THIRD WAY

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Scenarios Decarb America

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1. Pathways to Net-Zero Emissions

Policy Scenarios

Decarb America began by analyzing a reference case and a scenario exploring the impact of a package of sector-specific policies, the Sectoral Policies scenario.

Scenario	Description
Reference	Baseline scenario that assumes no additional policy changes. Uses the Energy Information Administration's Annual Energy Outlook (AEO) 2019 with updated fuel prices and the latest state clean energy policies from AEO 2020.
Sectoral Policies	Analyzes a package of frequently discussed low-carbon or clean energy policies in the transportation, electricity, buildings, and other sectors. Together, these policies are estimated to cut emissions by approximately 70% below current levels – a substantial reduction but not enough to fully decarbonize the U.S. economy. This scenario combines a zero-emission vehicle standard, zero-carbon fuel standard (for diesel, gasoline, jet fuel, and hydrogen), electrification and efficiency standards for buildings, clean energy standard for the power sector (100% clean electricity by 2050), and policies to reduce emissions of methane and ozone-depleting substances.

Competing Net-Zero Visions

Additionally, we analyzed seven distinct technology and policy pathways for reaching net-zero by 2050: 1) High Renewables/High Electrification, 2) Constrained Renewables, 3) Slow Consumer Adoption, 4) Constrained Renewables + Slow Consumer Adoption, 5) High Conservation, 6) Low Biomass, and 7) No Fossil. These net-zero scenarios reflect different assumptions about policy, technology, and consumer behavior and were designed to answer common questions about the technology and deployment challenges of reaching net-zero emissions.

Scenario	Description
High Renewables/ High Electrification	Achieves net-zero greenhouse gas emissions across the U.S. economy by 2050. This scenario applies the sectoral policies analyzed above and then allows the model to choose the optimal path to net-zero. This scenario includes assumptions common to other net-zero analyses in terms of achieving high levels of electrification and renewable energy deployment.
Constrained Renewables	Achieves net-zero emissions by 2050 with constraints on deployment of renewable electricity technologies to reflect siting challenges. Reduces available renewable energy to just 5% of the National Renewable Energy Laboratory's estimate of the technical potential for onshore wind, compared to 25% in the "Net-Zero by 2050" scenario. Solar deployment is limited by availability of land, with no more than 0.5% of available land area in any region allowed to be used for utility-scale solar. This scenario also constrains offshore wind deployment to 25% of technical potential to reflect potential hurdles in terms of siting of supporting transmission infrastructure and avoiding encroachment on existing ocean uses.
Slow Consumer Adoption	Assumes that fuel-switching in the transportation, industrial, and buildings sectors is delayed by 20 years, reflecting slower consumer adoption of efficiency equipment, hydrogen end-use technologies, and electrification technologies. Zero-carbon fuels are used instead of electricity and hydrogen to meet a large share of energy demands and still achieve net-zero.
Constrained Renewables + Slow Consumer Adoption	This scenario pairs the demand-side assumptions from the "Slow Consumer Adoption" scenario with the renewable constraints used in the "Constrained Renewables" scenario. Given these constraints, this scenario relies heavily on zero-carbon fuels, electricity generation from non-renewables (e.g., nuclear), and carbon capture technologies to meet energy demands and still achieve net-zero.
	Achieves net-zero emissions by 2050 with constraints on the overall footprint of the energy system. Assumes

High Conservation	on the overall footprint of the energy system. Assumes reduced energy demands in buildings, transportation, and industry. To reflect potential hurdles in terms of siting utility-scale energy and transmission infrastructure, this scenario deploys distributed solar and energy storage technologies at 75% of technical potential to meet a significant share of electricity demand.
Low Biomass	Achieves net-zero emissions by 2050 with reduced availability of biomass feedstocks to produce hydrogen, other synthetic gases, liquid biofuels, and on-site heat and electricity. Assumes a maximum available supply of 460 million metric tons (MMT), compared to 710 MMT in the Net Zero by 2050 scenario. Assumes that land currently used for corn ethanol will not be converted into land supplying other herbaceous energy crops, reducing available biomass supply by 34%.
No Fossil	Achieves net-zero emissions by 2050 by requiring the complete phase out of fossil-derived energy by 2050. This is achieved by the use of a zero carbon fuel standard and the elimination of all fossil fuel combustion, resulting in a substantial increase in hydrogen, synthetic hydrocarbons, and biofuels.

2. Energy Infrastructure Needs for a Net-Zero Economy

The Policy Scenarios and Competing Net-Zero Visions detailed above are used for our infrastructure analysis. The Interactive Maps webpage presents modeling results comparing the differences in infrastructure build-out between these nine scenarios.

3. Power Sector Deep Dive

Scenario	Description
Reference	Business-as-usual (BAU) scenario that assumes no additional policy changes. Uses the Energy Information Administration's Annual Energy Outlook (AEO) 2019 with updated fuel prices and clean energy policies from AEO 2020. The U.S. economy does not achieve net-zero emissions in this scenario: modeled CO2 emissions in 2050 still total nearly 4.1 billion metric tons.
High Renewables/ High Electrification (HR/HE)	Achieves net-zero greenhouse gas emissions across the U.S. economy by 2050 assuming cost reductions typical of wide scale adoption without significant technological breakthroughs. This scenario applies sectoral policies analyzed in Decarb America's Pathways to Net-Zero Emissions: Key Takeaways report and then allows the model to choose the optimal path to net-zero. This scenario includes assumptions common to other net-zero analyses in terms of achieving high levels of electrification and renewable energy deployment.
Carbon Capture and Sequestration Innovation (CCI)	Assumes technology breakthroughs that reduce the cost for hydrogen production from natural gas by $660/kW and geological sequestration costs by $25/ton CO2 (with geological sequestration, coal and gas can continue to be used in the power sector as net-zero power sources).
Nuclear Energy Innovation (NI)	Achieves net-zero by allowing new advanced nuclear reactors to be built and by converting coal plants into advanced nuclear reactors. Innovations are assumed to reduce the cost of new nuclear generating capacity by an order of magnitude relative to current (2020) costs, from $7000/kW to $700/kW.
Renewables Innovation (RI)	Assumes breakthroughs that reduce the cost of solar generating capacity to $430/KW, onshore and offshore wind energy to $872/kW and $1070/kW respectively, and costs for energy storage—specifically for short-duration (lithium-ion) and long-duration storage technologies—of $47/kWh and $3.60/kWh respectively.
Universal Innovation (UI)	Reflects all cost benefits from innovation in the CCI, NI, and RI scenarios simultaneously.

4. Clean Energy Innovation Breakthroughs

Not available.

5. Employment Impacts in a Decarbonized Economy

Not available.