



**U.S. Department of Energy
Advanced Research Projects Agency – Energy
Announcement of Teaming Partner List
for an upcoming Funding Opportunity Announcement:
*Energy-efficient Light-wave integrated Technology Enabling Networks
that Enhance Datacenters (ENLITENED)***

The Advanced Research Projects Agency Energy (ARPA-E) intends to issue a Funding Opportunity Announcement (FOA), entitled: *ENergy-efficient Light-wave Integrated Technology Enabling Networks that Enhance Datacenters (ENLITENED)*, focused on the application of integrated photonic technologies in future data centers (DCs). ***ARPA-E anticipates that the deadline for submission of Concept Papers to this FOA will occur 30 days after its issuance.*** The overall goal of the *ENLITENED* program will be to overcome the limitations of conventional metal interconnects used for DC server and switch chip input/output (I/O) functions. To achieve this, the high integration density and low energy-per-bit achievable with integrated photonic interconnect and switching technologies will be exploited – to ultimately provide transformational improvements in overall DC energy efficiency. As described in more detail below, the purpose of this announcement is to facilitate the formation of new project teams to respond to the upcoming FOA. The *ENLITENED* FOA will provide specific program goals, technical metrics, selection criteria, and other terms and requirements. For purposes of the Teaming Partner List, the following summarizes current planning for the FOA:

The technical goals of the anticipated FOA will be centered on overcoming the gap between current advances in integrated photonic technology research in interconnects and switches and the packaging and integration necessary to achieve wide-spread deployment of the technology in the networking sub-systems of future DCs. It is envisioned that the new integrated photonics-based DC networks will derive enhanced performance from new energy-efficient networking architectures that are directly enabled by the bandwidth density performance of the proposed integrated photonic technology platform.

The anticipated *ENLITENED* FOA will therefore target the critical packaging and integration challenges needed to exploit the inherent superior performance of dense photonic interconnects and switching technology at the *chip-scale* within DCs. Recognizing that the simple replacement of metal-based interconnect subsystems with integrated light-wave-based approaches will not provide an adequate solution to the problem of increasing DC load demands, this program will emphasize the coupling of photonics approaches to novel networking architectures that under realistic loads will result in significantly increased DC energy efficiency.

ARPA-E anticipates that the FOA will target research in: (1) Integration and packaging of photonic interconnects for chip-to-chip communications, (spanning from below “top-of-the-rack” to the on-board- and package-level server memory interconnect fabrics); (2) Integration and packaging of integrated photonics-enabled high radix switches; (3) DC network architectures that are enabled by the



new functionality brought by the above integrated photonics thrusts, and; (4) Modeling and simulation of the new DC architectures to provide quantifiable metrics to evaluate energy efficiency performance under realistic loads.

In order to realize the goals of the *ENLITENED* program, ARPA-E aims to bring together diverse engineering and scientific communities, including photonics researchers, packaging engineers, DC architecture experts, and DC modeling researchers that can develop and test the interconnect and switching sub-systems, and engage stake holders to put the new photonics-based technologies into the marketplace.

As a general matter, ARPA-E strongly encourages outstanding scientists and engineers from different organizations, scientific disciplines, and technology sectors to form project teams. Interdisciplinary 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.

The Teaming Partner List is being compiled to facilitate the formation of new project teams. The Teaming Partner List will be available on ARPA-E eXCHANGE (<http://arpa-e-foa.energy.gov>), ARPA-E's online application portal, starting in March 2016. 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 this 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 Notice, 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 Notice does not constitute a FOA. No FOA exists at this time. Applicants must refer to the final FOA, expected to be issued in March 2016, for instructions on submitting an application and for the terms and conditions of funding.