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

Announcement of Teaming Partner List for an upcoming Funding Opportunity Announcement: *Saving Energy Nationwide in Structures with Occupancy Recognition (SENSOR)*

The Advanced Research Projects Agency Energy (ARPA-E) intends to issue a Funding Opportunity Announcement (FOA) tentatively entitled *Saving Energy Nationwide in Structures with Occupancy Recognition (SENSOR)* to fund the development of novel occupancy and people counting sensors. Such hardware can lead to significant energy savings for heating and cooling in both residential and commercial scenarios, with additional energy savings possible via enabling demand controlled ventilation in the commercial scenarios. In addition, methods and facilities to accurately validate the sensor performance and resulting energy savings in quasi- and real- world scenarios is included.

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 SENSOR FOA. The anticipated FOA will provide specific program goals, technical metrics, selection criteria, and other terms and requirements. The anticipated FOA terms will be controlling. ARPA-E anticipates that the deadline for submission of Concept Papers will occur 30 days after issuance of the anticipated FOA. For purposes of the Teaming Partner List, the following summarizes current planning for the anticipated FOA:

The technical goals of the anticipated FOA will be centered on the development of novel sensor systems that can be validated to return occupancy and people counting data with certainty (i.e. high-accuracy and low-failure rates) at cost suitable for market adoption. “Sensor” as used here means the actual hardware sensor component(s), any on-board algorithms or hardware needed to turn the sensing signals into an accurate binary (for residential) or occupant count (for commercial, as described below); an industry accepted open-source method for communicating that information outside of the sensor system including encryption (wi-fi, BLE, or the like); a power source; and any additional nodes (in the case of a wireless sensor networks) needed to compile and transmit the information to building controls, such as a thermostat or a building automation system (BAS).

Two use cases have been identified. For the residential case, a whole home binary occupation signal is required, with this requirement the system must distinguish between humans and their pets. This occupancy signal will be used to change the temperature setbacks to “away” mode, and then automatically back to “occupied” mode when the home is again occupied. The user will not need to ever interact with the thermostat’s scheduling function as the occupancy controlled auto-scheduling will be “correct” almost all of the time, in accordance with the technical program metrics. In the commercial case where buildings are ventilated, there is an additional opportunity; energy used for ventilation is as least as significant as that used for heating and cooling, and the required ventilation level for a commercial

space can be vary depending on how many people are occupying a specific HVAC ("heating, cooling, and ventilation") zone, according to building standards. If the number of people are known for each zone, the ventilation can be tailored to be adequate without massively over-ventilating the space. In order to enhance user adoption, the development of similarly low cost, stable, and easy-to-deploy CO_2 sensors is in scope of this work to address concerns regarding indoor air quality (IAQ), even if they cannot be used to accurately measure occupancy directly.

In order to realize the goals of the SENSOR program, ARPA-E aims to bring together diverse engineering and scientific communities, including but not limited to sensor materials development, sensor device development, ultra-low power electronics platforms, distributed sensing systems, distributed wireless networks, advanced algorithm development, automated buildings, smart buildings, energy efficient buildings, indoor air quality ("IAQ"), HVAC control systems, and others. This includes input from the end-users of such technologies in the HVAC space, such as HVAC system fabricators, building managers, energy utilities, and the like. In addition, communities regarding the real-world testing and validation of such sensors, including validating the energy saved, are sought.

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. 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.

This 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 **November 2016**. This 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 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 **January 2017**, for instructions on submitting an application and for the terms and conditions of funding.