RESEARCH COORDINATION WITH OTHER DOE OFFICES

The U.S. Department of Energy offers a tremendous variety of research opportunities that complement the research supported by ARPA-E. Applicants interested in receiving financial assistance for basic research should contact the DOE's Office of Science. Office of Science National Scientific User Facilities are open to all researchers, including ARPA-E applicants and awardees. Projects focused on early-stage R&D for the improvement of technology along defined roadmaps may be appropriate for support through the DOE applied energy offices including: the Office of Fossil Energy, the Office of Nuclear Energy, the Office of Electricity Delivery and Energy Reliability, and Office of Energy Efficiency & Renewable Energy, including its program offices: Advanced Manufacturing, Building Technologies, Vehicle Technologies, Bioenergy Technologies, Fuel Cell Technologies, Solar Energy Technologies, Geothermal Technologies, Wind Energy Technologies, and Water Power Technologies.

In October 2017, ARPA-E hosted a meeting to discuss the OPEN 2018 FOA with representatives from the DOE offices noted above to coordinate the research to be supported under OPEN 2018 with their R&D plans. An important part of this meeting was a brainstorming activity in which ARPA-E received suggestions from the technical staff in the other DOE offices on research topics that they felt were opportunities for research under OPEN 2018. The list of topics below summarizes the results of this activity by four major topical groupings. However, it should not be construed as prioritization of interests for OPEN 2018. As noted in the funding opportunity announcement, the objective of OPEN 2018 is simple, yet comprehensive: to support high-risk R&D leading to the development of potentially disruptive new technologies across the full spectrum of energy applications.

POWER GENERATION (fossil, nuclear, renewable, centralized, and distributed)

- Store and transport heat with low loss (e.g. "thermal grid", materials and processes for molten salt)
- Advanced materials (e.g. high dose cladding) and manufacturing for nuclear reactors, fuels, and components
- Methane recycling – reinjection or conversion to chemicals or electricity
- Advanced analytics for fracturing optimization
- Advanced monitors and sensors across all energy production
- Superconducting generators for wind energy
- High temperature, high pressure materials
- High efficiency, small-scale power cycles that are fuel flexible and/or could use local fuel
- Marine-based power production

GRID (operation, management, planning, while enhancing resilience and reliability)

- Multi-day/seasonal storage including hydrogen fuel cells and electrolyzers and liquid fuels for storage
- Micro CHP (combined heat and power)
- Advanced/high-performance materials (e.g. super hydrophobic, high voltage, etc.)
- New technologies for grid protection and communication
- System-wide approaches to integrate more renewables
- Smart inverters for PV
- Hybrid AC/DC grids
- Ultra-high voltage wide-bandgap devices to eliminate transformers

EFFICIENCY (buildings, resource production, and manufacturing)

- Advanced building materials focused on building envelope (e.g. daylighting, heat management)
- "Human in the loop" and built-in diagnostics/controls

TRANSPORTATION AND BIOENERGY (storage, vehicles, fuels, and networks)

- Information-science-oriented programs (e.g. exa-scale computing, materials design, etc.)
- Multispectral sensors (e.g. thermal energy and infrared sensors)
- Dynamic charging and multi-valent ion batteries for electric or advanced hybrid vehicles
- Optimizing the engine for different hybrid architectures
- Dense packaging for power electronics (e.g. 3D packaging and heavy circuit boards)
- Pretreatment technologies for cellulosic sugars to enable low-cost cellulosic sugars