CERTIFICATION AND RATING OF ATTACHMENTS FOR FENESTRATION TECHNOLOGIES (CRAFT)

Funding Opportunity Announcement (FOA) Number: DE-FOA-0001000
FOA Type: Initial
CFDA Number: 81.086

FOA Issue Date:	November 5, 2013
Submission Deadline for Concept Papers:	December 5, 2013
Informational Webinar	December 9, 2013
Submission Deadline for Full Applications:	February 5, 2013
Submission Deadline for Replies to Reviewer Comments:	March 7, 2014
Expected Date for EERE Selection Notifications:	April 10, 2014
Expected Timeframe for Award Negotiations	June 10, 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.

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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	$1.6 M
Average Award Amount	EERE anticipates making awards that range from $1.0M to $1.6M.
Types of Funding Agreements	Cooperative Agreements
Period of Performance	48 months with additional DOE participation up to 96 months
Eligible Applicants	Individuals, Domestic Entities, Foreign Entities, Incorporated Consortia, Unincorporated Consortia, subject to the definitions in Section III.A.
Cost Share Requirement	35% of Total Project Costs
Submission of Multiple Applications	Applicants may only submit one Concept Paper and one Full Application for consideration under this FOA. If an applicant submits more than one Concept Paper or Full Application, EERE will only consider the last timely submission for evaluation. Any other submissions received listing the same applicant will be considered non-compliant and not eligible for further consideration. This limitation does not prohibit an applicant from collaborating on other applications (e.g., as a potential Subrecipient or partner) so long as the entity is only listed as the Prime Applicant on one Concept Paper and Full Application submitted under this FOA.
Application Forms	Required forms and templates for Full Applications are available on EERE Exchange at https://eere-Exchange.energy.gov.
FOA Summary	The Building Technologies Office's prioritization tool indicates that the use of insulating and reflective fenestration attachments is a cost-effective energy savings measure. Insulating and reflective fenestration attachments have the economic potential to save approximately 800 TBtu by 2030 in the residential and commercial sectors combined due to their low cost and the rapid turnover of the installed base, assuming that 50% of windows are covered with attachments. However, since there are currently no performance rating mechanisms for assessing the energy performance of fenestration attachments, the available energy savings cannot be realized because consumers are unable to identify the fenestration attachment products/product lines that have the potential to save energy. This FOA will provide the successful awardee with four years of cost-shared funding to develop a Program that will rate and certify the energy performance of both residential and commercial fenestration attachments. The FOA's objective is to develop a Program that creates a consistent set of energy performance-based rating and certification standards and program procedures, oversees the implementation of rating, certification, labeling, and performance verification procedures, and develops and maintains a publicly available, searchable electronic database of fenestration attachment product performance. The successful awardee performance will be based on its ability to achieve these objectives for the

	products identified as priorities in the application. The energy performance data and the associated labeling will enable consumers and building professionals, such as architects, to make comparisons among products easily and will encourage the installation of energy-efficient fenestration attachments. The rating and certification program resulting from this FOA is expected to drive market adoption of fenestration attachment products. Priority performance metrics for assessing the fenestration attachments include thermal transmittance, solar heat gain, visible transmittance, air leakage, energy performance, daylighting performance* and condensation resistance. Applicants are required to identify and prioritize these and any additional indices on a product category basis proposed for inclusion in the rating and certification Program. Applicants will provide discussion of acceptable trade-offs among measurement accuracy, cost of experimental testing of physical systems, and the accuracy of simulated performance. The awardee will determine which products require physical tested using standardized test procedures and which products will be rated using simulation. BTO does not specify that applicants rate a specific number of products, but instead, it requires the applicants to provide justification for a prioritized list of products that it will rate, certify and label. In addition, BTO requires that applicants provide a plan for financial self-sufficiency by the end of the period of performance. Thus, by the end of the period of performance, the awardee must rate, certify and label enough products to generate enough revenue from manufacturer dues (or other mechanisms) to be financially self-sufficient. *Daylighting performance is required only for commercial application.

I. FUNDING OPPORTUNITY DESCRIPTION

A. DESCRIPTION/BACKGROUND

1. PROGRAM OVERVIEW

In its 2011 Strategic Plan, DOE identified "catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies" as one of its goals. As part of that effort, BTO works to improve residential and commercial building components, energy modeling tools, building energy codes, and appliance standards. The Emerging Technologies Program of the Building Technologies Office (BTO) supports the research, development and deployment of efficient and affordable next-generation technology systems that have the potential to significantly improve the energy efficiency of new and existing buildings.

DOE has increased its focus on fenestration attachments and has developed a strategy to catalyze rapid deployment and installation of energy-efficient fenestration attachments based on its own analysis and stakeholder feedback. Analysis using the BTO Prioritization Tool (Farese 2012), http://www.nrel.gov/docs/fy12osti/54799.pdf, shows that energy-efficient window (fenestration) attachments have a cost-of-conserved energy of $7.60 and $3.70 in residential and commercial buildings, respectively. With increased market penetration, energy-efficient fenestration attachments have the potential to save nearly 800 TBTU per year by 2030 due to low product cost and rapid turnover of the installed base. These results prompted BTO to organize a technical analysis workshop in July 2012 to identify goals and knowledge gaps for the development of performance indices, simulation and test procedures, and the technical requirements for window attachment deployment programs. Participants included representatives from industry, the R&D community, government and public interest organizations. Workshop participants agreed upon several window attachment characteristics and attributes, but there was no clear consensus as to how to categorize products by energy performance. They also proposed primary and secondary product performance metrics and determined that established product performance metrics would most likely involve the definition and use of base case window(s). Workshop participants felt that WINDOW and THERM simulation tools have the most comprehensive set of simulation models for window attachments in the world and identified gaps to realizing proper testing and simulation methodologies that could be addressed through simple and cost-effective methodologies. As a result of the stakeholder feedback from the technical workshop, BTO began developing a Funding Opportunity Announcement regarding the rating, certification and labeling of fenestration attachments. A Request for Information on this subject was released in January 2013. Responses were submitted from industry, trade associations, manufacturers, NGOs and private citizens.

DOE has continued to engage with the fenestration attachment industry and has funded Lawrence Berkeley National Laboratory (LBNL) to conduct research and develop technical methods to accurately evaluate the performance of different types of residential and commercial fenestration attachments. It is DOE's expectation that the program resulting from this FOA will build on these efforts and result in the rapid adoption of fenestration attachment products. Since performance rating mechanisms do not currently exist for assessing the energy performance of fenestration attachments, DOE and the fenestration attachments industry identified accurate and objective performance data as a critical need for product adoption in the residential and commercial markets. A third-party rating, certification, and labeling program will enable consumers to distinguish among attachment products and models, and the underlying data will assist architects and engineers in better understanding the energy impact of particular products. However, development of such a rating and labeling program is not possible because there is currently no uniform, comprehensive, and accepted method of measuring and comparing performance of fenestration attachment product types and designs.

This FOA intends to provide the successful Awardee with four years of cost-shared funding to create and manage a Program[1] for the Certification and Rating of Attachments for Fenestration Technologies (CRAFT). This includes rating, certification, performance verification, and labeling standards for residential and commercial fenestration attachments. The successful applicant will develop a Program to rate fenestration attachment energy performance and will provide accurate and useful product comparison criteria, allowing end users in residential and commercial markets to assess the relative energy cost/benefits of fenestration attachments.

Lawrence Berkeley National Laboratory (LBNL), with assistance from the fenestration attachments industry, is developing test procedures and simulation tools and is measuring the optical properties of fenestration attachment fabrics and components. This work is further described in Section I.A.2 and Appendix G. DOE expects the Awardee to work collaboratively with LBNL and build upon this work as a technical basis for the Program's rating procedures.

The operations and activities of the Program will be separate and distinct from the existing window rating and labeling program established under the Energy Policy Act of 1992 (EPAct). Section 121 of EPAct mandates the development by the National Fenestration Rating Council of a "voluntary window rating program" of energy rating and labels for "windows and window systems." Pub. L. 102-486 § 121(a) (1992), codified at 42 U.S.C. § 6292. By its terms, section 121 applies only to windows and window systems. DOE has determined that window attachments are neither windows nor window systems.[2] As such, a rating and labeling system

[1] Program (capital "P") will here on out refer to the certification and rating of attachments for fenestration technologies program to be established in response to the FOA by the applicant.

[2] DOE's Office of the General Counsel has determined that EPAct Section 121 is inapplicable to window attachments. Specifically, Section 121 establishes a requirement for and procedures to develop a "voluntary ***window*** rating program that will develop energy rating and labels for ***windows*** and ***window systems***" (emphasis added). As such, Section 121 is director to a program concerning only windows and window systems. An attachment is not a window nor is it necessarily connected to a window and it is not an alternative form of a

for window attachments is not subject to section 121. Based on a review of technical data, building codes and industry practice, and for purposes of this FOA, DOE considers that window attachments include, but are not limited to: interior blinds, shades, and drapes; exterior awnings, shades and shutters; interior and exterior storm windows; and films attached to windows after manufacture.

2. FUNDING OPPORTUNITY OBJECTIVES

As noted above, the opportunity for energy savings from deployment of energy-efficient fenestration attachments in the marketplace is substantial. However, the lack of a uniform certification rating system makes product comparisons difficult and potentially inaccurate. To address this need, the Program will, implement the following tasks:

- Develop a consistent set of energy performance-based rating and certification standards and procedures for residential and commercial fenestration attachments, in collaboration with stakeholders.
- Oversee the implementation of rating, certification, labeling, and performance verification procedures for residential and commercial fenestration attachment products.
- Develop and maintain a publicly available, searchable electronic database of fenestration attachment product performance, including energy performance data for rated and certified products.

The Program will need to create a structure that can accomplish the above goals, along with developing quality assurance and accreditation procedures for certification bodies and laboratories to ensure products are rated consistently and accurately.

Technical Approach

DOE will fund one Awardee to accomplish the tasks described above. The Program will rate and certify interior and exterior residential and commercial attachments that are non-integral to manufactured fenestration products. Non-integral fenestration attachments are defined as ***products attached to an installed fenestration or attached to or near the perimeter of the inner or outer wall surrounding the fenestration.*** Fenestration attachments may be fixed or operable, manual or automated.

DOE expects the Program to develop and implement, in a fair and unbiased manner, rating and certification procedures for residential and commercial fenestration attachment categories. DOE also expects the Applicant to identify and justify the fenestration attachment types it would prioritize when developing a rating and certification Program and procedures. Applicants

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window. Thus, attachments are not within the scope of the program to be established under Section 121 EPAct, 1992

should use Table 1 as a reference list of fenestration attachment types, but applicants are not limited to the attachment types in Table 1.

Table 1: Interior and Exterior Fenestration Attachment Types

Cellular Shade	Drape	Awning
Slat Shade	Louvered Shutter	Storm Window
Pleated Shade	Roller Shutter	Sheer Shade
Roller Shade	Solar Screen	Window Film[3]
Roman Shade	Window Quilt	

In Table 2, DOE has identified performance indices it views as priorities for assessing the performance of fenestration attachments. The Applicant will identify and prioritize the indices from Table 2 and any additional indices on a product category basis that are to be included in the rating and certification program. The Applicant is to provide an explanation of how these indices would align with FOA goals and objectives.

In developing these indices, the Applicant may propose measuring fenestration attachments relative to one or more baseline fenestration products. Respondents should justify their approach to measurement and the basis for comparison of fenestration attachment performance. If the Applicant feels that another method is more appropriate, it should justify that approach. Applicants are to discuss acceptable trade-offs among measurement accuracy, cost with experimental testing of physical systems, and the accuracy of simulated performance. DOE encourages the Program to develop additional performance metrics that assess the impact of the fenestration attachment on the baseline fenestration in addition to the indices listed below.

[3] Products installed at the point of manufacture and that are integral to a fenestration product are considered a "window and window system" according to EPAct Section 121.

Table 2: Residential and Commercial Application Fenestration Attachment Performance Indices[4]

Thermal Transmittance (U-Factor)	Energy Performance (EP)
Solar Heat Gain Coefficient (SHGC)	Daylighting Potential (DP)*
Visible Transmittance (V_T)	Condensation Resistance (CR)
Air Leakage (AL)	

*DP is required only for commercial application.

Developing accurate and consistently applied rating and certification protocols will help generate trust in performance ratings among consumers and building professionals. DOE anticipates that quantitative and/or qualitative information may be presented to consumers as part of the product label, but emphasizes that building professionals need to have access to quantitative data. For consumers, Applicants are expected to explain and justify their decisions to use quantitative and/or qualitative information on product labels. Additionally, DOE expects that the rating metrics will be designed to compare fenestration attachment products across product categories so that consumers are able to understand the potential impact of switching from one attachment product category to another. For building science professionals, DOE expects the applicant to delineate the type of quantitative data to be made available and the mode by which building professionals will access the data.

The Program will need to determine which products need to be physically tested using standardized test procedures and which products can be rated using simulation methods. For example, standardized physical testing might be used for the following:

- Validating U-factor and/or SHGC for attachment product lines
- Conducting third-party energy efficiency program random (blind) testing
- Measuring U-factor, SHGC, and/or V_T for products for which there is no simulation method

LBNL will provide the underlying validated tools, including WINDOW and THERM, to determine product properties and attributes. The Program will determine how the information from those tools is converted into an average value, annual rating or another format suitable for rating and labeling purposes. LBNL has been the main developer of building and building component modeling software tools, including state-of-the-art computer programs THERM and WINDOW. These programs and the supporting databases are widely used by building component manufacturers, engineers, educators, students, architects, and others interested in heat

[4] Definitions of each of the Indices can be found in Appendix E.

transfer in building construction and are often referenced in standards and product literature. THERM models two-dimensional heat transfer effects in building components; WINDOW calculates fenestration product U-factor, SHGC, and V_T. The RESFEN and COMFEN programs calculate annual energy use in typical buildings and can be used to calculate EP values according to ISO 18292.[5] Additional information about WINDOW and THERM is presented in Appendix G.

The new Beta versions (versions 7.1) of WINDOW and THERM are currently available for testing and evaluation. Version 7.2 was released in September 2013. Versions 7.1 and 7.2 include an expanded range of complex glazing and shading devices, as well as dynamic glazing (electrochromic and thermochromic). WINDOW can calculate angle-dependent indices of performance for SHGC and V_T, but the final presentation of the calculated values may need to be modified, depending on the direction that the Program decides to pursue. Additional modifications to the presentation and interpretation of outputs from these software tools, including fractional changes of U-factor, SHGC, V_T, AL, EP, DP, etc. (i.e., ΔU, $\Delta SHGC$, ΔV_T, ΔAL, ΔEP, ΔDP), may also need to be developed. Additional information can be found in Appendix F.

LBNL will update these software tools, and the supporting test procedures, in two phases to meet anticipated Program needs. DOE will provide separate, ongoing funding to LBNL during the four-year performance period of this expected award for this work, pending Congressional approval. Phase I includes all products for which there are existing developed methods deemed adequate for initial use for specific product categories (see Table 3). Most of these models are already developed and LBNL has simulation capabilities and the related preliminary research level validations completed as of September 30, 2013. A technical report summarizing this LBNL research
at: http://www1.eere.energy.gov/buildings/technologies/pdfs/residential_windows_coverings.pdf
and a related report describing the installed base and consumer operation of residential window attachments
at: http://www1.eere.energy.gov/buildings/technologies/pdfs/energy_savings_from_windows_attachments.pdf have been published on the Building Technologies Office Website under "Research and Development." Additionally, a summary report from a Technical Analysis Workshop for Window Attachments is available
at: http://www.eereblogs.energy.gov/buildingenvelope/file.axd?file=2012%2f10%2fTechnical+Analysis+for+Window+Attachments+Workshop+Report_FINAL.pdf. The rest of the Phase I validations will be completed by September 30, 2014. The standardized test procedures developed during Phase I will be offered for use as the basis for ASTM standards.

[5] ISO 18292 provides for three different calculation methods: a) monthly energy balance, b) seasonal energy balance, and c) hourly energy balance methods. DOE envisions that the Program will adopt the hourly energy balance calculation method as the most accurate and consistent with the DOE's EnergyPlus simulation engine, but exact details and the final method and feasibility of expressing rated performance in terms of EP will be determined by the Program technical committee.

Phase II will involve developing standardized test procedures and simulation methods for more complex versions of products that were not developed in Phase I (i.e., triple-cell cellular shades) and based on Program input. Phase II is expected to start in early (October 1, 2014) and all standardized testing procedures are expected to be updated by September 30, 2016. Research level testing protocols will be updated during the systematic validation of new simulation models in Phase II. It is likely that the balloting for these additional ASTM standards and approval for the final versions of the ASTM standards will continue through FY16. While the ASTM standards are being developed and balloted domestically, parallel work through the International Standards Organization (ISO) Technical Committee 163 (TC 163-Thermal performance and energy use in the built environment) will continue with the goal to develop international standards based on ASTM standards.

Validated simulation methods are expected to be available for all commonly available existing products by the end of Phase II (September 30, 2016). If new products are developed, new methods may need to be developed beyond FY16. Similar to the process for developing standardized testing standards, updating ISO Window calculation standards will be carried out through participation in ISO TC163 and ASHRAE activities. Software tools WINDOW 8 and THERM 8 will be updated based on ASTM and ISO standards, and new versions will be released by September 30, 2016. Versions 8 will include all modeling capabilities shown in Table 4. Refinement, expansion and validation of the standardized procedures and simulation methods, as needed, will extend beyond FY16.

Table 3: Schedule for the development of standardized test procedures and simulation tools by LBNL by product category – Phase I

Product Type	Standardized Test Procedure						Simulation Method					
	Indoor Mounted		Outdoor Mounted		Between Glazing		Indoor Mounted		Outdoor Mounted		Between Glazing	
	T	O	T	O	T	O	T	O	T	O	T	O
Cellular Shades												
Slat Shades			9/2014	9/2014								
Roller Shades			3/2014	3/2014								
Solar Screens			3/2014	3/2014								
Sheer Shades							9/2015	9/2015			9/2015	9/2015
Pleated Shades							3/2014	3/2014			3/2014	3/2014
Window Quilts								6/2014				
Roman Shades							9/2015	9/2015				
Drapes	6/2014	6/2014					3/2014	3/2014				
Louvered Shutters			9/2014	9/2014				9/2014		3/2014		
Roller Shutters			3/2014	6/2014				9/2014		9/2014		
Awnings			3/2014	6/2014								
Surface Applied Films												
Storm Windows												

Currently Available
Currently Under Development (dates indicates expected availability)
Development Not Started (date indicates expected availability)
N/A

T = Thermal
O = Optical

Table 4: Schedule for the development of standardized test procedures and simulation tools by LBNL by product category – Phase II

Product Type	Standardized Test Procedure						Simulation Method					
	Indoor Mounted		Outdoor Mounted		Between Glazing		Indoor Mounted		Outdoor Mounted		Between Glazing	
	T	O	T	O	T	O	T	O	T	O	T	O
Cellular Shades												
Slat Shades								3/2015		3/2015		3/2015
Roller Shades								12/2015		12/2015		12/2015
Solar Screens								12/2015		12/2015		12/2015
Sheer Shades							9/2016	9/2016			9/2016	9/2016
Pleated Shades												
Window Quilts												
Roman Shades							9/2016	9/2016				
Drapes								12/2015				
Louvered Shutters												
Roller Shutters								12/2015		12/2015		
Awnings									6/2015	6/2015		
Surface Applied Films												
Storm Windows												

Currently Available
Currently under development and to be completed by 10/2015 (unless otherwise indicated)
N/A

T = Thermal
O = Optical

DOE will provide separate, ongoing funding to LBNL during the four-year performance period of this expected award for simulation tool and test procedure development, pending Congressional approval. The Program will be expected to work collaboratively with LBNL in order to leverage their capabilities and expertise on these technical tools (see Appendix F) and on educational and training activities. Educational and training activities will include train-the-trainer simulation workshops to train Program staff and/or outside consultants who will lead future certified simulator trainings, webinars to introduce new features in the simulation programs and train participants in using those features, online tutorials, and general user support of the tools. LBNL will also be separately funded by DOE to provide support for the launch and expansion of the Complex Glazing Database (CGDB) including database maintenance to verify data integrity, submission logistics, reviewing submitted data, peer review management of data, flagging approved records in the database, and user support.

At the end of the four-year period, the Program will be expected to provide the cost to support the CGDB, for educational and training activities, and for writing and maintenance of user and simulation manuals. The estimated cost of these tasks and activities are approximately $250,000 per year. Applicants are not required to include this cost in the budget submission for application, applicant s should include this estimation in their long term plan.

Organizational Approach

The Awardee is expected to establish the infrastructure for a fully functioning rating and certification Program. This includes management and accounting systems, along with

developing rating, certification, and performance verification and labeling policies, accreditation procedures for laboratories and certification bodies and developing and maintaining a publicly available, searchable electronic database of fenestration attachment product performance.

DOE encourages applicants with familiarity with and experience in the following areas: product certification programs, energy efficiency policies and programs, test procedure development, fenestration and fenestration attachment technology. DOE is also interested in applicants with established relationships with relevant stakeholders. Organizations that are accredited to create standards (e. g., American National Standards Institute) are encouraged to apply, as well. DOE strongly encourages organizations and companies with complementary expertise to partner together to generate stronger applications.

Due to the technical nature of this work, DOE strongly encourages applicants to have at least one team member with technical qualifications. This person's background should demonstrate technical competence in the field of fenestration/fenestration attachment performance, energy, energy efficiency, etc.

The Applicant will propose the structure of the organization and the size and structure of the Board of Directors. At a minimum, DOE strongly encourages applicants to propose a Board that includes manufacturers of different sizes (in terms of revenue) and different product technologies (i.e., interior coverings, exterior coverings), along with public interest organization(s), and code and government officials, as appropriate. The Board should be representative and balanced so that no one group has the ability to dominate proceedings.

DOE will provide four years of funding with regular go/no-go decision points, subject to the Awardee satisfactory completion of negotiated milestones. These milestones will be determined jointly by DOE and the Awardee during award negotiations. As discussed in Appendix C, applicants will be expected to generate a minimum 35% funding match (see Section III.B). DOE expects the organization to be financially self-sufficient after four years of DOE funding, and applicants are expected to present a financial self-sufficiency plan to demonstrate that the organization can survive on its own. The Program should rate and certify fenestration attachments from manufacturers of all sizes; therefore, the cost of participating in the Program should not be prohibitive to manufacturers, particularly small manufacturers.

DOE recognizes that in order to become a financially self-sufficient organization, each Applicant will propose an organizational and business model that it believes will best suit the proposed structure based on its resources. DOE encourages Applicants to propose and explain the model they believe will best serve the Program.

Applicants should be aware that some states restrict profit status of supervisory rating and certification entities.[6] Applicants are also expected to become accredited to ISO/IEC 17065: 2012 and should account for obtaining this accreditation in their schedule.

Throughout the performance period, DOE will actively manage the work of the Program to ensure that it is achieving the goals outlined in this FOA. DOE has a long-term interest in the Program's success, and DOE expects to remain involved in some capacity with the Program after the performance period has ended. DOE will be the holder of any trademarks associated with the brand and any domain names associated with the website. The trademarks and domain names will be licensed to the awardee for the duration of any financial assistance. After the conclusion of this financial assistance award, the trademarks and domain names will remain DOE's property and will be licensed at its discretion. If copyrightable data is developed under the award, the awardee must request permission from DOE before asserting copyright in that data.

Applicants are be expected to detail their short-term (four-year performance period) and long-term visions for the organization in their applications. In addition to developing rating and certification procedures, the Program is expected to develop a performance verification program, which will independently verify the energy performance of certified products. The Program will determine the timeline for implementing this effort. DOE recognizes that the program may not be fully realizable within the performance period.

The Applicant will create a website that contains information about the Program, its structure, and its policies and procedures, so that residential consumers and building professionals understand the agency's purpose. The website will include a publicly searchable, user-friendly database of certified products that reports key metrics, particularly on energy performance, such as U-Factor and SHGC. For an example of a consumer-facing and searchable database, see the DOE LED Lighting Facts® Product Search Tool. The certified products database (CPD) should have the ability to store the appropriate information with the label certificate for all components, subsystems, and whole products using standard formats for tracking and record keeping purposes, as well as providing access to data for building energy and illumination performance assessment computer programs. Applicants should account for costs associated with website and database development, hosting, and ongoing maintenance in their financial self-sufficiency plans.

[6] For example, Title 24 of the California Code of Regulations provides for designation of the National Fenestration Rating Council (NFRC) as the supervisory entity responsible for administering the state's certification program for fenestration products, provided that NFRC is a "nonprofit organization and shall maintain reasonable, nondiscriminatory fee schedules for the services it provides and shall make its fee schedules, the financial information on which fees are based, and financial statements available to its members for inspection."

Applicants that have experience or relationships with the following are encouraged to apply:

1. Product certification programs
2. Fenestration and fenestration attachment technology
3. Test and simulation procedure development
4. Fenestration attachments industry
5. Energy efficiency policy and programs

B. 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 do not describe a fenestration attachment rating and certification program.

II. Award Information

A. Award Overview

1. Estimated Funding

EERE expects to make approximately $1.6 million of Federal funding available for new awards under this FOA subject to the availability of appropriated funds. EERE anticipates making one award under this FOA. EERE may issue one, multiple, or no awards.

The individual award may vary between $1.0 and $1.6 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.

2. Period of Performance

EERE anticipates making awards that will run up to 48 months with an additional 48 months of continued DOE support and reporting. The funding will be provided for only the initial 48 months of the program. 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 EERE 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 EERE 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 nonprofits[7] 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

[7] 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.

Prime Recipient. The Full Application must state the nature of the corporate relationship between the foreign entity and domestic subsidiary or affiliate.
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: 35%

The cost share must be at least 35% of the total allowable costs for projects funded under the CRAFT FOA (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.)

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.

1. 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.

2. *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.

3. *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.

4. 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.

5. 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.

6. 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 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:

> 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 FFRDC effort, in aggregate, shall not exceed 15% of the total estimated cost of the project, including the applicant's and the FFRDC's portions of the effort.

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 only submit one Concept Paper and one Full Application for consideration under this FOA. If an applicant submits more than one Concept Paper or Full Application, EERE will only consider the last timely submission for evaluation. Any other submissions received listing the same applicant will be considered noncompliant and not eligible for further consideration. This limitation does not prohibit an applicant from collaborating on other applications (e.g., as a potential Subrecipient or partner) so long as the entity is only listed as the Prime Applicant on one Concept Paper and Full Application submitted under this FOA.

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:

SECTION	PAGE LIMIT	DESCRIPTION
Program Description	2 pages maximum	Applicants are required to describe succinctly: • The proposed project, including an overview of the technical development plan, the organizational structure, and the rating and certification Program;

		• The proposed project's technical approach to developing performance indices for residential and commercial fenestration attachments; • Identify the key risks/issues from a technical standpoint; • How the proposed technical approach will overcome the key technical shortcomings, limitations, and challenges; • How the proposed strategy will achieve the goals of the FOA; • The potential impact that the proposed project would have on the window attachments market; • The impact that EERE funding would have on the proposed project.
Addendum	2 pages maximum	Applicants may provide graphs, charts, or other data to supplement their Program Description. Applicants are required to provide a high-level Gantt chart that shows the project timeline and identifies the major tasks and deliverables. Applicants are required to describe succinctly the qualifications, experience, and capabilities of the proposed Project Team, including: • Whether the Principal Investigator (PI) and Project Team have the skill and expertise needed to successfully execute the project plan; • Whether the Applicant has prior experience which demonstrates an ability to perform tasks of similar risk and complexity; • Whether the Applicant has worked together with its teaming partners on prior projects or programs; and • Whether the Applicant has adequate access to equipment and facilities necessary to accomplish the effort and/or clearly explain how it intends to acquire access.

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.

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.

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 45 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, both the technical and business points of contact, names of all team member organizations, and any statements regarding confidentiality.
Project Overview (Recommended length: 1 page)	The Project Overview should contain the following: • Project Goal: Identify the project goals and the factors critical for achieving those goals. Discuss the team's short-term (four-year performance period) and long-term vision for the Program. • DOE Impact: Explain how DOE funding, relative to prior, current, or anticipated funding from other public or private sources, is necessary to achieve the project objectives.
Technical Description, Innovation, and Impact (Recommended length: 8 pages)	The Technical Description, Innovation and Impact section should contain the following: • Key Technical Issues: Identify and describe the key technical issues that must be addressed to rate and label fenestration attachments. This should include, but is not limited to, a discussion of physical testing, simulation, and component and material modeling. Identify all scientific and engineering principles that are relevant for the proposed effort. • Fenestration Attachment Technical Performance Characterization Strategy and Feasibility: Identify and justify the fenestration attachments that would be prioritized during the four-year performance period using Table 1 as a reference. Describe and justify a strategy for characterizing the technical performance of the prioritized attachments. If this approach can be used for multiple attachment types, explain how. Explain how this strategy will accommodate the differing needs of residential and commercial applications and how it will allow comparison of energy performance across fenestration attachment product categories. Include an explanation of the technical feasibility of this strategy and its ability to achieve FOA goals with a description of any relevant previous work completed in this area. Identify and justify the indices from Table 2 that would be developed during the four-year performance period. The strategy should include approaches for measuring data on the indices from Table 2 relative to baseline fenestration. If the Applicant decides to include indices not listed in Table 2, then detail the standards governing these metrics. If none exist, provide an outline of the general approach that would be used to develop one. Explain how the Applicant's rating strategy would generate the outputs necessary for residential and commercial building energy simulations. Discuss and justify acceptable trade-offs between measurement accuracy and cost. Describe the Applicant's proposed strategy for characterizing the impact of the fenestration attachment on the underlying baseline fenestration. Describe how the

	Applicant's rating strategy would address performance that is dependent on climate and user operation. • Outcomes, Innovation, and Impacts: Describe the outcomes of the technical performance characterization strategy described above. Describe how this approach is relevant to the FOA's goals and objectives. Justify why the approach described above is superior to other potential performance characterization approaches. Describe the potential impact if the performance characterization strategy is successful.
Workplan (Recommended length: 10 pages)	The Workplan should contain the following information: • 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 following:
    - 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 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 addresses 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

Technical Qualifications and Resources (Recommended length: 2 pages)	The Technical Qualifications and Resources should contain the following information: • 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: o The roles and the work to be performed by each PI and Key Participant; o Business agreements between the Applicant and each PI and Key Participant; o How the various efforts will be integrated and managed; o Process for making decisions on scientific/technical direction; o Publication arrangements; o Intellectual Property issues; and o Communication plans
Program Establishment and Management (Recommended length: 2 pages)	The Program Establishment and Management section should contain the following: • Describe and present, with justification, the proposed organizational and management structure. • Describe and justify the composition of the Board of Directors and key technical and administrative committees. • Discuss the anticipated role of individual stakeholder groups (e.g., manufacturers, test laboratories, public interest groups) relative to the organization. Include task descriptions for creating and operating the organization, including the division of responsibilities. If multiple organizations/companies are partnering on the project, discuss the roles of each partner and how the partners will work together to make decisions, communicate, and resolve conflict.
Technical Procedures and	The Technical Procedures and Management section should contain the following:

Management (Recommended length: 2 pages)	• Describe the proposed plan for systemizing test and simulation procedures and the process for approving test and simulation standards. • Describe how the Program will work with LBNL to conduct the necessary education and training to establish correct and consistent use of tools to measure products. • Specify if the Applicant's organization is currently accredited to develop standards through ANSI.
Rating, Certification and Performance Verification Programs Development (Recommended length: 2 pages)	The Rating Certification and Performance Verification Programs Development section should contain the following: • Describe the proposed rating, certification, and performance verification programs in the short term (four-year performance period) and the long term, including Applicant's proposed plan for developing such programs. • Plan should include a strategy for labeling fenestration attachments, developing accreditation procedures for accreditation and certification bodies, and acquiring ISO/IEC 17065 accreditation. • Describe how the programs will enable manufacturers of all sizes to participate without being cost prohibitive.
Integrity Assurance Program (Recommended length: 2 pages)	The Integrity Assurance Program section should contain the following: • Describe the scope of and strategy for creating an Integrity Assurance Program. • Discuss guidelines for labeling residential and commercial products, compliance monitoring and enforcement efforts. • Describe strategy for handling disputes.
IT Systems Management/Certified Products Database (Recommended length: 3 pages)	The IT Systems Management/Certified Products Database section should answer the following questions: • What are the categories of users and the needs of each? • What are the proposed structure of the website and database? • What are the main application components/modules of the website? • What are the main application components/modules of the database? • What capabilities must the database have? • What types of software and interface platform(s) do you anticipate would be suitable for the database? • What are the final outputs in the database and how are they presented? • What type of training will be conducted? • Will the organization be developing, maintaining, and hosting the website and/or database in-house or does Applicant expect to contract with an outside firm? If Applicant plans to develop and host this in-house please be sure to detail Applicant's experience with this type of work in the Relevant Qualifications and Experience section.
Financial Self-Sufficiency Business Plan (Recommended length:8 pages)	Present a business plan and model for achieving financial self-sufficiency. Clearly explain any assumptions used to generate the items below. Please include the following:

	• The business model, including the non-profit/for-profit status of the organization • Funding strategy, including matching/generating at least 35% of DOE's funding for each invoice. Describe how the Program will support itself after the DOE funding period has expired. • Start-up costs and investments in equipment, office space, etc. • Starting balance sheet and balance sheet projection at the end of Year 1 • 12-month cash flow projection • 12-month profit-and-loss projection • Low-, medium-, and high-revenue forecast(s) for each of the first 5 years. Identify each funding source. • Personnel plan (Estimate the number of full-time and part-time staff, their roles, and estimated salaries) Describe the adaptive management methods and strategies the Applicant will use over the course of the funding period if the assumptions described above are not borne out. Describe the system of financial internal controls the Applicant will use to ensure funds are spent solely for authorized purposes and to ensure the financial sustainability of the organization. Detail the management tools Applicant will use for staying on schedule and within budget.
Bibliography and reference, if applicable	Provide a bibliography for any references cited in the Technical Volume. This section must include only bibliographic citations.

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 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/. 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 identified 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:

- Program Summary;
- A description of the Program'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, EEERE 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 412.1A and can be found at https://www.directives.doe.gov/directives/current-directives/directives-current-400-series. DOE O 412.1 (Field Work Proposal form) is found within the directive. 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 is 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" located at: (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.

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 comply with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Environmental Questionnaire
- Current Financial Audit

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 5p.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 Unites 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. FOREIGN TRAVEL

If international travel is proposed for your project, please note that your organization must comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the "Fly America Act," and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available.

6. 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.

7. 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%)

- Strategy for developing and managing the organization to support the goals of the project
- If technical success is achieved, the proposed idea would significantly improve technical understanding of energy performance and generate energy savings through the adoption of more energy efficient fenestration attachments.

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

- The proposed understanding of technical issues; and
- The proposed approach is without major technical flaws. Approach addresses potential challenges and ways to overcome those challenges

2. *FULL APPLICATIONS*

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

Criterion 1: Technical Description, Innovation and Impact (30%)

- Degree to which the Applicant demonstrates an understanding of the technical challenges involved with rating fenestration attachments.
- Extent to which the Applicant provides complete and logical justifications for the fenestration products it will prioritize.
- Extent to which the proposed strategy and activities demonstrate a sound and comprehensive approach to characterizing the performance of fenestration attachments, physical testing and simulation, and measurement accuracy and cost.
- Extent to which the Applicant's proposed technical characterization strategy can be generalized to other fenestration attachment types.
- Extent to which the Applicant provides a complete and logical justification for the indices it will prioritize.

Criterion 2: Project Research and Market Transformation Plan (15%)

- Comprehensiveness and strength of the overall approach to and organization for managing the work, particularly the technical and management aspects.
- Degree to which the proposed risk management, quality assurance, project changes, and interdependencies strategies are clearly described and appropriate
- Identification of target market, along with known or perceived barriers to market penetration, including mitigation plan.
- Strength of the value proposition to the target market.
- Comprehensiveness of market transformation plan including but not limited to product labeling, marketing and education about the label, legal/regulatory considerations including intellectual property, infrastructure requirements, data dissemination, and U.S. manufacturing plan etc.

Criterion 3: Major Project Tasks (40%)

(1) Program Establishment and Management

- Clarity, logic, and completeness of proposed organizational and management structure, including the Board of Directors and key committees.
- Extent to which proposed tasks comprehensively address developing and implementing the Program, including appropriateness of timelines and milestones.
- Extent to which the Applicant has identified appropriate stakeholder groups and offers sound ways of engaging stakeholders, including manufacturers of all sizes.
- If multiple organizations/companies are partnering together, extent to which the

Applicant provides a detailed and thorough explanation of the roles of each partner and how they will work together.

(2) Technical Development Management

- Clarity, completeness, and extent to which the Applicant proposes a sound and thorough plan for systemizing test and simulation standards and the process for approving test and simulation procedures, including appropriateness of timelines, tasks, and milestones.
- Extent to which the proposed plan appropriately interfaces with the availability of test and simulation protocols.
- Clarity, completeness and extent to which the Applicant presents a strong plan for conduct training and education.

(3) Rating, Certification, and Performance Verification Program Development

- Extent to which the Applicant proposes and identifies the necessary components of a consistent and unbiased rating, certification, labeling, and performance verification Program.
- Extent to which proposed plan and tasks comprehensively address developing and implementing a rating and certification organization, including appropriateness of timelines, tasks, and milestones.

(4) Integrity Assurance Program

- Extent to which the proposed scope, strategy, and tasks demonstrate an understanding of the necessary components for ensuring product, Program, and organization integrity.
- Thoroughness of the proposed implementation approach, including appropriateness of timelines and milestones.

(5) IT Systems Management/Certified Products Database

- Extent to which the proposed IT systems management strategy aligns with the rating, certification, and performance verification Program.
- Thoroughness of the proposed implementation approach and activities, including appropriateness of timelines, tasks, and milestones.
- Extent to which the Applicant has identified relevant and appropriate application components/modules for the database and website and explained their need.
- Degree to which the Applicant demonstrates an understanding of the necessary capabilities of the database and website, and the software and hardware requirements to successfully create the website and database.
- Extent to which the Applicant has identified relevant outputs in the database and provided a sound approach for how they will be presented.
- Extent to which the Applicant presents a sound and thorough approach for education and training for using the database and website as appropriate.

(6) Financial Self-Sufficiency Plan

- Extent to which the Applicant presents a sound and comprehensive business model and adequately addresses the tax status of the organization (for-profit/non-profit).
- Quality of Applicant's funding strategy and timeline for achieving self-sufficiency and ability to comply with cost share requirements.
- Extent to which the relevant start-up costs have been identified and estimated accurately.
- Extent to which the revenue forecasts, cash flow projection, profit-and-loss projection, and balance sheets present sound and realistic estimates and identify appropriate sources.
- Extent to which the management tools described allow the Applicant to stay on schedule and within the budget.

Criterion 4: Technical Qualifications and Resources (15%)

- 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.
- Extent to which the Applicant has demonstrated a relationship with the fenestration attachments industry and other relevant stakeholders.

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/or financial uncertainty;
- The degree to which the proposed project directly addresses EERE's statutory mission and strategic goals.

Additional Factors

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 in April 2014 and making awards by the end of June 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 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.J.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.I.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, 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 is 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 evalutated at the Go/No Go decision points.
7. EERE participates in major project decision-making processes.

9. 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.

10. 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.

11. 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.

12. 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 part[8], on the outcome of the Go/No Go or Stage Gate Review.

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.

[8] 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.

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: btocraftfoa@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 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.

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.

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 retains unlimited rights in technical data produced under Government financial assistance awards, including the right to distribute to the public. One exception to the foregoing is that invention disclosures may be protected from public disclosure for a reasonable time in order to allow for filing a patent application.

O. COPYRIGHT

Awardees will be required to obtain DOE approval prior to asserting copyright protection in any data created under an award from this FOA. DOE's approval shall be based on awardee's compliance or support of the objectives of this FOA such as making the data, including software, publicly available.

P. TRADEMARKS AND DOMAIN NAMES.

Any trademarks and domain names associated with the database funded through this FOA shall be property of DOE. DOE intends to license the use of the trademarks and domain names to the awardee for the duration of the award.

Q. 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.

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

R. 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.

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://ww.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 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)	$100,00	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 – 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 E – TECHNICAL DEFINITIONS

Note: The energy indices listed below (U, SHGC, VT, AL) can be determined under different conditions (e.g., incident beam direction, presence or absence of diffuse sky, exterior/interior wind speed). The values will vary enormously over time and varying weather conditions.

It is possible to define the incremental performance indices (ΔIN) defined above for attachment products in many ways. In general, one can represent the functional dependence of each incremental performance index ΔIN on the two input indices INfen and INfen+attach generally as:

$$\Delta IN = f(IN_{fen}, IN_{fen+attach})$$

where the function f likely will be different for each of the indices U, SHGC, VT, AL, EP, DP, and CR, and in some cases might be more complex than a simple difference or ratio.

Thermal transmittance (U-Factor): The heat transfer per time per area and per degree of temperature difference. The U-Factor multiplied by the interior-exterior temperature difference and by the projected fenestration product area yields the total heat transfer through the fenestration product due to conduction, convection, and long wave infrared radiation. Units of U-Factor are $W/m^2 \cdot °C$ ($Btu/h \cdot ft^2 \cdot °F$).
[Ref - NFRC 600]

Delta Thermal transmittance (ΔU-Factor): Incremental decrease in U-factor with reference to attachment products, the U-Factor of the combined base-reference-plus-attachment-product is compared with the U-Factor of the base reference alone. The Attachment product's effect on base reference U-factor can be called the ΔU factor. Reduction in ΔU is positive quantity. Units of ΔU are $W/m^2 \cdot °C$ ($Btu/h \cdot ft^2 \cdot °F$).
[Ref – New Definition]

Solar heat gain coefficient (SHGC): The ratio of the solar heat gain flux entering the space through the fenestration area to the incident solar radiant flux. Solar heat gain includes directly transmitted solar radiant flux and that portion of the absorbed solar radiation, which is then reradiated, conducted, and convected into the space. Units of SHGC are dimensionless.
[Ref – Combination of NFRC 600 & ASHRAE 90.1]

Delta Solar heat gain coefficient (ΔSHGC): Incremental decrease in SHGC with reference to attachment products, the SHGC of the combined base reference plus attachment product is compared with the SHGC of the base reference alone. The Attachment product's effect on base case window SHGC can be called the ΔSHGC factor. Reduction in ΔSHGC is positive quantity. Units of ΔSHGC are dimensionless.
[Ref – New Definition]

Air Leakage (AL): The volume of air flowing per unit time per unit area through a fenestration system, due to air pressure or temperature difference between the outdoor and indoor environment. This air flow rate does not include any additional air flow associated with fenestration system installation into the building envelope. Units of AL are $l/s \cdot m^2$ (cfm/ft^2). Note: Area refers to total fenestration system area.
[Ref – Modified NFRC 600 language]

Delta Air Leakage (ΔAL): Incremental decrease in AL with reference to attachment products, the AL of the combined base reference plus attachment product is compared with the AL of the base reference alone. The Attachment product's effect on base reference AL can be called the ΔAL factor. Reduction in ΔAL is positive quantity. Units of ΔAL are $l/s \cdot m^2$ (cfm/ft^2). Note: Area refers to total fenestration system area.
[Ref – New Definition]

Visible Transmittance (V_T): The ratio of visible radiation entering the space through the fenestration product to the incident visible radiation, determined as the spectral transmittance of the total fenestration system, weighted by the photopic response of the eye and integrated into a single dimensionless value. Weighted by a standard solar spectrum. V_T is dimensionless.
[Ref –NFRC 600]

Delta Visible Transmittance (ΔV_T): Incremental decrease of V_T with reference to attachment products, the V_T of the combined base reference plus attachment product is compared with the V_T of the base reference alone. The Attachment product's effect on base reference V_T can be called the ΔV_T factor for the attachment relative to that of the base reference. Reduction in ΔV_T is positive quantity. Units of ΔV_T are dimensionless.
[Ref – New Definition]

Energy Performance (EP): The energy performance of a fenestration system is the calculated annual site energy need, per unit area, for heating and cooling caused by the fenestration system, in the reference building under the reference climatic conditions. A separate energy performance value for heating (EP_h) and cooling conditions (EP_c). Units of EP are kWh/m^2 (Btu/ft^2).
[Ref – ISO 18292]

Delta Energy Performance (ΔEP): Incremental decrease in EP with reference to attachment products, the EP of the combined base reference plus attachment product is compared with the EP of the base reference alone. The Attachment product's effect on base reference EP can be called the ΔEP factor. Reduction in ΔEP is positive quantity. ΔEP factor is normally positive quantity. Units of ΔEP are kWh/m^2 (Btu/ft^2).
[Ref – New Definition]

Daylighting Potential (DP): The daylight potential of a fenestration system indicates its potential to supply a building with daylight and depends on the visible transmittance, the glazing-to-fenestration-system area ratio and on the view factor from the glazing to the sky and the ground. Units of DP are dimensionless.

Delta Daylight Potential (ΔDP): Incremental increase in DP with reference to attachment products, the DP of the combined base reference plus attachment product is compared with the DP of the base reference alone. The Attachment product's effect on base reference DP can be called the ΔDP factor. Increase in ΔEP is positive quantity. Units of DP are dimensionless.
[Ref – New Definition]

Condensation Resistance (CR): A relative indicator of a fenestration product's ability to resist the formation of condensation at a specific set of environmental conditions. The higher the Condensation Resistance value the greater the resistance to the formation of condensation. Units of CR are dimensionless.
[Ref – NFRC 600]

Delta Condensation Resistance (ΔCR): Incremental increase in CR with reference to attachment products, the CR of the combined base reference plus attachment product is compared with the CR of the base reference alone. The Attachment product's effect on base reference CR can be called the ΔCR factor. Increase in ΔCR is positive quantity. Units of ΔCR are dimensionless.
[Ref – New Definition]

APPENDIX F – WINDOW AND THERM SIMULATION PROGRAMS

The THERM program models two-dimensional (2-D) heat-transfer effects in building components, including windows, walls, foundations, roofs, doors, appliances, and other products where thermal bridges are a concern. A product's energy performance and local temperature and heat flux patterns can be evaluated by THERM's heat-transfer analysis. These items may directly relate to problems with condensation, moisture damage, and structural integrity.

The THERM program incorporates 2-D conduction and radiation heat-transfer analysis (first principles based) and correlation-based convection heat transfer analysis. THERM is based on the finite-element method, which can model the complicated geometries of building products. Users can draw cross sections of products or components using the program's graphical interface by tracing imported files in DXF or bitmap format, or inputting the geometry from known dimensions. Each cross section is represented by a combination of polygons. The user defines the material properties for each polygon and defines the boundary conditions, which determine the environmental conditions to which the assembly is exposed. Once the model is created, the remaining analysis (finite element mesher and numerical calculations) is generated automatically. The program includes an automated error estimator, which refines portions of the geometry when there are local errors higher than the tolerance and re-runs the analysis until all of the results are within the error tolerance. The results presented include U-factors, isotherms, heat-flux vectors, and local temperatures.

Glazing and shading systems are imported from WINDOW into THERM and incorporated into the overall cross-sectional geometry, so that the 2-D cross-section of the frame and the spacer includes the portion of the glazing ("edge of glazing") that is subject to 2-D heat transfer. Importing these systems assures the consistency of the results between THERM and WINDOW.

WINDOW calculates the center-of-glazing properties of a glazing system and the total product area-weighted properties (based on previously calculated center-of-glazing, frame, edge-of-glazing, divider, and divider-edge properties calculated in THERM) to determine total window product U-factors, SHGC, and VT. WINDOW calculates the Condensation Resistance index (CR) in accordance with the NFRC 500 Standard. Algorithms in WINDOW are based on international standard ISO 15099. WINDOW program algorithms are documented in two publications, both of which are on the LBNL WINDOW 6 Documentation website (http://windows.lbl.gov/software/window/6/w6_docs.htm).

The WINDOW program can analyze products made from any combination of glazing layers, gas layers, frames, spacers, and dividers under any environmental conditions and at any tilt. It can also model complex glazing systems and shades such as frits, light redirecting glazing, venetian blinds, roller shades, solar screens, and cellular shades. The International Glazing Database (IGDB) and the Complex Glazing Database (CGDB) are integral parts of WINDOW. The IGDB is a library of glazing systems and the current iteration, version 28, features more than 4,000

commercially available glazing options in the United States and around the world. The CGDB is a library of complex glazing and shading materials and systems; the current edition, version 2, includes more than 200 commercially available components. Glazing and shading systems are analyzed with a multi-band (wavelength-by-wavelength) spectral model using a bi-directional scattering distribution function (BSDF) for complex systems, which generates accurate optical calculations for any system. The results can be saved in the WINDOW program database and can be exported into building energy simulation models DOE2 and EnergyPlus.

APPENDIX G – LBNL SOFTWARE TOOLS AND RESEARCH TEST FACILITIES TO SUPPORT PROGRAM OBJECTIVES

Thermal Lab Facilities for Validation of Simulation Models	
MoWiTT **Mobile Window Thermal Test Facility**	MoWiTT makes accurate field measurements of thermal and solar optical properties of fenestration attachments as part of window systems under variable outdoor conditions. Custom built on a 40' long trailer chassis with wheels, it contains 3 rooms: 2 side by side heavily instrumented rooms which can accommodate window and façade systems with interior or exterior attachments up to 8' x 8' and an instrumentation and control room. The test rooms are calorimetric chambers with guard structures, and with all surfaces covered in large area heat flow meters. It serves multiple purposes for validation and product innovation: 1) for component validation for steady state performance (i.e, U-Factor, SHGC), 2) for component validation under dynamic conditions (i.e., time series of energy flow through window), and 3) to test absolute and comparative performance of new technology for industry. The facility can operate in any orientation and has been operated in several climates.
TIRMAp **Thermal IR Measurement Apparatus**	TIRMAp measures temperature fields on indoor window surfaces, surface heat fluxes and detailed velocity field distributions near the window surface. It consists of a controllable cold box that will accommodate test specimens up to about 3'x4' and a high resolution imaging IR camera with full signal processing and storage capabilities. It provides accurate spatial measurements of heat flow to 1) assist companies in product development and to 2) validate algorithms and models that are implemented in software tools. These "Micro" validations allow us to validate models at the component algorithmic level, not simply overall tool results.
Guarded Heat Flow apparatus	Guarded Heat Flow apparatus serves to measure the thermal conductivity of window or attachment materials, insulation and quasi-homogenous assemblies, such as spacer assemblies with an area of up to 3' x 3'. This is often referred to as an ASTM C518 apparatus, from the underlying ASTM standard C518, which is the basis for this measurement.
Optical Lab Facilities for Validation of Simulation Models and input to CGDB.	
LDIS **Large Diameter Integrating Sphere**	LDIS measures hemispherical visible or solar transmittance of optically complex products (e.g., multi-cell scattering panels, etc.). It operates on a two axis tracker so can provide testing under any incident angle, using direct sun outdoors or an artificial sun indoors. In addition to validating algorithms and computer models, this facility can also measure whole product VT for products for which there are no computer models available.
Solar Range	The Perkin-Elmer Lambda 950 with Labsphere 150 mm integrating sphere is a

Spectrometer	spectrometer for measuring reflectance and transmittance of glazing and shading materials in the solar range (300-2500 nm). The main light source is a tungsten halogen lamp, which is complemented by a Deuterium lamp for shorter wavelengths. Near infrared wavelengths are detected using a PbS detector and a photomultiplier tube covers wavelengths under 860 nm. While the base equipment is a standard model a special accessory, developed at LBNL, serves to measure thin scattering samples at various angles of incidence.
FT-IR Spectrometer	The Perkin-Elmer Frontier Fourier-Transform Infra-RED (FTIR) spectrometer measures transmittance and reflectance in the wavelength range from 2.5 µm to 44 µm. It also measures hemispherical thermal emissivity of opaque samples. The instrument is fitted with a PYKE 10 degree angle of incidence reflectance accessory.
Spectro-Goniometer	The Optronic Laboratories OL-750 was custom-built to LBNL specifications to measure specular transmittance and reflectance versus angle of incidence for specular samples. The sample can be rotated and translated with 4 degrees of freedom and the detector moves in the horizontal plane of the instrument (not necessarily the scattering plane of the sample) to measure reflectance and transmittance. The freedom of movement of the detector also allows the instrument to be used for angle-resolved scattering measurements for cm-scale samples.
PAB OPTO II Goniometer	The Pab Opto II Goniometer (custom built for LBNL by Advanced Technologies Ltd) is a large scale goniometer for optical characterization of scattering glazing and shading products. It measures angle-resolved scattering over the full outgoing sphere to obtain the complete outgoing bi-directional scattering distribution function (BSDF) of a material (both reflectance and transmittance). Using a tungsten halogen light source and filtered Si-detectors it can obtain data in different wavelength bands across the solar spectrum. The NIR wavelengths are covered with an InGaAs detector. Automation of the sample holder allows unattended high angular resolution measurement of the entire BSDF.
VASE Ellipsometry	Variable angle of incidence spectroscopic ellipsometry. The JA Woollam VASE ellipsometer measures the change in polarization as light is reflected from the surface of the studied sample. The method is standard for obtaining optical constants (n, k) as well as thickness for thin film coatings on glass. The instrument can also be run in goniometer mode for measuring angle-resolved in-plane scattering of opaque samples such as those used in attachments.
Emissometer	The Devices and Services AE1 RD1 emissometer measures hemispherical thermal emissivity of opaque samples. Traditionally that property is obtained by measuring reflectance using an FT-IR spectrophotometer and calculating the integrated emissivity, which is the norm for transparent samples such as glazing materials. However for opaque samples such as materials from window shading attachments, AE1-RD1 provides much faster measurements without meaningful loss of accuracy .

Software Tools	
WINDOW	WINDOW is a computer program for calculating glazing and total window and window attachment (fenestration system) thermal and solar-optical performance indices (i.e. U-values, solar heat gain coefficients, solar and visible transmittances, etc.). WINDOW incorporates a state-of-the-art calculation method based on latest published research, including the ISO 15099 standard. The program can be used to design and develop new products, for product rating, to assist educators in teaching heat transfer through fenestration systems, and to help public officials in developing building energy codes. WINDOW is currently used by National Fenestration Rating Council to rate fenestration products. New features supporting attachment ratings include modeling of complex glazing and shading systems (venetian blinds, woven shades, cellular shades, etc. as noted in Table 3/4) Optical performance is calculated using generalized Bi-Directional Scattering Distribution Functions (BSDF) method. RADIANCE-based visualization can be used to assess daylight and glare performance of attachments. Whole product properties from WINDOW are used in other programs such as the RESFEN and COMFEN programs, which calculate total annual energy requirements in buildings.
THERM	THERM is a computer program for calculating two-dimensional (2-D) heat transfer in building components such as windows, window attachments, walls, and other products where thermal bridges are of concern. THERM is based on the finite element numerical method (FEM) and incorporates sophisticated automated meshing and error estimation for rapid model generation and ensuring accurate results. THERM's heat-transfer analysis allows evaluation of a product's energy efficiency and local temperature patterns, which may relate directly to problems with condensation, moisture damage, and structural integrity. THERM has a two-way interface to the WINDOW program and allows WINDOW to determine total window product (including attachments) U-factors, Solar Heat Gain Coefficients, Visible Transmittance and Condensation Resistance.
OPTICS	OPTICS is a computer program for storing, calculating and presenting optical properties of glazing layers and materials. OPTICS incorporates the International Glazing Database (IGDB), consisting of over 4,000 commercially available glazing products in U.S. and internationally. OPTICS also calculates optical properties of composite layers, such as laminates, applied films and coated glass. OPTICS works with the WINDOW program and shares IGDB with WINDOW.
RESFEN	RESFEN helps consumers and builders pick the most energy-efficient and cost-effective windows and window attachments for a given application, whether it is a new home, an addition, or retrofit. RESFEN calculates heating and cooling energy use and associated costs as well as peak heating and cooling demand for specific fenestration products including attachments, based on an annual energy simulation of a typical residential building, using EnergyPlus and the specific

	thermal and optical properties of the fenestration/attachment system being modeled. It provides performance data based on geographic location and building orientation.