

BUILDING ENERGY EFFICIENCY FRONTIERS AND INCUBATOR TECHNOLOGIES (BENEFIT) - 2014

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001027

FOA Type: Initial

CFDA Number: 81.086

FOA Issue Date:	2/4/2014
First Informational Webinar	2/7/2014
Submission Deadline for Concept Papers:	3/6/2014
Second Informational Webinar	3/25/2014
Submission Deadline for Full Applications:	4/21/2014
Submission Deadline for Replies to Reviewer Comments:	5/29/2014
Expected Date for EERE Selection Notifications:	7/7/2014
Expected Timeframe for Award Negotiations	9/5/2014

- Applicants must submit a Concept Paper by the due date listed above to be eligible to submit a Full Application.
- To apply to this FOA, Applicants must register with and submit application materials through EERE Exchange at <https://eere-Exchange.energy.gov>, EERE's online application portal. Frequently asked questions for this FOA and the EERE Application process can be found at <https://eere-exchange.energy.gov/FAQ.aspx>.
- Applicants must designate primary and backup points-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. If an application is selected for award negotiations, it is not a commitment to issue an award. It is imperative that the Applicant/Selectee be responsive during award negotiations and meet negotiation deadlines. Failure to do so may result in cancelation of further award negotiations and rescission of the Selection.

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
I. FUNDING OPPORTUNITY DESCRIPTION	2
A. DESCRIPTION/BACKGROUND	2
B. TOPIC AREAS/TECHNICAL AREAS OF INTEREST.....	2
1. <i>Topic 1: Open Topic for Energy Efficiency Solutions for Residential and Commercial Buildings</i>	3
2. <i>Topic 2: Innovative Sensors & Sensor Systems</i>	3
3. <i>Topic 3: Advanced Energy-Efficient Clothes Dryers</i>	6
4. <i>Topic 4: Highly Insulating Building Envelope Components</i>	9
C. APPLICATIONS SPECIFICALLY NOT OF INTEREST	13
II. AWARD INFORMATION	14
A. AWARD OVERVIEW	14
1. <i>Estimated Funding</i>	14
2. <i>Period of Performance</i>	14
3. <i>New Applications Only</i>	14
B. EERE FUNDING AGREEMENTS	15
1. <i>Cooperative Agreements</i>	15
2. <i>Funding Agreements with FFRDCs, GOGOs, Federal Agencies and Federal Instrumentalities</i>	15
3. <i>Grants</i>	15
4. <i>Technology Investment Agreements</i>	15
III. ELIGIBILITY INFORMATION	17
A. ELIGIBLE APPLICANTS	17
1. <i>Individuals</i>	17
2. <i>Domestic Entities</i>	17
3. <i>Foreign Entities</i>	17
4. <i>Incorporated Consortia</i>	18
5. <i>Unincorporated Consortia</i>	18
B. COST SHARING.....	19
2. <i>Legal Responsibility</i>	20
3. <i>Cost Share Allocation</i>	20
4. <i>Cost Share Types and Allowability</i>	20
5. <i>Cost Share Contributions by FFRDCs and GOGOs</i>	21
6. <i>Cost Share Verification</i>	21
7. <i>Cost Share Payment</i>	22
C. COMPLIANCE CRITERIA	22
1. <i>Compliance Criteria</i>	22
D. RESPONSIVENESS CRITERIA.....	23
E. OTHER ELIGIBILITY REQUIREMENTS.....	23
1. <i>Requirements for DOE/NNSA Federally Funded Research and Development Centers (FFRDC) Listed as the Applicant</i>	23
2. <i>Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient</i>	24
F. LIMITATION ON NUMBER OF CONCEPT PAPERS AND FULL APPLICATIONS ELIGIBLE FOR REVIEW	25
G. QUESTIONS REGARDING ELIGIBILITY	25
IV. APPLICATION AND SUBMISSION INFORMATION	25
A. APPLICATION PROCESS	25

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

B.	APPLICATION FORMS	26
C.	CONTENT AND FORM OF THE CONCEPT PAPER	27
1.	<i>Concept Paper Content Requirements</i>	27
D.	CONTENT AND FORM OF THE FULL APPLICATION	28
1.	<i>Full Application Content Requirements</i>	29
2.	<i>Technical Volume</i>	30
3.	<i>SF-424: Application for Federal Assistance</i>	36
4.	<i>Budget Justification Workbook (EERE 159)</i>	37
5.	<i>Summary/Abstract for Public Release</i>	37
6.	<i>Summary Slide</i>	37
7.	<i>Subaward Budget Justification (EERE159)</i>	38
8.	<i>Budget for DOE/NNSA FFRDC (if applicable)</i>	38
9.	<i>Authorization for non-DOE/NNSA or DOE/NNSA FFRDCs</i>	38
10.	<i>SF-LLL: Disclosure of Lobbying Activities</i>	38
11.	<i>Waiver Requests: Foreign Entities and Performance of Work in the United States</i>	39
12.	<i>U.S. Manufacturing Commitments</i>	39
E.	POST-AWARD INFORMATION REQUESTS	40
F.	CONTENT AND FORM OF REPLIES TO REVIEWER COMMENTS.....	40
G.	SUBMISSION DATES AND TIMES	41
H.	INTERGOVERNMENTAL REVIEW	41
I.	FUNDING RESTRICTIONS	41
1.	<i>Allowable Costs</i>	41
2.	<i>Pre-Award Costs</i>	41
3.	<i>Performance of Work in the United States</i>	42
4.	<i>Construction</i>	43
5.	<i>Equipment and Supplies</i>	43
6.	<i>Lobbying</i>	43
V.	APPLICATION REVIEW INFORMATION	44
A.	TECHNICAL REVIEW CRITERIA.....	44
1.	<i>Concept Papers</i>	44
2.	<i>Full Applications</i>	44
3.	<i>Criteria for Replies to Reviewer Comments</i>	46
B.	STANDARDS FOR APPLICATION EVALUATION	46
C.	OTHER SELECTION FACTORS	46
1.	<i>Program Policy Factors</i>	46
D.	MERIT REVIEW AND SELECTION PROCESS.....	47
1.	<i>Overview</i>	47
2.	<i>Pre-Selection Interviews</i>	47
3.	<i>Pre-Selection Clarification</i>	47
4.	<i>Selection</i>	48
VI.	AWARD ADMINISTRATION INFORMATION	48
A.	ANTICIPATED NOTICE OF SELECTION AND AWARD DATES	48
B.	AWARD NOTICES.....	48
1.	<i>Rejected Submissions</i>	48
2.	<i>Concept Paper Notifications</i>	48
3.	<i>Full Application Notifications</i>	49
4.	<i>Successful Applicants</i>	49
5.	<i>Postponed Selection Determinations</i>	50
6.	<i>Unsuccessful Applicants</i>	50
C.	ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS	50
1.	<i>Registration Requirements</i>	50

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

2.	<i>Award Administrative Requirements</i>	51
3.	<i>Limitations on Compensation Costs</i>	51
4.	<i>Subaward and Executive Reporting</i>	52
5.	<i>National Policy Requirements</i>	52
6.	<i>Environmental Review in Accordance with National Environmental Policy Act (NEPA)</i>	52
7.	<i>Applicant Representations and Certifications</i>	52
8.	<i>Statement of Substantial Involvement</i>	55
9.	<i>Intellectual Property Management Plan</i>	56
10.	<i>Subject Invention Utilization Reporting</i>	57
11.	<i>Intellectual Property Provisions</i>	57
12.	<i>Reporting</i>	57
13.	<i>Go/No-Go Review and Stage-Gate Review</i>	57
VII.	QUESTIONS/AGENCY CONTACTS	58
VIII.	OTHER INFORMATION	58
A.	FOA MODIFICATIONS	58
B.	INFORMATIONAL WEBINARS.....	59
C.	GOVERNMENT RIGHT TO REJECT OR NEGOTIATE.....	59
D.	COMMITMENT OF PUBLIC FUNDS	59
E.	TREATMENT OF APPLICATION INFORMATION	59
F.	EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL	61
G.	NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES.....	61
H.	NOTICE OF RIGHT TO CONDUCT A REVIEW OF FINANCIAL CAPABILITY	61
I.	NOTICE OF POTENTIAL DISCLOSURE UNDER FREEDOM OF INFORMATION ACT	61
J.	REQUIREMENT FOR FULL AND COMPLETE DISCLOSURE	61
K.	RETENTION OF SUBMISSIONS	62
L.	TITLE TO SUBJECT INVENTIONS	62
M.	GOVERNMENT RIGHTS IN SUBJECT INVENTIONS.....	63
1.	<i>Government Use License</i>	63
2.	<i>March-In Rights</i>	63
N.	RIGHTS IN TECHNICAL DATA	63
O.	COPYRIGHT	64
P.	PROTECTED PERSONALLY IDENTIFIABLE INFORMATION	64
Q.	ANNUAL COMPLIANCE AUDITS.....	66
	APPENDIX A – DEFINITIONS	67
	APPENDIX B – COST SHARE INFORMATION	72
	APPENDIX C – SAMPLE COST SHARE CALCULATION FOR BLENDED COST SHARE PERCENTAGE	77
	APPENDIX D – OPEN SOURCE SOFTWARE	79
	APPENDIX E – DATA MANAGEMENT PLANS	83
	APPENDIX F – TECHNICAL POTENTIAL AND PAYBACK CALCULATION	87

EXECUTIVE SUMMARY

Means of Submission	Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted through EERE Exchange at https://eere-Exchange.energy.gov , EERE's online application portal. EERE will not review or consider applications submitted through other means. The Users' Guide for Applying to the Department of Energy EERE Funding Opportunity Announcements is found at https://eere-Exchange.energy.gov/Manuals.aspx .
Total Amount to be Awarded	\$14,000,000
Average Award Amount	EERE anticipates making awards that range from \$500,000 to \$1,000,000 for Incubators awards and \$500,000 to \$2,000,000 for Frontiers awards.
Types of Funding Agreements	Cooperative Agreements, Grants, Technology Investment Agreements, Work Authorizations, and Interagency Agreements
Period of Performance	12 to 24 months for Incubators awards Up to 36 months for Frontiers awards.
Eligible Applicants	Individuals, Domestic Entities, Foreign Entities, Incorporated Consortia, Unincorporated Consortia, subject to the definitions in Section III.A.
Cost Share Requirement	The cost share must be at least 20% of the total allowable costs for research and development projects. Domestic Institutions of Higher Education, Domestic Nonprofit entities, U.S. Federally Funded Research and Development Centers (FFRDC), and U.S. State, Local, or Tribal governments conducting applied research and development activities funded under this FOA are eligible for a waiver to reduce the cost share requirement. Specifically, the cost share requirement is reduced from 20% to 10% when the qualified entity performs more than 50% of the project work, as measured by the Total Project Cost. See Section III.B of this FOA for more information.
Submission of Multiple Applications	Applicants may submit more than one application to this FOA, provided that each application describes a unique, scientifically distinct project.
Application Forms	Required forms and templates for Full Applications are available on EERE Exchange at https://eere-Exchange.energy.gov .
FOA Summary	This FOA supports research and development of technologies and approaches that lead to primary energy reductions in buildings in the USA. Off-roadmap topics (Incubators), together with roadmap-driven topics (Frontiers) are offered that complement the core funding provided to the national labs and allow all interested parties, including corporations, universities, and non-profits as well as the national labs, to contribute to advancement in these technological areas. The Incubators topics are (1) an open topic and (2) one focused on sensors; the Frontiers topics address (3) energy-efficient clothes dryers, and (4) the opaque and visible building envelope.

Questions about this FOA? Email benefitfoa@qo.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

I. FUNDING OPPORTUNITY DESCRIPTION

A. DESCRIPTION/BACKGROUND

Buildings accounted for 41% (40 quads) of the primary energy consumption in the USA in 2010, greater than that attributable to either transportation (28%) or industry (31%). This represented a cost of approximately \$400 billion in 2010 dollars. Buildings consumed 74% of the electricity generated in the USA, and 34% of the natural gas production. This led to buildings being responsible for 40% of the carbon dioxide emissions in the USA, or 7.4% of the total global carbon dioxide emissions.¹ It is clear that energy efficiency measures in the buildings sector provide a tremendous opportunity to reduce energy consumption and costs, and to reduce greenhouse gas (GHG) emissions.

B. TOPIC AREAS/TECHNICAL AREAS OF INTEREST

The Emerging Technologies (ET) Program of the Building Technologies Office (BTO) supports applied research and development for technologies and systems that contribute to building energy consumption. BTO's goal is to deliver 50% primary energy savings in the year 2030, relative to the baseline energy consumption projected by the *2010 Annual Energy Outlook*. The ET Program is helping to meet this goal by enabling cost-effective, energy-efficient technologies to be developed and introduced into the marketplace. The ET Program maintains support for the national laboratories in five core areas: Solid-State Lighting, HVAC (includes water heating and appliances), Sensors & Controls, Windows & Envelope, and Modeling & Tools. This FOA combines off-roadmap topics (Incubators) with roadmap-driven topics (Frontiers) that complement the core funding provided to the national labs and allow all interested parties, including corporations, universities, and non-profits as well as the national labs, to contribute to advancement in four of these core technological areas: HVAC, Sensors & Controls, Windows & Envelope, and Modeling & Tools. These topics are combined into this single, relatively large FOA in order to reduce administrative costs and to ensure that only the best applications are supported.

Because of their different focuses (Incubators: off-roadmap; Innovations: roadmap-driven), this FOA is divided into two sections: an Incubators section and an Innovations section.

INCUBATORS Topics:

The DOE Office of Energy Efficiency and Renewable Energy (EERE) is an organization focused on achieving aggressive and well-defined mid-to-long term clean energy goals for the United States of America. In that context, EERE has established multi-year plans and roadmaps. EERE focuses the majority of its resources on a limited number of "highest probability of success"

¹ 2011 Buildings Energy Data Book, available at <http://buildingsdatabook.eren.doe.gov/>

pathways/approaches to ensure that the program initiatives are supported at a critical mass (both in terms of dollars and time) for maximum impact.

This roadmap-based approach is one of EERE's greatest strengths, which can create challenges in recognizing and exploring unanticipated, game changing pathways/approaches which may ultimately be superior to the pathways/approaches on our existing roadmaps.

To enhance the responsiveness of the roadmap approach, EERE is issuing "Incubator" Funding Opportunity Announcements (FOAs) within its existing Offices and programs to support innovative technologies and solutions that could help meet existing goals but are not represented in a significant way in the Offices' existing Multi-Year Program Plans (MYPPs) or current portfolios. The Incubator programs will allow EERE to assess new technologies for their potential to be "on ramped" to future MYPPs. Successful incubator projects will reduce the risk associated with potentially breakthrough approaches and technologies so that they could be viable candidates for inclusion in future program roadmaps.

The focus of the Incubators section of the current FOA is on R&D activities that support the following BTO goals under the two major topics listed below:

1. TOPIC 1: OPEN TOPIC FOR ENERGY EFFICIENCY SOLUTIONS FOR RESIDENTIAL AND COMMERCIAL BUILDINGS

The Building Technologies Office (BTO) seeks to develop technologies, techniques, and tools for making buildings more energy efficient. Currently supported technologies include heating, ventilating, and air conditioning (HVAC), water heating, lighting, building envelope (including windows), and sensors and controls, as well as building energy modeling.

Any innovative energy-efficiency technologies, approaches, or design tools which show a clear application to residential and/or commercial buildings with significant primary energy savings potential that are neither (a) already supported by BTO (see section I.C Applications Specifically Not of Interest), or (b) described explicitly in a BTO roadmap (for example see <http://energy.gov/eere/buildings/program-plans-implementation-and-results>), are eligible to apply under Topic 1.

One performance metric used to evaluate applications will be the primary energy savings technical potential. Each application must describe a technology or approach that leads to a minimum primary energy savings technical potential of at least 250 TBtu (i.e., 0.25 Quads). A second metric will be the cost effectiveness, generally specified by a simple payback analysis. All applicants for Topic 1 should follow the procedures described in Appendix F for calculating the primary energy savings technical potential and determining the cost effectiveness.

2. TOPIC 2: INNOVATIVE SENSORS & SENSOR SYSTEMS

Improvements in sensors offer significant potential for energy savings in buildings. For example, a recent study on the use of advanced occupancy sensors compared with

conventional occupancy sensors revealed that advanced sensors yielded average energy savings of 17.8%, compared with only 5.9%, relative to a base-case commercial building.² Siemens Corporation estimates that energy savings of 30% are possible in buildings with improved climate, air quality, and occupancy sensors.³ Additionally, low-cost, wireless, and other advanced sensors are considered an “enabling technology” for a variety of building energy-efficiency strategies, including building commissioning (0.5 - 1.8 Quads technical potential), damper fault detection and diagnosis (0.02 to 0.1 Quads technical potential), demand-controlled ventilation (0.2 to 0.3 Quads technical potential), duct leakage diagnostics (0.15 to 0.4 Quads technical potential), optimal whole-building control (≥ 0.4 Quads technical potential), etc.⁴

BTO is developing open-architecture sensors and sensor systems that easily share data to enable building operators and owners to cost effectively capture energy and cost savings through the use of new and existing control system applications. The objective is to take to market new sensors and sensor configurations that allow easy application to building operation, easy and open access to the data from the sensors, and novel application of sensor data to building management systems. BTO is particularly interested in innovative approaches that reduce the cost and power consumption for data collection of common building operation variables (temperature, pressure, relative humidity, etc.), open-source sensor packages that allow for data acquisition and transmission with increased lifespan between manual calibrations, "virtual sensors" enabled by innovative combinations of hardware and software, and easily installed "plug and play" sensor packages in which sensors would be automatically recognized by building energy management systems, in a manner similar to how conventional printers are easily recognized by an existing computer network.

Topic 2 Successful Applicant Description

The successful applicant will develop open-source hardware sensing solutions for buildings in one of three sub-topic areas specifically tailored to small and medium buildings to advance opportunities for energy efficiency in this sector. Various existing solutions (some not necessarily found in the buildings sector today) might be considered and leveraged, where appropriate, in response to Topic 2. The solution should comprise the following components:

1. Application of new sensor nodes (e.g. temperature, vibration, flow, position and other sensing devices) from differing technology sectors applied to building applications for solutions in sensing and monitoring (e.g., application of automotive sensors to buildings' Indoor Air Quality (IAQ) solutions and equipment operations);
2. Sensor packages comprised of combinations of sensor nodes, power, logic, and communication configurations to sense building system states, energy usage,

² Zhang et al., 2013, "Energy Savings for Occupancy-Based Control (OBC) of Variable-Air-Volume (VAV) Systems," PNNL-22072

³ OECD, 2009, "Smart Sensor Networks: Technologies and Applications for Green Growth," OECD Digital Economy Papers, No. 167

⁴ Roth, K.W. et al., 2005, "Energy Impact of Commercial Building Controls and Performance Diagnostics: Market Characterization, Energy Impact of Building Faults and Energy Saving Potential"

environmental conditions and communicate the data/information. Specifically, BTO is seeking sensor packages that include:

- a. "Peel and Stick," "Plug and Play Solutions" (e.g. low-cost sensors that can be easily installed, commissioned, and operated to communicate to a centralized system);
 - b. Non-proprietary communication protocols;
 - c. Self-calibrating features;
 - d. Auto-mapping features (e.g., an implicit way of locating the sensor, has to have a unique identifier, must provide a method for identifying its installation location);
 - e. Fault-tolerant characteristics; and
 - f. Secure communications.
3. Virtual, proxy, or other inferential sensing and monitoring solutions for building applications (e.g., detecting individual equipment states/characteristics utilizing a network of low-cost sensors and post processing the data to infer equipment status and performance of a larger system). Virtual, proxy, and other inferential sensors have to generate an equivalent value to a traditional sensor given the application. Furthermore, virtual, proxy, and other inferential sensors have to yield valuable information that is actionable for building operations.

Three categories or types of virtual sensors are of interest:

- A. Difficult or costly to sense with a direct physical measurement (i.e. occupancy),
- B. Opportunistically using sensors that are already in use (i.e. temperature sensor to determine equipment state), and
- C. Non-intrusive.

The virtual, proxy and other inferential sensing characteristics should include:

- a) "Measurement" of energy, flow, temperature, pressure, light level;
- b) Installation, configuration, and calibration leads to a lower life cycle cost than traditional sensors;
- c) Cannot require complicated calibration;
- d) Provides continuous measurements over time.

Metrics for Topic 2

The successful applicant will develop open-source hardware solutions that address key requirements for commercial and residential buildings sensing and monitoring across BTO's five sensor and controls unifying criteria:

- 1) Interoperability – the solutions must work within existing control solutions (and not be proprietary).

- 2) Scalability – the solutions must be able to scale into production and scale into a building (and not be custom, one-off solutions).
- 3) Deploy-ability – the solutions must be self-starting and not require on-going commissioning or maintenance (and not need calibrating with third-party equipment).
- 4) Availability – the solutions must be “open” in terms of their communication standards (and not custom and proprietary).
- 5) Affordability – the solutions must be low in cost of manufacturing, installation, and ongoing operation.

FRONTIERS Topics:

In addition to "off-roadmap" research and development, the Emerging Technologies Program is also seeking to support roadmap-driven research and development that contributes to core technological areas (solid-state lighting, HVAC, sensors & controls, window & envelope, and modeling & tools). Because of limited funding we seek applications for only specified topics within these core technological areas. The intention is to offer this FOA on an annual basis, with the topics rotated among four of the five technological areas (all except solid-state lighting, which releases a separate annual FOA) in order to drive progress forward along their respective roadmaps.

The two solicited FY14 "Frontiers" topics are provided below, together with their corresponding targets, performance metrics, and impact metrics.

3. TOPIC 3: ADVANCED ENERGY-EFFICIENT CLOTHES DRYERS

Household appliances such as clothes dryers consume substantial amounts of energy in the residential sector. In 2010, electric clothes dryers consumed 0.59 Quads of primary energy in the residential sector.⁵ This reflects the fact that almost 80% of US households have a clothes dryer, about 80% of which are electric.⁶ Yet, the energy efficiency of electric clothes dryers has not improved significantly over the recent past years.

On August 24, 2011, amended standards were issued for residential clothes dryers. The full text of the amended standard is available in the Code of Federal Regulations, 10 CFR 430.32(h)(3). On January 1, 2015, these amended standards will establish new product classes and energy conservation standards for residential clothes dryers, as summarized in Table 1. Compliance with these new standards will be required on January 1, 2015.

⁵ 2010 Buildings Energy Data Book

⁶ Energy Star Market & Industry Scoping Report: Residential Clothes Dryers, Nov 2011

Table 1 Amended standards for residential clothes dryers

Product Class	Energy Factor (pounds/kWh)
1. Vented Electric, Standard (4.4 ft ³ or greater capacity)	3.73
2. Vented Electric, Compact (120V) (less than 4.4 ft ³ capacity)	3.61
3. Vented Electric, Compact (240V) (less than 4.4 ft ³ capacity)	3.27
4. Vented Gas	3.30
5. Ventless Electric, Compact (240V) (less than 4.4 ft ³ capacity)	2.55
6. Ventless Electric Combination Washer/Dryer	2.08

The energy efficiency of clothes dryers is measured by Energy Factor (EF, pounds/kWh). A heat pump dryer has been developed by a U.S. company which has successfully tested several prototypes and found energy savings of 68 percent as compared to energy use by conventional electric clothes dryers. The estimated retail cost is approximately twice that of a conventional electric dryer. Drying times were essentially the same as for the conventional dryer, and the dryer operates on standard 120 V line power. The prototype uses a disposable filter to reduce lint in the air system. Applications are sought with innovative cost and lint reduction systems which could enable heat pump dryers to be successful in the marketplace.

Research conducted on both heat pump dryers and conventional vented dryers on the European market showed that heat pump dryers consumed about 50 percent less energy than conventional dryers. The heat pump dryers tested had energy efficiency values between 0.32 and 0.40 kWh/kg laundry (5.50 to 6.88 pounds/kWh) (with 70 percent initial moisture, measured according to test standard EN 61121) whereas conventional dryers had values between 0.6 and 0.8 kWh/kg laundry (2.75 to 3.67 pounds/kWh). Another benefit noted by this research was that the leakage of water vapor into the room was around 20 percent, which is significantly lower than for conventional dryers. Table 2 presents the "Max Tech" Energy Factors for a variety of electric and gas clothes dryers. Additional information on the values in Table 2 can be found in the cited Technical Support Document (TSD).⁷

Table 2 Max Tech values from DOE's recent rulemaking for clothes dryers⁷

	Energy Factor (EF) (lb/kWh)	
Vented Clothes Dryer Active Mode Efficiency Levels (Vented Electric Standard and Vented Electric Compact (120V))	Electric Standard	Electric Compact (120V)
	Amended Test Procedure	Amended Test Procedure
	5.43	5.44
	Energy Factor (EF) (lb/kWh)	
Vented Clothes Dryer Active Mode Efficiency Levels (Vented Electric Compact (240V) and Vented Gas)	Electric Compact (240V)	Gas
	Amended Test Procedure	Amended Test Procedure
	4.91	3.62 (Gap Fill/Maximum Available)
	Energy Factor (EF) (lb/kWh)	
Ventless Clothes Dryer Active Mode Efficiency Levels	Electric Compact (240 V)	Electric Combination Washer/Dryer
	Amended Test Procedure	Amended Test Procedure
	4.04	3.70

Applications are sought for advanced energy-efficient clothes dryers (vented and ventless) to increase the Energy Factor at or exceeding the Max Tech values from DOE's recent rulemaking for clothes dryers (Table 2), with amended test procedure rating. The incremental first costs must result in a simple payback of less than 5 years over a minimum efficiency standard unit. Drying times should not increase more than 20% over baseline units and lint in the air system should be fully addressed. It is essential that proposers demonstrate knowledge of prior efforts and explain how they will overcome past technical and economic barriers that have prevented successful commercialization in prior efforts. Furthermore, concepts with measurable non-EF benefits, which are important for market success, are particularly encouraged and should be documented. For vented clothes dryers, this could include the "HVAC Burden;" running a conventional vented dryer replaces a 1275-ft² home of its conditioned air in approximately 1 hour. The specific items to address are summarized in Table 3.

Table 3 Items to address for Topic 3: Advanced Energy-Efficient Clothes Dryers

Applications for topic 3 should document the following:	
	Energy Factor (EF) equal to or greater than Max Tech values from DOE's recent rulemaking for clothes dryers (Table 2)
	Simple payback of less than 5 years over a minimum efficiency standard unit
	Drying times should not increase more than 20% over baseline units; compatibility with clothes washers
	Lint in the air system should be fully addressed and interactions with heat

⁷ Engineering Technical Support Document (TSD) chapter for DOE's recent rulemaking for clothes dryers, available at <http://www.regulations.gov/contentStreamer?objectId=0900006480c8ee0d&disposition=attachment&contentType=pdf>

	exchangers fully addressed
	Demonstrate knowledge of prior efforts and explain how past technical and economic barriers will be overcome
	Any measurable non-EF benefits

4. TOPIC 4: HIGHLY INSULATING BUILDING ENVELOPE COMPONENTS

In U.S. residential and commercial buildings, 37% of primary energy is used for space heating and cooling.

Table 4 shows the energy lost (in Quads) through conduction and solar heat gain in windows, and through conduction in opaque building envelope components, from heating and cooling in 2010. These results are for both the residential and commercial building sectors in 2010. A positive value indicates that the building component increases heat load while a negative value indicates that the building component reduces heat load. These results show that energy losses through building envelope components are dominated by heating losses through windows by conduction and through opaque building envelope components (roofs, walls and foundations). Additionally Table 5 shows the total number of residential buildings and the total floorspace of commercial buildings in 2010 and projected to 2035. In both cases, pre-2010 buildings dominate the market through the year 2035. Retrofitting existing buildings often requires different, more challenging technologies that must be sufficiently flexible to be applied to a wide range of different structures. Additionally, the price points for incorporating energy-efficient technologies to existing buildings are different than those that can be used for new buildings.

Consequently, Topic 4 is divided into two sub-topics, both focused on highly insulating building envelope components for retrofitting existing buildings in both the residential and commercial sectors: visibly transparent (or fenestration) and opaque building envelope components. FOA metrics for both sub-topics are shown in Table 6. Applicants are also encouraged to propose technologies that have higher *R*-values than the specified targets in Table 6 provided that the installed cost premium yields a comparable simple payback period.

Table 4 Primary Energy Consumption Attributable to Building Envelope Components in 2010 (Quads)⁸

Building Component	Residential		Commercial	
	Heating	Cooling	Heating	Cooling
Roofs	1.00	0.49	0.88	0.05
Walls	1.54	0.34	1.48	-0.03
Foundation	1.17	-0.22	0.79	-0.21
Infiltration	2.26	0.59	1.29	-0.15
Windows (Conduction)	2.06	0.03	1.60	-0.30
Windows (Solar Heat Gain)	-0.66	1.14	-0.97	1.38

Source: Office of Energy Efficiency and Renewable Energy 2011b; Office of Energy Efficiency and Renewable Energy 2011d; Office of Energy Efficiency and Renewable Energy 2011e; Office of Energy Efficiency and Renewable Energy 2011g

Table 5 New and Existing Building Floor Space in 2010 and 2035

Number of Residential Buildings (millions) ⁹		
	Pre-2010 Buildings	Post-2010 Buildings
2010	82.7	1.2
2035	52.0	51.0
Commercial Building Floor Space (billion ft ²) ¹⁰		
	Pre-2010 Buildings	Post-2010 Buildings
2010	79.3	1.8
2035	52.8	50.2

⁸ Office of Energy Efficiency and Renewable Energy. (2011). *Building Energy Data Book*. Washington, DC: U.S. Department of Energy, "Table 2.1.5 - 2010 Residential Energy End-Use Splits, by Fuel Type (Quadrillion Btu)," available at <http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=2.1.5>; "Table 2.1.15 - Aggregate Residential Building Component Loads as of 1998," available at <http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=2.1.15>; "Table 3.1.4 - 2010 Commercial Energy End-Use Splits, by Fuel Type (Quadrillion Btu)," available at <http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=3.1.4>; "Table 3.1.12 - Aggregate Commercial Building Component Loads as of 1998," available at <http://buildingsdatabook.eren.doe.gov/TableView.aspx?table=3.1.12>.

⁹ Energy Information Agency. (2013). 2009 Residential Energy Consumption Survey, Table HC9.3. Washington, DC: Energy Information Agency, available at <http://www.eia.gov/consumption/residential/data/2009/xls/HC9.3%20Household%20Demographics%20by%20Year%20of%20Construction.xls>; Energy Information Agency. (2013). *Annual Energy Outlook 2013*, Table A4. Washington, DC: Energy Information Agency, available at <http://www.eia.gov/forecasts/aeo/er/pdf/tbla4.pdf>.

¹⁰ Energy Information Administration. (2010). *Annual Energy Outlook 2010*. Washington, DC: Energy Information Administration, available at [http://www.eia.gov/oiaf/archive/aeo10/pdf/0383\(2010\).pdf](http://www.eia.gov/oiaf/archive/aeo10/pdf/0383(2010).pdf); Energy Information Agency. (2013c). *Annual Energy Outlook 2013*, Table A5. Washington, DC: Energy Information Agency, available at <http://www.eia.gov/forecasts/aeo/er/pdf/tbla5.pdf>.

Table 6 Topic 4 Metrics – Highly Insulating Building Components Technologies for Retrofitting Existing Buildings

Market	Performance	Installed Cost Premium (\$/ft ²)	Visible Transmission (V_T)	Simple Payback (years)
Subtopic 1: Visibly transparent building envelope components (fenestration)				
Residential	≥ 7	6	0.6	5
Commercial	≥ 5	3	0.4	9.5
Subtopic 2: Opaque building envelope components				
Residential and Commercial	$\geq R8/\text{inch}$	0.3	N/A	10

Subtopic 1, Visibly transparent building components: The technology targets for residential and commercial windows are shown in Table 6. In all cases, windows must have a comparable thickness and weight to the currently installed window base to enable retrofitting existing buildings. Additionally, commercial windows must meet much more demanding structural tests (design pressures, deflection limits, torsion, and other hurricane ratings, operability, etc.) as well as very different market demands for durability, design flexibility, integration into different wall facades, etc. Visible transmittance (V_T) values are approximate, but are chosen to provide sufficient daylighting. V_T values are based on center-of-glass measurements.

Highly insulating windows are the most impactful individual technology in the fenestration space. R-10 windows have the potential to save 2,021 TBtu (2.0 Quads) in the residential and commercial sectors combined assuming that the current stock of windows were immediately replaced with R-10 windows. However, R-10 windows have limited market penetration without a substantial reduction in cost. Current projections show that payback periods in the residential and commercial sectors are 12 and 68 years, respectively. By contrast, an R-7 residential window at \$6/ft² installed cost premium is projected to have a payback period of approximately 5 years. Along the same lines, an R-5 commercial window at \$3/ft² installed cost premium is projected to have a payback of 9.5 years. Applicants are also encouraged to propose technologies that have higher R-values than the specified targets in Table 6 provided that the installed cost premium yields a comparable simple payback period. For both residential and commercial windows, high-volume, low-cost manufacturing processes and simplified, low-cost window installations that enable mass scale and possibly automated window replacement are expected to be essential to achieving the cost targets.

Subtopic 2, Opaque building envelope components: The metrics and targets for this subtopic are shown in Table 6: $\geq R8/\text{inch}$ building envelope thermal insulation material that can be added to walls of existing buildings at $< \$0.3/\text{ft}^2$ installed cost premium. The target does not specify if the insulation material should be applied to the internal or external surface of the walls. Insulation materials must meet existing durability (fire, structure, moisture, acoustic code) requirements, and minimize occupant disturbance. This material must be applicable for

wall insulation, but can also be applicable for other portions of the envelope to reduce thermal bridging between building components.

Two inches of R8/inch thermal insulation materials added to walls in residential and commercial buildings without consideration of installed cost has the potential to save 951 TBtu (0.95 Quads). The payback period for an additional 2 inches of an R8/inch insulation material at \$0.3/ft² incremental installed cost applied to walls has a simple payback period of less than 10 years. Note that this analysis is performed in terms of \$/ft², as opposed to \$/(ft²*R), in order to isolate the impacts of installed cost and performance. High-volume, low-cost manufacturing processes are expected to be essential to achieving this target. In addition to reducing material costs, these targets are unlikely to be achieved unless the proposed technologies also enable low labor-cost, easy installation methods. Labor costs for traditional interior or exterior insulation are \$0.4 to \$0.5/ft², depending on the insulation type, but not accounting for associated construction such as moving windows or electrical outlets.¹¹ Additionally, slow, labor-intensive installation leads to infrequent insulation upgrades to existing buildings resulting in slow market uptake for next-generation technologies. Insulation materials that can achieve the FOA target and are amenable to quick and easy installation compared to existing technologies, and minimize occupant disturbance, will have a greater energy savings impact.

C. APPLICATIONS SPECIFICALLY NOT OF INTEREST

The following types of applications will be deemed nonresponsive and will not be reviewed or considered (See Section III.D of the FOA):

- Applications that fall outside the technical parameters specified in Section I.B of the FOA, including but not limited to low-volume, high-cost manufacturing processes which will not allow advanced technologies to be deployed at scale.
- Applications closely related to currently supported projects in the Building Technologies Office, as listed below:
 - Dynamic windows and films
 - Attic insulation
- Applications for proposed technologies that are not based on sound scientific principles (e.g., violates the law of thermodynamics).

¹¹ Kosny, Jan; Fallahi, Ali; Shukla, Nitin. (January 2013). *Cold Climate Building Enclosure Solutions*. Washington, DC: U.S. Department of Energy.
http://cse.fraunhofer.org/Portals/55819/docs/ba_cold_climate_enclosure_solutions.pdf

II. AWARD INFORMATION

A. AWARD OVERVIEW

1. ESTIMATED FUNDING

EERE expects to make approximately \$14 million of Federal funding available for new awards under this FOA subject to the availability of appropriated funds. EERE anticipates making approximately 14 awards under this FOA. EERE may issue one, multiple, or no awards.

Individual awards may vary between \$500,000 and \$2 million.

EERE may issue awards in one, multiple, or none of the following topic areas:

Topic 1: Open Topic for Energy Efficiency Solutions for Residential and Commercial Buildings , and Topic 2: Innovative Sensors & Sensor Systems; EERE may issue approximately 7 awards total between these two topic areas, with an average award amount of \$750,000.

Topic 3: Advanced Energy-Efficient Clothes Dryers, and Topic 4: Highly Insulating Building Envelope Components; EERE may issue approximately 7 awards total between these two topic areas, with an average award amount of \$1.25 million.

EERE may establish more than one budget period for each award and fund only the initial budget period(s). Funding for all budget periods, including the initial budget period, is not guaranteed. Before the expiration of the initial budget period(s), EERE may perform a down-select among different recipients and provide additional funding only to a subset of recipients.

2. PERIOD OF PERFORMANCE

EERE anticipates making awards that will run up to 24 months in length for topics 1 and 2, and up to 36 months in length for topics 3 and 4. Project continuation will be contingent upon satisfactory performance and go/no-go decision review. At the go/no-go decision points, EERE will evaluate project performance, project schedule adherence, meeting milestone objectives, compliance with reporting requirements, and overall contribution to the program goals and objectives. As a result of this evaluation, EERE will make a determination to continue the project, re-direct the project, or discontinue funding the project. Only those projects demonstrating a high probability of successfully meeting the program targets will be continued.

3. NEW APPLICATIONS ONLY

EERE will accept only new applications under this FOA. EERE will not consider applications for renewals of existing EERE-funded awards through this FOA.

B. EERE FUNDING AGREEMENTS

Through Cooperative Agreements and other similar agreements, EERE provides financial and other support to projects that have the potential to realize the FOA objectives. EERE does not use such agreements to acquire property or services for the direct benefit or use of the United States Government.

1. COOPERATIVE AGREEMENTS

EERE generally uses Cooperative Agreements to provide financial and other support to Prime Recipients.

Through Cooperative Agreements, EERE provides financial or other support to accomplish a public purpose of support or stimulation authorized by Federal statute. Under Cooperative Agreements, the Government and Prime Recipients share responsibility for the direction of projects.

EERE has substantial involvement in all projects funded via Cooperative Agreement. See Section VI.C.8 of the FOA for more information on what substantial involvement may involve.

2. FUNDING AGREEMENTS WITH FFRDCs, GOGOs, FEDERAL AGENCIES AND FEDERAL INSTRUMENTALITIES

In most cases, Federally Funded Research and Development Centers (FFRDC) or Government-owned, Government-operated laboratories (GOGO) are funded independently of the remainder of the Project Team. The FFRDC or GOGO then executes an agreement with any non-FFRDC/GOGO Project Team members to arrange work structure, project execution, and any other matters. Regardless of these arrangements, the entity that applied as the Prime Recipient for the project will remain the Prime Recipient for the project.

3. GRANTS

Although EERE has the authority to provide financial support to Prime Recipients through Grants, EERE generally does not fund projects through Grants. EERE may fund a limited number of projects through Grants, as appropriate.

4. TECHNOLOGY INVESTMENT AGREEMENTS

In rare cases, and if determined appropriate, EERE will consider awarding a Technology Investment Agreement (TIA) to a non-FFRDC applicant. TIAs, governed by 10 CFR Part 603, are assistance instruments used to increase the involvement of commercial entities in the Department's research, development, and demonstration programs. A TIA may be either a type of cooperative agreement or an assistance transaction other than a cooperative agreement,

depending on the intellectual property provisions. In both cases, TIAs are not necessarily subject to all of the requirements of 10 CFR Part 600.

In a TIA, EERE may modify the standard Government terms and conditions, including but not limited to:

- Intellectual Property Provisions: EERE may negotiate special arrangements with Recipients to avoid the encumbrance of existing intellectual property rights or to facilitate the commercial deployment of inventions conceived or first actually reduced to practice under the EERE funding agreement.
- Accounting Provisions: EERE may authorize the use of generally accepted accounting principles (GAAP) where Recipients do not have accounting systems that comply with Government recordkeeping and reporting requirements.

EERE will be more amenable to awarding a TIA in support of a proposal from a consortium or a team arrangement that includes cost sharing with the private sector. Such a consortium or teaming arrangement could include a DOE/NNSA FFRDC, other Federal agency, or other Federal agency FFRDC. If the DOE/NNSA FFRDC is a part of the consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC portion of the work will be authorized and funded under the DOE field work authorization system and performed under the laboratory's Management and Operating contract. Funding for another Federal agency or its FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations, such as those involving intellectual property, may be made through a "funds in" agreement to facilitate the FFRDCs participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

An applicant may request a TIA if it believes that using a TIA could benefit the RD&D objectives of the program (see section 603.225) and can document these benefits. If an applicant is seeking to negotiate a Technology Investment Agreement, the applicant must include an explicit request in its Full Application. After an applicant is selected for award, the Contracting Officer will determine if awarding a TIA would benefit the RD&D objectives of the program in ways that likely would not happen if another type of assistance agreement (e.g., cooperative agreement subject to the requirements of 10 CFR Part 600). The Contracting Officer will use the criteria in 10 CFR 603, Subpart B, to make this determination.

III. ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

1. INDIVIDUALS

U.S. citizens and lawful permanent residents are eligible to apply for funding as a Prime Recipient or Subrecipient.

2. DOMESTIC ENTITIES

For-profit entities, educational institutions, and nonprofits¹² that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as a Prime Recipient or Subrecipient.

State, local, and tribal government entities are eligible to apply for funding as a Prime Recipient or Subrecipient.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) and DOE Government-Owned, Government-Operated laboratories (GOGOs) are eligible to apply for funding as a Prime Recipient or Subrecipient.

Non-DOE/NNSA FFRDCs and non-DOE GOGOs are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a Prime Recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a Subrecipient, but are not eligible to apply as a prime recipient.

3. FOREIGN ENTITIES

Foreign entities, whether for-profit or otherwise, are eligible to apply for funding under this FOA.

Other than as provided in the “Individuals” or “Domestic Entities” sections above, all Prime Recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a Prime Recipient, it must designate in the Full Application a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the Prime Recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.

¹² Nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, are not eligible to apply for funding.

Foreign entities may request a waiver of the requirement to designate a subsidiary in the United States as the Prime Recipient in the Full Application (i.e., a foreign entity may request that it remains the Prime Recipient on the award). To do so, the Applicant must submit an explicit waiver request in the Full Application, which includes the following information:

- Entity name;
- Country of incorporation;
- Description of the work to be performed by the entity for whom the waiver is being requested; and
- Countries where the work will be performed.

In the waiver request, the Applicant must demonstrate to the satisfaction of EERE that it would further the purposes of this FOA and is otherwise in the interests of EERE to have a foreign entity serve as the Prime Recipient. The Contracting Officer may require additional information before considering the waiver request. Save the waiver request(s) in a single PDF file using the following convention for the title: "ControlNumber_LeadOrganization_Waiver".

A foreign entity may receive funding as a Subrecipient.

4. INCORPORATED CONSORTIA

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a Prime Recipient or Subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the EERE Contracting Officer.

5. UNINCORPORATED CONSORTIA

Unincorporated Consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the Prime Recipient/consortium representative. The Prime Recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the Prime Recipient/consortium representative under Section III.A of the FOA.

Upon request, unincorporated consortia must provide the EERE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out

the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

- Management structure;
- Method of making payments to consortium members;
- Means of ensuring and overseeing members' efforts on the project;
- Provisions for members' cost sharing contributions; and
- Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. COST SHARING

Cost Share 20%, Cost Share Waiver Utilized

i. Cost Sharing Generally

The cost share must be at least 20% of the total allowable costs for research and development projects (i.e., the sum of the Government share, including FFRDC costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See 10 CFR 600.30 for the applicable cost sharing requirements.)

ii. Special Cost Share Waiver for Domestic Institutions of Higher Education, Domestic Nonprofit Entities, FFRDCs, or U.S. State, Local, or Tribal Government Entity

EERE has implemented a special cost share waiver for certain types of entities applying to this FOA. Accordingly, when the following conditions are met, this FOA requires a cost share of 10%, rather than 20%:

- The Prime Recipient is a Domestic Institution of Higher Education, Domestic Nonprofit, FFRDC, or U.S. State, Local, or Tribal Government entity, and
- The Prime Recipient is performing more than 50% of the project work, as measured by total project cost.

Applicants to this FOA seeking to utilize the reduced cost share must be prepared to verify to EERE that these conditions are met.

To assist Applicants in calculating proper cost share amounts, EERE has included a cost share information sheet and sample cost share calculation as Appendices B and C to this Funding Opportunity Announcement.

2. LEGAL RESPONSIBILITY

Although the cost share requirement applies to the project as a whole, including work performed by members of the project team other than the Prime Recipient, the Prime Recipient is legally responsible for paying the entire cost share. The Prime Recipient's cost share obligation is expressed in the Assistance agreement as a static amount in U.S. dollars (cost share amount) and as a percentage of the Total Project Cost (cost share percentage). If the funding agreement is terminated prior to the end of the project period, the Prime Recipient is required to contribute at least the cost share percentage of total expenditures incurred through the date of termination.

The Prime Recipient is solely responsible for managing cost share contributions by the Project Team and enforcing cost share obligation assumed by Project Team members in subawards or related agreements.

3. COST SHARE ALLOCATION

Each Project Team is free to determine how best to allocate the cost share requirement among the team members. The amount contributed by individual Project Team members may vary, as long as the cost share requirement for the project as a whole is met.

4. COST SHARE TYPES AND ALLOWABILITY

Every cost share contribution must be allowable under the applicable Federal cost principles, as described in Section IV.I.1 of the FOA. In addition, cost share must be verifiable upon submission of the Full Application.

Project Teams may provide cost share in the form of cash or in-kind contributions. Cash contributions may be provided by the Prime Recipient or Subrecipients. Allowable in-kind contributions include, but are not limited to: personnel costs, indirect costs, facilities and administrative costs, rental value of buildings or equipment, and the value of a service, other resource, or third party in-kind contribution.

Project teams may use funding or property received from state or local governments to meet the cost share requirement, so long as the funding was not provided to the state or local government by the Federal Government.

The Prime Recipient may not use the following sources to meet its cost share obligations including, but not limited to:

- Revenues or royalties from the prospective operation of an activity beyond the project period;
- Proceeds from the prospective sale of an asset of an activity;
- Federal funding or property (e.g., Federal grants, equipment owned by the Federal Government); or
- Expenditures that were reimbursed under a separate Federal Technology Office.

In addition, Project Teams may not use independent research and development (IR&D) funds to meet their cost share obligations. Project Teams may not use the same cash or in-kind contributions to meet cost share requirements for more than one project or program.

Cost share contributions must be specified in the project budget, verifiable from the Prime Recipient's records, and necessary and reasonable for proper and efficient accomplishment of the project. As all sources of cost share are considered part of total project cost, the cost share dollars will be scrutinized under the same Federal regulations as Federal dollars to the project. Every cost share contribution must be reviewed and approved in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

Applicants are encouraged to refer to 10 CFR Parts 600 and 603 for additional guidance on cost sharing, specifically 10 CFR §§600.30, 600.123, 600.224, 600.313, and 603.525-555.

5. COST SHARE CONTRIBUTIONS BY FFRDCs AND GOGOs

Because FFRDCs and GOGOs are funded by the Federal Government, costs incurred by FFRDCs and GOGOs generally may not be used to meet the cost share requirement. FFRDCs may contribute cost share only if the contributions are paid directly from the contractor's Management Fee or another non-Federal source.

6. COST SHARE VERIFICATION

Applicants are required to provide written assurance of their proposed cost share contributions in their Full Applications.

Upon selection for award negotiations, Applicants are required to provide additional information and documentation regarding their cost share contributions. Please refer to Appendix B of the FOA for guidance on the requisite cost share information and documentation.

7. COST SHARE PAYMENT

All proposed cost share contributions must be reviewed in advance by the Contracting Officer and incorporated into the project budget before the expenditures are incurred.

EERE requires Prime Recipients to contribute the cost share amount incrementally over the life of the award. Specifically, the Prime Recipient's cost share for each billing period must always reflect the overall cost share ratio negotiated by the parties (i.e., the total amount of cost sharing on each invoice when considered cumulatively with previous invoices must reflect, at a minimum, the cost sharing percentage negotiated).

In limited circumstances, and where it is in the government's interest, the EERE Contracting Officer may approve a request by the Prime Recipient to meet its cost share requirements on a less frequent basis, such as monthly or quarterly. Regardless of the interval requested, the Prime Recipient must be up-to-date on cost share at each interval. Such requests must be sent by email to the Contracting Officer during award negotiations and include the following information: (1) a detailed justification for the request; (2) a proposed schedule of payments, including amounts and dates; (3) a written commitment to meet that schedule; and (4) such evidence as necessary to demonstrate that the Prime Recipient has complied with its cost share obligations to date. The Contracting Officer must approve all such requests before they may go into effect.

C. COMPLIANCE CRITERIA

To be considered for substantive evaluation, an applicant submission must meet the Compliance criteria set forth below. **Concept Papers and Full Applications must meet all Compliance criteria listed below or they will be considered noncompliant. EERE will not review or consider noncompliant submissions**, including Concept Papers, Full Applications, and Replies to Reviewer Comments that were: submitted through means other than EERE Exchange; submitted after the applicable deadline; and/or submitted incomplete. EERE will not extend the submission deadline for Applicants that fail to submit required information due to server/connection congestion.

1. COMPLIANCE CRITERIA

i. Concept Papers

Concept Papers are deemed compliant if:

- The Applicant successfully uploaded all required documents and clicked the "Submit" button in EERE Exchange by the deadline stated in this FOA.

ii. Full Applications

Full Applications are deemed compliant if:

- The Applicant submitted a compliant and responsive Concept Paper;
- The Full Application complies with the content and form requirements in Section IV.D of the FOA; and
- The Applicant successfully uploaded all required documents and clicked the “Submit” button in EERE Exchange by the deadline stated in the FOA.

iii. Replies to Reviewer Comments

Replies to Reviewer Comments are deemed compliant if:

- The Reply to Reviewer Comments complies with the content and form requirements in Section IV.F of the FOA; and
- The Applicant successfully uploaded all required documents to EERE Exchange by the deadline stated in the FOA.

D. RESPONSIVENESS CRITERIA

EERE performs a preliminary technical review of Full Applications. Any “Applications Specifically Not of Interest,” as described in Section I.C of the FOA, are deemed nonresponsive and are not reviewed or considered.

E. OTHER ELIGIBILITY REQUIREMENTS

1. REQUIREMENTS FOR DOE/NNSA FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC) LISTED AS THE APPLICANT

A DOE/NNSA FFRDC is eligible to apply for funding under this FOA if its cognizant Contracting Officer provides written authorization and this authorization is submitted with the application. If a DOE/NNSA FFRDC is selected for award, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory’s Management and Operating (M&O) contract.

The following wording is acceptable for the authorization:

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

2. REQUIREMENTS FOR DOE/NNSA AND NON-DOE/NNSA FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS INCLUDED AS A SUBRECIPIENT

DOE/NNSA and non-DOE/NNSA FFRDCs may be proposed as a Subrecipient on another entity's application subject to the following guidelines:

i. Authorization for non-DOE/NNSA FFRDCs

The Federal agency sponsoring the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The use of a FFRDC must be consistent with its authority under its award.

ii. Authorization for DOE/NNSA FFRDCs

The cognizant Contracting Officer for the FFRDC must authorize in writing the use of the FFRDC on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization:

Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

iii. Value/Funding

The value of and funding for the FFRDC portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and other FFRDC through an interagency agreement with the sponsoring agency.

iv. Cost Share

Although the FFRDC portion of the work is usually excluded from the award to a successful applicant, the applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC's portions of the project.

v. *Limit on FFRDC Effort*

The scope of work to be performed by the FFRDC may not be more significant than the scope of work to be performed by the applicant.

vi. *Responsibility*

The Prime Recipient will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues including, but not limited to disputes and claims arising out of any agreement between the Prime Recipient and the FFRDC contractor.

F. LIMITATION ON NUMBER OF CONCEPT PAPERS AND FULL APPLICATIONS ELIGIBLE FOR REVIEW

Applicants may submit more than one Full Application to this FOA, provided that each application describes a unique, scientifically distinct project.

G. QUESTIONS REGARDING ELIGIBILITY

EERE will not make eligibility determinations for potential applicants prior to the date on which applications to this FOA must be submitted. The decision whether to submit an application in response to this FOA lies solely with the applicant.

IV. APPLICATION AND SUBMISSION INFORMATION

A. APPLICATION PROCESS

The application process will include two phases: a Concept Paper phase and a Full Application phase. **Only applicants who have submitted a compliant Concept Paper will be eligible to submit a Full Application.** At each phase, EERE performs an initial eligibility review of the applicant submissions to determine whether they meet the eligibility requirements of Section III of the FOA. EERE will not review or consider noncompliant and/or nonresponsive submissions. All submissions must conform to the following form and content requirements, including maximum page lengths, described below and must be submitted via EERE Exchange at <https://eere-exchange.energy.gov/>, unless specifically stated otherwise. **EERE will not review or consider submissions submitted through means other than EERE Exchange, submissions submitted after the applicable deadline, and incomplete submissions.** EERE will not extend deadlines for Applicants who fail to submit required information and documents due to server/connection congestion. A control number will be issued when an Applicant begins the Exchange application process. This control number must be included with all Application documents, as described below.

The Concept Paper, Full Application, and Reply to Reviewer Comments must conform to the following requirements:

- Each must be submitted in Adobe PDF format.
- Each must be written in English.
- All pages must be formatted to fit on 8.5 x 11 inch paper with margins not less than one inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10 point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 or larger. Footnotes and endnotes are counted toward the maximum page requirement.
- The Control Number must be prominently displayed on the upper right corner of the header of every page. Page numbers must be included in the footer of every page.
- Each must not exceed the specified maximum page limit, including cover page, charts, graphs, maps, and photographs when printed using the formatting requirements set forth above and single spaced. If Applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages.

Applicants are responsible for meeting each submission deadline. **Applicants are strongly encouraged to submit their Concept Papers and Full Applications at least 48 hours in advance of the submission deadline.** Under normal conditions (i.e., at least 48 hours in advance of the submission deadline), Applicants should allow at least 1 hour to submit a Concept Paper, Full Application, or Reply to Reviewer Comments. Once the Application is submitted in EERE Exchange, Applicants may revise or update their application until the expiration of the applicable deadline.

EERE urges Applicants to carefully review their Concept Papers and Full Applications, and to allow sufficient time for the submission of required information and documents. All Full Applications that pass compliance review will undergo comprehensive technical merit review according to the criteria identified in Section V.A.2 of the FOA.

B. APPLICATION FORMS

The application forms and instructions are available on EERE Exchange. To access these materials, go to <https://eere-exchange.energy.gov> and select the appropriate funding opportunity number.

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_Project_Part_1
ControlNumber_LeadOrganization_Project_Part_2, etc.

C. CONTENT AND FORM OF THE CONCEPT PAPER

To be eligible to submit a Full Application, Applicants must submit a Concept Paper by the specified due date.

Each Concept Paper must be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated into a single Concept Paper.

1. CONCEPT PAPER CONTENT REQUIREMENTS

The Concept Paper must conform to the following content requirements, and not exceed a total of **4 pages**, including the cover page and all graphics, tables, references, etc.

SECTION	PAGE LIMIT	DESCRIPTION
Cover Page	1 page maximum	<ul style="list-style-type: none"> • Applicants are required to include a Cover Page with their Concept Paper containing: <ul style="list-style-type: none"> ○ Topic Area Number ○ Project Title ○ Lead Organization ○ Organization Type ○ Anticipated Project Budget (Federal and Cost Share) ○ Principal Investigator, Team Members, and Key Participants <p>Abstract – no more than 200 words in length, and it should provide a truncated explanation of the proposed project</p>
Technology Description	3 pages maximum	<p>Applicants are required to include the following sections in their Concept Papers:</p> <ul style="list-style-type: none"> • Introduction <ul style="list-style-type: none"> ○ Describe the proposed technology or approach, including its basic operating principles • Impact of the Proposed Technology/Approach Relative to State-of-the-Art <ul style="list-style-type: none"> ○ Describe the current state-of-the-art in the relevant field and application, including key shortcomings, limitations, and challenges ○ Describe the proposed technology's target level of performance and cost effectiveness relative to the

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

		<p>state-of-the-art (Applicants for <i>Topic 1: Open Topic for Energy Efficiency Solutions for Residential and Commercial Buildings</i> should include estimations of the primary energy savings technical potential and simple payback for technology proposals, per the approaches described in Appendix F)</p> <ul style="list-style-type: none"> • Overall Scientific and Technical Merit <ul style="list-style-type: none"> ○ Describe how the proposed technology/approach is unique and innovative ○ Provide additional technical description of the proposed technology/approach, as needed
--	--	--

EERE will not review or consider ineligible Concept Papers (see Section III of the FOA).

EERE makes an independent assessment of each Concept Paper based on the criteria in Section V.A.1 of the FOA. EERE will encourage a subset of Applicants to submit Full Applications. Other Applicants will be discouraged from submitting a Full Application. An applicant who receives a “discouraged” notification may still submit a Full Application. EERE will review all compliant and responsive Full Applications. However, by discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project in an effort to save the Applicant the time and expense of preparing an application that is unlikely to be selected for award negotiations.

In order to provide Applicants with feedback on their Concept Papers, EERE will include general comments provided from independent reviewers on an Applicant’s Concept Paper in the encourage/discourage notification sent to Applicants at the close of that phase.

D. CONTENT AND FORM OF THE FULL APPLICATION

Applicants must submit a Full Application by the specified due date to be considered for funding under this FOA. Applicants must complete the following application forms found on the EERE Exchange website at <https://eere-exchange.energy.gov/>, in accordance with the instructions.

Applicants will have approximately 30 days from receipt of the Concept Paper Encourage/Discourage notification to prepare and submit a Full Application. Regardless of the date the Applicant receives the Encourage/Discourage notification, the submission deadline for the Full Application remains the date stated on the FOA cover page.

All Full Application documents must be marked with the Control Number issued to the Applicant. Applicants will receive a control number upon submission of their Concept Paper, and should include that control number in the file name of their Full Application submission (i.e., *Control number_Applicant Name_Full Application*).

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

1. FULL APPLICATION CONTENT REQUIREMENTS

EERE will not review or consider ineligible Full Applications (see Section III of the FOA).

Each Full Application should be limited to a single concept or technology. Unrelated concepts and technologies should not be consolidated in a single Full Application.

Full Applications must conform to the following requirements:

SUBMISSION	COMPONENTS	FILE NAME (IF NECESSARY)
Full Application (PDF, unless stated otherwise)	Technical Volume (See Chart in Section IV.D.2)	ControlNumber_LeadOrganization_TechnicalVolume
	SF-424 (no page limit)	ControlNumber_LeadOrganization_App424
	Budget Justification (EERE 159) (no page limit, Microsoft Excel format. Applicants must use the template available in EERE Exchange)	ControlNumber_LeadOrganization_Budget_Justification
	Summary for Public Release (1 page max)	ControlNumber_LeadOrganization_Summary
	Summary Slide (1 page limit, Microsoft PowerPoint format)	ControlNumber_LeadOrganization_Slide
	Subaward Budget Justification (EERE 159);	ControlNumber_LeadOrganization_Subawardee_Budget_Justification
	Budget for Federally Funded Research and Development Center Contractor File, (if applicable)	ControlNumber_LeadOrganization_FWP
	Authorization from cognizant Contracting Officer for FFRDC, if applicable	ControlNumber_LeadOrganization_FFRDCAuth
	SF-LLL Disclosure of Lobbying Activities	ControlNumber_LeadOrganization_SF-LLL
	Foreign Entity and Performance of Work in the United States waiver requests (if applicable)	ControlNumber_LeadOrganization_Waiver
	U.S. Manufacturing Plans	ControlNumber_LeadOrganization_USMP

Note: The maximum file size that can be uploaded to the EERE Exchange website is 10MB. Files in excess of 10MB cannot be uploaded, and hence cannot be submitted for review. If a file exceeds 10MB but is still within the maximum page limit specified in the FOA it must be broken into parts and denoted to that effect. For example:

ControlNumber_LeadOrganization_Project_Part_1
ControlNumber_LeadOrganization_Project_Part_2, etc.

EERE will not accept late submissions that resulted from technical difficulties due to uploading files that exceed 10MB.

EERE provides detailed guidance on the content and form of each component below.

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

2. TECHNICAL VOLUME

The Technical Volume must be submitted in Adobe PDF format. The Technical Volume must conform to the following content and form requirements, including maximum page lengths. If Applicants exceed the maximum page lengths indicated below, EERE will review only the authorized number of pages and disregard any additional pages. This volume must address the Merit Review Criteria as discussed in Section V.A.2 of the FOA. Save the Technical Volume in a single PDF file using the following convention for the title: “ControlNumber_LeadOrganization_TechnicalVolume”.

Applicants must provide sufficient citations and references to the primary research literature to justify the claims and approaches made in the Technical Volume. EERE and reviewers may review primary research literature in order to evaluate applications. However, EERE and reviewers are under no obligation to review cited sources (e.g., internet websites).

The Technical Volume to the Full Application may not be more than **15** pages, including the cover page, table of contents, and all citations, charts, graphs, maps, photos, or other graphics, and must include all of the information in the table below. The applicant should consider the weighting of each of the evaluation criteria (see Section V.A.2 of the FOA) when preparing the Technical Volume.

SECTION/PAGE LIMIT	DESCRIPTION
Cover Page	The cover page should include the project title, the specific FOA Topic Area being addressed, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Project Overview (This section should constitute approximately 10% of the Technical Volume)	<p>The Project Overview should contain the following information:</p> <ul style="list-style-type: none"> • Background: The Applicant should discuss the background of their organization, including the history, successes, and current research and development status (i.e., the technical baseline) relevant to the technical topic being addressed in the Full Application. • Project Goal: The Applicant should explicitly identify the targeted improvements to the baseline technology and the critical success factors in achieving that goal. • DOE Impact: The Applicant should discuss the impact that DOE funding would have on the proposed project. Applicants should specifically explain how DOE funding, relative to prior, current, or anticipated funding from other public and private sources, is necessary to achieve the project objectives.

<p>Technical Description, Innovation, and Impact (This section should constitute approximately 25% of the Technical Volume)</p>	<p>The Technical Description should contain the following information:</p> <ul style="list-style-type: none"> • Relevance and Outcomes: The Applicant should provide a detailed description of the technology, including the scientific and other principles and objectives that will be pursued during the project. This section should describe the relevance of the proposed project to the goals and objectives of the FOA, including the potential to meet specific DOE technical targets or other relevant performance targets. The Applicant should clearly specify the expected outcomes of the project. • Feasibility: The Applicant should demonstrate the technical feasibility of the proposed technology and capability of achieving the anticipated performance targets, including a description of previous work done and prior results. • Innovation and Impacts: The Applicant should describe the current state of the art in the applicable field, the specific innovation of the proposed technology, the advantages of proposed technology over current and emerging technologies, and the overall impact on advancing the state of the art/technical baseline if the project is successful.
<p>Workplan (This section should constitute approximately 50% of the Technical Volume)</p>	<p>The Workplan should contain the following information:</p> <ul style="list-style-type: none"> • Project Objectives: The Applicant should provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes. • Technical Scope Summary: The Applicant should provide a summary description of the overall work scope and approach to achieve the objective(s). The overall work scope is to be divided by performance periods that are separated by discrete, approximately annual decision points (see below for more information on go/no-go decision points). The applicant should describe the specific expected end result of each performance period. • Work Breakdown Structure (WBS) and Task Descriptions: The Workplan should fully describe the work to be accomplished and how the applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables. The Workplan is to be structured with a hierarchy of performance period (approximately annual), task and subtasks, which is typical of a standard work breakdown structure (WBS) for any project. The Workplan shall contain a concise detailed description of the specific activities to be conducted over the life of the project. "Detailed" is defined as a full explanation and disclosure of the project being proposed (i.e., a statement such as "we will then complete a proprietary process" is unacceptable). It is the Applicant's responsibility to prepare an adequately detailed task plan to describe the proposed project and the plan for addressing the objectives of this FOA. To this end each task and subtask is to have a unique number and title and an indication of the duration of the task or subtask in months. Each task and subtask is to have a task summary that describes the objectives, what work is to be accomplished, and relationship to project deliverables or expected results. Appropriate milestones should be incorporated into the task and subtask structure. Each task and subtask is to have a technical details section, as appropriate, to discuss how the work will be done, anticipated problems or uncertainties, and any further clarification, such as why a specific approach is being taken.

An example Work Breakdown Structure is provided below.

- **Milestones:** The Applicant should provide appropriate milestones throughout the project to demonstrate success, where success is defined as technical achievement rather than simply completing a task. To ensure that milestones are relevant, Applicants should follow the SMART rule of thumb, which is that all milestones should be **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**imely. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The Applicant should also provide the means by which the milestone will be verified. In addition to describing milestones in the Workplan text and including them in the schedule, the Applicant is required to complete the Milestone Summary Table shown below.
- **Go/No-Go Decision Points:** The Applicant should provide project-wide go/no-go decision points at appropriate points in the Workplan. A go/no-go decision point is a risk management tool and a project management best practice to ensure that, for the current phase or period of performance, technical success is definitively achieved and potential for success in future phases or periods of performance is evaluated, prior to actually beginning the execution of future phases. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one project-wide go/no-go decision point for each year (12-month period) of the project. The Applicant should also provide the specific technical criteria to be used to make the go/no-go decision. In addition to describing the go/no-go decision points in the Workplan text and including them in the schedule, the Applicant is required to complete the Milestone Summary Table shown below, which must include go/no-go decision points and their method of verification.
- **Project Schedule (Gantt Chart or similar):** The Applicant should provide a detailed schedule for the entire project, including task and subtask durations, milestones, and go/no-go decision points.
- **Project Management:** The Applicant should discuss the team's proposed management plan, including the following:
 - The overall approach to and organization for managing the work
 - The roles of each Project Team member
 - Any critical handoffs/interdependencies among Project Team members
 - The technical and management aspects of the management plan, including systems and practices, such as financial and project management practices
 - The approach to project risk management
 - A description of how project changes will be handled
 - If applicable, the approach to Quality Assurance/Control
 - How communications will be maintained among Project Team members
- **Market Transformation/Commercialization Plan:** The Applicant should provide a market transformation/commercialization plan, including the

	<p>following:</p> <ul style="list-style-type: none">○ Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including a mitigation plan○ Identification of a product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. manufacturing plan etc., and product distribution.
--	--

Example Milestone Summary Table and Work Breakdown Structure are provided on the following two pages, after which the Technical Volume requirements will continue.

Milestone Summary Table							
Recipient Name:							
Project Title:							
Task Number	Task Title or Subtask Title (If Applicable)	Milestone Type (Milestone or Go/No-Go Decision Point)	Milestone Number* (Go/No-Go Decision Point Number)	Milestone Description (Go/No-Go Decision Criteria)	Milestone Verification Process (What, How, Who, Where)	Anticipated Date (Months from Start of the Project)	Anticipated Quarter (Quarters from Start of the Project)

*Milestone numbering convention should align with Task and Subtask numbers, as appropriate. For example, M1.1, M3.2, etc.

Note 1: It is required that each project have at least one milestone per quarter for the entire project duration. It is not necessary that each task have one milestone per quarter.

Note 2: It is required that each project have at least one project-wide go/no-go decision point each year. If a decision point is not specific to a particular task, then you may leave the task information blank for those decision points.

Note 3: All milestones should follow the SMART rule of thumb: Specific, Measureable, Achievable, Relevant, and Timely

Example Work Breakdown Structure

Technical Summary: Provide a high-level overview of the final result of this project. Explain the final objective, outcome, milestone and/or deliverable that are to be produced and the rationale for why the applicant has organized the tasks in the way they have.

Technical Details (Optional): Describe the relevant management, engineering, design, process, scientific or other principles and aspects of the project that warrant discussion.

Task 1: Distinctive Title, Date range of the task in months (M1-M4)

Task Summary: Task summaries shall explicitly describe what work is to be accomplished, identify the project objectives/outcomes being addressed and provide a concise statement of the objectives of that task. In addition, the description should indicate the project deliverables that this task will help achieve (D1, D2, D5 etc.; note that deliverables may be applicable to multiple or all tasks.)

Task Details: Within this section, the barriers and risks should be identified, as well as the approaches for overcoming those barriers and risks. Where appropriate, multiple pathways early in the effort can be outlined for risk reduction.

Milestone 1.1 (if applicable)

Milestone 1.2 (if applicable)

Etc.

Subtask 1.1: Date range (M1-M2)

Subtask Summary: Describe the specific and detailed work efforts that go into achieving the higher-level tasks.

Subtask Details: Describe the evaluation techniques that will be used and the expected result that will be generated from the effort.

Milestone 1.1.1 (if applicable)

Milestone 1.1.2 (if applicable)

Etc.

Subtask 1.2:

(Continue until all Task 1 subtasks are listed)

Task 2: (continue in the format above until all tasks and subtasks are listed)

Subtask 2.1: Description and Discussion

Subtask 2.2: Description and Discussion

<p>Technical Qualifications and Resources (Approximately 15% of the Technical Volume)</p>	<p>The Technical Qualifications and Resources should contain the following information:</p> <ul style="list-style-type: none"> • Describe the Project Team’s unique qualifications and expertise, including those of key subrecipients. • Describe the Project Team’s existing equipment and facilities that will facilitate the successful completion of the proposed project; include a justification of any new equipment or facilities requested as part of the project. • This section should also include relevant, previous work efforts, demonstrated innovations, and how these enable the Applicant to achieve the project objectives. • Describe the time commitment of the key team members to support the project. • Attach one-page resumes for key participating team members as an appendix. Resumes do not count towards the page limit. Multi-page resumes are not allowed. • Describe the technical services to be provided by DOE/NNSA FFRDCs and GOGOs, if applicable. • Attach any letters of support from partners/end users as an appendix (1 page maximum per letter). Letters of support do not count towards the page limit. • For multi-organizational or multi-investigator projects, describe succinctly: <ul style="list-style-type: none"> ○ The roles and the work to be performed by each PI and Key Participant; ○ Business agreements between the Applicant and each PI and Key Participant; ○ How the various efforts will be integrated and managed; ○ Process for making decisions on scientific/technical direction; ○ Publication arrangements; ○ Intellectual Property issues; and ○ Communication plans
<p>FOA-Specific Requirements</p>	<p>Applicants for <i>Topic 1: Open Topic for Energy Efficiency Solutions for Residential and Commercial Buildings</i> should include estimations of the primary energy savings technical potential and simple payback for technology proposals, per the approaches described in Appendix F.</p>

3. SF-424: APPLICATION FOR FEDERAL ASSISTANCE

Complete all required field in accordance with the instructions on the form. The list of certifications and assurances in Field 21 can be found at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms>, under Certifications and Assurances. Note: The dates and dollar amounts on the SF-424 are for the complete project period and not just the first project year, first phase or other subset of the

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

project period. Save the SF-424 in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_App424”.

4. BUDGET JUSTIFICATION WORKBOOK (EERE 159)

Applicants are required to complete the Budget Justification Workbook. This form is available on EERE Exchange at <https://eere-Exchange.energy.gov/>, within the FOA announcement. Prime Recipients must complete each tab of the Budget Justification Workbook for the project as a whole, including all work to be performed by the Prime Recipient and its Subrecipients and Contractors, and provide all requested documentation (e.g., a Federally-approved forward pricing rate agreement, Defense Contract Audit Agency or Government Audits and Reports, if available). Applicants should include costs associated with required annual audits and incurred costs proposals in their proposed budget documents. The “Instructions and Summary” included with the Budget Justification Workbook will “auto-populate” as the Applicant enters information into the Workbook. Applicants must carefully read the “Instructions and Summary” tab provided within the Budget Justification Workbook. Save the Budget Justification Workbook in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Budget_Justification”.

5. SUMMARY/ABSTRACT FOR PUBLIC RELEASE

Applicants are required to submit a one-page summary/abstract of their project. The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public after selections are made. The project summary must not exceed 1 page when printed using standard 8.5 x 11 paper with 1” margins (top, bottom, left, and right) with font not smaller than 11 point. Save the Summary for Public Release in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Summary”.

6. SUMMARY SLIDE

Applicants are required to provide a single PowerPoint slide summarizing the proposed project. The slide must be submitted in Microsoft PowerPoint format. This slide is used during the evaluation process. Save the Summary Slide in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Slide”.

The Summary Slide template requires the following information:

- A technology Summary;

- A description of the technology’s impact;
- Proposed project goals;
- Any key graphics (illustrations, charts and/or tables);
- The project’s key idea/takeaway;
- Project title, Prime Recipient, Principal Investigator, and Key Participant information; and
- Requested EERE funds and proposed applicant cost share.

7. SUBAWARD BUDGET JUSTIFICATION (EERE159)

Applicants must provide a separate budget justification, EERE 159 (i.e., budget justification for each budget year and a cumulative budget) for each subawardee that is expected to perform work estimated to be more than \$250,000 or 25 percent of the total work effort (whichever is less). The budget justification must include the same justification information described in the “Budget Justification” section, above. Save each subaward budget justification in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_Subawardee_Budget_Justification”.

8. BUDGET FOR DOE/NNSA FFRDC (IF APPLICABLE)

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, the Applicant must provide a DOE Field Work Proposal (FWP) in accordance with the requirements in DOE Order 412.1, Work Authorization System. DOE Order 412.1 and DOE O 412.1 (Field Work Proposal form) are available at the following link, under “DOE Budget Forms”:
<https://www.directives.doe.gov/directives/current-directives/412.1-BOrder-1/view>. Save the FWP in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_FWP”.

9. AUTHORIZATION FOR NON-DOE/NNSA OR DOE/NNSA FFRDCs

The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The use of a FFRDC contractor must be consistent with the contractor’s authority under its award. Save the Authorization in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_FFRDCAuth”.

10. SF-LLL: DISCLOSURE OF LOBBYING ACTIVITIES

Prime Recipients and Subrecipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Prime Recipients and Subrecipients are required to complete and submit SF-LLL, “Disclosure of Lobbying Activities” (<http://www.whitehouse.gov/sites/default/files/omb/grants/sflllin.pdf>) if any non-Federal funds have been paid or will be paid to any person for influencing or attempting to influence any of the following in connection with your application:

- An officer or employee of any Federal agency;
- A Member of Congress;
- An officer or employee of Congress; or
- An employee of a Member of Congress.

Save the SF-LLL in a single PDF file using the following convention for the title “ControlNumber_LeadOrganization_SF-LLL”.

11. WAIVER REQUESTS: FOREIGN ENTITIES AND PERFORMANCE OF WORK IN THE UNITED STATES

i. Foreign Entity Participation:

As set forth in Section III.A.3, all Prime Recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. To request a waiver of this requirement, the Applicant must submit an explicit waiver request in the Full Application. Waiver information is provided in Section III.A.3 of the FOA.

ii. Performance of Work in the United States

All work under EERE funding agreements must be performed in the United States. This requirement does not apply to the purchase of supplies and equipment, so a waiver is not required for foreign purchases of these items. However, the Prime Recipient should make every effort to purchase supplies and equipment within the United States. Section IV.I.3 lists the necessary information that must be included in a request to waive this requirement.

12. U.S. MANUFACTURING COMMITMENTS

As part of the application, Applicants are required to submit a U.S. Manufacturing Plan. The U.S. Manufacturing Plan represents the applicant’s measurable commitment to support U.S. manufacturing of the results from its award.

The nature and specificity of the applicants’ U.S. Manufacturing Plans are expected to vary based on the FOA. A higher level of specificity is expected in U.S. Manufacturing Plans for technologies at higher technology readiness levels due to the greater certainty surrounding the commercialization of these awards. U.S. Manufacturing Plans submitted in response to FOAs targeting technologies at high technology readiness levels or demonstration activities should include specific commitments to manufacturing in the U.S. For example, a U.S. Manufacturing Plan may commit to manufacturing products that embody or are made through the use of IP developed under the award in the U.S. or making investments in U.S. facilities to support

product manufacture. U.S. Manufacturing Plans submitted in response to FOAs directed at technologies at lower technology readiness levels may have fewer specific manufacturing details and may focus more on licensing and other strategies to promote U.S. manufacturing.

The weight given to the U.S. Manufacturing Plans during the review and selection process varies based on the particular FOA. Applicants should review Section V.A.2 of this FOA to determine the weight given to the U.S. Manufacturing Plans under this FOA.

When an applicant is selected for an award, the U.S. Manufacturing Plan submitted by the applicant becomes part of the terms and conditions of the award. The applicant/awardee may request a waiver or modification of the U.S. Manufacturing Plan from DOE upon a showing that the original U.S. Manufacturing Plan is no longer economically feasible.

E. POST-AWARD INFORMATION REQUESTS

If selected for award, EERE reserves the right to request additional or clarifying information for any reason deemed necessary, including but not limited to:

- Indirect cost information
- Other budget information
- Commitment Letters from Third Parties Contributing to Cost Share, if applicable
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Environmental Questionnaire

F. CONTENT AND FORM OF REPLIES TO REVIEWER COMMENTS

EERE will provide Applicants with reviewer comments following evaluation of all compliant and responsive Full Applications. Applicants will have approximately two business days to prepare a short Reply to Reviewer Comments responding to comments however they desire or supplementing their Full Application.

EERE will not review or consider ineligible Replies to Reviewer Comments (see Section III of the FOA). EERE will review and consider each compliant and responsive Full Application, even if no Reply is submitted or if the Reply is found to be noncompliant.

Replies to Reviewer Comments must conform to the following content and form requirements, including maximum page lengths, described below. If a Reply to Reviewer Comments is more than three pages in length, EERE will review only the first three pages and disregard any additional pages.

SECTION	PAGE LIMIT	DESCRIPTION
Text	2 pages max	Applicants may respond to one or more reviewer comments or supplement their Full Application.
Optional	1 page max	Applicants may use this page however they wish; text, graphs, charts, or other data to respond to reviewer comments or supplement their Full Application are acceptable.

G. SUBMISSION DATES AND TIMES

Concept Papers, Full Applications, and Replies to Reviewer Comments must be submitted no later than 5 p.m. EST on the dates provided on the cover page of this FOA.

H. INTERGOVERNMENTAL REVIEW

This Technology Office is not subject to Executive Order 12372 – Intergovernmental Review of Federal Technology Offices.

I. FUNDING RESTRICTIONS

1. ALLOWABLE COSTS

All expenditures must be allowable, allocable, and reasonable in accordance with the applicable Federal cost principles.

Refer to the following applicable Federal cost principles for more information:

- 2 CFR 220 for Educational Institutions;
- 2 CFR 225 for State, Local, and Indian Tribal Governments;
- 2 CFR 230 for Non Profit Organizations; and
- FAR Part 31 for For-Profit entities.

2. PRE-AWARD COSTS

Recipients must obtain written Contracting Officer approval prior to incurring pre-award costs. Upon approval, Recipients may charge to an award resulting from this FOA pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award and no earlier than the selection date, if the costs are allowable in accordance with the applicable Federal cost principles reference in 10 CFR Part 600. Recipients must obtain the prior approval of the Contracting Office for any pre-award costs that are for periods greater than this 90 day calendar period.

i. Pre-Award Costs Related to National Environmental Policy Act (NEPA) Requirements

EERE's decision whether and how to distribute federal funds under this FOA is subject to NEPA. Applicants should carefully consider and should seek legal counsel or other expert advice before taking any action related to the proposed project that would have an adverse effect on the environment or limit the choice of reasonable alternatives prior to EERE completing the NEPA review process.

EERE does not guarantee or assume any obligation to reimburse costs where the Prime Recipient incurred the costs prior to receiving written authorization from the Contracting Officer. If the Applicant elects to undertake activities that may have an adverse effect on the environment or limit the choice of reasonable alternatives prior to receiving such written authorization from the Contracting Officer, the Applicant is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share. Likewise, if a project is selected for negotiation of award, and the Prime Recipient elects to undertake activities that are not authorized for Federal funding by the Contracting Officer in advance of EERE completing a NEPA review, the Prime Recipient is doing so at risk of not receiving Federal Funding and such costs may not be recognized as allowable cost share. Nothing contained in the pre-award cost reimbursement regulations or any pre-award costs approval letter from the Contracting Officer override these NEPA requirements to obtain the written authorization from the Contracting Officer prior to taking any action that may have an adverse effect on the environment or limit the choice of reasonable alternatives.

3. PERFORMANCE OF WORK IN THE UNITED STATES

EERE requires all work under EERE financial assistance agreements to be performed in the United States. This requirement does not apply to the purchase of supplies and equipment; however, the Prime Recipient should make every effort to purchase domestically produced supplies and equipment. If a recipient fails to comply with the Performance of Work in the United States requirement, the EERE Contracting Officer may deny reimbursement for the work conducted outside the United States and such costs may not be recognized as allowable cost share.

There may be limited circumstances where it is in the interest of the project to perform a portion of the work outside the United States. To seek a waiver of the Performance of Work in the United States requirement, the Applicant must submit an explicit waiver request in the Full Application, which includes the following information:

- The countries in which the work will be performed;
- A description of the work to be performed outside the U.S.; and
- The rationale for performing the work outside the U.S.

For the rationale, the Applicant must demonstrate to the satisfaction of the EERE Contracting Officer that a waiver would further the purposes of this FOA and is otherwise in the interests of EERE and the United States. For example, an Applicant may seek to demonstrate the United States economic interest will be better served by having certain work performed outside the United States (e.g., demonstrate the expertise to develop the technology exists only outside the United States, but the technology's ultimate commercialization will result in substantial benefits to the United States such as improved electricity reliability or creating domestic jobs). The Contracting Officer may require additional information before considering the waiver request. Save the waiver request(s) in a single PDF file titled "ControlNumber_PerformanceofWork_Waiver".

4. CONSTRUCTION

EERE generally does not fund projects that involve major construction (i.e., construction of new buildings, major renovations, or additions to existing buildings). Recipients are required to obtain written authorization from the Contracting Officer before incurring any major construction costs.

5. EQUIPMENT AND SUPPLIES

To the greatest extent practicable, all equipment and products purchased with funds made available under this award should be made or manufactured in the United States. This requirement does not apply to used or leased equipment.

Property disposition will be required at the end of a project if the property is no longer used by the Prime Recipient for the objectives of the project, and the fair market value of property exceeds \$5,000. The rules for property disposition are set forth in the following sections of 10 CFR Part 600:

- 10 CFR 600.130 to 600.137 for Universities, Hospitals, or other Nonprofit Institutions;
- 10 CFR 600.231 to 600.233 for State and Local Governments; and
- 10 CFR 600.320 to 600.325 for For-Profit organizations.

6. LOBBYING

Recipients and Subrecipients may not use any Federal funds to influence or attempt to influence, directly or indirectly, congressional action on any legislative or appropriation matters.

Recipients and Subrecipients are required to complete and submit SF-LLL, "Disclosure of Lobbying Activities" (<http://www.whitehouse.gov/sites/default/files/omb/grants/sflllin.pdf>) if any non-Federal funds have been paid or will be paid to any person for influencing or attempting to influence any of the following in connection with your application:

- An officer or employee of any Federal agency;
- A Member of Congress;
- An officer or employee of Congress; or
- An employee of a Member of Congress.

V. APPLICATION REVIEW INFORMATION

A. TECHNICAL REVIEW CRITERIA

1. CONCEPT PAPERS

Concept Papers are evaluated based on the following criteria:

Criterion 1: Impact of the Proposed Technology Relative to State of the Art (50%)

This criterion involves consideration of the following factors:

- Method used to identify current state of the art technology
- If technical success is achieved, the proposed idea would significantly improve technical and economic performance relative to the state of the art.

Criterion 2: Overall Scientific and Technical Merit (50%)

This criterion involves consideration of the following factors:

- The proposed technology is unique and innovative; and
- The proposed approach is without major technical flaws.

2. FULL APPLICATIONS

Applications will be evaluated against the merit review criteria shown below.

Criterion 1: Technical Merit, Innovation, and Impact (50%)

Technical Merit and Innovation

- Extent to which the proposed technology or process is innovative and has the potential to advance the state of the art;
- Degree to which the current state of the technology and the proposed advancement are clearly described;
- Extent to which the application specifically and convincingly demonstrates how the applicant will move the state of the art to the proposed advancement; and
- Sufficiency of technical detail in the application to assess whether the proposed work is scientifically meritorious and revolutionary, including relevant data, calculations and discussion of prior work in the literature with analyses that support the viability of the proposed work.

Impact of Technology Advancement

- How the project supports the topic area objectives and target specifications and metrics; and
- The potential impact of the project on advancing the state of the art.

Criterion 2: Project Research and Market Transformation Plan (30%)

Research Approach and Workplan

- Degree to which the approach and critical path have been clearly described and thoughtfully considered; and
- Degree to which the task descriptions are clear, detailed, timely, and reasonable, resulting in a high likelihood that the proposed Workplan will succeed in meeting the project goals.

Identification of Technical Risks

- Discussion and demonstrated understanding of the key technical risk areas involved in the proposed work, and the quality of the mitigation strategies to address them.

Baseline, Metrics, and Deliverables

- The level of clarity in the definition of the baseline, metrics, and milestones; and
- Relative to a clearly defined experimental baseline, the strength of the quantifiable metrics, milestones, and mid-point deliverables defined in the application, such that meaningful interim progress will be made.

Market Transformation Plan

- Identification of target market, competitors, and distribution channels for proposed technology along with known or perceived barriers to market penetration, including mitigation plan; and
- Comprehensiveness of commercialization plan including but not limited to product development and/or service plan, commercialization timeline, financing, product marketing, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, U.S. manufacturing plan etc., and product distribution.

Criterion 3: Team and Resources (20%)

- The capability of the Principal Investigator(s) and the proposed team to address all aspects of the proposed work with a good chance of success. Qualifications, relevant expertise, and time commitment of the individuals on the team;
- The sufficiency of the facilities to support the work;
- Degree to which the proposed consortia/team demonstrates the ability to facilitate and expedite further development and commercial deployment of the proposed technologies;
- Level of participation by project participants as evidenced by letter(s) of commitment and how well they are integrated into the Workplan; and

- Reasonableness of budget and spend plan for proposed project and objectives.

3. CRITERIA FOR REPLIES TO REVIEWER COMMENTS

EERE has not established separate criteria to evaluate Replies to Reviewer Comments. Instead, Replies to Reviewer Comments are attached to the original applications and evaluated as an extension of the Full Application.

B. STANDARDS FOR APPLICATION EVALUATION

Applications that are determined to be compliant will be evaluated in accordance with this FOA, by the standards set forth in EERE's Notice of Objective Merit Review Procedure (76 Fed. Reg. 17846, March 31, 2011) and the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance," which is available at:

<http://energy.gov/sites/prod/files/meritrev.pdf>.

C. OTHER SELECTION FACTORS

1. PROGRAM POLICY FACTORS

In addition to the above criteria, the Selection Official may consider the following program policy factors in determining which Applicants to encourage to submit Full Applications and which Full Applications to select for award negotiations:

- The degree to which the proposed project, including proposed cost shares, optimizes the use of available EERE funding to achieve programmatic objectives;
- The level of industry involvement and demonstrated ability to commercialize energy or related technologies;
- Technical, market, organizational, and environmental risks associated with the project;
- Whether the proposed project is likely to lead to increased employment and manufacturing in the United States;
- Whether the proposed project will accelerate transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty;
- The degree to which the proposed project directly addresses EERE's statutory mission and strategic goals;
- For applications submitted to Topics 1 and 2 (the Incubator topics), the likelihood that the successful completion of the proposed project would result in a technology or solution that could be incorporated into the BTO multi-year program plan. Please see:

http://www1.eere.energy.gov/buildings/pdfs/btp_planning.pdf

<http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/myp11.pdf>

D. MERIT REVIEW AND SELECTION PROCESS

1. OVERVIEW

The Merit Review process consists of multiple phases that each include an initial eligibility review and a thorough technical review. Rigorous technical reviews are conducted by reviewers that are experts in the subject matter of the FOA. Ultimately, the Selection Official considers the recommendations of the reviewers, along with other considerations such as Program Policy Factors, in determining which applications to select.

2. PRE-SELECTION INTERVIEWS

As part of the merit review process, EERE may invite one or more of the top ranked applicants to participate in a final phase of the merit review evaluation process: Pre-Selection Interviews. Pre-Selection Interviews are distinct from and more formal than pre-selection clarifications (See Section V.D.3 of the FOA). The top ranked applicant(s) will meet with the Merit Review Panel to allow the Merit Review Panel to seek clarification on the contents of the Full Applications and otherwise ask questions regarding the proposed project. The information provided by applicants to EERE through Pre-Selection Interviews contributes to EERE's selection decisions.

EERE will arrange to meet with the invited applicants in person at EERE's offices or a mutually agreed upon location. EERE may also arrange pre-selection site visits at certain Applicants' facilities. In the alternative, EERE may invite the top-ranked applicants to participate in a one-on-one conference with EERE via webinar, videoconference, or conference call.

EERE will not reimburse Applicants for travel and other expenses relating to the Pre-Selection Interviews, nor will these costs be eligible for reimbursement as pre-award costs.

EERE may obtain additional information through Oral Presentations and site visits that will be used to make a final selection determination. EERE may select applications for funding and make awards without Oral Presentations and site visits. Participation in Oral Presentations or site visits with EERE does not signify that Applicants have been selected for award negotiations.

3. PRE-SELECTION CLARIFICATION

EERE may determine that pre-selection clarifications are necessary from one or more applicants. These pre-selection clarifications will solely be for the purposes of clarifying the application, and will be limited to information already provided in the application documentation. The pre-selection clarifications may occur before, during or after the merit

review evaluation process. Information provided by an applicant that is not necessary to address the pre-selection clarification question will not be reviewed or considered. Typically, a pre-selection clarification will be carried out through either written responses to EERE's written clarification questions or video or conference calls with EERE representatives.

The information provided by Applicants to EERE through pre-selection clarifications is incorporated in their applications and contributes to the merit review evaluation and EERE's selection decisions. If EERE contacts an applicant for pre-selection clarification purposes, it does not signify that the applicant has been selected for negotiation of award or that the applicant is among the top ranked applications.

EERE will not reimburse applicants for expenses relating to the pre-selection clarifications, nor will these costs be eligible for reimbursement as pre-award costs.

4. SELECTION

The Selection Official may consider the merit review recommendation, program policy factors, and the amount of funds available in arriving at selections for this FOA.

VI. AWARD ADMINISTRATION INFORMATION

A. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

EERE anticipates notifying applicants selected for negotiation of award by early summer 2014 and making awards by late summer 2014.

B. AWARD NOTICES

1. REJECTED SUBMISSIONS

Noncompliant and nonresponsive Concept Papers and Full Applications are rejected by the Contracting Officer and are not reviewed or considered. The Contracting Officer sends a notification letter by email to the technical and administrative points of contact designated by the Applicant in EERE Exchange. The notification letter states the basis upon which the Concept Paper was discouraged or the Full Application was rejected.

2. CONCEPT PAPER NOTIFICATIONS

EERE notifies Applicants of its determination to encourage or discourage the submission of a Full Application. EERE sends a notification letter by email to the technical and administrative points of contact designated by the Applicant in EERE Exchange.

Applicants may submit a Full Application even if they receive a notification discouraging them from doing so. By discouraging the submission of a Full Application, EERE intends to convey its lack of programmatic interest in the proposed project. Such assessments do not necessarily reflect judgments on the merits of the proposed project. The purpose of the Concept Paper phase is to save Applicants the considerable time and expense of preparing a Full Application that is unlikely to be selected for award negotiations.

A notification letter encouraging the submission of a Full Application does not authorize the Applicant to commence performance of the project. Please refer to Section IV.1.2 of the FOA for guidance on pre-award costs.

3. FULL APPLICATION NOTIFICATIONS

EERE notifies Applicants of its determination via a notification letter by email to the technical and administrative points of contact designated by the Applicant in EERE Exchange. The notification letter may inform the Applicant that its Full Application was selected for award negotiations, or not selected. Alternatively, EERE may notify one or more Applicants that a final selection determination on particular Full Applications will be made at a later date, subject to the availability of funds or other factors.

Written feedback on Full Applications is made available to Applicants before the submission deadline for Replies to Reviewer Comments. By providing feedback, EERE intends to guide the further development of the proposed technology and to provide a brief opportunity to respond to reviewer comments.

4. SUCCESSFUL APPLICANTS

A notification letter selecting a Full Application for award negotiations does not authorize the Applicant to commence performance of the project. If an application is selected for award negotiations, it is not a commitment to issue an award. Applicants do not receive an award until award negotiations are complete and the Contracting Officer executes the funding agreement.

The award negotiation process will take approximately 60 days. Applicants must designate a primary and a backup point-of-contact in EERE Exchange with whom EERE will communicate to conduct award negotiations. The Applicant must be responsive during award negotiations (e.g., provide requested documentation) and meet the negotiation deadlines. If the Applicant fails to do so or negotiations are otherwise unsuccessful, EERE will cancel award negotiations and rescind the Selection. EERE reserves the right to terminate award negotiations at any time for any reason.

Please refer to Section IV.1.2 of the FOA for guidance on pre-award costs.

5. *POSTPONED SELECTION DETERMINATIONS*

A notification letter postponing a final selection determination until a later date does not authorize the Applicant to commence performance of the project. EERE may ultimately determine to select or not select the Full Application for award negotiations.

6. *UNSUCCESSFUL APPLICANTS*

EERE shall promptly notify in writing each applicant whose application has not been selected for award or whose application cannot be funded because of the unavailability of appropriated funds. If the application was not selected, the written notice shall explain why the application was not selected.

C. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. *REGISTRATION REQUIREMENTS*

There are several one-time actions before submitting an Application in response to this Funding Opportunity Announcement (FOA), and it is vital that applicants address these items as soon as possible. Some may take several weeks, and failure to complete them could interfere with an applicant's ability to apply to this FOA, or to meet the negotiation deadlines and receive an award if the application is selected. These requirements are as follows:

i. EERE Exchange

Register and create an account on EERE Exchange at <https://eere-exchange.energy.gov>. This account will then allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission. Applicants should also designate backup points of contact so applicants may be easily contacted if deemed necessary. **This step is required to apply to this FOA.**

The EERE Exchange registration does not have a delay; however, **the remaining registration requirements below could take several weeks to process and are necessary for a potential applicant to receive an award under this FOA.** Therefore, although not required in order to submit an Application through the EERE Exchange site, all potential applicants lacking a DUNS number, or not yet registered with SAM or FedConnect should complete those registrations as soon as possible.

ii. DUNS Number

Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>.

iii. System for Award Management

Register with the System for Award Management (SAM) at <https://www.sam.gov>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually.

iv. Fedconnect

Register in FedConnect at <https://www.fedconnect.net/>. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf.

v. Grants.gov

Register in Grants.gov (<http://www.grants.gov>) to receive automatic updates when Amendments to this FOA are posted. However, please note that Concept Papers and Full Applications will not be accepted through Grants.gov.

vi. Electronic Authorization of Applications and Award Documents

Submission of an application and supplemental information under this FOA through electronic systems used by the Department of Energy, including EERE Exchange and [fedconnect.net](http://www.fedconnect.net), constitutes the authorized representative's approval and electronic signature.

2. AWARD ADMINISTRATIVE REQUIREMENTS

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR 600. Grants and cooperative agreements made to universities, non-profits, and other entities subject to 10 CFR 600 are subject to the Research Terms and Conditions located on the National Science Foundation website at: <http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp>.

3. LIMITATIONS ON COMPENSATION COSTS

The annual compensation costs (total amount of wages, salary, bonuses and deferred compensation) for an individual allowable for an award under this FOA are capped at \$250,000 (i.e. \$250,000 is the maximum amount that EERE will reimburse a Recipient for any one individual's annual compensation and EERE will not recognize such costs above \$250,000 as Recipient cost share).

This limitation does not restrict the Recipient or its subrecipients from providing annual compensation to an individual that exceeds \$250,000. However, any amount above \$250,000 cannot be included in the total project costs (i.e., Federal share or recipient cost share).

4. SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR Part 170. Prime Recipients must register with the new FFATA Subaward Reporting System database and report the required data on their first tier Subrecipients. Prime Recipients must report the executive compensation for their own executives as part of their registration profile in SAM.

5. NATIONAL POLICY REQUIREMENTS

The National Policy Assurances that are incorporated as a term and condition of award are located at: <http://energy.gov/management/downloads/national-policy-assurances-be-incorporated-award-terms>.

6. ENVIRONMENTAL REVIEW IN ACCORDANCE WITH NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

EERE's decision whether and how to distribute federal funds under this FOA is subject to the National Environmental Policy Act (42 USC 4321, *et seq.*). NEPA requires Federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, please see DOE's NEPA website, at <http://nepa.energy.gov/>.

While NEPA compliance is a Federal agency responsibility and the ultimate decisions remain with the federal agency, all Recipients selected for an award will be required to assist in the timely and effective completion of the NEPA process in the manner most pertinent to their proposed project.

7. APPLICANT REPRESENTATIONS AND CERTIFICATIONS

i. Lobbying Restrictions

By accepting funds under this award, the Recipient agrees that none of the funds obligated on the award shall be expended, directly or indirectly, to influence Congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. §1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

ii. *Corporate Felony Conviction and Federal Tax Liability Representations (March 2012)*

By submitting an application in response to this FOA, the Applicant represents that:

It is not a corporation that has been convicted (or had an officer or agent of such corporation acting on behalf of the corporation convicted) of a felony criminal violation under any Federal law within the preceding 24 months;

No officer or agent of the corporation have been convicted of a felony criminal violation for an offence arising out of actions for or on behalf of the corporation under Federal law in the past 24 months; or

It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations, the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

iii. *Applicant Lighting Efficiency Certification (April 2012)*

In submitting an application in response to this FOA, the Applicant certifies that if chosen for a grant award and the award is in excess of \$1,000,000 it will, by the end of the Federal Government's fiscal year, upgrade the efficiency of its facilities by replacing any incandescent lighting of the type for which section 325 of the Energy Policy and Conservation Act (42 USC 6295) establishes a standard that does not meet or exceed the energy efficiency standard for incandescent light bulbs set forth in that section with a lamp that meets or exceeds the standards for lamps established in or pursuant to that section.

Incandescent reflector lamps shall meet or exceed the lamp efficacy standards shown in the table:

Rated lamp wattage	Lamp spectrum	Lamp diameter (inches)	Rated voltage	Minimum average lamp efficacy (lm/W)
40-205	Standard Spectrum	>2.5	≥125V	6.8*P0.27
			<125V	5.9*P0.27
		≤2.5	≥125V	5.7*P0.27
			<125V	5.0*P0.27
40-205	Modified Spectrum	>2.5	≥125V	5.8*P0.27

			<125V	5.0*P0.27
		<2.5	≥125V	4.9*P0.27
			<125V	4.2*P0.27

Note 1: P is equal to the rated lamp wattage, in watts.

Note 2: Standard Spectrum means any incandescent reflector lamp that does not meet the definition of modified spectrum in 10 CFR 430.2.

Subject to the exemption below, the standards specified in this section shall apply to ER incandescent reflector lamps, BR incandescent reflector lamps, BPAR incandescent reflector lamps, and similar bulb shapes.

Subject to the exemption below, the standards specified in this section shall apply to incandescent reflector lamps with a diameter of more than 2.25 inches, but not more than 2.75 inches.

Exemption: The standards specified in this section shall not apply to the following types of incandescent reflector lamps:

- (A) Lamps rated at 50 watts or less that are ER30, BR30, BR40, or ER40 lamps;
- (B) Lamps rated at 65 watts that are BR30, BR40, or ER40 lamps; or
- (C) R20 incandescent reflector lamps rated 45 watts or less.

For purposes of this Certification, the following definitions apply:

- (A) Facilities means the room(s), area(s), or building(s) that are used to complete a majority of the work under the project.
- (B) In excess of \$1,000,000 means the total value of the grant including all budget periods funded with Federal funds and Prime Recipient cost share is greater than \$1,000,000.
- (C) The Federal Government's fiscal year begins October 1st and ends September 30th.
- (D) Except as provided in subparagraph (4) below, the term "incandescent lamp" means a lamp in which light is produced by a filament heated to incandescence by an electric current, including only the following:
 - (1) Any lamp (commonly referred to as lower wattage nonreflector general service lamps, including any tungsten-halogen lamp) that has a rated wattage between 30 and 199 watts, has an E26 medium screw base, has a rated voltage range that lies at least partially within 115 and 130 volts, and is not a reflector lamp;

- (2) Any lamp (commonly referred to as a reflector lamp) which is not colored or designed for rough or vibration service applications, that contains an inner reflective coating on the outer bulb to direct the light, an R, PAR, ER, BR, BPAR, or similar bulb shapes with E26 medium screw bases, a rated voltage or voltage range that lies at least partially within 115 and 130 volts, a diameter which exceeds 2.25 inches, and has a rated wattage that is 40 watts or higher;
 - (3) Any general service incandescent lamp (commonly referred to as a high- or higher-wattage lamp) that has a rated wattage above 199 watts (above 205 watts for a high wattage reflector lamp); or
 - (4) The term “incandescent lamp” does not include any lamp excluded by the Secretary, by rule, as a result of a determination that standards for such lamp would not result in significant energy savings because such lamp is designed for special applications or has special characteristics not available in substitutable lamp types.
- (E) The term “base” means the portion of the lamp which connects with the socket as described in ANSI C81.61-1990.
- (F) The term “bulb shape” means the shape of the lamp, especially the glass bulb with designations for bulb shapes found in ANSI C79.1-1980 (R1984).
- (G) The term “lamp efficacy” means the lumen output of a lamp divided by its wattage, expressed in lumens per watt (LPW).
- (H) The term “lamp wattage” means the total electrical power consumed by a lamp in watts, after the initial seasoning period referenced in the appropriate IES standard test procedure and including, for fluorescent, arc watts plus cathode.

8. STATEMENT OF SUBSTANTIAL INVOLVEMENT

There will be a substantial involvement between EERE and the Prime Recipient during the performance of a resultant cooperative agreement. The EERE Technology Office goals and objectives addressed by the project are of such importance that shared responsibility for the management, control, direction and performance of the project is needed to ensure goals and objectives are met. EERE has the right to intervene in the conduct or performance of project activities for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities. EERE does not limit its involvement to the administrative requirements of this Award. Instead, EERE has substantial involvement in the direction and redirection of the technical aspects of the project as a whole. Substantial involvement includes, but is not limited to the following:

1. EERE shares responsibility with the Prime Recipient for the management, control, direction, and performance of work under this award.
2. EERE reviews and approves in a timely manner project plans, including project management, testing and technology transfer plans, and recommending alternate approaches, if the plans do not address the critical programmatic issues.
3. EERE participates in project management planning activities, including risk analysis, to ensure EERE Technology Office requirements or limitations are considered in performance of the work elements.
4. EERE may intervene in the conduct or performance of work under this Award for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities.
5. EERE promotes and facilitates technology transfer activities, including disseminating Technology Office results through presentations and publications.
6. EERE may redirect or discontinue funding projects that fail to fully and satisfactorily complete the work described in the Statement of Project Objectives as evaluated at the Go/No Go decision points.
7. EERE participates in major project decision-making processes.

9. INTELLECTUAL PROPERTY MANAGEMENT PLAN

Within 30 days of selection, Applicants must submit an executed IP Management Plan between the members of the consortia or team.

The award will set forth the treatment of and obligations related to intellectual property rights between EERE and the individual members. The IP Management Plan should describe how the members will handle intellectual property rights and issues between themselves while ensuring compliance with Federal IP laws, regulations, and policies (see Sections VIII.L-VIII.O of this FOA for more details on applicable Federal IP laws and regulations).

The following is a non-exhaustive list of examples of items that the IP Management Plan may cover:

- The treatment of confidential information between members (e.g., the use of non-disclosure agreements);
- The treatment of background IP (e.g., any requirements for identifying it or making it available);
- The treatment of inventions made under the project (e.g., any requirements for disclosing to the other members, filing patent applications, paying for patent prosecution, and cross-licensing or other licensing arrangements between the members);
- The treatment of data produced, including software, under the project (e.g., any publication process or other dissemination strategies, copyrighting strategy or arrangement between members);

- Any technology transfer and commercialization requirements or arrangements between the members;
- The treatment of any intellectual property issues that may arise due to a change in membership of the consortia or team; and
- The handling of disputes related to intellectual property between the members.

10. SUBJECT INVENTION UTILIZATION REPORTING

To ensure that Prime Recipients and Subrecipients holding title to subject inventions are taking the appropriate steps to commercialize subject inventions, EERE requires that each Recipient holding title to a subject invention submit annual reports for 10 years from the date the subject invention was disclosed to EERE on the utilization of the subject invention and efforts made by Recipient or their licensees or assignees to stimulate such utilization. The reports must include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Prime Recipient, and such other data and information as EERE may specify.

11. INTELLECTUAL PROPERTY PROVISIONS

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at <http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards>.

12. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist can be accessed at http://energy.gov/sites/prod/files/FA_RepReqChecklist_033011_final.pdf.

13. GO/NO-GO REVIEW AND STAGE-GATE REVIEW

Each project selected under this FOA will be subject to a period project evaluation referred to as a Go/No-Go or Stage Gate Review. Federal funding beyond the Go/No Go or Stage Gate decision point (continuation funding), is contingent, in part¹³, on the outcome of the Go/No Go or Stage Gate Review.

¹³ Continuation funding is contingent on (1) contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) meeting the objectives, milestones, deliverables, decision point criteria, and stage gates of Recipient's approved project and obtaining approval from EERE to continue work on the project; (3) submittal of required reports; and/or (4) compliance with the terms and conditions of the award.

As a result of the Go/No Go or Stage Gate Reviews, DOE may, at its discretion, authorize the following actions: (1) continue to fund the project, contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority; (2) recommend redirection of work under the project; (3) place a hold on federal funding for the project, pending further supporting data or funding; or (4) discontinue funding the project because of insufficient progress, change in strategic direction, or lack of funding.

- **Go/No-Go Decision Points:** Go/No-Go decision points are similar to project milestones, in that EERE staff will review the project based on pre-established metrics defined in the award negotiations process following selection.
- **Stage-Gate Reviews:** Stage-Gate reviews are very similar to Go/No-Go decision points, except that EERE will bring in third parties to assist with validation of project progress. These third parties are typically specialized subject matter experts that will allow EERE to evaluate crucial aspects of project performance with a greater degree of specificity and scrutiny.

VII. QUESTIONS/AGENCY CONTACTS

Upon the issuance of a FOA, EERE personnel are prohibited from communicating (in writing or otherwise) with Applicants regarding the FOA except through the established question and answer process as described below. Specifically, questions regarding the content of this FOA must be submitted to: benefitfoa@go.doe.gov not later than 3 business days prior to the application due date.

All questions and answers related to this FOA will be posted on EERE Exchange at: <https://eere-exchange.energy.gov>. **Please note that you must first select this specific FOA Number in order to view the questions and answers specific to this FOA.** EERE will attempt to respond to a question within 3 business days, unless a similar question and answer has already been posted on the website.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov.

VIII. OTHER INFORMATION

A. FOA MODIFICATIONS

Amendments to this FOA will be posted on the EERE Exchange website and the Grants.gov system. However, you will only receive an email when an amendment or a FOA is posted on these sites if you register for email notifications for this FOA in Grants.gov. EERE recommends

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

that you register as soon after the release of the FOA as possible to ensure you receive timely notice of any amendments or other FOAs.

B. INFORMATIONAL WEBINARS

EERE will conduct two informational webinars during the FOA process. The first will be held after the initial FOA release but before the due date for Concept Papers. The second will be held after Concept Paper encourage/discourage notifications have been sent but before the due date for Full Applications.

The purpose of these webinars will be to give applicants a chance to ask questions about the FOA process generally. Attendance is not mandatory and will not positively or negatively impact the overall review of any Applicant submissions. As the webinars will be open to all Applicants who wish to participate, Applicants should refrain from asking questions or communicating information that would reveal confidential and/or proprietary information specific to their project. Specific dates for the webinars can be found on the cover page of the FOA.

The link for reaching this webinar is posted on this BTO website:

<http://energy.gov/eere/buildings/building-technologies-office>

C. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

EERE reserves the right, without qualification, to reject any or all applications received in response to this FOA and to select any application, in whole or in part, as a basis for negotiation and/or award.

D. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by anyone other than the Contracting Officer, either express or implied, is invalid.

E. TREATMENT OF APPLICATION INFORMATION

In general, EERE will use data and other information contained in applications for evaluation purposes only unless such information is generally available to the public or is already the property of the Government.

Applicants should not include trade secrets or commercial or financial information that is privileged or confidential in their application unless such information is necessary to convey an understanding of the proposed project or to comply with a requirement in the FOA.

Applications containing trade secrets or commercial or financial information that is privileged or confidential, which the applicant does not want disclosed to the public or used by the

Government for any purpose other than application evaluation, must be marked as described in this section.

The cover sheet of the application must be marked as follows and identify the specific pages containing trade secrets or commercial or financial information that is privileged or confidential:

Notice of Restriction on Disclosure and Use of Data:

Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential, and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.
[End of Notice]

The header and footer of every page that contains trade secrets or commercial or financial information that is privileged or must be marked as follows: "May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure."

In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

The above markings enable EERE to follow the provisions of 10 CFR 1004.11(d) in the event a Freedom of Information Act (FOIA) request is received for information submitted with an application. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under a FOIA request or otherwise. The U.S. Government is not liable for the disclosure or use of unmarked information, and may use or disclose such information for any purpose.

Subject to the specific FOIA exemptions identified in 5 U.S.C. 552(b), all information submitted to EERE by a FOA applicant is subject to public release under the Freedom of Information Act, 5 U.S.C. §552, as amended by the OPEN Government Act of 2007, Pub. L. No. 110-175. It is the applicant's responsibility to review FOIA and its exemptions to understand (1) what information may be subject to public disclosure and (2) what information applicants submit to the Government that are protected by law. In some cases, DOE may be unable to make an independent determination regarding which information submitted by an applicant is releasable and which is protected by an exemption. In such cases, DOE will consult with the applicant, in accordance with 10 C.F.R. §1004.11, to solicit the applicant's views on how the information should be treated.

F. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

G. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this Technology Office include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

H. NOTICE OF RIGHT TO CONDUCT A REVIEW OF FINANCIAL CAPABILITY

EERE reserves the right to conduct an independent third party review of financial capability for applicants that are selected for negotiation of award (including personal credit information of principal(s) of a small business if there is insufficient information to determine financial capability of the organization).

I. NOTICE OF POTENTIAL DISCLOSURE UNDER FREEDOM OF INFORMATION ACT

Applicants should be advised that identifying information regarding all applicants, including applicant names and/or points of contact, may be subject to public disclosure under the Freedom of Information Act, whether or not such applicants are selected for negotiation of award.

J. REQUIREMENT FOR FULL AND COMPLETE DISCLOSURE

Applicants are required to make a full and complete disclosure of all information requested. Any failure to make a full and complete disclosure of the requested information may result in:

- The rejection of a Concept Paper, Full Application, and/or Reply to Reviewer Comments;
- The termination of award negotiations;
- The modification, suspension, and/or termination of a funding agreement;
- The initiation of debarment proceedings, debarment, and/or a declaration of ineligibility for receipt of Federal contracts, subcontracts, and financial assistance and benefits; and

- Civil and/or criminal penalties.

K. RETENTION OF SUBMISSIONS

EERE expects to retain copies of all Letters of Intent, Concept Papers, Full Applications, Replies to Reviewer Comments, and other submissions. No submissions will be returned. By applying to EERE for funding, Applicants consent to EERE's retention of their submissions.

L. TITLE TO SUBJECT INVENTIONS

Ownership of subject inventions is governed pursuant to the authorities listed below.

- Domestic Small Businesses, Educational Institutions, and Nonprofits: Under the Bayh-Dole Act (35 U.S.C. § 200 et seq.), domestic small businesses, educational institutions, and nonprofits may elect to retain title to their subject inventions.
- All other parties: The Federal Non Nuclear Energy Act of 1974, 42. U.S.C. 5908, provides that the Government obtains title to new inventions unless a waiver is granted (see below).
- Class Waiver: Under 42 U.S.C. § 5908, title to subject inventions vests in the U.S. Government and large businesses and foreign entities do not have the automatic right to elect to retain title to subject inventions. However, EERE may issue "class patent waivers" under which large businesses and foreign entities that meet certain stated requirements may elect to retain title to their subject inventions.
- Advance and Identified Waivers: Applicants may request a patent waiver that will cover subject inventions that may be invented under the award, in advance of or within 30 days after the effective date of the award. Even if an advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver for identified inventions, i.e., individual subject inventions that are disclosed to EERE within the timeframes set forth in the award's intellectual property terms and conditions. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.
- Determination of Exceptional Circumstances (DEC): EERE is considering the use of a blanket Determination of Exceptional Circumstances which, if used, would warrant the modification of the standard patent rights clause for small businesses and non-profit awardees under Bayh-Dole to the extent necessary to implement and enforce the Applicant's U.S. Manufacturing Plan (see section IV.D.13 of the FOA). For example, the commitments and enforcement of a U.S. Manufacturing Plan may be tied to subject inventions. Any Bayh-Dole entity affected by this DEC has the right to appeal it.

M. GOVERNMENT RIGHTS IN SUBJECT INVENTIONS

Where Recipients and Subrecipients retain title to subject inventions, the U.S. Government retains certain rights.

1. GOVERNMENT USE LICENSE

The U.S. Government retains a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any subject invention throughout the world. This license extends to contractors doing work on behalf of the Government.

2. MARCH-IN RIGHTS

The U.S. Government retains march-in rights with respect to all subject inventions. Through “march-in rights,” the Government may require a Prime Recipient or Subrecipient who has elected to retain title to a subject invention (or their assignees or exclusive licensees), to grant a license for use of the invention to a third party. In addition, the Government may grant licenses for use of the subject invention when a Prime Recipient, Subrecipient, or their assignees and exclusive licensees refuse to do so.

DOE may exercise its march-in rights only if it determines that such action is necessary under any of the four following conditions:

- The owner or licensee has not taken or is not expected to take effective steps to achieve practical application of the invention within a reasonable time;
 - The owner or licensee has not taken action to alleviate health or safety needs in a reasonably satisfied manner;
 - The owner has not met public use requirements specified by Federal statutes in a reasonably satisfied manner; or
 - The U.S. Manufacturing requirement has not been met.
- Any determination that march-in rights are warranted must follow a fact-finding process in which the recipient has certain rights to present evidence and witnesses, confront witnesses and appear with counsel and appeal any adverse decision. To date, DOE has never exercised its march-in rights to any subject inventions.

N. RIGHTS IN TECHNICAL DATA

Data rights differ based on whether data is first produced under an award or instead was developed at private expense outside the award.

“Limited Rights Data”: The U.S. Government will not normally require delivery of confidential or trade secret-type technical data developed solely at private expense prior to issuance of an award, except as necessary to monitor technical progress and evaluate the potential of proposed technologies to reach specific technical and cost metrics.

Government rights in Technical Data Produced Under Awards: The U.S. Government normally retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. However, pursuant to special statutory authority, certain categories of data generated under EERE awards may be protected from public disclosure for up to five years after the data is generated (“Protected Data”). For awards permitting Protected Data, the protected data must be marked as set forth in the awards intellectual property terms and conditions and a listing of unlimited rights data (i.e., non-protected data) must be inserted into the data clause in the award. In addition, invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

O. COPYRIGHT

The Prime Recipient and Subrecipients may assert copyright in copyrightable data, such as software, first produced under the award without EERE approval. When copyright is asserted, the Government retains a paid-up nonexclusive, irrevocable worldwide license to reproduce, prepare derivative works, distribute copies to the public, and to perform publicly and display publicly the copyrighted work. This license extends to contractors and others doing work on behalf of the Government. In addition, for those awards requiring distribution of software as Open-Source Software (OSS), the additional information in Appendix D must be addressed in the application.

P. PROTECTED PERSONALLY IDENTIFIABLE INFORMATION

In responding to this FOA, Applicants must ensure that Protected Personally Identifiable Information (PII) is not included in the following documents: Project Abstract, Project Narrative, Biographical Sketches, Budget or Budget Justification. These documents will be used by the Merit Review Committee in the review process to evaluate each application. PII is defined by the Office of Management and Budget (OMB) and EERE as:

Any information about an individual maintained by an agency, including but not limited to, education, financial transactions, medical history, and criminal or employment history and information that can be used to distinguish or trace an individual’s identity, such as their name, social security number, date and place of birth, mother’s maiden name, biometric records, etc., including any other personal information that is linked or linkable to an individual.

This definition of PII can be further defined as: (1) Public PII and (2) Protected PII.

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

Public PII: PII found in public sources such as telephone books, public websites, business cards, university listing, etc. Public PII includes first and last name, address, work telephone number, email address, home telephone number, and general education credentials.

Protected PII: PII that requires enhanced protection. This information includes data that if compromised could cause harm to an individual such as identity theft.

Listed below are examples of Protected PII that Applicants must not include in the files listed above to be evaluated by the Merit Review Committee.

- Social Security Numbers in any form
- Place of Birth associated with an individual
- Date of Birth associated with an individual
- Mother's maiden name associated with an individual
- Biometric record associated with an individual
- Fingerprint
- Iris scan
- DNA
- Medical history information associated with an individual
- Medical conditions, including history of disease
- Metric information, e.g. weight, height, blood pressure
- Criminal history associated with an individual
- Employment history and other employment information associated with an individual
- Ratings
- Disciplinary actions
- Performance elements and standards (or work expectations) are PII when they are so intertwined with performance appraisals that their disclosure would reveal an individual's performance appraisal
- Financial information associated with an individual
- Credit card numbers
- Bank account numbers
- Security clearance history or related information (not including actual clearances held)

Listed below are examples of Public PII that Applicants may include in the files listed above to be evaluated by the Merit Review Committee:

- Phone numbers (work, home, cell)
- Street addresses (work and personal)
- Email addresses (work and personal)
- Digital pictures
- Medical information included in a health or safety report
- Employment information that is not PII even when associated with a name

- Resumes, unless they include a Social Security Number
- Present and past position titles and occupational series
- Present and past grades
- Present and past annual salary rates (including performance awards or bonuses, incentive awards, merit pay amount, Meritorious or Distinguished Executive Ranks, and allowances and differentials)
- Present and past duty stations and organization of assignment (includes room and phone numbers, organization designations, work email address, or other identifying information regarding buildings, room numbers, or places of employment)
- Position descriptions, identification of job elements, and those performance standards (but not actual performance appraisals) that the release of which would not interfere with law enforcement programs or severely inhibit agency effectiveness
- Security clearances held
- Written biographies (e.g. to be used in a Technology Office describing a speaker)
- Academic credentials
- Schools attended
- Major or area of study
- Personal information stored by individuals about themselves on their assigned workstation or laptop unless it contains a Social Security Number

Q. ANNUAL COMPLIANCE AUDITS

If a for-profit entity is a Prime Recipient and has expended greater than \$500K of Federal funds in a respective fiscal year, an annual compliance audit performed by an independent auditor may be required. For additional information, please refer to 10 C.F.R. § 600.316 and for-profit audit guidance documents posted under the “Coverage of Independent Audits” heading at <http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms> .

If an educational institution, non-profit organization, or state/local government is a Prime Recipient or Subrecipient and has expended greater than \$500K of Federal funds in a respective fiscal year, then an A-133 audit is required. For additional information, please refer to OMB Circular A-133 through the link below.

<http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a133/a133.pdf>

Applicants and sub-recipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit. EERE will share in the cost of the audit at its applicable cost share ratio.

APPENDIX A – DEFINITIONS

"**Applicant**" means the legal entity or individual signing the Application. This entity or individual may be one organization or a single entity representing a group of organizations (such as a Consortium) that has chosen to submit a single Application in response to a FOA.

"**Application**" means the documentation submitted in response to a FOA.

"**Authorized Organization Representative (AOR)**" is the person with assigned privileges who is authorized to submit grant applications through Grants.gov on behalf of an organization. The privileges are assigned by the organization's E-Business Point of Contact designated in the SAM.

"**Award**" means the written documentation executed by a Contracting Officer, after an Applicant is selected, which contains the negotiated terms and conditions for providing Financial Assistance to the Applicant. A Financial Assistance Award may be a Grant, Cooperative Agreement, or Technology Investment Agreement.

"**Budget**" means the cost expenditure plan submitted in the Application, including both the EERE contribution and the Applicant Cost Share.

"**Compliance**" is an eligibility determination that refers to the non-technical requirements outlined in a FOA (e.g., formatting, timeliness of submission, or satisfaction of prerequisites).

"**Consortium (plural consortia)**" means the group of organizations or individuals that have chosen to submit a single Application in response to a FOA.

"**Contracting Officer**" means the EERE official authorized to execute Awards on behalf of EERE and who is responsible for the business management and non-Technology Office aspects of the Financial Assistance process.

"**Cooperative Agreement**" means a Financial Assistance instrument used by EERE to transfer money or property when the principal purpose of the transaction is to accomplish a public purpose of support or stimulation authorized by Federal statute, and Substantial Involvement (see definition below) is anticipated between EERE and the Applicant during the performance of the contemplated activity. Refer to 10 CFR 600.5 for additional information regarding cooperative agreements.

"**Cost Sharing**" means that portion of the project or program's costs not borne by the Federal Government. The percentage of Applicant Cost Share is to be applied to the Total Project Cost (i.e., the sum of Applicant plus EERE Cost Shares) rather than to the EERE contribution alone. Cost sharing information can be found in the Code of Federal Regulations at 10 CFR 600.123 (non-profit and university), 600.224 (State and Local Governments), and 600.313 (for profit entities).

“Data Universal Numbering System (DUNS) Number” is a unique nine-character identification number issued by Dun and Bradstreet (D&B). Organizations must have a DUNS number prior to registering in the SAM. Call 1-866-705-5711 to receive one free of charge.

“E-Business Point of Contact (POC)” is the individual who is designated as the Electronic Business Point of Contact in the SAM registration. This person is the sole authority of the organization with the capability of designating or revoking an individual’s ability to conduct SAM transactions.

“E-Find” is a Grants.gov webpage where you can search for Federal Funding Opportunities in FedGrants. It can be found at <http://www.grants.gov/search/searchHome.do>.

“EERE Exchange” is the Department of Energy, Energy Efficiency and Renewable Energy’s web system for posting Federal FOAs and receiving applications.
EERE Exchange website

"Financial Assistance" means the transfer of money or property to an Applicant or Participant to accomplish a public purpose of support authorized by Federal statute through Grants or Cooperative Agreements and sub-awards. For EERE, it does not include direct loans, loan guarantees, price guarantees, purchase agreements, Cooperative Research and Development Agreements (CRADAs), or any other type of financial incentive instrument.

“FedConnect” is where federal agencies make awards via the web. It can be found at <https://www.fedconnect.net/FedConnect/>.

“Federally Funded Research and Development Center (FFRDC)” means a government-sponsored operation that exists for the purpose of carrying out various functions related to both basic and applied research and development on behalf of the Government. Typically, most or all of the facilities utilized in an FFRDC are owned by the Government, but the operations are not always managed by the Government; an FFRDC may be managed by a University or consortium of Universities, other not-for-profit or nonprofit organization, or a for-profit organization, with the Government performing an oversight function.

“Funding Opportunity Announcement (FOA)” is a publicly available document by which a Federal agency makes known its intentions to award discretionary grants or cooperative agreements, usually as a result of competition for funds. FOAs may be known as FOAs, notices of funding availability, solicitations, or other names depending on the agency and type of program. See 10 CFR 600.8 for more information.

"Grant" means a Financial Assistance instrument used by EERE to transfer money or property when the principal purpose of the transaction is to accomplish a public purpose of support or stimulation authorized by Federal statute, and no Substantial Involvement is anticipated between EERE and the Applicant during the performance of the contemplated activity.

“Grants.gov” is the “storefront” web portal which allows organizations to electronically find grant opportunities from all Federal grant-making agencies. Grants.gov is THE single access point for over 900 grant programs offered by the 26 Federal grant-making agencies. It can be accessed at <http://www.grants.gov>.

“Indian Tribe” means any Indian tribe, band, nation, or other organized group or community, including Alaska Native village or regional or village corporation, as defined in or established pursuant to the Alaska Native Claims Settlement Act (85 Stat. 688)[43 U.S.C. § 1601 et seq.], which are recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

"Key Personnel" mean the individuals who will have significant roles in planning and implementing the proposed Project on the part of the Applicant and Participants, including FFRDCs.

“Marketing Partner Identification Number (MPIN)” is a very important password designated by your organization when registering in SAM. The E-Business Point of Contact will need the MPIN to assign privileges to the individual(s) authorized to perform SAM transactions on behalf of your organization. The MPIN must have 9 digits containing at least one alpha character (must be in capital letters) and one number (no spaces or special characters permitted).

“Modification” means a revision to a FOA.

"Participant" for purposes of this FOA only, means any entity, except the Applicant substantially involved in a Consortium, or other business arrangement (including all parties to the Application at any tier), responding to the FOA.

“Principal Investigator” refers to the technical point of contact/Project Manager for a specific project award.

"Project" means the set of activities described in an Application, State plan, or other document that is approved by EERE for Financial Assistance (whether such Financial Assistance represents all or only a portion of the support necessary to carry out those activities).

“Project Team” means the team which consists of the Prime Recipient, Subrecipients, and others performing or otherwise supporting work under an EERE funding agreement.

“Proposal” is the term used to describe the documentation submitted in response to a FOA. Also see Application.

“Prime Recipient” means the organization, individual, or other entity that receives a Financial Assistance Award from EERE (i.e., is the signatory on the award), is financially accountable for

the use of any EERE funds or property provided for the performance of the Project, and is legally responsible for carrying out the terms and condition of the award.

“Responsiveness” is an eligibility determination that refers to the objective technical requirements (not goals or targets) outlined in a FOA, such as a technology type or technical parameters. For example, submission of a photovoltaic solar panel design in response to a FOA calling for innovative geothermal drilling technologies should be found nonresponsive. Likewise, an application with a design that incorporates rare earth materials to a FOA that prohibits the use of rare earth materials should be found nonresponsive. Conversely, the belief that a technology will not achieve the technical targets of the FOA will never be used as a proper basis for a rejection as nonresponsive.

“System for Award Management (SAM)” is the primary database which collects, validates, stores and disseminates data in support of agency missions. It can be accessed at <https://www.sam.gov>.

“Selection” means the determination by the EERE Selection Official that negotiations take place for certain Projects with the intent of awarding a Financial Assistance instrument.

“Selection Official” means the EERE official designated to select Applications for negotiation toward Award under a subject FOA.

“Substantial Involvement” means involvement on the part of the Government. EERE's involvement may include shared responsibility for the performance of the Project; providing technical assistance or guidance which the Applicant is to follow; and the right to intervene in the conduct or performance of the Project. Such involvement will be negotiated with each Applicant prior to signing any agreement.

“Technology Investment Agreement (TIA)” is a type of assistance instrument used to support or stimulate research projects involving for-profit firms, especially commercial firms that do business primarily in the commercial marketplace. TIAs are different from grants and cooperative agreements in that the award terms may vary from the Government-wide standard terms (See DOE TIA regulations at 10 CFR Part 603). The primary purposes for including a TIA in the type of available award instruments are to encourage non-traditional Government contractors to participate in an R&D program and to facilitate new relationships and business practices. A TIA can be particularly useful for awards to consortia (See 10 CFR 603.225(b) and 603.515, Qualification of a consortium).

“Total Project Cost” means all the funds to complete the effort proposed by the Applicant, including EERE funds (including direct funding of any FFRDC) plus all other funds that will be committed by the Applicant as Cost Sharing.

“Tribal Energy Resource Development Organization or Group” means an “organization” of two or more entities, at least one of which is an Indian Tribe (see “Indian Tribe” above) that has the

[71]

written consent of the governing bodies of all Indian Tribes participating in the organization to apply for a grant or loan, or other assistance under 25 U.S.C. § 3503.

APPENDIX B – COST SHARE INFORMATION

Cost Sharing or Cost Matching

The terms “cost sharing” and “cost matching” are often used synonymously. Even the DOE Financial Assistance Regulations, 10 CFR Part 600, use both of the terms in the titles specific to regulations applicable to cost sharing. EERE almost always uses the term “cost sharing,” as it conveys the concept that non-federal share is calculated as a percentage of the Total Project Cost. An exception is the State Energy Program Regulation, 10 CFR 420.12, State Matching Contribution. Here “cost matching” for the non-federal share is calculated as a percentage of the Federal funds only, rather than the Total Project Cost.

How Cost Sharing Is Calculated

As stated above, cost sharing is calculated as a percentage of the Total Project Cost. Following is an example of how to calculate cost sharing amounts for a project with \$1,000,000 in federal funds with a minimum 20% non-federal cost sharing requirement:

- Formula: Federal share (\$) divided by Federal share (%) = Total Project Cost
Example: \$1,000,000 divided by 80% = \$1,250,000
- Formula: Total Project Cost (\$) minus Federal share (\$) = Non-federal share (\$)
Example: \$1,250,000 minus \$1,000,000 = \$250,000
- Formula: Non-federal share (\$) divided by Total Project Cost (\$) = Non-federal share (%)
Example: \$250,000 divided by \$1,250,000 = 20%

See the sample cost share calculation for a blended cost share percentage below. Keep in mind that FFRDC funding is DOE funding.

What Qualifies For Cost Sharing

While it is not possible to explain what specifically qualifies for cost sharing in one or even a couple of sentences, in general, if a cost is allowable under the cost principles applicable to the organization incurring the cost and is eligible for reimbursement under an EERE grant or cooperative agreement, then it is allowable as cost share. Conversely, if the cost is not allowable under the cost principles and not eligible for reimbursement, then it is not allowable as cost share. In addition, costs may not be counted as cost share if they are paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing.

The rules associated with what is allowable as cost share are specific to the type of organization that is receiving funds under the grant or cooperative agreement, though are generally the same for all types of entities. The specific rules applicable to:

- Institutions of Higher Education, Hospitals, and Other Nonprofit Organizations are found at 10 CFR 600.123;
- State and Local Governments are found at 10 CFR 600.224;
- For-profit Organizations are found at 10 CFR 600.313.

In addition to the regulations referenced above, other factors may also come into play such as timing of donations and length of the project period. For example, the value of ten years of donated maintenance on a project that has a project period of five years would not be fully allowable as cost share. Only the value for the five years of donated maintenance that corresponds to the project period is allowable and may be counted as cost share.

Additionally, EERE generally does not allow pre-award costs for either cost share or reimbursement when these costs precede the signing of the appropriation bill that funds the award. In the case of a competitive award, EERE generally does not allow pre-award costs prior to the signing of the Selection Statement by the EERE Selection Official.

Following is a link to the DOE Financial Assistance Regulations. You can click on the specific section for each Code of Federal Regulations reference mentioned above.

DOE Financial Assistance Rules (10 CFR 600)

As stated above, the rules associated with what is allowable cost share are generally the same for all types of organizations. Following are the rules found to be common, but again, the specifics are contained in the regulations and cost principles specific to the type of entity:

- (A) Acceptable contributions. All contributions, including cash contributions and third party in-kind contributions, must be accepted as part of the Prime Recipient's cost sharing if such contributions meet all of the following criteria:
- (1) They are verifiable from the recipient's records.
 - (2) They are not included as contributions for any other federally-assisted project or program.
 - (3) They are necessary and reasonable for proper and efficient accomplishment of project or program objectives.
 - (4) They are allowable under the cost principles applicable to the type of entity incurring the cost as follows:

- a. For-profit organizations. Allowability of costs incurred by for-profit organizations and those nonprofit organizations listed in Attachment C to OMB Circular A-122 is determined in accordance with the for-profit cost principles in 48 CFR Part 31 in the Federal Acquisition Regulation, except that patent prosecution costs are not allowable unless specifically authorized in the award document. (v)
Commercial Organizations. FAR Subpart 31.2—Contracts with Commercial Organizations
 - b. Other types of organizations. Allowability of costs incurred by other types of organizations that may be Subrecipients under a prime award is determined as follows:
 - i. Institutions of higher education. Allowability is determined in accordance with: 2 CFR 220 Cost Principles for Educational Institutions
 - ii. Other nonprofit organizations. Allowability is determined in accordance with: 2 CFR 230 Cost Principles for Nonprofit Organizations
 - iii. Hospitals. Allowability is determined in accordance with the provisions of: Title 45 Appendix E to Part 74—Principles for Determining Costs Applicable to Research and Development Under Grants and Contracts With Hospitals
 - iv. Governmental organizations. Allowability for State, local, or federally recognized Indian tribal government is determined in accordance with: PART 225—Cost Principles for State, Local, and Indian Tribal Governments (OMB Circular A-87)
- (5) They are not paid by the Federal Government under another award unless authorized by Federal statute to be used for cost sharing or matching.
- (6) They are provided for in the approved budget.
- (B) Valuing and documenting contributions
- (1) Valuing recipient's property or services of recipient's employees. Values are established in accordance with the applicable cost principles, which mean that amounts chargeable to the project are determined on the basis of costs incurred. For real property or equipment used on the project, the cost principles authorize depreciation or use charges. The full value of the item may be applied when the item will be consumed in the performance of the award or fully depreciated by the end of the award. In cases where the full value of a donated capital asset is to be applied as cost sharing or matching, that full value must be the lesser or the following:

- a. The certified value of the remaining life of the property recorded in the recipient's accounting records at the time of donation; or
 - b. The current fair market value. If there is sufficient justification, the Contracting Officer may approve the use of the current fair market value of the donated property, even if it exceeds the certified value at the time of donation to the project. The Contracting Officer may accept the use of any reasonable basis for determining the fair market value of the property.
- (2) Valuing services of others' employees. If an employer other than the recipient furnishes the services of an employee, those services are valued at the employee's regular rate of pay, provided these services are for the same skill level for which the employee is normally paid.
- (3) Valuing volunteer services. Volunteer services furnished by professional and technical personnel, consultants, and other skilled and unskilled labor may be counted as cost sharing or matching if the service is an integral and necessary part of an approved project or program. Rates for volunteer services must be consistent with those paid for similar work in the recipient's organization. In those markets in which the required skills are not found in the recipient organization, rates must be consistent with those paid for similar work in the labor market in which the recipient competes for the kind of services involved. In either case, paid fringe benefits that are reasonable, allowable, and allocable may be included in the valuation.
- (4) Valuing property donated by third parties.
- a. Donated supplies may include such items as office supplies or laboratory supplies. Value assessed to donated supplies included in the cost sharing or matching share must be reasonable and must not exceed the fair market value of the property at the time of the donation.
 - b. Normally only depreciation or use charges for equipment and buildings may be applied. However, the fair rental charges for land and the full value of equipment or other capital assets may be allowed, when they will be consumed in the performance of the award or fully depreciated by the end of the award, provided that the Contracting Officer has approved the charges. When use charges are applied, values must be determined in accordance with the usual accounting policies of the recipient, with the following qualifications:
 - i. The value of donated space must not exceed the fair rental value of comparable space as established by an independent appraisal of comparable space and facilities in a privately-owned building in the same locality.

- ii. The value of loaned equipment must not exceed its fair rental value.
- (5) Documentation. The following requirements pertain to the recipient's supporting records for in-kind contributions from third parties:
- a. Volunteer services must be documented and, to the extent feasible, supported by the same methods used by the recipient for its own employees.
 - b. The basis for determining the valuation for personal services and property must be documented.

APPENDIX C – SAMPLE COST SHARE CALCULATION FOR BLENDED COST SHARE PERCENTAGE

The following example shows the math for calculating required cost share for a project with \$2,000,000 in Federal funds with four tasks requiring different Non-federal cost share percentages:

Task	Proposed Federal Share	Federal Share %	Recipient Share %
Task 1 (R&D)	\$1,000,000	80%	20%
Task 2 (R&D)	\$500,000	80%	20%
Task 3 (Demonstration)	\$400,000	50%	50%
Task 4 (Outreach)	\$100,000	100%	0%

Federal share (\$) divided by Federal share (%) = Task Cost

Each task must be calculated individually as follows:

Task 1

\$1,000,000 divided by 80% = \$1,250,000 (Task 1 Cost)

Task 1 Cost minus federal share = Non-federal share

\$1,250,000 - \$1,000,000 = \$250,000 (Non-federal share)

Task 2

\$500,000 divided 80% = \$625,000 (Task 2 Cost)

Task 2 Cost minus federal share = Non-federal share

\$625,000 - \$500,000 = \$125,000 (Non-federal share)

Task 3

\$400,000 / 50% = \$800,000 (Task 3 Cost)

Task 3 Cost minus federal share = Non-federal share

\$800,000 - \$400,000 = \$400,000 (Non-federal share)

Task 4

Federal share = \$100,000

Non-federal cost share is not mandated for outreach = \$0 (Non-federal share)

The calculation may then be completed as follows:

Tasks	\$ Federal Share	% Federal Share	\$ Non-Federal Share	% Non-Federal Share	Total Project Cost
Task 1	\$1,000,000	80%	\$250,000	20%	\$1,250,000
Task 2	\$500,000	80%	\$125,000	20%	\$625,000
Task 3	\$400,000	50%	\$400,000	50%	\$800,000
Task 4	\$100,000	100%	\$0	0%	\$100,000
Totals	\$2,000,000		\$775,000		\$2,775,000

Blended Cost Share %

Non-federal share (\$775,000) divided by Total Project Cost (\$2,775,000) = 27.9% (Non-federal)

Federal share (\$2,000,000) divided by Total Project Cost (\$2,775,000) = 72.1% (Federal).

APPENDIX D – OPEN SOURCE SOFTWARE

Open Source Software Distribution Plan

Applicants that are applying to one or more Topic Areas for which open source software distribution is required must submit a plan describing how software produced under this FOA will be distributed. For a DOE National Laboratory or a FFRDC, the data rights clause, including rights and requirements pertaining to computer software, in its Management and Operating (M&O) Contract shall apply and shall take precedence over any requirement set forth in this Appendix. The plan must include the following elements:

1. A complete description of any existing software that will be modified or incorporated into software produced under this FOA, including a description of the license rights. The license rights must allow the modified or incorporated software to be distributed as open source.
2. A discussion of the open source license that the Applicant plans to use for the software it plans to produce under the FOA, and how that choice furthers the goals of this FOA. The discussion must also address how the license conforms to the conditions listed below.
3. A method for depositing the software in a source code repository.
4. A method for sharing and disseminating the software and other information to team members or others when multiple parties will contribute to the development of the software or the FOA requires that the software or other information be shared or disseminated to others.

Open Source Definition: Open source licenses must conform to all of the following conditions:

Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale. The rights attached to the software must apply to all to whom the software is redistributed without the need for execution of an additional license by those parties.

Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, e.g., downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program.

Deliberately obfuscated source code and intermediate forms such as the output of a preprocessor or translator are not allowed.

Derived Works

The license must allow modifications and derived works, and permit the option of distributing the modifications and derived works under the same terms as the license of the original software.

Integrity of the Author's Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

No Restriction Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

License Must Not Be Specific to a Product or Technology

The rights attached to the program must not depend on the program's being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution. No provision of the license may be predicated on any individual technology or style of interface.

License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

Examples of Acceptable Licenses

Apache License, 2.0

<http://www.apache.org/licenses>

The 2.0 version of the Apache License was approved by the Apache Software Foundation in 2004. The goals of this license revision were to reduce the number of frequently asked questions, to allow the license to be reusable without modification by any project (including non-ASF projects), to allow the license to be included by reference instead of listed in every file, to clarify the license on submission of contributions, to require a patent license on contributions that necessarily infringe the contributor's own patents, and to move comments regarding Apache and other inherited attribution notices to a location outside the license terms

The result is a license that is compatible with other open source licenses, while remaining true to and supportive of collaborative development across both nonprofit and commercial organizations.

All packages produced by the ASF are implicitly licensed under the Apache License, Version 2.0, unless otherwise explicitly stated.

GNU General or Public License (GPLv3)

<http://www.gnu.org/licenses/gpl.html>

The GNU General Public License (GNU GPL or simply GPL) is the most widely used free software license, originally written by Richard Stallman for the GNU Project.

The GPL is the first copyleft license for general use, which means that derived works must be distributed under the same license terms. Under this philosophy, the GPL grants the recipients of a computer program the rights of the free software definition and uses copyleft to ensure the freedoms are preserved, even when the work is changed or additions are made. This aspect distinguishes the GPL from permissive free software licenses, including the BSD licenses.

The license's copyright disallows modification of the license. Copying and distributing the license is allowed because the GPL requires recipients to get "a copy of this License along with the Program". According to the GPL FAQ, anyone can make a new license using a modified version of the GPL as long as he or she uses a different name for the license, does not mention "GNU", and removes the preamble, though the preamble can be used in a modified license if permission to use it is obtained from the Free Software Foundation (FSF).

GNU Library or "Lesser" General Public License (LGPLv3) <http://www.gnu.org/licenses/lgpl.html>

The GNU Lesser General Public License (formerly the GNU Library General Public License) or LGPL is a free software license published by the Free Software Foundation (FSF). It was designed as a compromise between the strong-copyleft GNU General Public License or GPL and permissive licenses such as the BSD licenses and the MIT License. The GNU Library General Public License (as the LGPL was originally named) was published in 1991, and adopted the version number 2 for parity with GPL version 2. The LGPL was revised in minor ways in the 2.1 point release, published in 1999, when it was renamed the GNU Lesser General Public License to reflect the FSF's position that not all libraries should use it. Version 3 of the LGPL was published in 2007 as a list of additional permissions applied to GPL version 3.

The LGPL places copyleft restrictions on the program governed under it but does not apply these restrictions to other software that merely link with the program. There are, however, certain other restrictions on this software.

The LGPL is primarily used for software libraries, although it is also used by some stand-alone applications, most notably Mozilla and OpenOffice.org.

The MIT License (MIT)

<http://opensource.org/licenses/MIT>

The MIT License is a free software license originating at the Massachusetts Institute of Technology (MIT). It is a permissive license, meaning that it permits reuse within proprietary software provided all copies of the licensed software include a copy of the MIT License terms. Such proprietary software retains its proprietary nature even though it incorporates software under the MIT License. The license is also GPL-compatible, meaning that the GPL permits combination and redistribution with software that uses the MIT License.

Software packages that use one of the versions of the MIT License include Expat, PuTTY, the Mono development platform class libraries, Ruby on Rails, Lua (from version 5.0 onwards), and the X Window System, for which the license was written.

Mozilla Public License 2.0 (MPL-2.0)

<http://www.mozilla.org/MPL/2.0/>

The Mozilla Public License (MPL) is a free and open source software license. Version 1.0 was developed by Mitchell Baker when she worked as a lawyer at Netscape Communications Corporation and version 1.1 at the Mozilla Foundation. Version 2.0 was developed in the open, overseen by Baker and led by Louis Villa. The MPL is characterized as a hybridization of the modified BSD license and GNU General Public License.

The MPL is the license for the Mozilla Application Suite, Mozilla Firefox, Mozilla Thunderbird and other Mozilla software. The MPL has been adapted by others as a license for their software, most notably Sun Microsystems, as the Common Development and Distribution License for OpenSolaris, the open source version of the Solaris 10 operating system, and by Adobe, as the license for its Flex product line.

APPENDIX E – DATA MANAGEMENT PLANS

Each EERE Funding Opportunity Announcement (FOA) for research, development and demonstration work issued on or after October 1, 2012 shall require each applicant or team of applicants to submit an acceptable Data Management Plan (DMP) as part of its proposal or application to the FOA.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

The DMP should describe how data generated in the course of the proposed work will be shared and preserved or explain why data sharing and/or preservation are not possible or scientifically appropriate. **At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.**

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws, and DOE regulations, orders, and policies.

DMP Reviews

DMPs will be reviewed as part of a compliance review of full applications submitted in response to a FOA. If a DMP is not submitted or does not address the above elements, then the full applications will be considered non-compliant and will not be further considered by EERE.

Data Determination for a DMP

The Principal Investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as “protected data”) and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed work at private expense that will be used in the course of the proposed work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as “limited rights data”). Any use of limited rights data or labeling of data as “protected data” must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the proposed work and which of these are considered digital research data necessary to validate the research findings or results.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation: A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under

what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and re-distribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections, systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, EERE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DOIs). In most cases, EERE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a web-based platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples).

Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study.”

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

APPENDIX F – TECHNICAL POTENTIAL AND PAYBACK CALCULATION

One performance metric used to evaluate applications will be the 2030 primary energy savings technical potential. Each application to *Topic 1: Open Topic for Energy Efficiency Solutions for Residential and Commercial Buildings* must describe a technology or approach that leads to a minimum annual primary energy savings technical potential of at least 250 TBtu (i.e., 0.25 Quads). All applicants proposing a technology innovation for Topic 1 should provide the *Primary Energy Savings Technical Potential* (TBtu), and the *Simple Payback* (years). The *Primary Energy Savings Technical Potential* is calculated from Eq. (F1):

$$\left[\begin{array}{c} \text{Primary Energy Savings} \\ \text{Technical Potential} \\ \text{(TBtu)} \end{array} \right] = \left[\begin{array}{c} \% \text{ Energy Savings} \\ \text{Over Typical New} \\ \text{Technology} \end{array} \right] \times \left[\begin{array}{c} \text{Energy Market} \\ \text{Size} \\ \text{(TBtu)} \end{array} \right] \quad (\text{F1})$$

The *Energy Market Size* (TBtu) can be determined from the market addressed by the technology (residential, commercial, new, retrofit, etc.), the end use (space air conditioning, lighting, cooking, refrigeration, etc.), the climate zone (1 – 5), and other information. An example determination of *Energy Market Size* (TBtu) for residential heating in new construction is presented in Figure F1, and is posted in EERE Exchange with the FOA as “Building Technologies Office Market Definition Calculator”.

Figure F1 Example 2030 market size (in TBtu) for residential heating in new construction



Building Technologies Office
Market Definition Calculator

Please use this form to define a market for your proposal and follow the guidelines suggested in Appendix F of the BENEFIT FOA. In order to complete this form, please insert '0' or '1' for all applicable market segments below, and total market size will be calculated in a green colored box below.

Title: Residential Heating (New)

Total Market Size:* 1384 TBtUs

Comments:
For all climate zones and technology types, the total market for new residential heating is 1384 TBtus.

*Total market size is defined for the year 2030 and based on Annual Energy Outlook 2010 reference case.

Space Air Conditioning and Heating

Market		Component		Climate Zone		Technology Type		Units	Units
Residential	1	Attic	1	Climate Zone 1	1	Air-Source Heat Pump	1	Residenti Heating	38,436,262 units
Commercial	0	Walls	1	Climate Zone 2	1	Ground-Source Heat Pump	1	Residenti Cooling	0 units
Heating	1	Basement	1	Climate Zone 3	1	Furnace / RTU	1	Commerci Heating	0 million square feet
Cooling	0	Infiltration	1	Climate Zone 4	1	Boiler / Centrifugal Chiller	1	Commerci Cooling	0 million square feet
Pre-2010	0	Doors	1	Climate Zone 5	1	Sectional Heating; Residential A/C	1		
New	1	Window-C	1			Electric Radiator; Wall or Window A/C	1		
		Window-SHG	1			Other (recip., screw, scroll compressor)	1		
		Internal	1						

Questions about this FOA? Email benefitfoa@go.doe.gov. Problems with EERE Exchange? Email EERE-ExchangeSupport@hq.doe.gov. Include FOA name and number in subject line.

The “Typical New Technology” is the technology that is being replaced. For “covered” technologies, that is, technologies subject to minimum efficiency standards,¹⁴ Applicants should assume the efficiency of the “Typical New Technology” to be greater than or equal to the applicable efficiency standard. For “covered” and other technologies, Table F1 presents the projected 2030 stock and average stock efficiency for a variety of residential equipment that may be used in this calculation. In all cases Applicants should ensure that if a “covered” technology is being replaced, the efficiency of the “Typical New Technology” is equal to or greater than the applicable efficiency standard.

Table F1 2030 Residential equipment stock and average efficiency¹⁵

Equipment Class	Stock (million units)	Stock Average Efficiency
Main Space Heaters		
Electric Heat Pumps (HSPF)	18.75	8.53
Natural Gas Heat Pumps (GCOP)	0	1.3
Geothermal Heat Pumps (COP)	2.25	3.71
Natural Gas Furnace (AFUE)	76.41	0.88
Distillate Furnace (AFUE)	6.36	0.85
Space Cooling		
Electric Heat Pumps (SEER)	18.75	14.60
Natural Gas Heat Pumps (GCOP)	0	0.67
Geothermal Heat Pumps (EER)	2.25	17.42
Central Air Conditioners (SEER)	83.89	14.00
Room Air Conditioners (EER)	52.64	10.29
Water Heaters		
Electric (EF)	62.84	0.92
Natural Gas (EF)	72.74	0.62
Distillate Fuel Oil (EF)	2.15	0.63
Liquefied Petroleum Gases (EF)	2.27	0.68
Refrigeration		
Refrigerators (kW.hr/yr)	178.00	520.37
Freezers (kW.hr/yr)	51.25	435.66

If the provided information is not used to calculate the *Energy Market Size* (TBtu), then a comparable approach can be applied, with corresponding justification.

A second performance metric used to evaluate applications will be the cost effectiveness, as measured by the *Simple Payback*. This will be applicable only to technology innovations, and not to other innovations such as design tools or enabling technologies for which primary energy

¹⁴ http://www1.eere.energy.gov/buildings/appliance_standards/standards_test_procedures.html

¹⁵ Residential Sector Equipment Stock and Efficiency, Reference case:
<http://www.eia.gov/oiaf/aeo/tablebrowser/#release=AE02010&subject=12-AE02010&table=30-AE02010®ion=0-0&cases=aeo2010r-d111809a>

savings and/or payback are difficult to describe. Proposers should compute the *Simple Payback* for their proposed technology innovation per Eq. (F2):

$$\left[\begin{array}{c} \text{Simple} \\ \text{Payback} \\ \text{(Yr)} \end{array} \right] = \frac{\left[\begin{array}{c} \text{Incremental Initial} \\ \text{Cost of Proposed} \\ \text{Technology at Scale (\$)} \end{array} \right]}{\left[\begin{array}{c} \text{Cost} \left(\frac{\$}{\text{Yr}} \right) \\ \text{Savings} \end{array} \right]} \tag{F2}$$

$$= \frac{\left[\begin{array}{c} \text{Incremental Initial} \\ \text{Cost of Proposed} \\ \text{Technology at Scale (\$)} \end{array} \right]}{\left[\begin{array}{c} \text{Unit Energy Consumed by} \\ \text{Typical New Technology} \\ \text{Per Year (kWh/Yr)} \end{array} \right] \left[\begin{array}{c} \text{Energy} \left(\frac{\$}{\text{kWh}} \right) \\ \text{Cost} \end{array} \right] \left[\begin{array}{c} \% \text{ Energy Savings} \\ \text{Over Typical New} \\ \text{Technology} \end{array} \right]}$$

where the *Incremental Initial Cost of Proposed Technology at Scale (\$)* is computed from

$$\left[\begin{array}{c} \text{Incremental Initial} \\ \text{Cost of Proposed} \\ \text{Technology at Scale (\$)} \end{array} \right] = \left[\begin{array}{c} \text{Unit Cost of} \\ \text{Proposed Technology} \\ \text{at Scale (\$)} \end{array} \right] - \left[\begin{array}{c} \text{Unit Cost of} \\ \text{Typical New} \\ \text{Technology (\$)} \end{array} \right] \tag{F3}$$

Note that the *% Energy Savings Over Typical New Technology* term in Eq. (F2) is the same as that in Eq. (F1). The “Energy Cost” can be specified alternatively in \$/MMBtu (i.e., for natural-gas-fired systems), or in whatever units are most appropriate. The nationally averaged energy costs specified in Table F2 *must* be used for this calculation. The proposer should describe, and provide supporting documentation, what they consider to be an acceptable maximum payback (in years), which can vary significantly depending on the end use.

Table F2 Retail energy 2012 pricing

Sector	Electricity, ¢/kWh ¹⁶	Natural Gas	
		\$/Thousand Cubic Feet ¹⁷	\$/MMBTU ^{Error!} Bookmark not defined.
Residential	11.88	10.68	10.45
Commercial	10.12	8.13	7.95

Proposers of non-technological solutions, e.g., modeling approaches, are also required to provide an estimate of primary energy savings potentially resulting from their innovation, as well as an analysis of their cost effectiveness. The approaches used in these analyses need to be appropriately justified.

¹⁶ http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_3

¹⁷ http://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PCS_DMcf_a.htm