Insight

Biden Climate Plan 2.0

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Executive Summary

- As part of his bid for the presidency, Joe Biden has released a climate plan that includes a new target: a 100 percent carbon-free electric sector by 2035.
- The plan relies on reducing the cost of carbon capture, which has yet to be proven commercially viable, and implementing it in over 60 percent of current generation.
- Natural gas and coal generators incapable of implementing carbon capture technology but subject to Biden's proposed clean-energy standard may be forced to shutter operations, driving up consumer prices.

Introduction

Former Vice President and presumptive Democratic presidential nominee Joe Biden last week formally announced an updated plan to address climate change. Despite initially proposing the costliest plan in U.S. history to address climate change, Biden was criticized by progressives for failing to present a plan with specific targets. In response, Biden's campaign created a taskforce, including the co-founder of the Sunrise Movement (which created and promoted the Green New Deal), to suggest a more progressive path forward, leading to Biden's new approach.

Biden's most recent climate plan includes seven elements to "Build a Modern, Sustainable Infrastructure and an Equitable Clean Energy Future" and borrows from taskforce suggestions by proposing a 2035 target for a 100 percent carbon-free electric sector. It not only addresses the largest sources of carbon emissions but also aims to create millions of jobs, new bridges and highways, clean drinking water, expanded broadband, and much more as part of a broader commitment to a net-zero economy by 2050. Biden plans to make investments in infrastructure, the auto industry, transit, the power sector, buildings,

housing, innovation, agriculture and conservation, and environmental justice. This new plan comes with a $2 trillion price tag.

Carbon-Free Power

In order to accomplish 100 percent carbon-free power generation by 2035, Biden proposes that millions of solar panels, thousands of wind turbines, and storage facilities be constructed. What he failed to mention during his speech was that existing infrastructure such as hydropower and nuclear power would continue to operate, and carbon capture retrofits would be implemented at existing natural gas and coal power plants under his plan. In addition, new and improved electric transmission and distribution infrastructure is planned, although no detail was provided in either Biden's plan or speech as to what that means. In order to encourage this large-scale investment in the energy sector, Biden plans to reform and extend tax incentives, increase research funding, and develop financing mechanisms to leverage private sector investment. The plan pays particular attention to energy efficiency, carbon capture technologies, and renewable hydrogen. Biden continues to suggest that the Advanced Research Projects Agency for Climate (ARPA-C) is necessary to drive the development of these technologies, among others, despite the existence of ARPA for Energy (ARPA-E) with this goal.

Generation

In 2019, net generation totaled 4,118 billion kilowatt-hours at utility scale facilities and was produced by a variety of resources: natural gas (38.4 percent), coal (23.5 percent), nuclear (19.7 percent), wind (7.3 percent), hydropower (6.6 percent), solar (1.8 percent), and biomass (1.4 percent), as well as petroleum and geothermal each providing less than 1 percent.[1] According to its 2020 reference case,[2] the Energy Information Administration (EIA) projects that energy consumption will grow in coming years but at a rate lower than the growth of gross domestic product as gains in efficiency grow.[3] Electricity demand will average about 1 percent of annual growth through 2050, and the consumption of relatively low-priced natural gas will continue to grow in coming decades due to electric and industrial sector demand.[4]

Biden's plan suggests that over 60 percent of current generation sources—natural gas, coal, and petroleum-fueled power plants—would be subject to the requirement to install carbon capture technologies. And with projected growth in natural gas consumption, new facilities would need to be constructed with carbon capture in mind. Alternatively, the price of renewable resources in combination with battery storage would need to continue declining to become a competitive generation source.

According to a report issued by the United Nations Intergovernmental Panel on Climate Change (IPCC), the future performance of carbon capture technology is "uncertain," and it remains costly due to the bespoke nature of installations at existing facilities. IPCC reported that the addition of carbon capture technologies would add between 0.9-2.4 cents per kWh to the price of power generated at coal and natural gas-fueled facilities. These costs have largely proven prohibitive to date. Carbon capture is further complicated by the need to transport the carbon upon capture; the resulting carbon dioxide must be stored or utilized, and transport creates additional costs that can drive up prices further.[5]

To overcome these issues, Biden's plan calls for additional investment in carbon capture research to reduce costs. In particular, Biden calls for the creation of the new agency mentioned above, ARPA-C, to accomplish this goal. It is useful to consider the establishment and operations of an existing research agency, ARPA-E, to better understand what this effort involves. Upon Biden taking office, legislation creating and funding ARPA-C would need to be passed. In the case of ARPA-E, it took about 2 years from the introduction of its establishing legislation to the initiation of its first round of research projects. ARPA-E projects are funded for a 3-year duration, and it is unclear how many would be necessary either simultaneously or consecutively in order to make the gains necessary to reduce cost. Upon reviewing the programming at ARPA-E after 6 years of operation, the National Academy of Sciences found that "Given that truly transformational technologies, whether in the energy or some other sector, take many years or decades before becoming apparent…the committee would not expect any ARPA-E programs to have had any transformational impacts on the energy sector yet."[6] And the EIA found that the operation of a 90 percent effective carbon capture generating facility requires a 3-4 year lead time.[7] Assuming the technological advances do not require any additional development beyond their time at ARPA-E, which many do, particularly to fully commercialize, it would be at least 10 years before the United States could see operational low-cost carbon capture. Establishing an agency to facilitate research, identify worthwhile projects, complete research successfully, and commercialize technology that would produce carbon capture at a negligible price point—and then have industry implement it by 2035, just 15 years—is unlikely.

Under Biden's plan, these power plants would also be subject to a "technology-neutral Energy Efficiency and Clean Electricity Standard" (EECES), a mandate which goes undefined, but like other renewable portfolio standards, would likely require a certain percentage of generation be renewable or carbon-free. As low-cost carbon capture technology may not be available, this mandate would result in the installation of carbon capture technology that would raise consumer prices, or force facilities to shutter.

Transmission & Distribution

Biden's plan makes mention of upgraded transmission and distribution lines, which he failed to mention it in his speech at all. The transmission system is the series of 600,000 miles of power lines spanning the country and carrying power from the point of generation to utilities, while distribution lines bring that power to retail consumers.

With the installation of new generating resources these upgrades would be inevitable. The addition of new generation requires the expansion of transmission lines which can prove costly, particularly for renewable resources. The often-remote locations of renewable resources require longer lines driving up costs, for example, by 1.5 cents per kWh to the levelized cost of wind generation, which are passed on directly to the retail consumer.[8] The intermittent and non-dispatchable nature of renewable resources adds new complexities to the operation of the transmission and distribution networks. Increased reliance on renewable resources necessitates the use of utility-scale batteries to store excess solar power generated during the day and wind power generated at night.[9]

A University of Chicago working paper compared the performance of the electric sector in 29 states where renewable portfolio standards (RPS) were implemented with those where such standards had not. The analysis captured the impact of the policies that Biden's plan proposes, including increased installation of intermittent renewable resources, expansion of the transmission system, and increased use of battery storage. The working paper finds "that 7 years after passage of an RPS program, the required renewable share of generation is 1.8 percentage points higher and average retail electricity prices are 1.3 cents per kWh, or 11% higher; the comparable figures for 12 years after adoption are a 4.2 percentage point increase in renewables' share and a price increase of 2.0 cents per kWh or 17 percent. These cost estimates significantly exceed the marginal operational costs of renewables and likely reflect costs that renewables impose on the generation system, including those associated with their intermittency, higher transmission costs, and any stranded asset costs assigned to ratepayers." Stranded assets are those abandoned before the end of their economic life, such as some fossil-fuel generated facilities that may be forced to shutter.

Conclusion

Biden's plan appears to be more of the same —policy proposals focused on instituting additional mandates and providing subsidies. It is difficult to imagine a scenario where natural gas facilities would be deemed uneconomic in the next 15 years leading to their demise. In fact, the EIA estimates suggest otherwise. Under Biden's plan, however, it appears that these facilities may be replaced by their renewable counterparts by way of mandates and at a higher cost to retail consumers. Rather than focusing on the

implementation of technology that has yet to prove its viability under the guise of addressing climate change, jobs, and environmental justice, the United States would be better served by a policy program that is an outgrowth of technological and economic realities.

[1] https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

[2] WHAT IS THE AEO2020 REFERENCE CASE? • THE AEO2020 REFERENCE CASE REPRESENTS EIA'S BEST ASSESSMENT OF HOW U.S. AND WORLD ENERGY MARKETS WILL OPERATE THROUGH 2050, BASED ON KEY ASSUMPTIONS INTENDED TO PROVIDE A BASE FOR EXPLORING LONG-TERM TRENDS. • THE AEO2020 REFERENCE CASE SHOULD BE INTERPRETED AS A REASONABLE BASELINE CASE THAT CAN BE COMPARED WITH THE CASES THAT INCLUDE ALTERNATIVE ASSUMPTIONS. • EIA BASED THE ECONOMIC AND DEMOGRAPHIC TRENDS REFLECTED IN THE REFERENCE CASE ON THE CURRENT VIEWS OF LEADING ECONOMIC FORECASTERS AND DEMOGRAPHERS. FOR EXAMPLE, THE REFERENCE CASE PROJECTION ASSUMES IMPROVEMENT IN KNOWN ENERGY PRODUCTION, DELIVERY, AND CONSUMPTION TECHNOLOGIES. • THE REFERENCE CASE GENERALLY ASSUMES THAT CURRENT LAWS AND REGULATIONS THAT AFFECT THE ENERGY SECTOR, INCLUDING LAWS THAT HAVE END DATES, ARE UNCHANGED THROUGHOUT THE PROJECTION PERIOD. THIS ASSUMPTION MAKES IT POSSIBLE FOR US TO USE THE REFERENCE CASE AS A BENCHMARK TO COMPARE POLICY-BASED MODELING. • THE POTENTIAL EFFECTS OF PROPOSED LEGISLATION, REGULATIONS, OR STANDARDS ARE NOT INCLUDED IN THE AEO2020 CASES.
HTTPS://WWW.EIA.GOV/OUTLOOKS/AEO/PDF/AEO2020%20FULL%20REPORT.PDF

[3] Key Takeaways from Reference Case: https://www.eia.gov/outlooks/aeo/

[4] https://www.eia.gov/outlooks/aeo/pdf/AEO2020%20Full%20Report.pdf

[5] https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_chapter8-1.pdf

[6] https://www.nap.edu/catalog/24778/an-assessment-of-arpa-e

[7] https://www.eia.gov/outlooks/aeo/assumptions/pdf/table_8.2.pdf?utm_source=American+Action+Forum+Emails&utm_campaign=040adec89c-EMAIL_CAMPAIGN_2019_05_01_08_53_COPY_01&utm_medium=email&utm_term=0_64783a8335-040adec89c-352712841

[8] https://epic.uchicago.edu/wp-content/uploads/2019/07/Do-Renewable-Portfolio-Standards-De

liver.pdf

[9] https://www.forbes.com/sites/brianmurray1/2019/06/17/the-paradox-of-declining-renewable-costs-and-rising-electricity-prices/#1ba6fb2161d5