



Insight

# ARPA-C, Same as ARPA-E

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## Executive Summary

- Presumptive Democratic presidential nominee Joe Biden has proposed a number of policies and initiatives to combat climate change, including a new agency focused on driving innovation.
- The emission of carbon dioxide in the United States is largely driven by the consumption of energy, a field subject to the innovation of the Advanced Research Projects Agency for Energy (ARPA-E).
- Biden's proposed Advanced Research Projects Agency for Climate (ARPA-C) would serve the same purpose as ARPA-E and prove duplicative in addressing climate change.

## Introduction

Throughout his campaign, presidential candidate and former Vice President Joe Biden has presented a series of policies to address climate change, including some worthwhile policies such as putting a price on carbon and driving technological innovation. [1]? Of the policies presented thus far, one of the more detailed proposals is the creation of a new agency, the Advanced Research Projects Agency for Climate (ARPA-C). ARPA-C, like its predecessors the Advanced Research Projects Agency for Energy (ARPA-E) and the Defense Advanced Research Projects Agency (DARPA), would focus on developing innovative technologies. Biden's proposed ARPA-C programming would focus on eight areas:

- Grid-scale battery storage at one-tenth the cost of lithium-ion batteries;
- Small modular nuclear reactors at half the construction cost of today's reactors;
- Refrigeration with no global warming potential;
- Zero-net-energy buildings at zero net cost;
- Carbon-free hydrogen produced by renewables at the same cost as that from shale gas;
- Decarbonizing the production of steel, concrete, and chemicals and construction materials;
- Decarbonizing the food and agriculture sector, and using agriculture to sequester; and
- Employing carbon capture and sequestration for power plant exhausts.

These areas focus on improving technologies that are currently in various stages of development by lowering cost, driving efficiency, and reducing emissions. While all of these areas are important, a new ARPA-C would simply duplicate the efforts of current government agencies, most notably ARPA-E.

## ARPA-E

ARPA-E was established in 2007 under the America COMPETES Act and has funded over 800 projects since 2009.[2] ARPA-E's mission is "to overcome the long-term and high-risk technological barriers in the development of energy technologies." In particular, its founding legislation provides that it should enhance the economic and energy security of the United States by reducing imports of energy from foreign sources;

reducing energy-related emissions, including greenhouse gases; and improving the energy efficiency of all economic sectors.[3] ARPA-E also aims to fund the development of technologies that are not receiving support through the private sector or other federal research programs.[4]

The Government Accountability Office found that ARPA-E successfully funded projects that were not of interest to private investors, as a majority of the technologies were unproven or likely could not be commercialized in less than three years. Private investors typically are concerned with seeing a return on their investment in the short term, making them reluctant to invest in more speculative technologies.[5]

## **Why ARPA-C?**

While Biden's ARPA-C proposal makes no specific references to curbing energy imports, it does call for technologies that increase energy efficiency and reduce greenhouse gas emissions. In short, it appears that ARPA-E has already been tasked with addressing the very issues that ARPA-C would tackle under Biden's proposal.

ARPA-E's defining language highlights the undeniable ties between energy consumption and emissions, such as greenhouse gases, that drive climate change. The largest contributors of emissions in the United States are the transportation and power generation sectors.[6] Of Biden's eight proposed broadly defined areas for research and development, all are directly tied to the consumption of energy and seeking to drive efficiencies and reduce emissions.

Even those issues that appear to be indirectly tied to the energy sector, such as decarbonizing the agriculture sector, have received attention from ARPA-E. For example, two of ARPA-E's programs, Systems for Monitoring and Analytics for Renewable Transportation Fuels from Agricultural Resources and Management (SMARTFARM) and Rhizosphere Observations Optimizing Terrestrial Sequestration (ROOTS), seek to develop technology that aids in capturing and sequestering carbon dioxide through natural processes like agricultural production. The SMARTFARM program is focused on the development of technology that quantifies the feedstock-related emissions of biofuels as they grow in the field, driving the growth of efficient feedstock and eventually providing greater insight into the quantities of carbon dioxide sequestered.[7] ROOTS, on the other hand, aims to improve degraded soil quality by reducing carbon debt.[8] With this level of both breadth and detail, ARPA-E's programming has historically demonstrated that it is able to drive the innovation needed to address climate change.

## **Conclusion**

Despite proposing a historically high \$1.7 trillion climate plan, Biden has been criticized by some organizations, including the Sunrise Movement that supported Bernie Sanders campaign, for not doing enough to address environmental injustice [9]? In response, Biden has assembled a taskforce, including a Sunrise Movement co-founder, to refine his climate policy and address these concerns.[10]? While the threat of climate change has grown since the founding of ARPA-E, it is not helpful to create another agency with seemingly the same mission as one that already exists.

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[1] <https://www.washingtonpost.com/graphics/politics/policy-2020/climate-change/carbon-tax/>

[2] <https://arpa-e.energy.gov/?q=site-page/arpa-e-impact>

[3] 42 U.S.C. 149 § 16538(c)(1)

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

[5] <https://www.gao.gov/assets/590/587665.pdf>

[6] <https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf>

[7] <https://arpa-e.energy.gov/?q=arpa-e-programs/smartfarm>

[8] <https://arpa-e.energy.gov/?q=arpa-e-programs/roots>

[9] <https://subscriber.politicopro.com/article/2020/04/bidens-plan-to-win-over-skeptical-climate-activists-1917697>

[10] <https://insideclimatenews.org/news/13052020/biden-ocasio-cortez-kerry-climate-task-force>