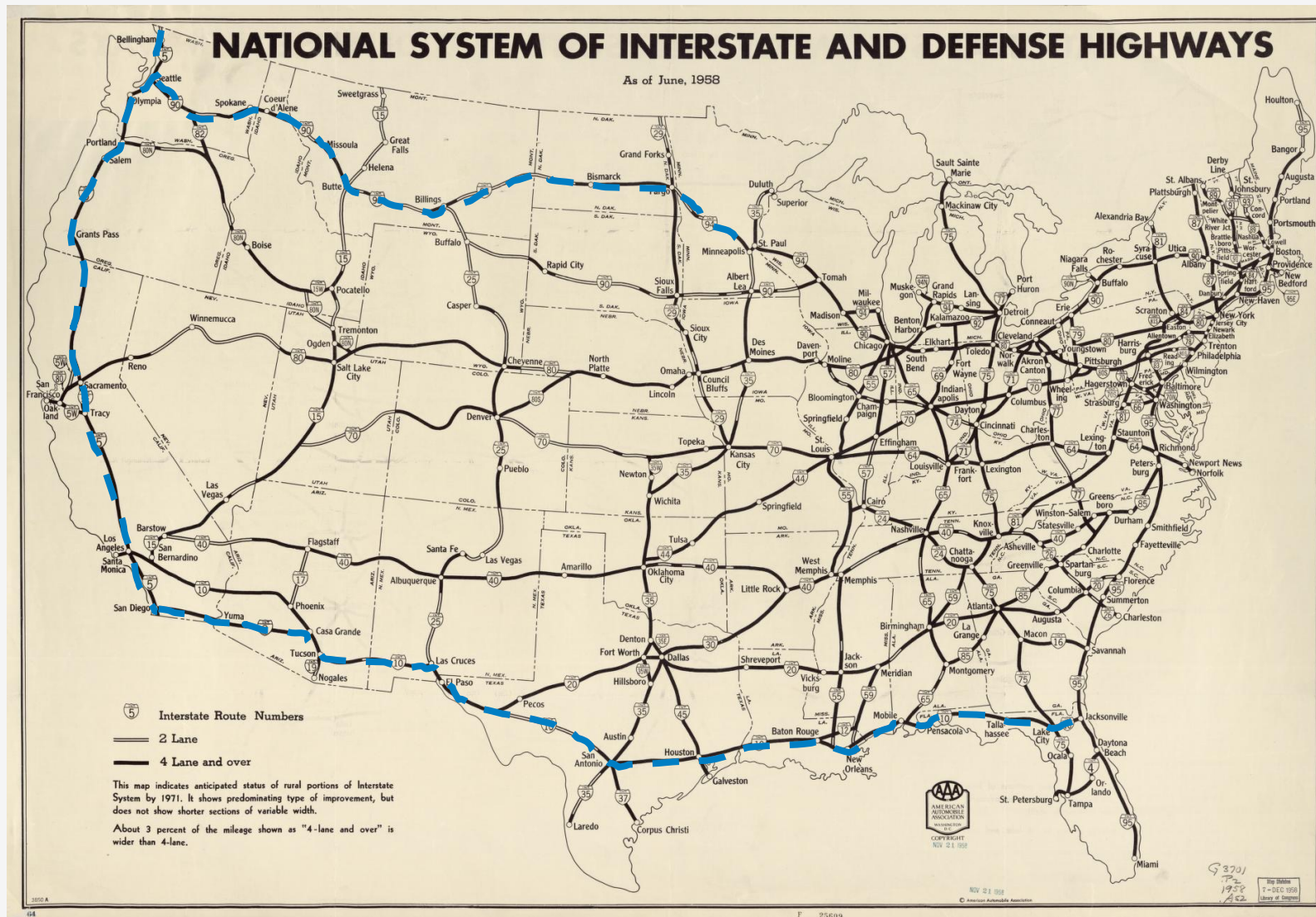


Petra Nova is an EPCAct05-subsidized slipstream project designed to capture 90% of 37% of the flue gas emissions of a single unit at a multi-unit power plant (240 MW equivalent at a 2,500 MW power plant)



SaskPower Boundary Dam is a 110 MW equivalent slipstream project at a facility with 824 MW total capacity

SECOND ELEMENT: Transport (assumed nationwide build)



Interstate Highway System

Length: 45,000 miles

Original estimate: 12 years, \$25B

Actual: 35 years, \$114B

CO2 Pipeline Needed (EERC):

Needed capacity: 66,000 miles

Current capacity: 5,339 miles

EPA deadline: 10 years

EPA assumes it will be possible to build the equivalent pipeline length of the Interstate Highway System plus 20,000 miles in LESS THAN 10 YEARS!

THIRD ELEMENT: CO₂ storage

- Practical challenges:
 - Nationwide geological reservoir exploration still ongoing
 - Many coal-fired power plants are distant from CO₂ storage locations
 - Feasibility: Feasibility and site characterization requires at least 2.5 years
 - Pore space leasing: Most states lack rules and regulatory framework
- Legal/regulatory:
 - Class VI permitting: only North Dakota, Wyoming, and Louisiana have received primacy for approving CO₂ storage (average permit approval: 4.5 years)
 - EPA permitting:
 - 98 Class VI permit applications waiting for approval
 - EPA has only approved 2 permits, with average process time of 6.5 years
 - Yet in Final Rule, EPA asserts it will be approve permits within 2 years



North Dakota Perspective on Federal Regulatory Trainwreck

Jonathan Fortner
VP of Government Affairs
Lignite Energy Council
May 14, 2024

Threats to North Dakota Lignite

The EPA Regulatory Trainwreck and other radical rules...

- Attempts to regulate outside MN's borders
- Disrupts economic synergy between North Dakota and Minnesota
- Disregards companies' progress to implement CCS on realistic timelines
- Similar concept has already been ruled illegal by courts
- Expected to cause increased rates for many ratepayers

- Based on flawed risk assessment
- Ignores principles of cooperative federalism
- North Dakota sites have met all requirements under an EPA-certified program
- EPA has refused to approve pending extension requests for facilities that have complied with the requirements
- EPA has refused to approve state permitting programs and is attempting to enforce more stringent requirements

- EPA is weaponizing a visibility rule to force unlawful standards
- Data shows wildfires are most significant factor in visibility impairment, not lignite plants
- North Dakota has never been in non-attainment of Natural Ambient Air Quality Standards
- North Dakota lignite plants invested billions of dollars in environmental upgrades
- Replaces North Dakota engineers, policymakers and regulators with EPA's Washington, DC bureaucrats

- Ignores the Department of Energy's own technology development timeline
- Illegally requires pre-commercial, still-experimental technology
- Achieves no measurable impact on global CO₂ levels
- Increases costs to ratepayers
- Studies show it will result in blackouts

- The EPA's own data shows no measurable health benefit
- Ignores EPA's own determination that lignite requires its own subcategory
- Expected to cost consumers more
- Expected to lead to significant plant closures
- Models show significant risk of increasing blackouts

- The EPA's unelected, unaccountable bureaucrats have failed to consider the socio-economic impact this would have on the people of North Dakota
- The EPA continues to use inaccurate technical data to justify their litany of new rules
- The EPA failed to conduct meaningful outreach to states or industry
- The EPA did not consider the impact of its rules on reliability of the electric grid
- The EPA continues to ignore reliability, resilience and technological readiness

Minnesota Carbon Free
• Rules final mid-2024

Coal Combustion Residuals

Regional Haze

GHG/111 (Carbon Rule)

MATS

EPA

STOP DANGER AHEAD

- No final date available
- EPA has issued disapprovals
- Litigation underway

- State SIP submitted
- Lawsuit filed to force review

• Final estimated April 2024

• Final estimated April 2024



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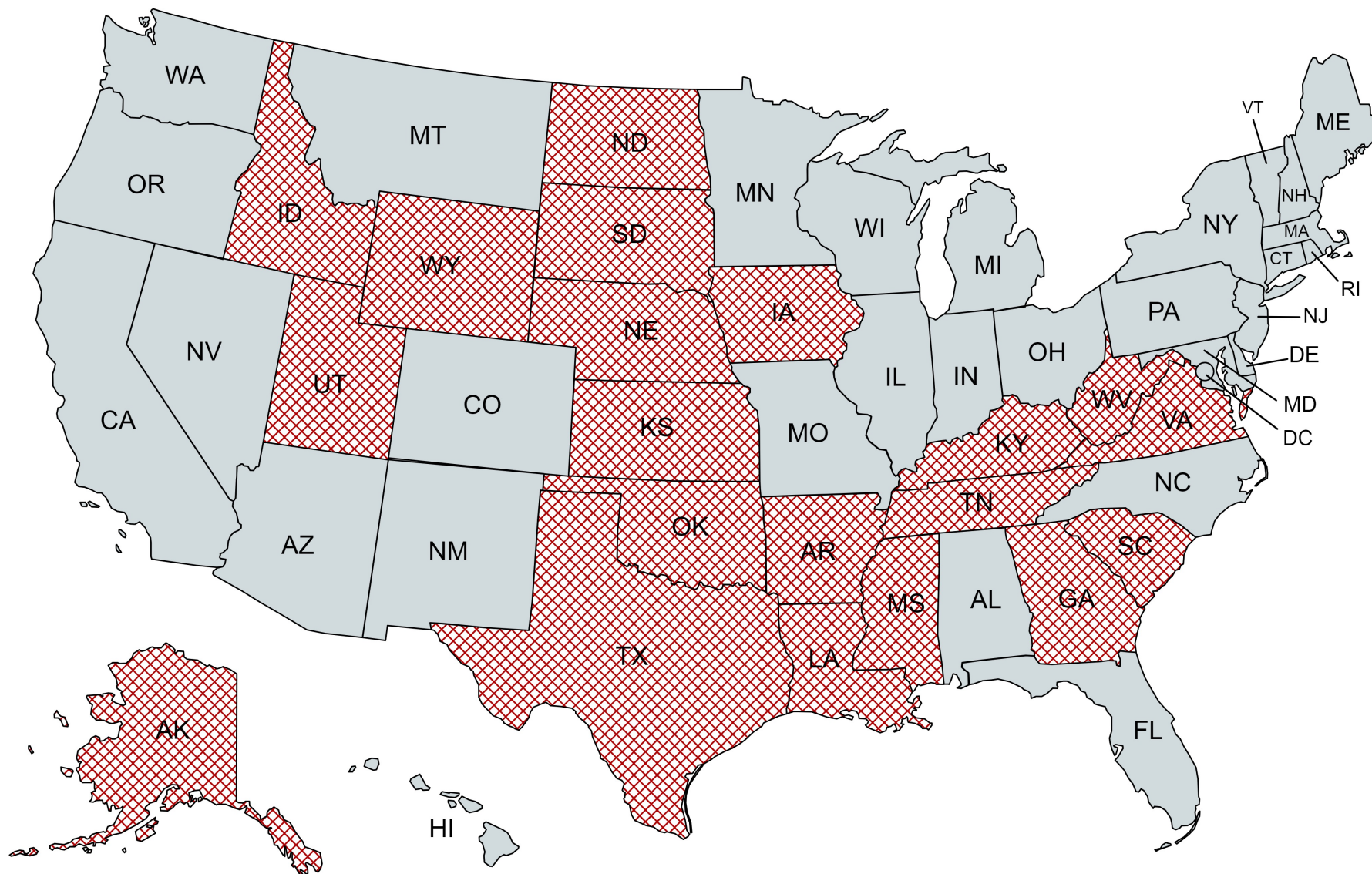


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MATS

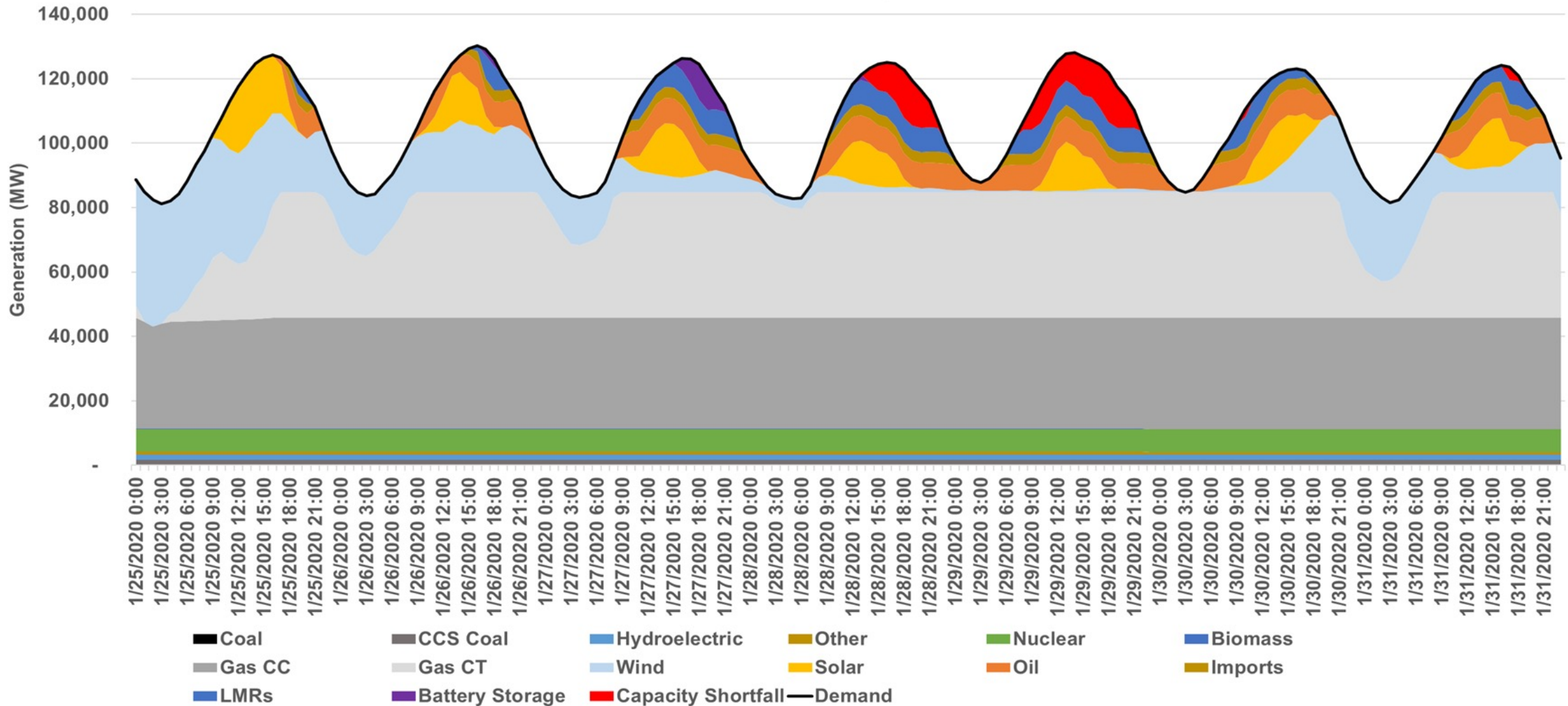
- Central piece of the MATS proposal is to eliminate the sub-category for lignite, which has different chemical properties from other types of coal
- EPA is proposing performance standards that have been documented to not be achievable using North Dakota lignite
- Therefore, this rule is specifically targeting North Dakota as other states that utilize lignite blend their coals to lower emissions
- EPA's own data shows no health benefits from eliminating the lignite subcategory

MATS rule litigation: State & non-state litigants



MATS Grid Study

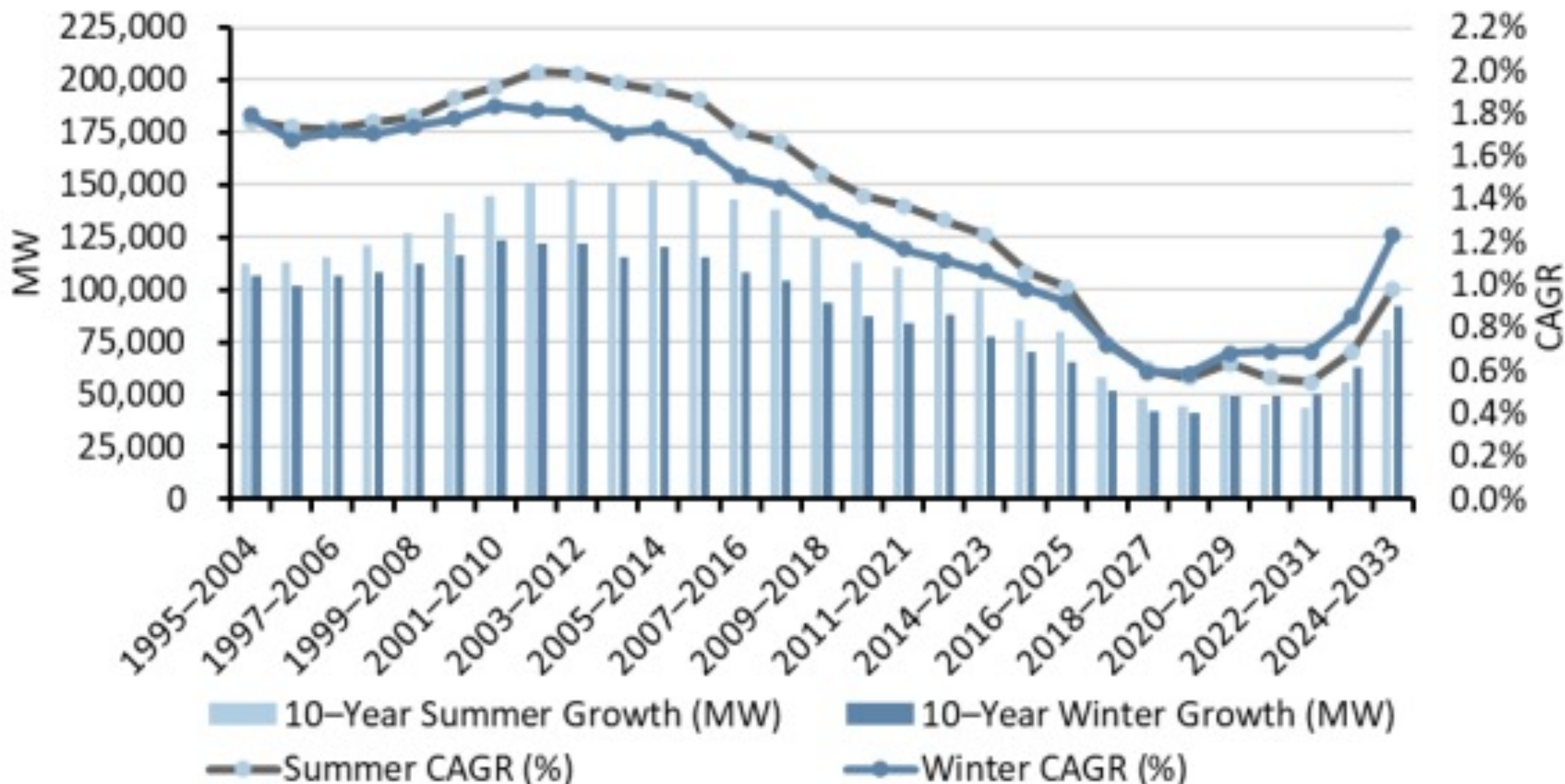
Capacity Shortfall Events in EPA Model Year 2040 Using 2020 Historical Demand and Wind and Solar Capacity Factors



The Coming Reliability Crisis & Flaws in EPA's Grid Modeling



The era of flat demand is over

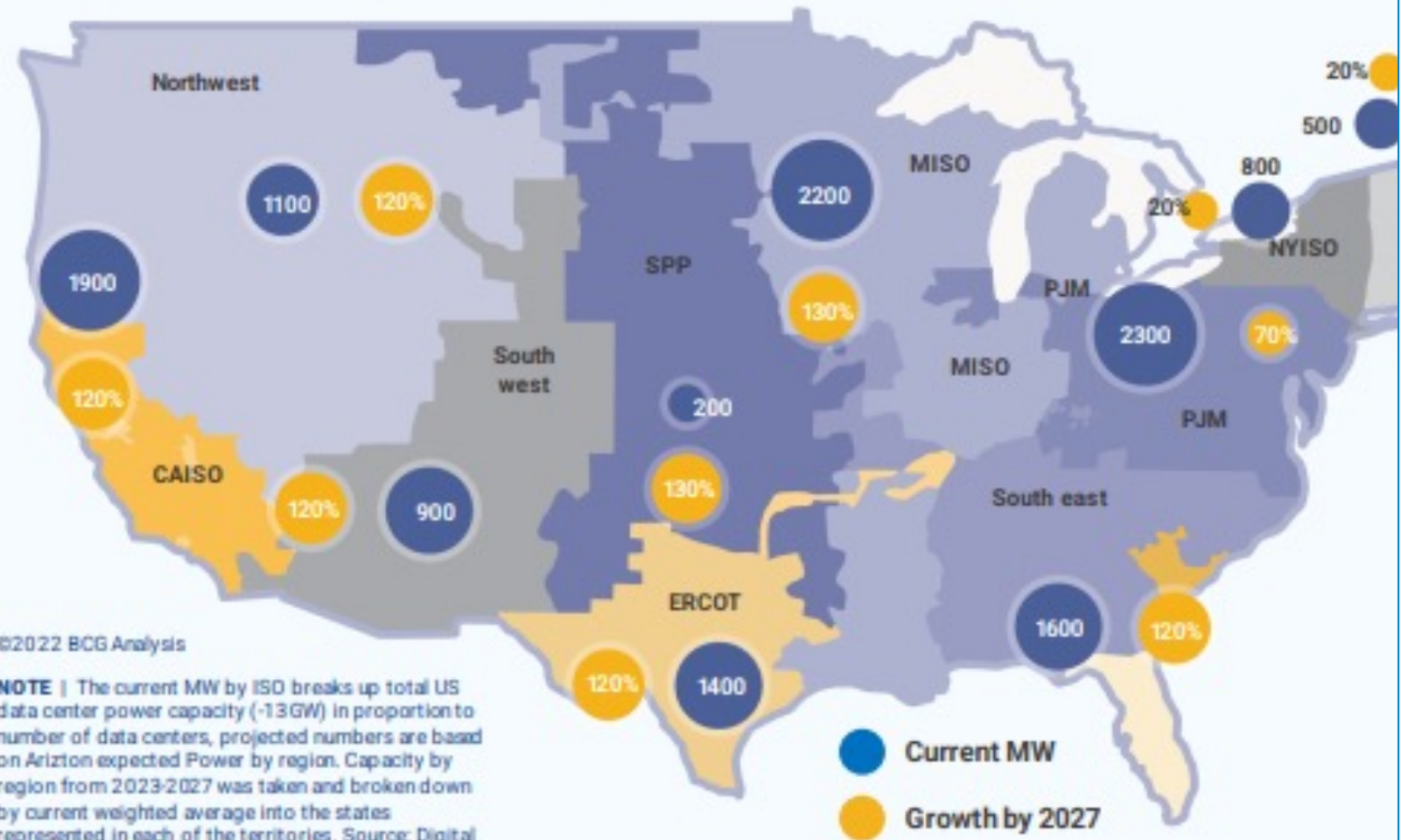


2022-23: Planners **doubled** the 5-year load growth forecast (from 22GW to 38 GW)

5-year Nationwide Growth Forecast



>60% of Data Centers Expected in MISO, CAISO, PJM, and Southeast by 2027



SOURCES | Arizton, [US Data Center Construction Market – Industry Outlook and Forecast 2023-2028](#) (February 2023)
Avelar, Victor et. al., [The AI Disruption: Challenges and Guidance for Data Center Design](#) (September 2023).
Boston Consulting Group, [The Impact of GenAI on Electricity](#) (September 2022).
JLL, [North America Data Center Report](#) (H1 2023).
Mordor Intelligence, [U.S. Data Center Construction Market Size](#) (2023).

EPA's Own Grid Analysis Shows Major Problems When Corrected for Accreditation Errors Relative to What RTOs Use in the Real World

- EPA did not even begin to conduct a grid reliability study to look at hourly variability in electricity supply and demand (although it did conduct annualized resource adequacy).
- EPA makes indefensible assumptions about how much power renewable energy sources will actually produce when the sun does not shine and the wind does not blow.
- EPA's grid will produce wide-scale power outages.
- EPA has set the country on a collision course that will make it impossible for the grid to support current needs, let alone support economic growth.

EPA's indefensible accreditations for intermittent resources

MISO vs EPA Capacity Accreditation for Wind Resources

Resource	Planning Year 2024-25	2028	2030	2035	2040	2045	2050	2055
MISO Average Solar	38.75%	7.5%	7.5%	4.5%	4.5%	4.5%	4.5%	4.5%
EPA Existing Solar	N/A	24%	24%	24%	19%	19%	19%	19%
EPA New Solar	N/A	39%	50%	52%	40%	34%	33%	30%
% Difference: MISO vs EPA Existing	N/A	220%	220%	433%	322%	322%	322%	322%
% Difference: MISO vs EPA New	N/A	420%	567%	1056%	789%	656%	633%	567%

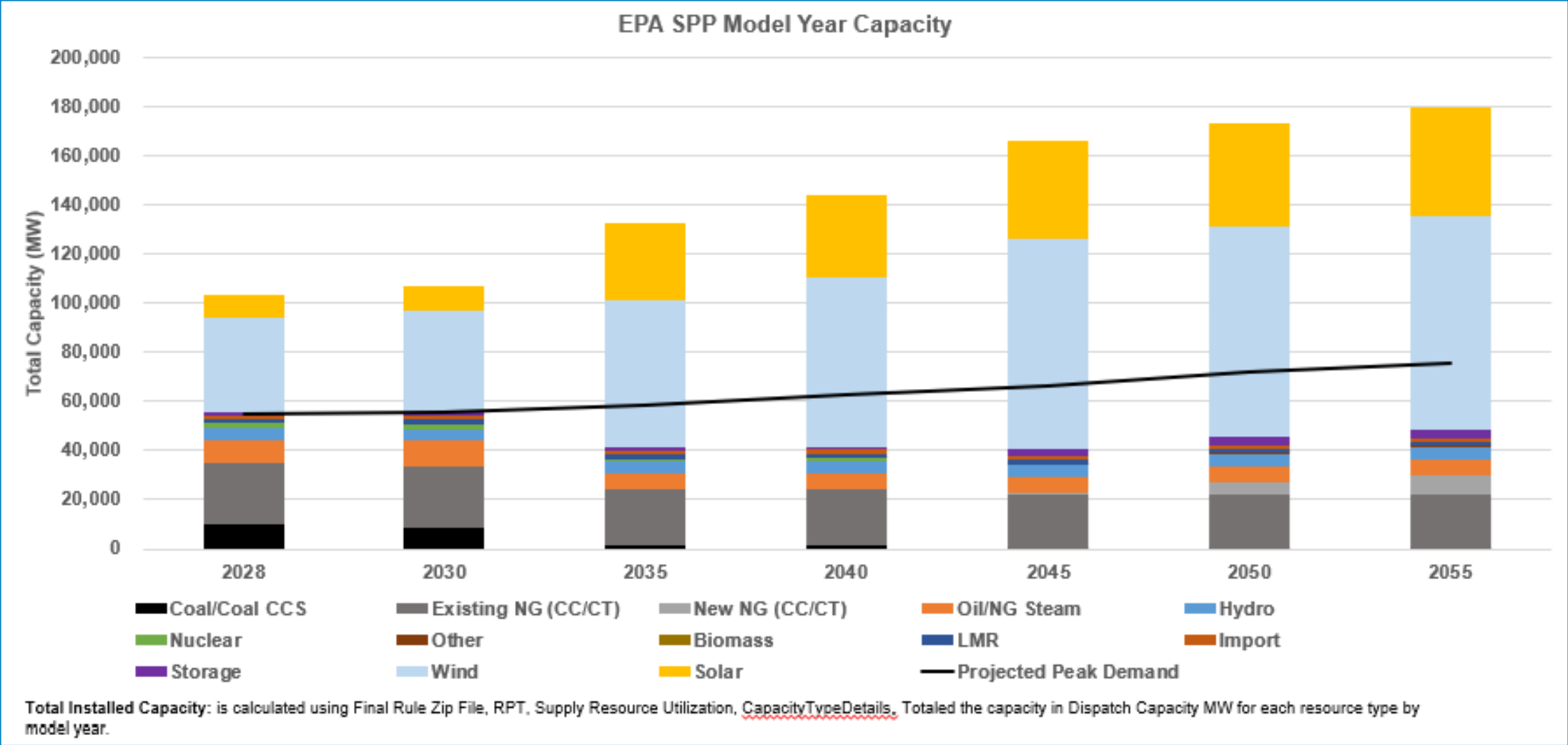
MISO vs EPA Capacity Accreditation for Wind Resources

MISO Average Wind	26.2%	12%	12%	11%	11%	11%	11%	11%
EPA Existing Wind	N/A	14%	14%	14%	20%	20%	20%	20%
EPA New Wind	N/A	16%	23%	15%	10%	9%	9%	9%
% Difference: MISO vs EPA Existing	N/A	17%	17%	27%	82%	82%	82%	82%
% Difference: MISO vs EPA New	N/A	33%	92%	36%	-9%	-18%	-18%	-18%

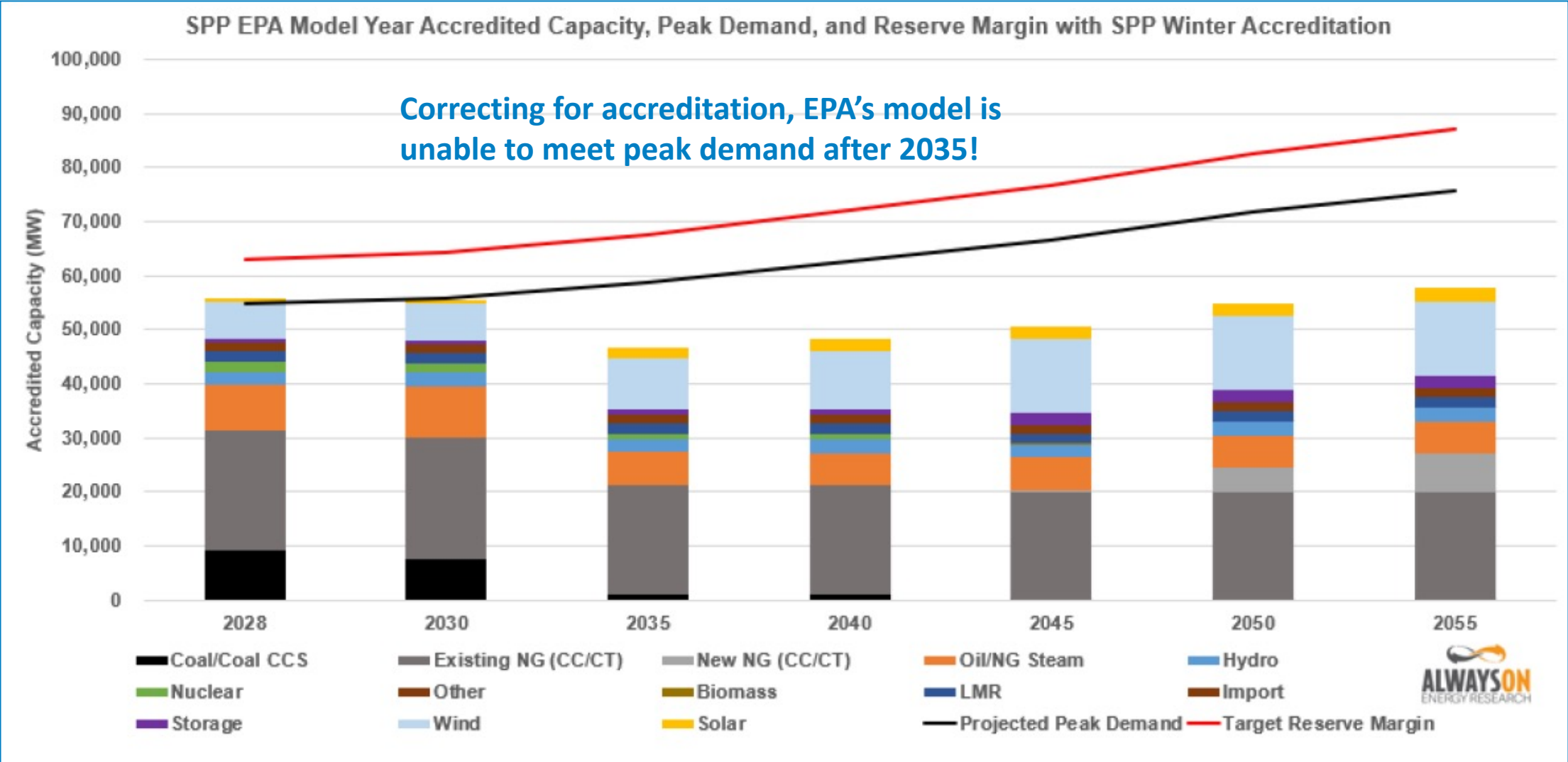
SPP EPA Final Rule Model Year Accreditation for Existing and New Wind and Solar Resources

Resource	2028	2030	2035	2040	2045	2050	2055
Existing Wind	10%	10%	10%	10%	10%	10%	10%
New Wind	14%	52%	21%	26%	18%	18%	19%
Existing Solar	82%	82%	82%	82%	82%	82%	82%
New Solar	100%	100%	84%	84%	83%	83%	83%

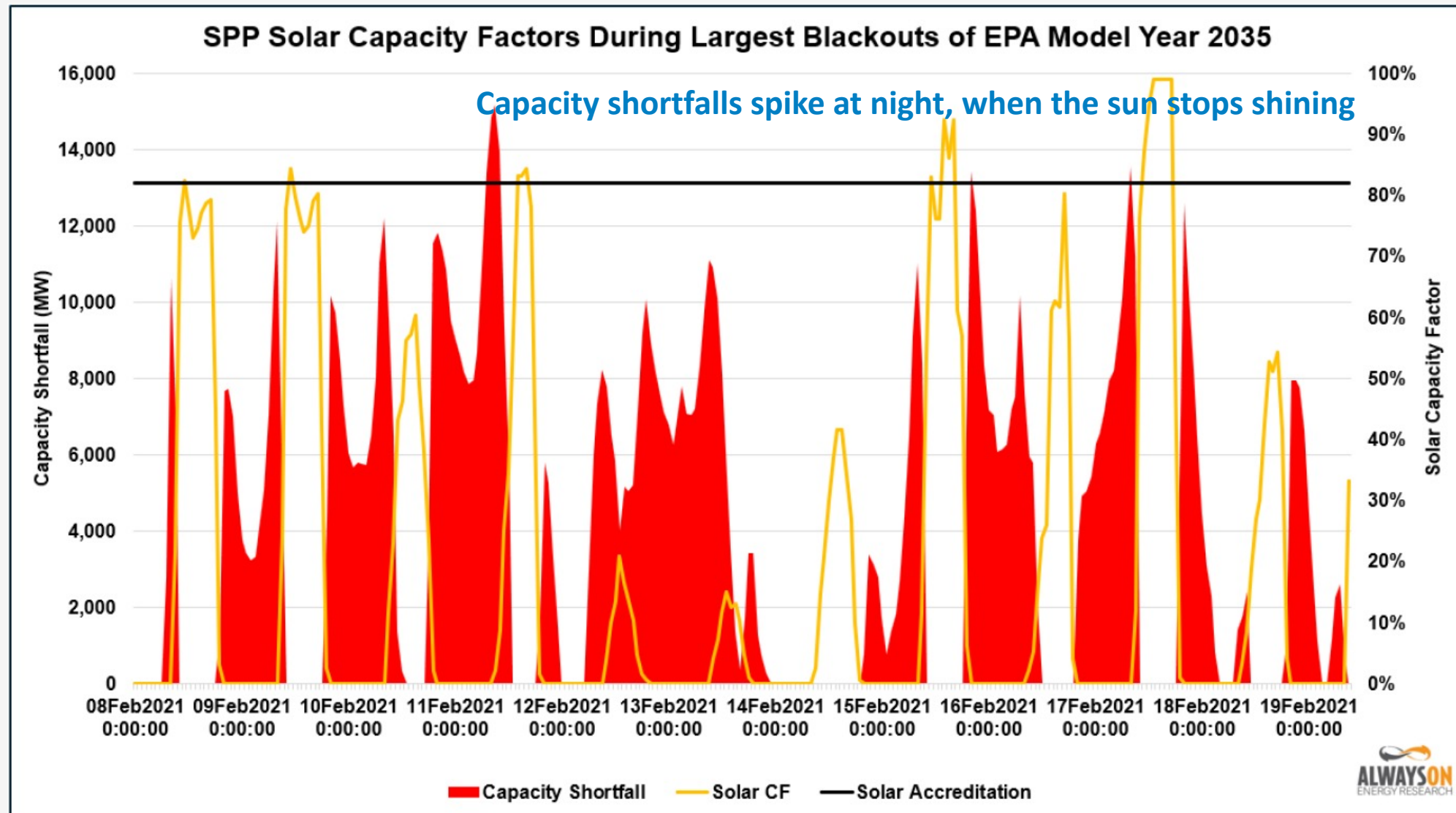
EPA's Assumed SPP Resource Adequacy Given Flawed Accreditation



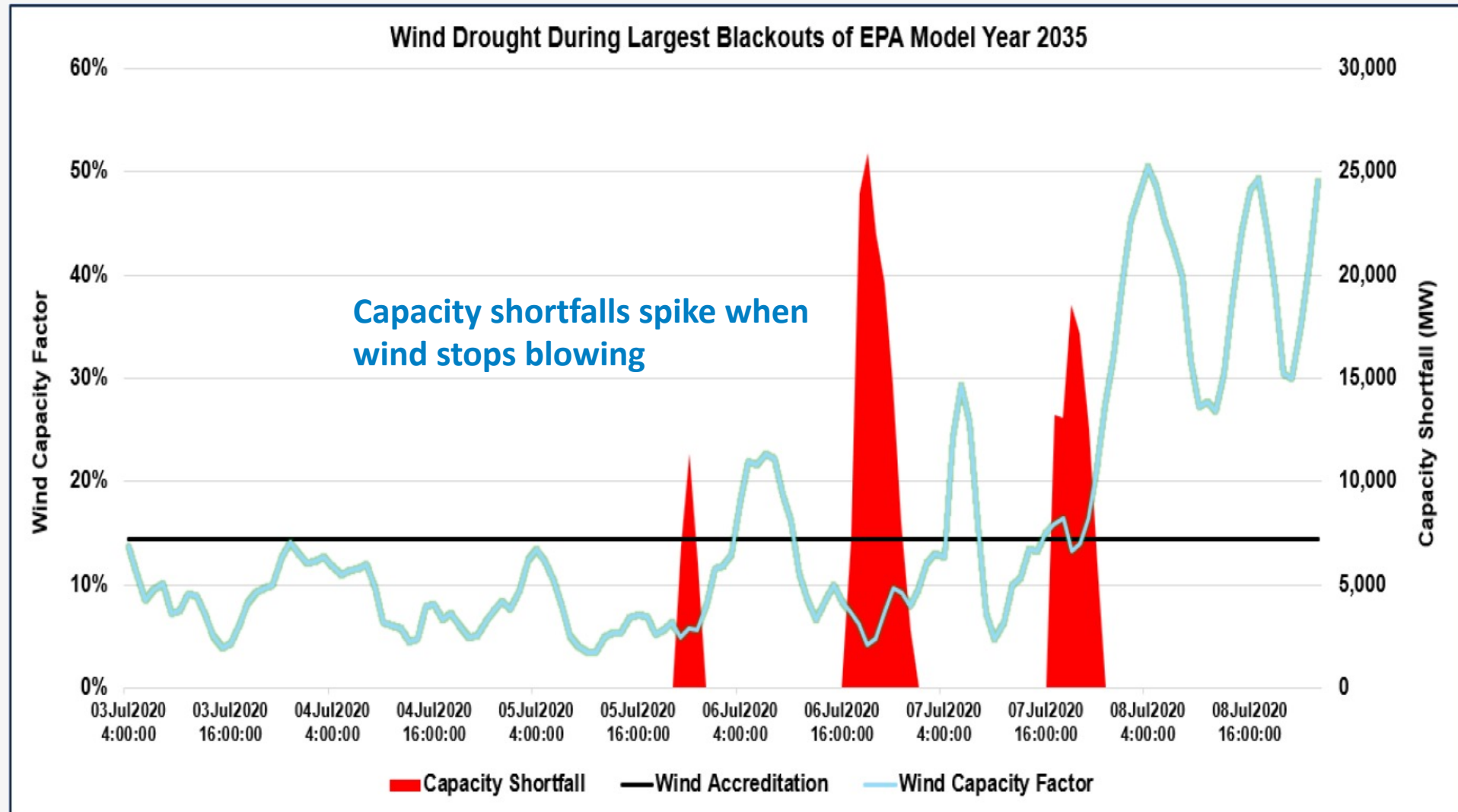
EPA's SPP Resource Adequacy Mode with Accreditation **Corrected**



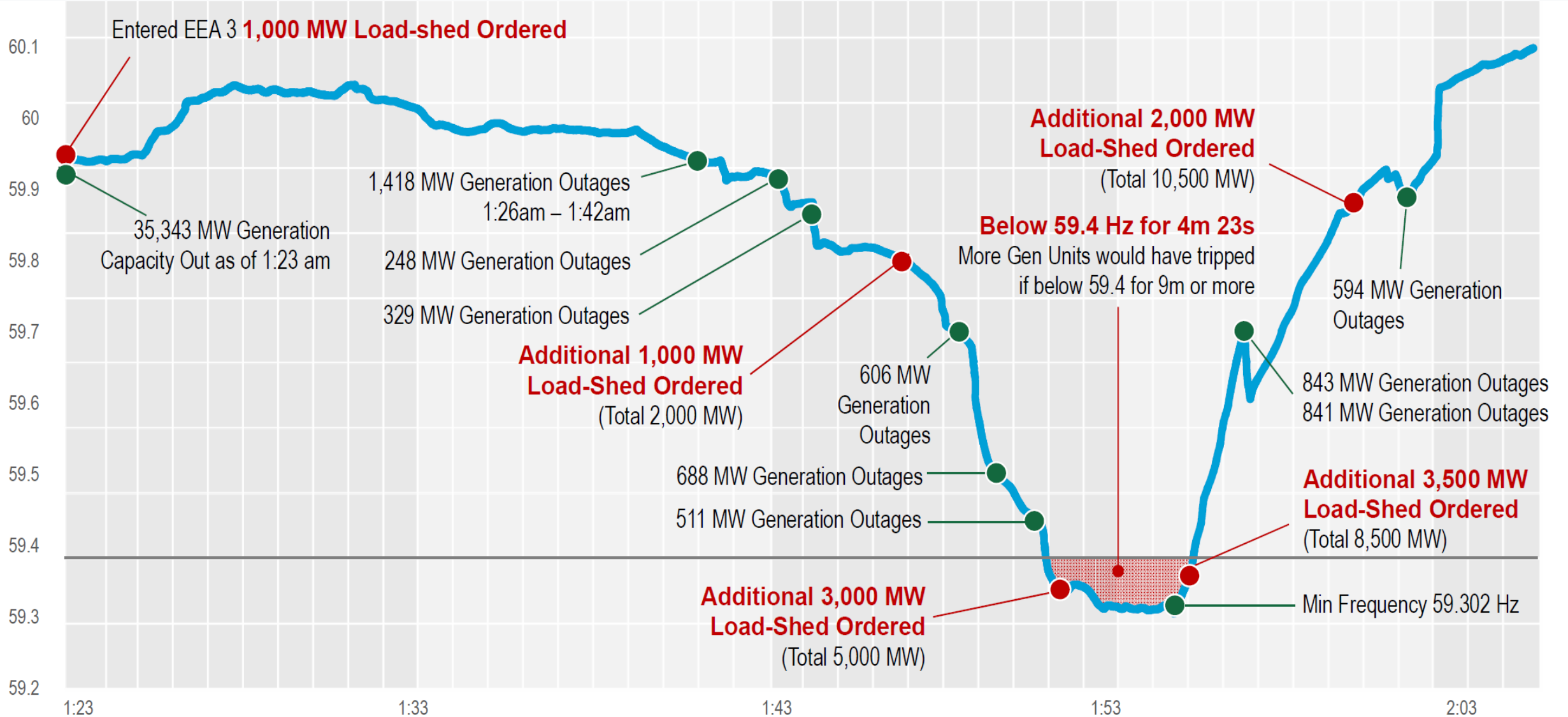
SPP winter power outages vs. solar nightly shortfalls



MISO summer power outages correlate directly to wind shortfalls




LEST WE FORGET: The Night the Texas Grid Almost Went Down for a Month – *(Would Have Been Largest Energy Disaster in History)*



CCUS Timeline

- 1993:** North Dakota Legislature adds carbon dioxide pipelines to the definition of common carrier pipelines which includes crude petroleum, gas and coal and prohibits discrimination between shippers in facilities furnished, service rendered or rates applied. Carbon dioxide is also added to the definition of transmission facilities under gas or liquid transmission lines.
- 2000:** Dakota Gasification Company's Great Plains Synfuels Plant begins sending carbon dioxide through a 205-mile pipeline to Saskatchewan, Canada, where oil companies use it for enhanced oil recovery operations that result in permanent geologic sequestration. From 2000 to present day, the plant has captured and transported more than 40 million metric tons of CO₂ for geologic sequestration.
- 2002:** Interstate Oil and Gas Compact Commission (IOGCC) task force established to study CO₂ storage and the role of the states.
- 2008:** Federal Energy Improvement and Extension Act added tax credit for carbon dioxide sequestration. The legislation included several provisions designed to encourage cleaner, more efficient, and environmentally responsible use of coal specifically, and GHG emissions reductions broadly.

CCUS Timeline

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- 2009:** North Dakota Legislature creates Chapter 38-22 and 47-31 authorizing the regulatory and legal regime for geologic storage of CO₂, defining pore space ownership and setting up long-term liability laws.
- 2010:** Administrative Rulemaking implementing the law and creating a new chapter in the administrative code, NDAC chapter 43-05-01 Geologic Storage of Carbon Dioxide, making North Dakota the first state in the nation with a complete and comprehensive legal and regulatory framework in place for CO₂ storage. EPA Class VI final rule published December 10, 2010.
- 2011:** Legislative Management Study to review carbon dioxide storage easements and duration of easements. North Dakota Legislature appropriations committee appropriated (HB 1014) \$532,000 from the general fund to the Carbon Dioxide Storage Facility Administrative Fund and directed the NDIC's Oil and Gas Division to create one full-time position for up to three years or until fee income is sufficient to provide funding for the administration of the provisions of NDCC Chapter 38-22 with the goal of this position to apply for and obtain Class VI Primacy.
- 2013:** North Dakota Oil and Gas Division rulemaking to amend NDAC Chapter 43-05-01 to meet the stringency of the EPA Class VI regulations, with rule changes effective April 1, 2013. Class VI wells uniquely designed to protect underground sources of water and are for used for the geologic storage of carbon dioxide. On June 21, 2013 North Dakota files application with EPA for Class VI primacy.

CCUS Timeline

- 2015:** North Dakota Legislature exempts carbon dioxide capture equipment uses for enhanced oil recovery from sales and use taxes.
Legislative Management Study passed that considers the potential benefits and costs to industry, state and environment in using carbon capture enhanced recovery methods.
- 2017:** North Dakota Industrial Commission approves Lignite Research Program's creation for Advanced Energy Technology Fund to accelerate the deployment of carbon capture and other emerging technologies and ensure additional research dollars fund the most promising advanced projects.
North Dakota Legislature passes concurrent resolution requesting the Congress and the President of the United States to enact legislation to expand and extend the current federal tax credit for carbon capture, utilization, and storage under Section 45Q of the Internal Revenue Code; to provide appropriations to the United States Department of Energy sufficient to achieve and sustain a robust carbon capture research, development, demonstration, and deployment program; to support the inclusion of economically and environmentally beneficial carbon capture projects in any forthcoming federal infrastructure initiative; to support policies to increase the operational efficiency; and to support the preservation of a fuel-diverse electric generation portfolio critical to our domestic economic, energy, and national security.
- 2018:** North Dakota's Class VI primacy application approved by EPA effective April 24, 2018.
The Bipartisan Budget Act of 2018 expanded and extended the 45Q tax credit to include \$50 per ton for carbon sequestration and \$35 per ton for carbon captured for enhanced oil recovery. Changes included a start-of construction deadline and 12-year claim period instead of the 75 million metric ton cap; allowing the credit for CO2 utilization in addition to EOR; and allowing owners of carbon capture equipment to claim tax credits instead of the person capturing the CO2, which created flexibility in ownership structures facilitating tax equity investment.
The North Dakota Industrial Commission through the Lignite Research Council approves a \$15 million grant to Minnkota Power Cooperative to fund a preliminary study regarding Project Tundra at the Young Station. The money leads to another \$9.8 million grant from the Department of Energy in 2019.


CCUS Timeline

- 2019:** North Dakota Legislature exempts carbon dioxide for geologic storage from property taxes and sales and use taxes and incentivized the use of anthropogenic carbon dioxide for enhanced oil recovery. The bill also sets authorizes a fee structure for captured carbon dioxide injections, with an exemption for projects that produce carbon dioxide from coal and is located outside of the Bakken and Three Forks formations. (HB1439)
- 2020:** The North Dakota Industrial Commission through the Lignite Research Council approved another \$5 million grant to Minnkota Power Cooperative to allow for the evaluation of additional geologic storage of CO₂ in underground formations adjacent to the plant and the nearby Center Mine, owned by BNI Energy, as a near-term option.
- 2021:** Internal Revenue Service issued final regulations for claiming Section 45Q credits. Among the issues addressed in these regulations were requirements for “secure geological storage,” credit recapture, and taxpayers eligible to claim the credit.
- North Dakota Legislature authorizes the creation of the Clean Sustainable Energy Authority (HB1452) and funds \$25 million in grant opportunities and \$250 million in commercialization loan programs.
- Project Tundra (Minnkota Power) approved for \$100 million commercialization loan.
- Energy & Environmental Research Center awarded \$7 million grant for front-end engineering and design for carbon capture facility at Coal Creek Station
- North Dakota Legislature passes federal conformity to update Century Code to include “secure geological storage,” for 45Q tax credits following IRS actions.

CCUS Timeline

- 2022:** North Dakota Industrial Commission approves Class VI storage facility applications for Minnkota Power Cooperative's Project Tundra. Minnkota and the UND Energy & Environmental Research Center developed two compliant applications that met all of the regulatory and financial assurance requirements the State has established for geologic storage of CO₂. This is the second Class VI storage facility permit application approved in North Dakota, following Red Trail Energy Ethanol Plant.
- Red Trail Ethanol becomes the first commercial storage project permitted under state Class VI primacy to begin injecting carbon dioxide in June 2022.
- Inflation Reduction Act increases 45Q federal tax credit from \$50 per ton to \$85 per ton for sequestration, from \$35 per ton to \$60 per ton for enhanced oil recovery and permits the direct-pay of the tax credits to nonprofit electric cooperative utilities.
- 2023:** North Dakota Legislature approves additional funding to the Clean Sustainable Energy Authority (HB1014) for \$25 million in grant opportunities and \$250 million in commercialization loan program.
- Project Tundra (Minnkota Power) approved for \$150 million commercialization loan.
- Legislature creates Carbon Capture Education program under the North Dakota Industrial Commission (HB1014) to contract for carbon capture and utilization education and marketing in consultation with three \$100,000 contributions from Lignite Research Council, the Oil and Gas Research Council, and the Renewable Energy Council.
- Legislature defeated eleven bills that attempted to limit the ability for the state to regulate and provide economic certainty to carbon capture projects.

CCUS Timeline

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- 2023:** NDIC approves Lignite Research, Development and Marketing Program matching grant for \$6,119,690 to co-applicants University of North Dakota (UND) and EERC for development of a carbon capture storage complex for Coal Creek Station.
- NDIC approves fourth Class VI carbon capture and storage project for Blue Flint Ethanol to geologically store carbon dioxide from their ethanol facility located in McLean County.
- NDIC approves the Clean Sustainable Energy Authority grant for the Commercial Deployment of Carbon Dioxide Capture & Geological Sequestration in McLean County. This project will capture emissions from the Blue Flint Ethanol facility and permanently store them underground within secure saline formations. The successful completion of this project will demonstrate that CO₂ can safely and efficiently be stored in McLean County.
- NDIC approves additional \$150M commercial loan funding for Project Tundra.
- NDIC approves second Project Tundra CO₂ storage permit. The Dakota Carbon Center West storage facility has the capacity to store 122 million metric tons of CO₂ over a 20-year period. Combined with the already permitted Dakota Carbon Center East facility, Minnkota has the capability to store 222 million metric tons of CO₂ over two decades in Oliver County.
- US Department of Energy selects Project Tundra as a recipient of Bipartisan Infrastructure Law funding through its Carbon Capture Demonstration Projects Program. The funding is under award negotiation for up to \$350M.
- 2024** NDIC approves \$300,000 grant to Bismarck-based firm AE2S to develop education and marketing plans for carbon capture and utilization. AE2S will be tasked with developing a strategic plan to help explain to the public the benefits of carbon capture, like enhanced oil recovery and the process of injecting materials like Carbon Dioxide to obtain more oil underground.

Geopolitical Energy Reality Check



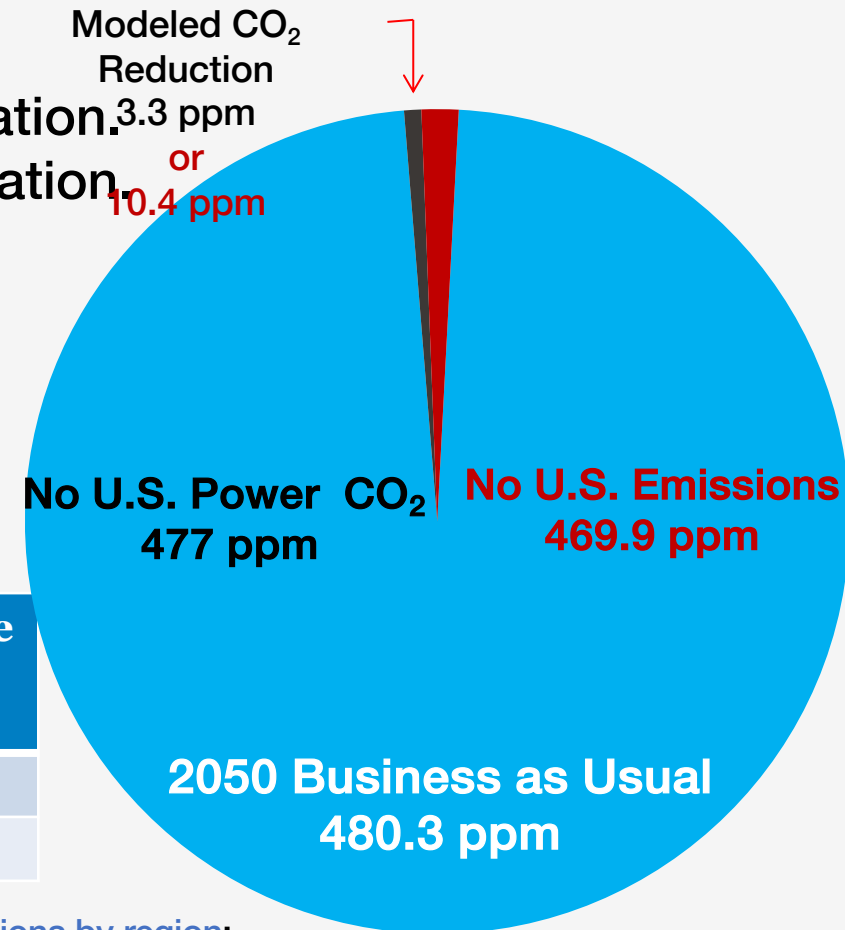
Abandoning U.S. Coal & Capping Gas Does NOT Move the Needle – Global Deployment of Market-based CCUS Will

2050 IMPACT OF DECARBONIZING ELECTRICITY:

- NO COAL FLEET = 2.06 ppm (0.4%) reduction in CO₂ concentration.
- NO FOSSIL FLEET = 3.3 ppm (0.7%) reduction in CO₂ concentration.
- Modeled global temperature reduced by a mere 0.016°C.

2050 IMPACT OF DECARBONIZING ENTIRE U.S.:

- 10.4 ppm (2.2%) reduction in CO₂ concentration.
- Modeled global temperature reduced by 0.053°C.

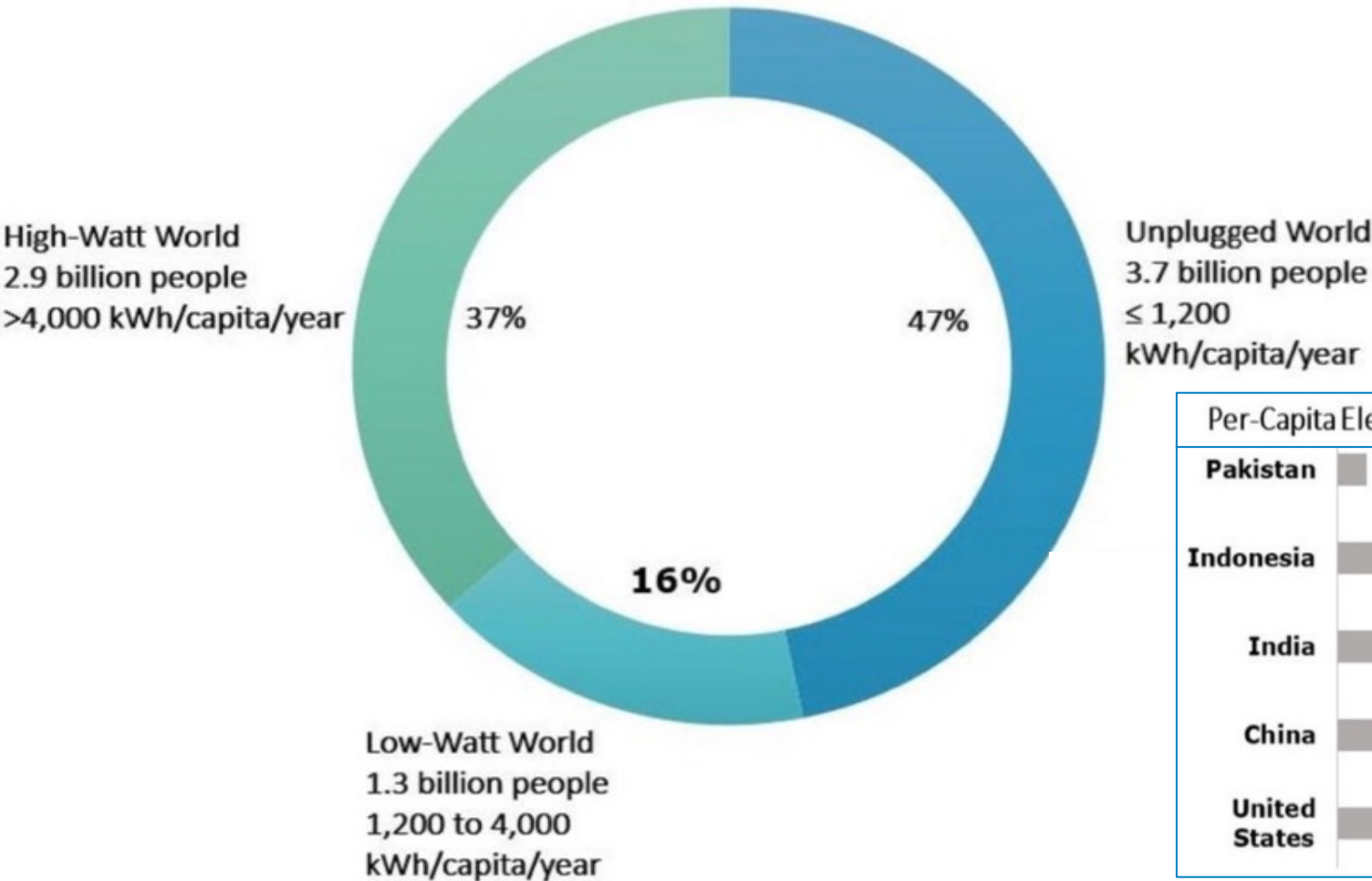


CO ₂ Emissions	2010	2020	2030	2040	2050	% Change
World	30,834	34,972	36,398	39,317	42,771	+38.7%
U.S.	5,571	5,260	4,839	4,867	5,071	-8.9%

Sources: Energy Information Administration, International Energy Outlook 2017, [World carbon dioxide emissions by region](#); [MAGICC6 Model](#); Intergovernmental Panel on Climate Change Fifth Assessment Report Working Group I, [Summary for Policymakers](#); National Oceanic and Atmospheric Administration [Global Land and Temperature Anomalies](#).

Why is global energy (and coal use) rising? The world is energy starved.

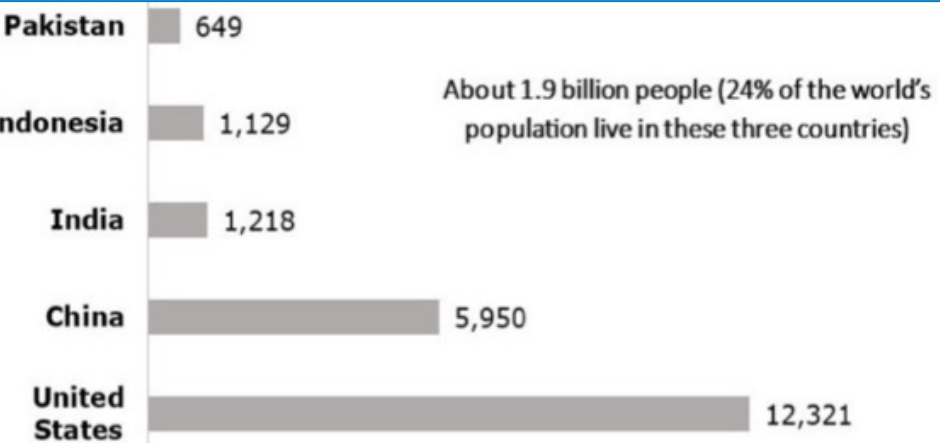
63% of the world desperately needs power!



Large U.S. kitchen refrigerator
1,200 kWh/year

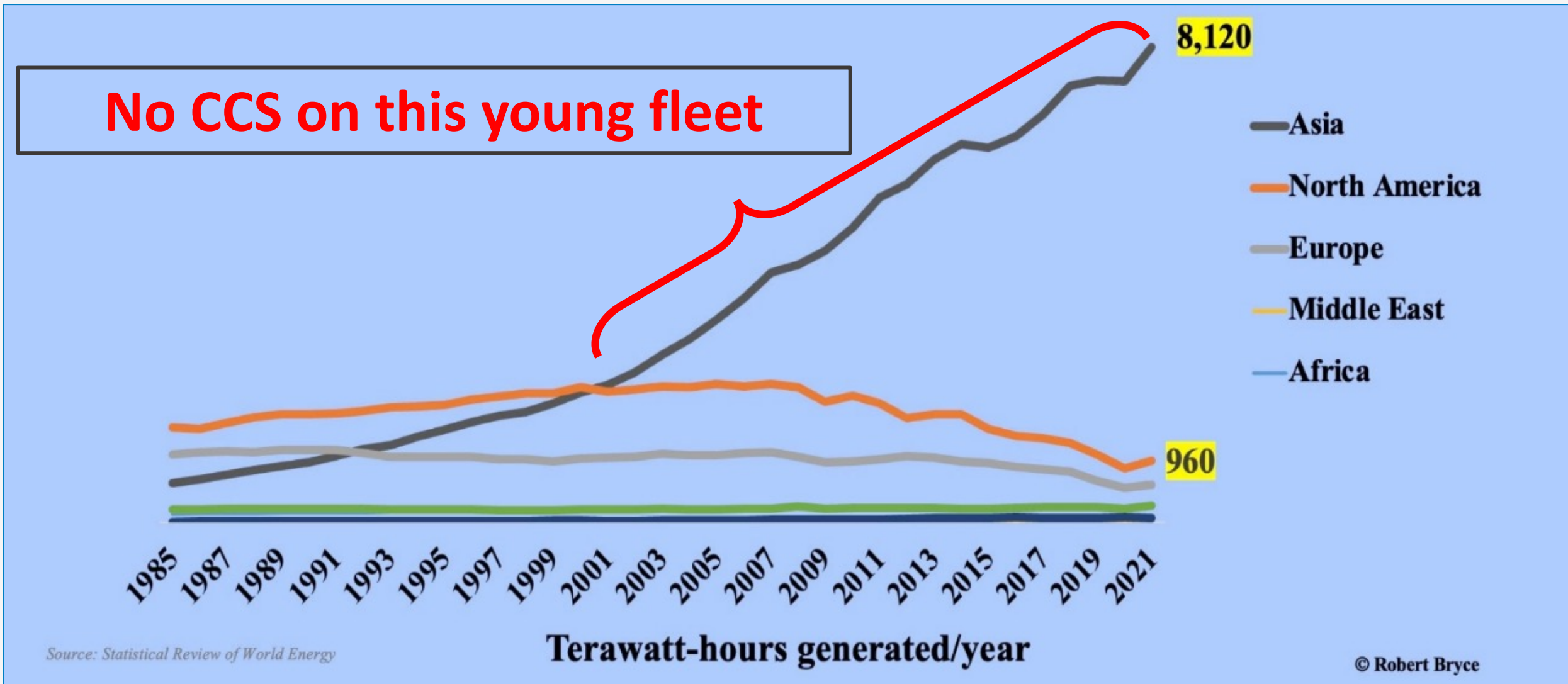
Global average
≈3,500 kWh/capita/year

Per-Capita Electricity Generation, Five Most-Populous Countries, 2021



Sources: Our World in Data, author calculations

The Global Power Fleet Emissions Story is NOT an American One



Questions

