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The Climate Challenges and Opportunities Ahead

Net-zero emissions target calls for a supercharged decade of energy innovation.

By Ernest J. Moniz

President-elect Joe Biden's announcement that former secretary of state John Kerry will fill a new role as [Climate Envoy](#), with a seat at the National Security Council, sent the unmistakable message that the United States will not only rejoin [the Paris Agreement](#) but will also work hard to regain its global leadership role on climate change as an environmental and security imperative.

That global effort will succeed only if built on a solid domestic foundation, and another Bostonian – former EPA Administrator Gina McCarthy – will serve as White House domestic coordinator for an aggressive program. Simply rebuilding after Trump will not be enough. Dramatic acceleration of America's clean energy transition must be a [Biden administration hallmark](#).

Many of the challenges are brought into focus by the recent study "[Net-Zero New England: Ensuring Electric Reliability in a Low-Carbon Future](#)." Different regions of the United States have unique needs and opportunities for reaching a low-carbon economy, and Biden's plan will need to weave together regional approaches.

New England's greenhouse gas emissions [are dominated](#) by transportation, heating of residential and commercial buildings, and

electricity generation, reflecting its northern climate and small heavy-industry sector. The primary scenario for achieving economy-wide net-zero emissions by 2050 involves both decarbonizing the electric sector and substantial electrification of both transportation and heating.

Even accounting for continued energy efficiency gains, which the Northeast is good at, [a near doubling of electricity supply](#) is needed in only 30 years, with two-thirds of that electricity coming from renewables such as wind, solar, and hydroelectric power. With a sustained effort, this doubling can be managed. However, meeting the associated infrastructure challenge could be much harder, especially if public opposition materializes. Land-use constraints are significant, so 22,000 megawatts of offshore wind are called for. Translation: about 2,000 massive off-shore turbines, together with extensive underwater transmission. On shore, the electricity must be distributed, and extensive servicing facilities need to be provided.

The scenario also calls for more transmission capacity to import more Canadian hydropower, a sustained natural gas infrastructure to back up heating during polar vortex cold spells, ubiquitous electric-vehicle fast-charging infrastructure, and capacity for using green hydrogen at scale. [The region](#) has ample

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innovation capabilities to meet technology needs, such as long-duration (including seasonal) affordable electricity storage. However, the demonstrated difficulty of deploying new infrastructure in New England — from natural gas pipelines to power lines to nuclear power to the aborted Cape Wind project — will need to be overcome. Success will be rewarded not only with a low-carbon economy but also with new industries and high-skill jobs. The Biden administration will need to tailor strategies to regional realities in close collaboration with the states.

Heavy-industry decarbonization will be a challenge elsewhere. Among the important industrial decarbonization tools — for ethanol plants, cement plants, refineries, and others — is carbon dioxide capture, utilization, and underground storage. CCUS, carbon dioxide removal from the atmosphere, hydrogen production and distribution at scale, low-carbon liquid fuels, and engineered geothermal systems would be game-changing for deep decarbonization across multiple energy end-use sectors, but innovation is needed to reduce costs. Success would come earlier if the oil and gas industry uses its capabilities — underground, refinery and fuel distribution operations — and workforce to advance [net-zero solutions](#) while avoiding stranded workers, stranded communities, and stranded assets. The Biden plan importantly elevates the importance of [jobs and social equity](#) in addressing climate.

The thread of these arguments is to provide as many options and as much flexibility as possible to meet the deep decarbonization goal — and innovation is key. We need as many low- to no-carbon tools as can be developed. This inclusive approach is what will get us to a shared goal of climate risk mitigation the fastest. But there's obviously a lot of work to do to bring the key

players together. That's another job for President-elect Biden — to [build the coalitions](#) that can get this done, with no time to waste.

He will need a multi-pronged approach. On or close to day one, he needs to have ready an extensive package of executive actions. That clearly entails rolling back Trump-era actions that rolled back Obama-Biden rules, such as those on methane emissions and automobile fuel efficiency standards. It entails reenergizing federal actions such as promulgating [Department of Energy equipment efficiency standards](#) that help pull technoeconomic performance forward and push trillion-dollar consumer energy savings and gigaton carbon dioxide emissions reductions. The societal cost of emitting greenhouse gases should be restored as a factor in cost-benefit analysis of efficiency standards. Executive action will also entail new initiatives, such as charging the financial regulatory bodies to internalize corporate climate-risk disclosure and performance as a central part of their mandate.

Biden also has opportunities for bipartisan congressional action. Congress has shown considerable bipartisan support for the critical innovation agenda, despite the current administration's proposals to the contrary. The net-zero challenge calls for a [supercharged decade of energy innovation](#), starting now. The infrastructure modernization imperative for the United States must be addressed, including for modernized electricity grids, electric-vehicle charging, hydrogen storage and distribution, and large-scale carbon dioxide management. These are bipartisan opportunities to [create jobs](#) and strengthen our country.

Comprehensive climate legislation will be more challenging and certainly depends on the outcome of the Senate races in Georgia.

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Nevertheless, the realities that we see all around us — storm surges, fires, droughts, and more — are convincing more and more of the electorate that it's beyond time to act on climate. Biden is as well placed as any to build the types of coalitions — labor and business, environmental groups and financial institutions, religious and military leaders, public and private sectors, Republicans and Democrats, and others — needed to accelerate legislative climate solutions. We cannot realistically expect comprehensive legislation immediately, but opportunities for step-by-step progress, such as a clean energy standard, may come sooner than many think — with persistence and public support.

The COVID-19 crisis has shown us that the unthinkable does happen. Biden has clearly committed to avoiding a similar outcome from climate change.

Ernest J. Moniz was the US Secretary of Energy from 2013 to 2017 and is founder of the MIT Energy Initiative and the Energy Futures Initiative, a Washington-based nonprofit.

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