The Net-Negative CO_2 Baseload Power Initiative

Coal's Role in the Emerging Energy Trilemma

American Coal Council
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Net-Negative CO_2 Baseload Generation Technology

- Established in June, 2021 as a 501(c)(6)
- The Team

Steve Winberg
Chairman & CEO

Ken Humphreys
Treas. & Sec.

Fred Palmer
Senior Consultant

- Our Members
  - CONSOL Energy
  - Peabody
  - PFBC-EET

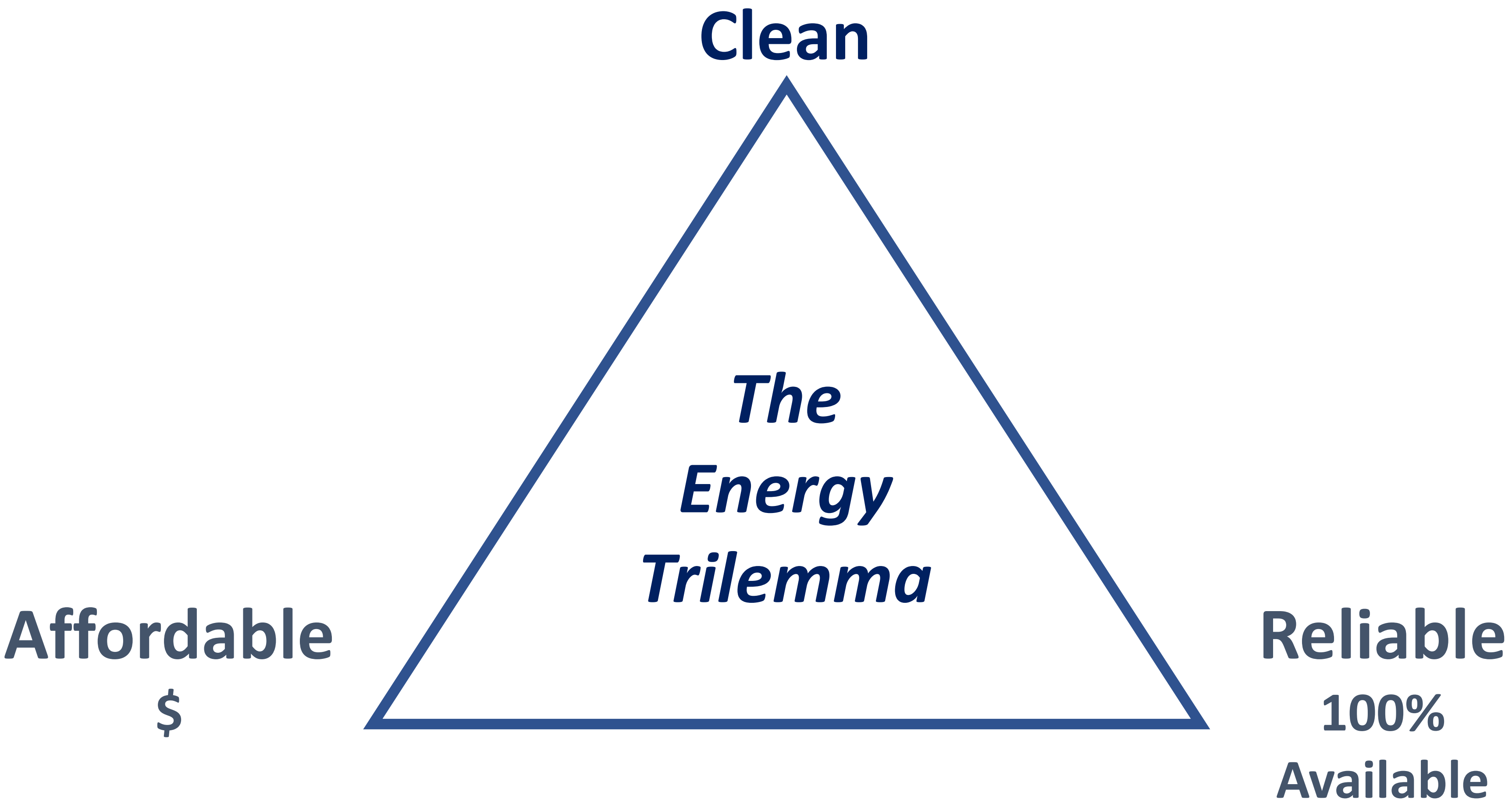
Situation Assessment – What I told you last year

Still the facts

- Coal is not the problem – CO_2 is the problem – but coal opponents have demonized coal and the public largely accepts this demonization
- India and China came to coal's defense at COP26. Small word changes matter:
  - "Phase down" not "Phase out"
  - Unabated coal, not all coal
- An Administration change in three years is unlikely to substantially mitigate ESG, shareholder, State and international pressures that work against conventional coal.
- Coal opponents are well-funded, getting "richer", and view any coal win as a temporary stay of execution.
- The net effect of expanded renewable tax credits, renewable portfolio standards and other renewables incentives are reducing coal plant dispatchability and degrading the investment returns on coal power projects.
- EPA is ramping up its regulatory assault on coal – both production and use.
- Power producers are moving away from coal.
- The coal industry needs to continue its defense, but defending the status quo is not enough.
- Offense is needed – Coal needs to be "*For Something*".

What has Changed - ACC 2023

Energy Trilemma has reentered the energy lexicon



The Energy Trilemma

"Clean" Electricity

- Power producers are focused on renewables and now, small modular reactors
- IRA provides production tax credit up to 3.3 cents/kWh & 30% Investment tax credit
- Renewables are intermittent, but IRA does not require back-up storage capability
- Nuclear is expensive - permitting and siting challenges

Reliable Electricity

- People expect the lights to come on when they flip the switch
- Manufacturing is not sustainable if electricity is not 24x7
- NERC - >70% of U.S. grid is at risk
- PJM – last month sounded a new warning

Affordable Electricity

- In 2022, average electricity prices rose 14.3% - more than double inflation.
- Press focuses on middle- and lower-income families paying their high utility bills
- Loss of manufacturing jobs is an even bigger challenge for middle- and lower-income families
- International Renewable Energy Agency estimates $131 T cost to reach 1.5C by 2050.

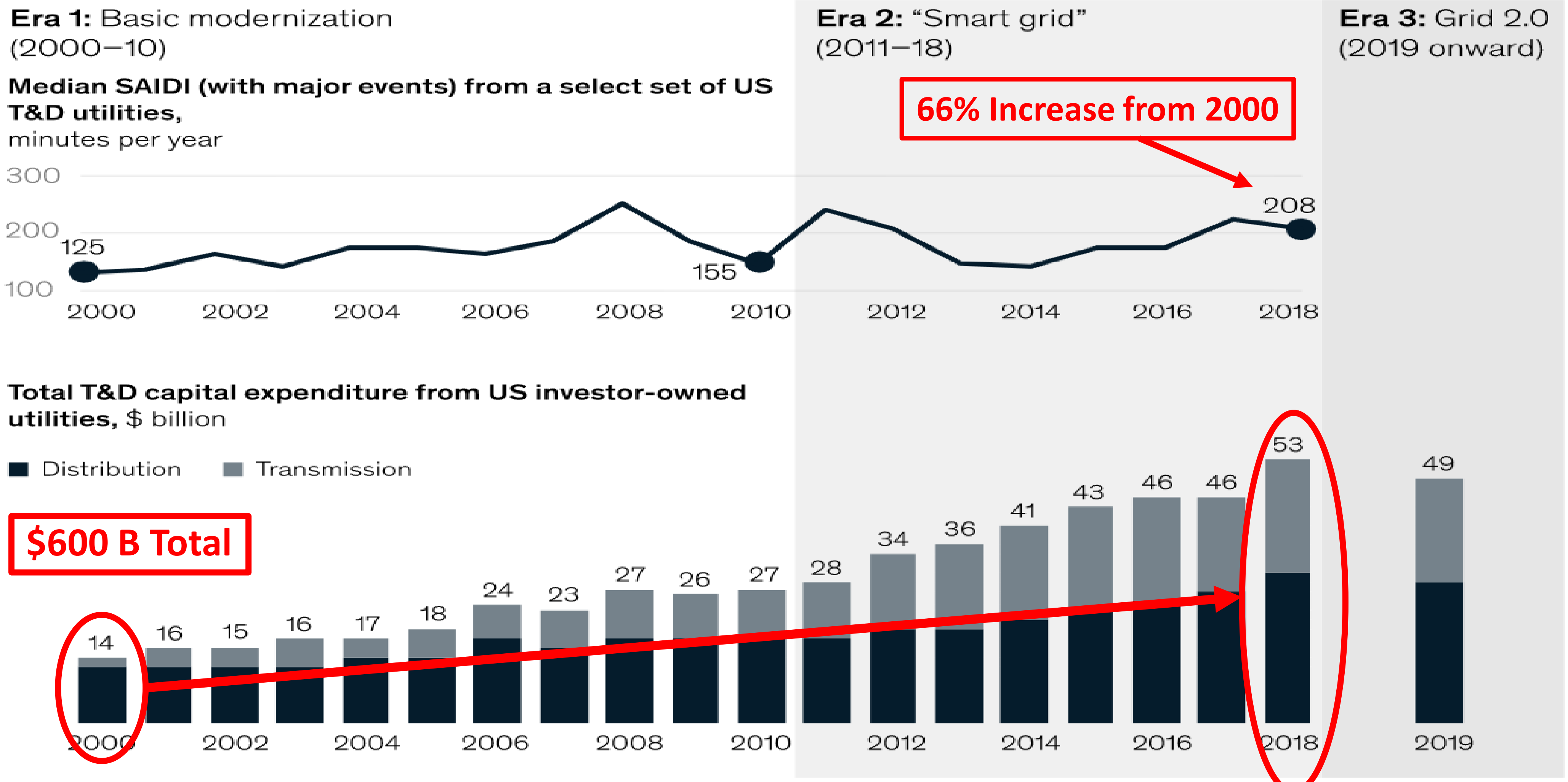
NERC 2022 Long –Term Reliability Assessment

10 Year Forecast

Figure 1: Risk Area Summary 2023–2027

System Average Interruption Duration Index (SADI) vs. T&D Investments

McKinsey Article (11/11/2020)



Source: ABB Energy Velocity, Energy Information Administration (post 2012 SAIDI data), Lawrence Berkeley National Laboratory (pre-2012 SAIDI data), Federal Energy Regulatory Commission (T&D capital spend data)

Coal History & Forecast

Year	Coal Consumption (Million Tons)	Capacity (GW)	Generation (Thousand MWH)	Capacity Factor (%)**	Capacity-Weighted Average Age (yrs.)
2007	1,045	313	2,016,450	73.5	
2013	861	304	1,581,115	59	
2022	506*	197****	816,000	47	51****
2030	234** **54% decline**	91***	377,000**	47	~ 59**
2030 w/OTR	175** **65% decline**	68***	282,000**	47	

* My estimate using 10 months of EIA data

** My estimate

*** America's Power est. based on announced retirements

**** EIA data

Takeaways:

- **By 2030 coal will lose 1/2 to 2/3 of 2022 U.S. coal sales**
- **Losses could be even higher given EPA's intent to impose more emissions restrictions**
- **Fleet continues to age and capital is limited to maintenance of production**
- **Coal industry needs to protect its market share – technology is the long-term answer**

Reliable Energy Tax Fairness Act (RETF)

Congresswoman Miller (WV)

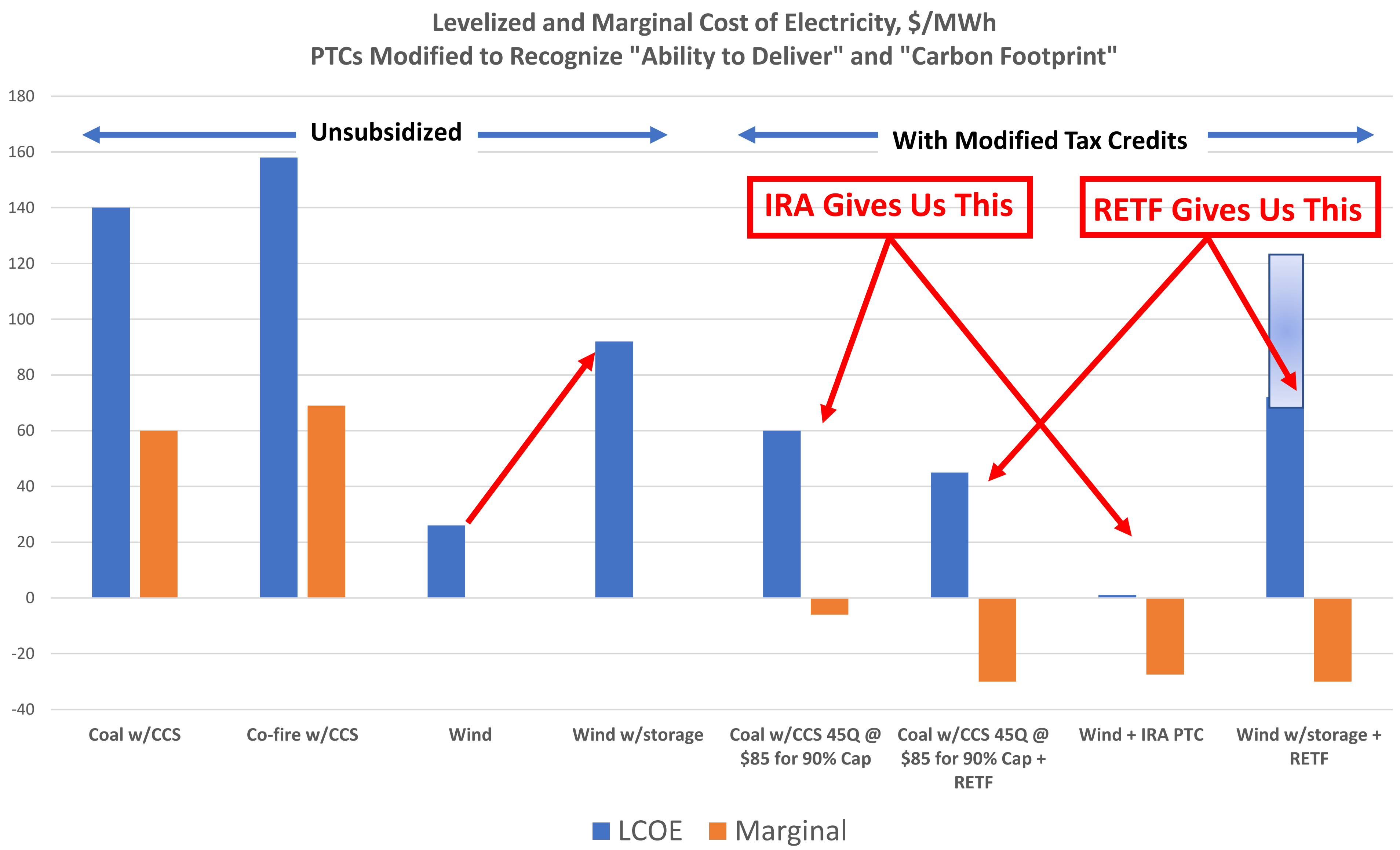
- RETF realigns Production Tax Credits (PTC) and Investment Tax Credits(ITC)
  - Addressed the need for affordable, reliable, clean electricity
  - PTC and ITC are fuel-neutral
  - PTC and ITC would be "stackable" with 45Q
  - Credits are transferable
- What qualifies
  - Fossil electricity generation with CCUS
  - Nuclear electricity generation
  - Renewables with energy storage or clean back-up power
  - Other generation (biomass, hydro, geothermal)
- Must meet minimum annual performance thresholds
  - Sixty percent (60%) for electricity deliverability
  - Eighty percent (80%) for carbon neutrality
- Qualified projects
  - Participate in NERC's Generation Activity Data System
  - Register with North American Electricity Reliability Corp. (NERC)
  - Enter into service after December 31, 2021 – includes major retrofits

Coal Projects under RETF

- 45Q ($85) as passed under the IRA is not as lucrative for power producers as the tax credits for renewables.
- Power producers will allocate capital to renewables before CCUS due to the higher ROI.
- The combination of 45Q and a PTC/ITC will improve the hurdle rate and entice power producers to consider CCUS.
- If so enticed, the first step would be a detailed techno-economic study.
  - Capital and operating cost of CCUS
  - Needed upgrades on the power plant to maximize electricity and CO_2 production – **aka life extension!**
  - Reduced emissions (criteria pollutants and mercury) to reduce capital and operating cost of capture unit
- With CCUS, the plant dispatch dynamics change
  - Operator generates a tax credit for every kWh produced and every ton of CO_2 sequestered.
  - More coal gets burned!
- If the CCUS study does not clear their hurdle rate, the operator does not move forward with project.

Plant-Level Economics

Coal Can Compete on a Level Playing Field



"Somethings" the Coal Industry Needs to Be For

- Positioning the existing coal fleet for the future
  - Need to protect the value of the existing infrastructure
  - Forestall premature coal plant retirements
  - Support NMA's Electricity Reliability Enforcement Act
- Support Reliable Energy Tax Fairness Act (RETF) - Miller Bill
  - Generation only qualifies if 60% dispatchable on demand.
  - Generation only qualifies if 80% CO_2 neutrality
  - Perhaps could include a tax credit for efficiency improvement
  - Credits need to be stackable
  - If fossil has to perform Life Cycle Analysis (LCA) so should renewables
- Building a post-2030 future that adds new profit streams and creates societal value, including addressing climate change concerns:
  - Coal-to-Products
  - CO_2-to-Products
  - Net-Negative CO_2 Coal-to-Energy Generation
    - Net-Negative CO_2 Baseload Power Technology
    - Net-Negative CO_2 Hydrogen Technology
- Ensure that coal becomes part of Speaker McCarthy's Commitment to America.

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