



**U.S. Department of Energy
Advanced Research Projects Agency – Energy**

**Announcement of Teaming Partner List for an upcoming
Funding Opportunity Announcement:**

New Program in Carbon Optimized Bioconversion

The Advanced Research Projects Agency – Energy (ARPA–E) intends to issue a new Funding Opportunity Announcement (FOA) to use advanced synthetic biology tools to engineer novel bioconversion platforms and systems capable of using and incorporating external energy inputs to substantially increase carbon utilization, flux, and efficiency while driving towards and achieving industrially relevant productivities. Successful platforms would offer fundamentally new capacities for the bioeconomy by allowing for fully *carbon optimized* renewable fuel and chemical synthesis with maximal carbon and resource efficiency. Proposed systems of interest include, but are not limited to (1) carbon-optimized fermentation strains that avoid CO₂ evolution, (2) engineered mixotrophic consortia or systems that avoid CO₂ evolution, (3) biomass derived sugar or carbon oxide gas fermentation with internal CO₂ utilization, (4) cell-free carbon optimized biocatalytic biomass conversion and/or CO₂ utilization, (5) cross-cutting or other proposed carbon optimized bioconversion schemes. All systems will need to demonstrate the capacity to accommodate external reducing equivalents to optimize the carbon flux and efficiency of the system as compared to a traditional fermentation system or bioconversion pathway (i.e. the sum of the recoverable energy contents of the products is greater than the energy content of the biomass or primary carbon feedstock). Allowable external reducing equivalents are limited to those that can be produced electrocatalytically using H₂O, CO₂, or both.

ARPA-E programs are pursuing transformational technologies up-and-down the bioeconomy supply chain to increase the sustainability of renewable fuel and chemical synthesis and to enable industrial scale carbon management and CO₂ emissions mitigation. The program outlined in this FOA will build on these innovations by funding the development of (i) hydrogen accommodating non-oxidative glycolytic strains of industrial relevance for immediate enhancement of first generation biofuel production – corn starch ethanol, (ii) external energy accommodating carbon optimized platforms of industrial relevance for advanced and cellulosic fuel and fuel relevant intermediate biosynthesis, (iii) new tools and engineered approaches to optimize fermentation and biosynthesis for carbon efficiency, and (iv) advanced tools to decouple key biochemical pathways from the limitations of cell growth and maintenance by promoting the design and engineering of robust and industrially relevant cell-free bioconversion and biocatalytic platforms.

ARPA-E will provide financial support to teams proposing to develop novel carbon-optimized bioconversion systems that meet the metrics specified in the FOA. If successful, the technologies funded by this carbon optimized bioconversion program are expected to catalyze new conversion platforms for biofuels and other high-volume bioproducts that are capable of avoiding 100% of carbon loss to CO₂, enabling greater than 40% increases in recoverable bioproduct from the same feedstocks. Additionally, this program will fund cutting-edge technologies to de-risk gas-fed fermentation feedstocks and cell-free



bioconversion systems. ARPA-E held a workshop on these topics in September 2019. Information on this workshop can be found at the event webpage (<https://arpa-e.energy.gov/?q=events/carbon-optimized-bioconversion>).

As a general matter, ARPA-E strongly encourages outstanding scientists and engineers from different organizations, scientific disciplines, and technology sectors to form new project teams. Multidisciplinary and cross-sector collaboration spanning organizational boundaries enables and accelerates the achievement of scientific and technological outcomes that were previously viewed as extremely difficult, if not impossible. Furthermore, ARPA-E strongly encourages involving industry partners to advise and collaborate with teams, with the ultimate goal of achieving successful industry adoption and integration of a new risk-driven operational and planning paradigm.

The Teaming Partner List is being compiled to facilitate the formation of new project teams. ARPA-E intends to make the Teaming Partner List available on ARPA-E eXCHANGE (<http://ARPA-E-foa.energy.gov>), ARPA-E's online application portal, in July 2020. Once posted, the Teaming Partner List will be updated periodically, until the close of the Full Application period, to reflect new Teaming Partners who have provided their information.

Any organization that would like to be included on the Teaming Partner list should complete all required fields in the following link: <https://arpa-e-foa.energy.gov/ApplicantProfile.aspx>. Required information includes: Organization Name, Contact Name, Contact Address, Contact Email, Contact Phone, Organization Type, Area of Technical Expertise, and Brief Description of Capabilities.

By submitting a response to this Announcement, you consent to the publication of the above-referenced information. **By facilitating this Teaming Partner List, ARPA-E does not endorse or otherwise evaluate the qualifications of the entities that self-identify themselves for placement on the Teaming Partner List.** ARPA-E will not pay for the provision of any information, nor will it compensate any respondents for the development of such information. Responses submitted to other email addresses or by other means will not be considered.

This Announcement does not constitute a FOA. No FOA exists at this time. Applicants must refer to the final FOA, expected to be issued by the end of August 2020, for instructions on submitting an application, the desired technical metrics, and for the terms and conditions of funding.