**INVITATION TO SUBMIT A PROPOSAL FOR AN ASHRAE PROJECT**-

**Smart Grid Application Guide for Building Professionals**

This is a Request-for-Proposal (RFP) for a project dealing with a subject in which you or your institution have either been recommended or have expressed interest. Should you decide not to submit a proposal, please circulate this information to any colleague who might have interest in this subject.

**Title: Smart Grid Application Guide for Building Professionals.**

Scheduled Project Start Date: **November 26, 2018**.

All proposals (hardcopy or electronic format) must be received at ASHRAE Headquarters **October 19, 2018.**

**Electronic copies must be sent to** **lpratt@ashrae.org****.**

If you have questions concerning the Project, please contact:

## Manager Special Projects

Lilas K. Pratt

ASHRAE, Inc.

1791 Tullie Circle, NE

Atlanta, GA 30329

Phone: 404-636-8400

Fax: 404-321-5478

E-Mail: lpratt@ashrae.org

Contractors intending to submit a proposal should so notify, by mail, fax or e-mail, the Manager Special Projects, by October 1, 2018 in order that any late or additional information on the RFP may be furnished to them prior to the bid due date.

Proposals may now be submitted electronically. Electronic submissions require a PDF file containing the complete proposal preceded by signed copies of the two forms listed below in the order listed below. **ONLY** **electronic proposals are to be sent to** **lpratt@ashrae.org****.**

**All other correspondence must be sent to** **lpratt@ashrae.org****.** Hardcopy submissions require 1-signed original in the same order. **In all cases, the proposal must be in the hands of the ASHRAE Manager Special Projects by 5 p.m. EST October 19, 2018.**

The following forms must accompany the proposal:

1. ASHRAE Application for Grant of Funds (signed)
2. Additional Information for Contractors (signed)

ASHRAE reserves the right to reject any or all bids.

# WORK STATEMENT

Smart Grid Application Guide for Building Professionals

### VISION AND AUDIENCE

Changes occurring in the electric grid infrastructure will require new design and operation considerations for buildings and how they interact with the grid. Facilities can be operated in ways that support grid operations (economic efficiency, environmental protection and/or reliability) while potentially lowering their own costs of operation by managing loads and storage to contribute to balancing grid-wide demand and changes to the generation mix. As the modern grid develops, building management systems are being provided signals about the condition of the grid and current prices or values for electricity or grid services. Building operators will have increasing economic or reliability incentives for responding appropriately to grid conditions. A key requirement for success of the “smart grid” will be this communication and cooperation between energy service providers and building energy management systems to effectively manage supply and demand.

An effective energy user-energy provider partnership will depend upon bidirectional communications—the ability to manage facilities’ equipment, process systems, and controls in response to communication with a smart electrical grid and communicate information about those electrical loads and on-site resources for generating electricity. The expected result will be more efficient and reliable power system operations and designs. A building manager able to coordinate its building operations with the grid stands to reap significant economic benefits by sharing in the resulting improvements in grid operational and investment efficiencies. Such energy user-provider integration must support a wide range of energy management applications and electrical service provider interactions, including on-site generation, demand response, electrical storage, peak-demand management, direct load control, and other related energy management functions.

However, building operators often do not have a good understanding of the complexity of utility rate structures and resource management programs. Moreover, as the “smart grid” develops, the nature of the grid services that building owners may be able provide keeps changing, and the value propositions, tariffs and requirements vary with locality. ASHRAE is committed to helping facility owners, designers and operators provide safe, comfortable, efficient and affordable conditions in the built environment. ASHRAE sees an immediate need to provide useful resources for facility personnel to identify and evaluate the myriad of smart grid-related options and opportunities as they become available. The proposed Smart-Grid Application Guide will provide building owners, managers, and designers the guidance they need to understand the smart grid and applicable standards and regulations, and to design and operate systems in this new smart-grid environment. The guide will focus on the concrete steps needed to prepare a building for the smart grid.

### OBJECTIVE

To develop a user’s guide that serves as an educational tool to inform building professionals about the smart grid and the role of buildings in it, and to provide practical information about concrete steps to prepare and operate a building in a smart grid environment.

### SCOPE

**Targeted Audience:** Building owners and other building industry professionals that serve them.

**Content:**

While ASHRAE regularly updates its guidance documents, this is the first version of the guide, so the contractor will not have a previous version to work from. The proposal should provide details about the bidder’s proposed content and layout to effectively meet the stated objectives.

The guide should be comprehensive with respect to the kinds of resources that may be available in a building to support smart grid needs (perhaps a checklist of things to consider) and give sufficient information about each topic so the user can evaluate whether it deserves consideration for their building. The potential value proposition for the building owner should be included. It is expected that, for some topics, extensive details about how to proceed would be beyond the scope of this guide. In such cases the guide could still provide enough practical application guidance to be useful to readers and provide references to sources with more detailed information.

It is suggested that the proposed content of the guide include, but not necessarily be limited to, the following elements: [Note that these topic suggestions are given to inform bidders about the desired scope of the guide. The categories below overlap, and their classification and order are not intended to be a Table of Contents.]

1. A tutorial description of the future smart grid and the possible roles for buildings and building systems
2. A glossary of smart grid-related terms important to building professionals
3. Listing/describing the resources, design options, and operating decisions a building manger may consider (examples are given below).
4. Listing the smart grid-related programs and potential revenue streams that a building operator may consider (examples are given below).
5. Flowcharts and graphics should be included that explain processes and topics relevant to the subjects presented, including illustrations, photographs, figures, graphs, and charts. Photographs of technologies may be helpful because readers may not familiar with technologies.
6. References to relevant standards and resources (such as from ASHRAE, IEC, IEEE, ISO, NIST, OpenADR, etc.) – both throughout the document and in a references section. The reference section should be annotated (a sentence or two for each) to describe the listed resource, its focus, and what information it provides.
7. A description of various tariff structures, regulatory environments, market structures, utility programs, how they are evolving, and what the implications are for the building industry. Examples include:
	1. Utility programs (widely varying per regulatory jurisdiction – patterns are helpful, lists of the types of programs)
	2. Time-variable rates
	3. Net metering
	4. Grid services and ancillary services
	5. Power quality management
8. Demand Side Management as an umbrella for various utility programs to incent customers to make their loads responsive to utility/grid needs. Examples include:
	1. Demand response
	2. Interruptible rates
	3. Time of use tariffs
	4. Electric vehicle charging tariffs
	5. Flexible fuel supplies (fuel switching)
9. Behind-the-meter distributed energy resources (DER)
	1. Renewable and standby generation
	2. Advanced inverter functions
	3. Thermal energy storage (TES)
	4. Electrical energy storage
		1. Battery energy storage (BES)
		2. Fly wheels
		3. Uninterruptible power supplies (UPS)
	5. Advanced controls to make building loads more flexible
	6. Fuel Cells
	7. Combined heat and power (CHP), including cogeneration, district energy, and waste heat recovery
10. Multiple-facility Operation
	1. Microgrids
	2. Customer aggregation for demand response
11. Meeting building needs during interruptions of grid services
	1. Resilience
	2. Reliability
	3. Off-grid operations (islanded operation)
	4. Responsibilities and actions of building operators
12. Characterize the responses that the building can provide (actions by Building Owner)

Focus on the resources within the building that would be needed in relation to this topic. Examples include:

* 1. Decrease electricity use from grid (high performance, high efficiency buildings)
	2. Interrupt load
	3. Provide reactive power (VARs)
	4. Increase energy used from grid
	5. Supply electricity to the grid
	6. Operate in islanded mode
	7. Peak load shedding
1. Constraints on actions by Building Owners. Examples include:
	1. Ramp rate (how quickly can load be increased or decreased?)
	2. Amount of load you can dispatch – kW
	3. Amount of energy you can dispatch – kWh
	4. How long can load be deferred (load reduction)?
	5. How much kW and kWh can the facility feed into the grid?
	6. Power quality,
	7. Reactive power
	8. Capabilities of on-site technologies and controls
2. Additional considerations:
	1. Enumerating the resources and resource decisions the building owner can choose (e.g., oversizing the backup generator; adding a battery to the PV system; using an advanced inverter, installing TES)
	2. Electric vehicles and the connection of the charging facilities to the building (and the opportunity to manage that) – relates to tax breaks, incentives, etc.
	3. Transactive energy – introduce what this is and how it might develop.
	4. The guide is intended to focus on commercial buildings, campuses, mixed use facilities, industrial facilities, and multi-family residential buildings.
	5. Some content may be applicable to small commercial and single-family residential facilities.

**Size:**

The final document will be published in an 8 ½ x 11, soft cover format. Other ASHRAE documents with the expected level of scope and depth are usually are in the range of 100 – 150 pages. This size is also consistent with the planned publication format. An indication of the expected page count, content, and organization should be included in the proposal.

### DELIVERABLES

**Interim Deliverables**

Progress and Financial Reports shall be made to ASHRAE (the Society) through its Senior Manager of Special Projects (or designee) at monthly intervals.

During the course of this effort, the contractor shall provide the documents described below for review by the Monitoring Committee. The Monitoring Committee shall approve each deliverable listed below in a timely manner (as specified in the contract documents) prior to initiation of the succeeding deliverable. These documents shall be delivered according to the final schedule specified in the contract.

1. An outline of the manual containing sufficient detail to allow the Monitoring Committee to determine whether the scope of the manual will be adequate.
2. A preliminary working draft of the complete manual (60% complete).
3. The final working draft of the complete manual (90% complete), incorporating changes recommended by the Monitoring Committee.

Electronic files of the working drafts shall be delivered to the Chair of the Monitoring Committee and the Manager of Special Projects for each review cycle of the User’s Manual. Document delivery will be coordinated through the Manager of Special Projects. The files shall clearly show the changes proposed. File formats shall be both Microsoft Word and Adobe Acrobat.

**Final Deliverables**

Word File

1. Appropriate front matter, including an accurate table of contents with page numbers.
2. Text and appendices in an electronic format specified by ASHRAE Publications in the User Manual template documents. (Copy attached.)
3. Illustrations, tables, and all other artwork provided separately and/or in electronic format specified by ASHRAE Publications and as noted below.
4. All other materials necessary for a complete publication.
5. Reprint permission by owner of copyright for any material, illustrations, graphics, or photographs used from outside sources.

Format Specifications for Word File

1. All of the text (including front matter, table of contents, any back matter such as an index, etc) in Word. The Word file(s) must be free of conditional text, line numbers, track changes, and cross-references. The document must be in dual units (I-P and SI).
2. Tables must be noted in the text (where they go) and numbered consecutively as they appear in the text. All tables must be Word or Excel tables; they CANNOT be unalterable images of tables. All table titles should be descriptive but concise, and each column should be labeled with a heading and include units of measurement and other necessary qualifying information; dual units must be provided for all measurements. In creating tables, the authors should use only 1 point (0.014 in. [0.355mm]) or thicker lines.
3. Figures must be noted in the text (where they go) and numbered consecutively as they appear in the text, but the actual figures themselves must be provided to ASHRAE as individual TIF or EPS files in Grayscale mode saved at high resolution (600 dpi or greater) and at least 4 in. size or greater. All figure files should be clearly labeled. In creating figures, the authors should use only 1 point (0.014 in. [0.35 mm]) or thicker lines—smaller lines will not reproduce well. The figures will be reproduced in black and white, so they should employ patterns or shapes to distinguish sections instead of coloring and shading. Each figure should have a brief legend or descriptive labels, as appropriate. Any text included in a figure (except the figure caption) should be embedded as part of the image file and not contained in a separate text box that is not part of the image file; captions should NOT be part of the image file. All figures should be provided in dual units, like the text. Providing two graphics for each figure – one in IP units and one in SI units – is acceptable; such figures must be supplied as one TIF or EPS file with both graphics included in the one image file.
4. Works cited in the text must have reference list entries in a references section at the end of the document. ASHRAE uses the author-date citation method. Footnotes should be avoided in the document. Parentheticals are the preferred method for non-reference supplemental information.
5. The authors of the text need to obtain permission to reprint any images that they want to use from another source; ASHRAE will not obtain permissions for them.
6. The text and figures must comply with ASHRAE’s commercialism policy (<https://www.ashrae.org/about/governance/ashrae-commercialism-policy-and-guidelines>).
7. Final submission of the completed book must include the manuscript in Word, separate TIF or EPS files for all illustrations and photos, and contact information for the authors in case of questions during any final editing or lay-out of the book.

### CONTRACTOR REQUIREMENTS

The contractor must have demonstrated familiarity with building operations, and with “smart grid” technologies, resources, and programs. Details of this familiarity should be specifically described in the proposal.

The contractor must have demonstrated expertise in the development of design guides, manuals, or documents of like kind.

### LEVEL OF EFFORT

It is estimated that the guide can be completed by the selected contractor within 6 months of the award of the contract.

### SUGGESTED APPROACH

1. Prepare expanded/annotated outline for review by the Monitoring Committee.
2. Review the outline draft with the Monitoring Committee.
3. Address all review comments and reach agreement on the organization and content of the document.
4. Compile a list of relevant literature, organizations, regulations, and other resources that should be referenced in the guide. Review this with the Monitoring Committee.
5. Prepare a draft of the manual for review by the Monitoring Committee.
6. Review the draft with the Monitoring Committee. Address all review comments and reach agreement on the substance of each change.
7. Develop formatting and graphics to produce the guide for publication by ASHRAE.
8. Develop the index and table of contents, composing each page, and providing consistent headers and footers.
9. Submit the document for final review and approval by ASHRAE to verify that changes have been accurately implemented.
10. Submit the project files, including source documents, for publication of the document by ASHRAE.

### ADDITIONAL INFORMATION FOR BIDDERS

**General Information/Proposal Requirements**

1. The proposal should specify a timeline with identified intervals for critical milestones including reviews and deliverables. Bidders should consider the time and costs necessary to provide for two (2) interim review cycles (60% and 90% complete drafts) by the Monitoring Committee for each of the working drafts (preliminary and final). Review cycles should include time for the Monitoring Committee to review the document and provide feedback to the contractor.
2. Bidders should propose topics and appropriate level of detail for the guide. Indicate resources, guidance, and standards that can be used to support topic discussions and strategy for providing guidance to building managers for evaluating less defined or rapidly evolving options.
3. Provide an indication of the expected page count, content, and organization in the proposal.
4. Monthly conference calls with the Monitoring Committee will be scheduled to monitor progress and direction.
5. The proposal should describe bidder’s relevant past experience. This could include a) developing guidance documents, especially for building operating. management or design professionals; b) training building professionals; c) work having to do with designing or evaluating advanced grid functions, customer-focused programs, facility-sited distributed energy resources; etc.
6. Include a list of previous published works (articles, manuals, papers, etc.) relevant to this project.
7. The following materials are attached to this RFP:
	1. Required Bid Forms:
		1. Additional information for Contractors
		2. ASHRAE Application for Grant of Funds
8. The following reference materials are available online:
	1. Building Our New Energy Future (primer) ([www.ashrae.org/File%20Library/About/Leadership/new\_energy\_future\_web\_061518.pdf](http://www.ashrae.org/File%20Library/About/Leadership/new_energy_future_web_061518.pdf))
	2. OpenADR documents ([www.openadr.org/dr-program-guide](http://www.openadr.org/dr-program-guide))
	3. Smart Buildings: Using Smart Technology to Save Energy in Existing Buildings from ACEEE (<http://aceee.org/research-report/a1701>)
	4. Barriers and Opportunities to Broader Adoption of Integrated Demand Side Management at Electric Utilities: A Scoping Study from Lawrence Berkeley National Lab (LBNL) (<https://emp.lbl.gov/publications/barriers-and-opportunities-broader>)
9. The following materials are available upon request:
	1. Electronic copy of ASHRAE Author’s Manual

Proposal Technical Evaluation Criteria

1. Contractor’s understanding of the Work Statement and approach to complete the project, as demonstrated in the proposal. (25%)
2. Past performance writing user-oriented guidance and/or evaluating options for facility operations. (20%)
3. Contractor’s experience with building operations; interaction of buildings with the power system (types of service agreements, requirements to interconnect on-site electric generation and storage assets, load/demand management, grid services); and the structure and implementation of advanced grid technologies and functions (i.e., familiarity with the “smart grid” and its regulatory and market implications). (35%)
4. Qualifications and experience of personnel for project. (20%)

In addition to these technical criteria, price will be a factor. Selection will be based on the best value for ASHRAE.

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This is a "Work for Hire." ASHRAE will be listed as the author of the User’s Manual. ASHRAE will publish and hold the exclusive copyright to the Manual, including any associated software and source code. Only ASHRAE may license use of the Manual to third parties.

Reprint permission by owner of copyright must accompany any material, illustrations, graphics, or photographs used from outside sources.

All materials developed for this work will be treated as confidential material that cannot be disclosed to third parties without the written permission of ASHRAE.

ADDITIONAL REFERENCES

NREL PIX Library (<https://images.nrel.gov/bp/#/>)

**NSI/ASHRAE Standard 135-2016** **BACnet - A Data Communication Protocol for Building Automation and Control Networks**

**NSI/ASHRAE/NEMA Standard 201-2016** **Facility Smart Grid Information Model**

**ANSI/ASHRAE/IES Standard 202-2013** **Commissioning Process for Buildings and Systems**

ASHRAE Applications Handbook Chapter 56, Electrical Considerations

ASHRAE Applications Handbook Chapter 61, Smart Building Systems (Smart Grid Basics section)