

## Solving the Climate Change Problem

### Executive Summary<sup>1</sup>

**More frequent, intense, and diverse climate impacts, and projections about a future with increasing emissions, have inspired commitments by countries, states, and cities to reduce their contributions to climate change to net zero by mid-century.** Such commitments align with the international community's pledge under the Paris Agreement to limit warming to 2 °C (3.6 °F) above pre-industrial levels in an effort to avoid some of the worst impacts of climate change. As the National Academies of Sciences notes, there are scientific and technologically plausible ways in which these net-zero goals may be achieved. Each of these pathways would require some combination of large reductions in existing greenhouse gas emissions and a simultaneous expansion of carbon capture efforts to offset remaining emissions from hard-to-abate sectors. Reshaping the economy around low- and no-emissions electricity, while continuing to meet global energy demands, will be an integral part of emissions reductions.

**Government action and the free market have worked together to dramatically reduce the cost of renewables in recent years, such that solar and wind are now the cheapest sources of energy on the market.** These reduced energy costs, however, are not sufficient to achieve the goal of net-zero emissions by 2050. To do that solar and wind deployment in the United States would need to double in the 2020s, and then again in the 2030s. While challenging, such a rate of change is not unprecedented. Natural gas, for example, replaced coal at a more rapid pace after the advent of hydraulic fracturing techniques in 2007. Because solar and wind resources are not always readily available, the National Academies suggest that additional low- or no-emissions sources, like natural gas combined with carbon capture, could be employed to supplement energy supply and meet demand. Some emissions-intensive sectors of the economy, including transportation and household heating and cooking, are already being electrified and stand to further benefit from tax credits in the Inflation Reduction Act of 2022.

**Additional low- or no-emissions sources, combined with increased energy efficiency and natural climate solutions, could power sectors of the economy that cannot currently be electrified,** such as aviation, shipping, cement making, steel production, and some manufacturing activities. Emissions of fluorinated gases—highly potent greenhouse gases, mostly derived from refrigeration and air conditioning—could be progressively eliminated by replacing existing units with less impactful ones upon their retirement. One big challenge will be dealing with agricultural emissions of the greenhouse gases nitrous oxide and methane, but emerging climate-friendly farming techniques, shifts in dietary habits, and reductions in food waste are all promising ways to reduce such emissions. Preserving and enhancing carbon storage in the world's existing natural carbon sinks, like forests, agricultural lands, and coastal ecosystems, could offset remaining emissions.

**Large-scale changes to the U.S. energy system will inevitably affect people's lives.**

Communities that are economically reliant on fossil-fuel businesses might face job and

revenue loss, as in the case of coal workers across the United States. Education and training programs could help these displaced workers find meaningful employment in the new energy economy. In addition to mitigating against the worst impacts of climate change, the benefits of the energy transition include new jobs, a revitalization of American innovation and manufacturing, and the compound benefit of a healthier society with reduced healthcare costs. Economists calculate the transition would financially benefit the United States on purely economic grounds, even if climate were not a consideration. As recognized by the National Academies, this decade is critical for securing a clean-energy future and, with the right policy portfolio, the United States could be well-positioned to lead the world in the energy transition to net zero.

<sup>1</sup>This is a summary of Solving the Climate Change Problem by the Climate Judiciary Project Team.