Clean Air Act Rules and Grid Planning

AAPCA 2022 Fall Business Meeting

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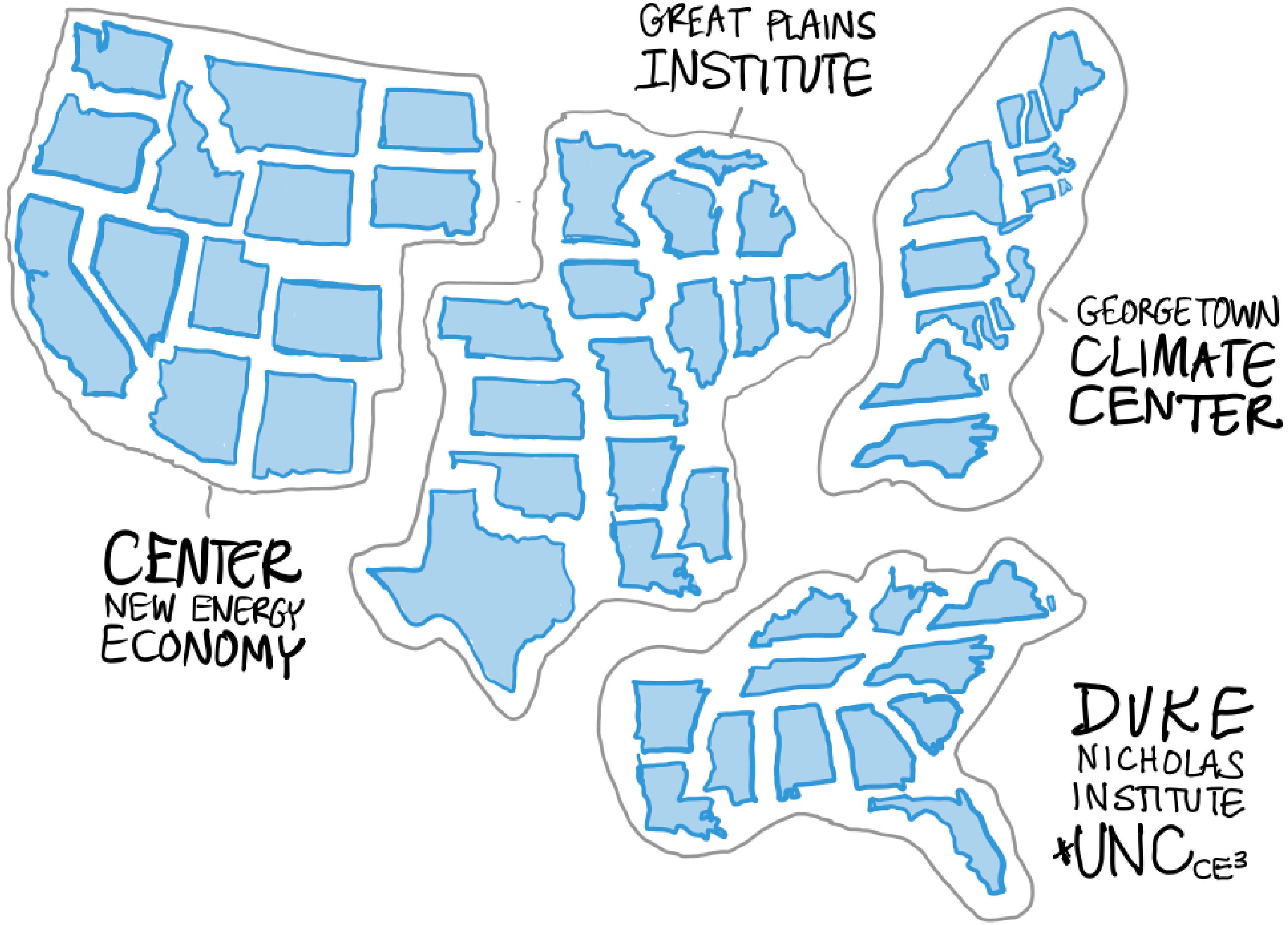
CENTER FOR CLIMATE, ENERGY, ENVIRONMENT AND ECONOMICS

CONVENERS' NETWORK



* HARVARD ENVIRONMENTAL AND ENERGY LAW PROGRAM

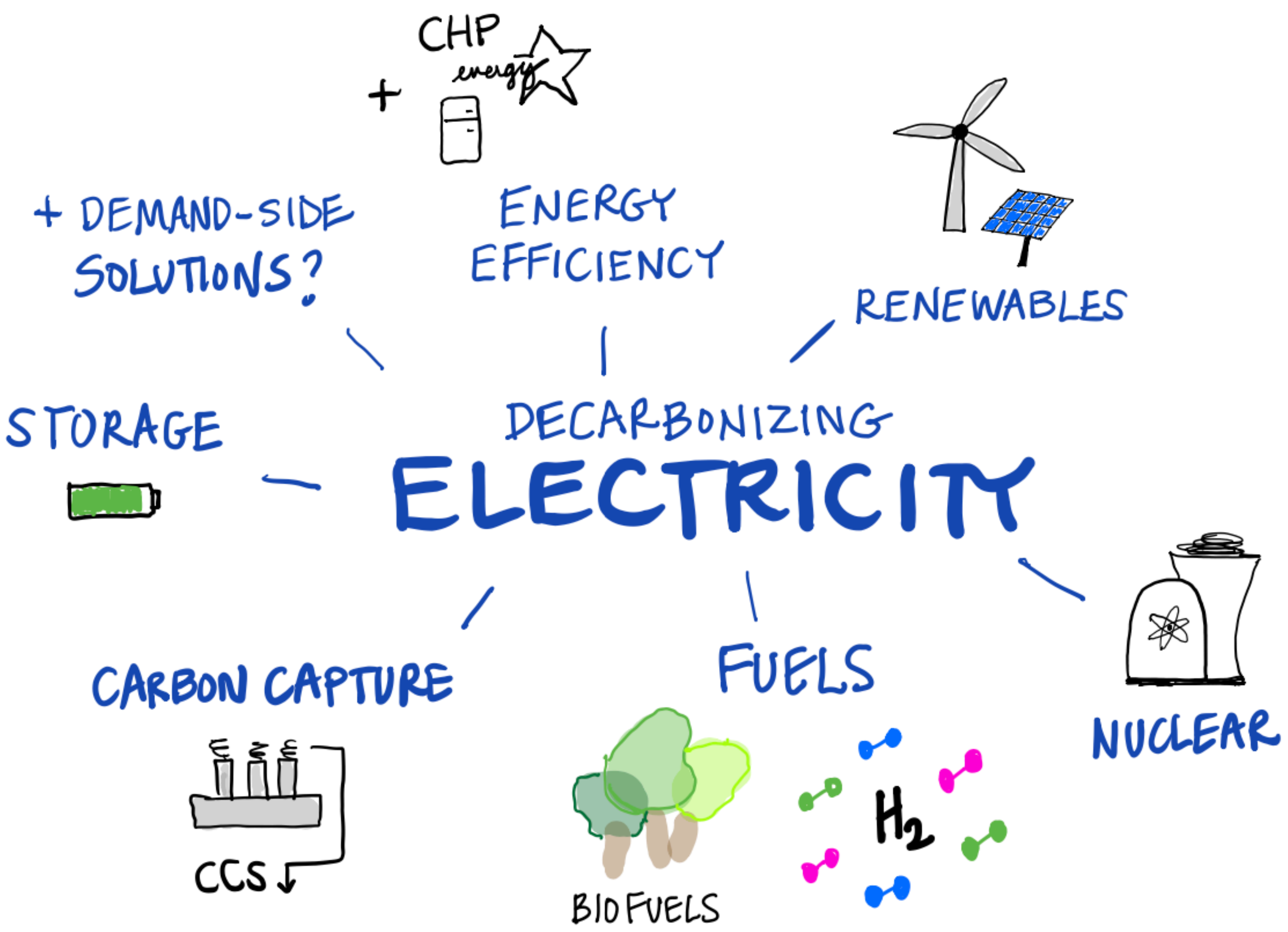
Risk Management (Cost and Reliability)

- Regulatory Risk
- Technology Risk
- Fuel Risk (price and availability)

EPA Power Sector Rules

- PM 2.5
- Mercury & Air Toxics Review
- Coal Ash Disposal Draft
- Effluent Limitation Guidelines
- GHG New Source Performance Standards (111(b))
- GHG Existing Source Performance Standards (111(d))

THE INFLATION REDUCTION ACT GENERALLY



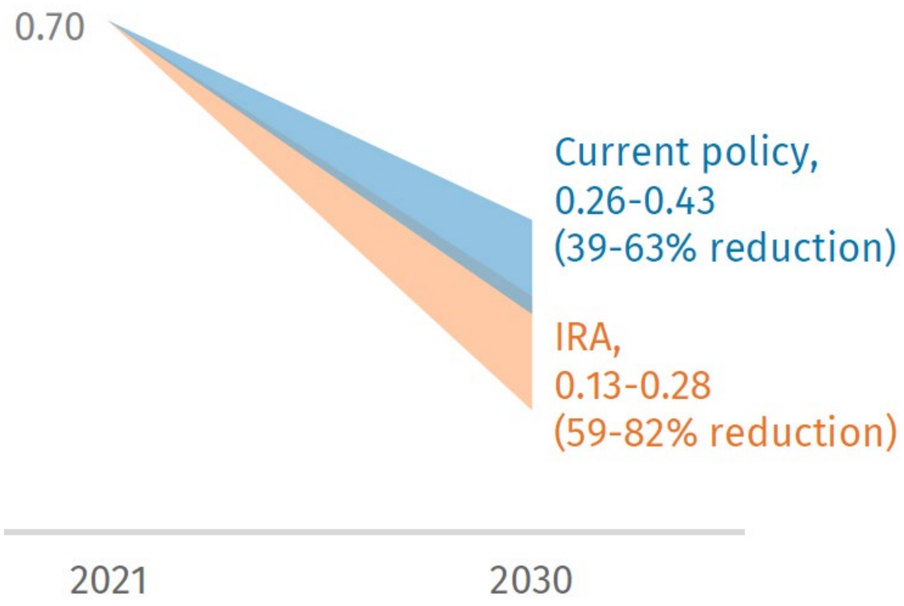
Rhodium Power-Sector Emissions for the U.S.

CO_2 Emissions (MMTCO2e)

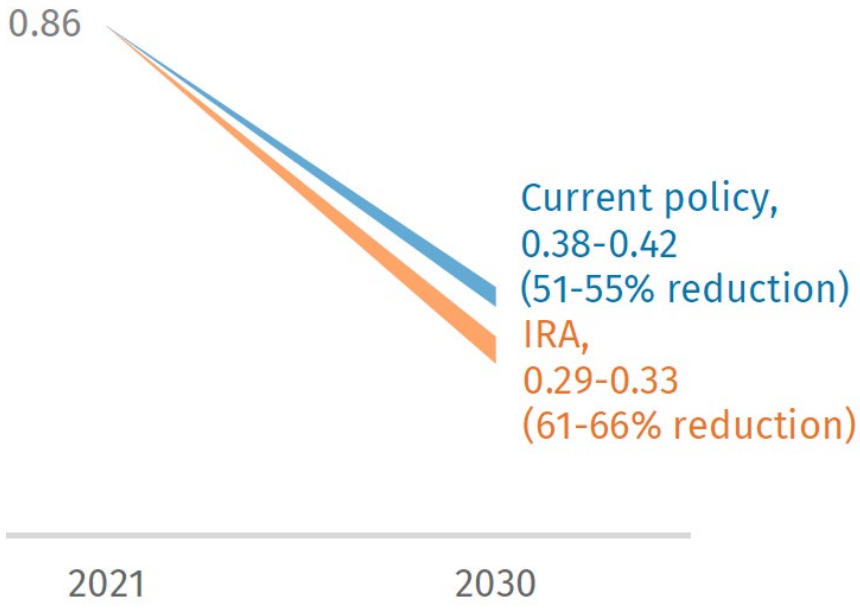
Rhodium Results from RHG-NEMS Modeling

- Compares across three emissions scenarios from the "Taking Stock 2022" report
- U.S. CO_2 emissions in the power sector fall by 50% from the Current Policy baseline in their Central case.
- IRA reduces SO_2 emissions by around an additional 20% in the three emissions scenario alternatives
- IRA reduces NOx by less than SO2, presumably because coal generation falls more than gas CC

SO_2 Emissions (mill tons)

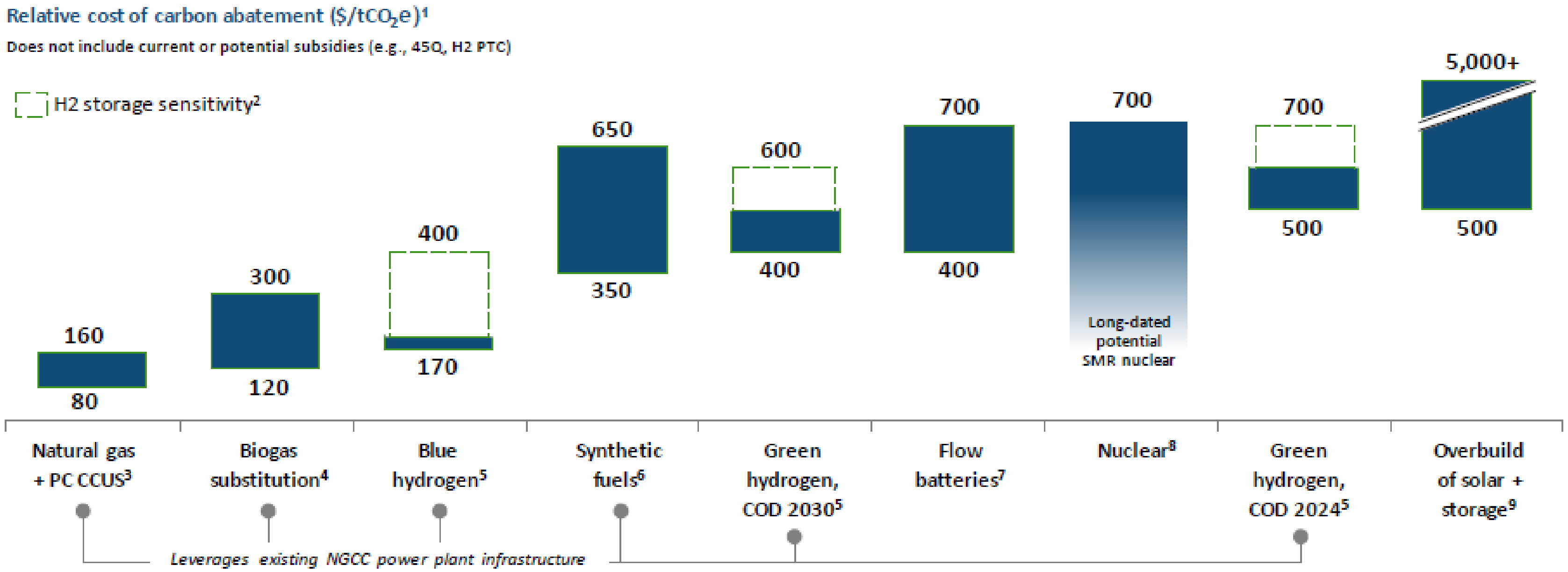


NOx Emissions (mill tons)



CCUS is a cost-effective option to decarbonize firm capacity required to maintain reliability

Gas plant post-combustion CCUS or, with incentives, low-carbon H2 provide most cost-effective decarbonized firm power



1. Cost of carbon abatement assuming an existing NGCC alternative, 50% LHV efficiency; $3.5/MMBTU NG fuel costs; 8% WACC and 20-yr lifetime; unless otherwise noted, lower limit corresponds to 85% CF and upper 30% Capacity factor 2. H2 storage sensitivity estimates H2 storage needed to accommodate demand and supply fluctuations with independently owned H2 production (vs. 3rd party or otherwise shared H2 production that is sized to meet instantaneous demand and has a lower H2 storage requirement as a result) 3. Assumes 95% capture of effluent and 16% additional power losses to drive CCUS; cost drops further for lower efficiency plants where abatement opportunity is larger 4. Ranged based on biogas costs from $12-24/MMBTU; capacity constrained by viable feedstocks 5. BCG Hydrogen for power production model output 6. Range based on e-methane costs from $30-50/MMBTU; nascent technology 7. Ranged based on cycles per year, 200-300; assumes $500/kWh storage costs 8. Low end of range reflects SMR nuclear emerging technology estimate from Breakthrough Institute NuScale analysis (low technology readiness today); high end reflects Lazard LCOE analysis for existing nuclear, ~$130-200/MWh; 9. Lazard LCOS analysis, wholesale PV+storage use case; "Long run resource adequacy under deep decarbonization pathways for CA," E3, 2019

Source: Lazard; IEA; EPA; GTM; American Gas Foundation; Sargent & Lundy; Breakthrough Institute; BCG analysis