



**REQUEST FOR PROPOSAL  
CLIMATE CONTROLS USABILITY TESTING FOR  
ENERGY STAR®**

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## Scope

### ***General Description of Service***

The Contractor shall conduct usability testing of one Residential Climate Control model as defined by this Request for Proposal (RFP) and the applicable documents, referenced below. The testing shall:

- 1) determine the validity of the content of the test procedure and administrator script; and
- 2) determine the appropriate user group size and demographic for future round robin testing.

The testing is also expected to help answer the following questions:

- » How does variability of numerical results relate to the number of people in the user group?
- » Are the test procedure and administrative scripts well written and complete?
- » What are expected test cost and test burden for manufacturers?

Preliminary work may begin as soon as the contract is awarded, including acquisition of devices to test and training of test administrators. The Contractor may begin recruiting the user group for testing as soon as the appropriate documents<sup>1</sup> are reviewed and the test approach is approved by the Central Department of Energy Institutional Review Board (CDOEIRB). Testing shall be scheduled so that the client may be present during a pre-determined part of the set-up and testing. All work shall be under quality control. Documentation shall be comprehensive, covering all aspects of the evaluation.

### ***Background***

The Contractor and a selected, diverse group of 50 individual users will perform Residential Climate Control usability testing. This testing is intended to distinguish Residential Climate Controls that are easy to use and program from the rest of the Residential Climate Controls on the market. These products will facilitate energy saving behavior through increased adoption of program modes and other energy saving features.

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<sup>1</sup> Documents include, but are not limited to: CDOEIRB Human Subjects Research Application (FWA00015568), test protocol describing in detail the procedure of the test and the human subjects' role, human recruitment materials, and a consent form indicating the risks of the test.

## References

### **Definitions**

Client:	DOE, EPA, Navigant, and/or ICF
DOE:	U.S. Department of Energy
EPA:	U.S. Environmental Protection Agency
HVAC:	Heating, Ventilation, and Air Conditioning
LBNL:	Lawrence Berkeley National Laboratory
Residential Climate Control:	A device that controls HVAC equipment to provide interior heating and/or cooling to dwellings. These devices are commonly referred to as programmable thermostats
Test Administrator:	The individual(s) conducting Residential Climate Control usability testing
User Group:	A group of persons recruited by the test laboratory in accordance with selection criteria included in the Group Composition section of this Request for Proposal
Individual User:	A member of the User Group
UUT:	Unit Under Test

### **Applicable Documents**

- 1) *ENERGY STAR Program Requirements Product Specification for Residential Climate Controls: Test Method – Usability*: Used for determining product compliance with the Performance-Based Usability Requirements in the ENERGY STAR Eligibility Criteria for Residential Climate Controls.<sup>2</sup>
- 2) *ENERGY STAR Residential Climate Controls Draft Specification Framework – Performance Based Usability Requirements*: Detailed proposed usability requirements for ENERGY STAR Residential Climate Controls, including revised language for prescriptive usability requirements and new performance-based usability test requirements.
- 3) *ENERGY STAR Program Requirements Product Specification for Residential Climate Controls: Usability Test Script – DRAFT*: Detailed script for test administrators to follow in order to provide instructions to test subjects.

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<sup>2</sup> Section 6 of the document is the test procedure.

## Test Requirements

### ***Unit Under Test (UUT) Types and Quantities***

The Contractor shall administer the testing of the UUT shown below.

#### Appliance Model

Honeywell RTH7600D 7-Day  
Programmable Thermostat

The Contractor shall conduct usability testing on at least one UUT. The Contractor may propose purchase of additional units of the same model to facilitate an accelerated test schedule. One or more additional units shall be available as backup in the event that any of the originals malfunction.

### ***Group Composition***

The user group shall be comprised of 50 members and shall meet the following requirements:

- » Represented Age Group
  - Age 21-34: 14 users
  - Age 35-49: 14 users
  - Age 50-64: 14 users
  - Age 65-79: 7 users
  - + 1 additional person
- » Gender
  - Male: 25 users
  - Female: 25 users
- » Level of Education
  - Less than High School Education: 7 users
  - High School Graduate and Less than Bachelor's Degree: 28 users
  - Bachelor's Degree or Higher: 14 users
  - + 1 additional person
- » Vision<sup>3</sup>
  - No Color Vision Deficiency: 48 users
  - Red-Green Color Vision Deficiency: 2 users

All individual users must meet each the following requirements:

- » U.S. resident
- » No prior experience with the UUT
- » No association or prior involvement with the HVAC or related industries, including family members associated with the UUT or its manufacturer, including stocks, bonds, or other investments (mutual funds exempted)
- » No other conflict of interest that could unfairly influence test results

<sup>3</sup> Additional information on Color Vision Deficiencies is available at the website of the National Institutes of Health, at: <http://www.nih.gov/>.

**Work Scope**

For each UUT assigned to the Contractor, the Contractor shall provide the following:

- » Allow and assist with on-site visits and inspections, which may include representatives from DOE, EPA, Navigant, ICF, and/or LBNL:
  - On-site inspection and approval of test set up and instrumentation prior to onset of testing
  - Possible additional on-site meetings/inspections to review test procedures and practices
- » UUT storage until scheduled testing is initiated
- » Unpacking and visual inspection of UUT
- » Usability testing of the UUT in accordance with the applicable test methods listed in *Test Methods and Metrics* above, as modified by this RFP
- » **Usability tasks shall be limited to 1, 2, 3 and 5 due to limitations of the UUT**
- » Re-packaging for shipment of all UUTs. The Contractor may be required to store UUTs for up to 90 days after all testing is complete and all reports are delivered
- » All deliverables as specified in the Deliverables section below

**Deliverables**

Before initiating testing, the Contractor shall create a survey, which will ultimately be distributed to the user group. Information solicited from the user group shall include, but should not be limited to:

- » Age
- » Gender
- » Level of Education
- » Familiarity with HVAC systems
- » Vision impairments
- » Arthritis
- » Upper mobility impairments
- » English proficiency (i.e., English as a first language, English as a second language, etc.)

The Contractor shall use its usability testing expertise to determine what other information would be useful in evaluating the usability of Residential Climate Controls.

Prior to initiating testing each user shall complete the survey. The Contractor shall compile the responses and create a test report documenting the recommended composition of the user group based on survey and test results.

The Contractor shall also provide the following deliverables for this assignment:

<b>Product Description</b>
Product Make (name of manufacturer)
Product Model Name (if available)
Product Model Number
Product Serial Number

**Laboratory Details**

### Laboratory Details

Laboratory Name

Laboratory Address

Test Administrator(s) (identified by name or unique identifier)

Dates Test Conducted (mm/dd/yyyy)

### Test Room Characteristics (for each day of testing)

Ambient Temperature (°F)

Relative Humidity (%)

Ambient Noise (db)

### User Characteristics (for each user)

Name or Unique Identifier

Home Zip Code

Additional Information Solicited in Survey

### Test Results (for each user)

User (identified by name or other unique identifier)

Test Start Time

Task 1 Success (s=0 if task completed incorrectly, s=1 if task completed correctly)

Time to Complete Task 1, if s=1

Task 2 Success (s=0 if task completed incorrectly, s=1 if task completed correctly)

Time to Complete Task 2, if s=1

Task 3 Success (s=0 if task completed incorrectly, s=1 if task completed correctly)

Time to Complete Task 3, if s=1

Task 5 Success (s=0 if task completed incorrectly, s=1 if task completed correctly)

Time to Complete Task 5, if s=1

Task 6 Success (s=0 if task completed incorrectly, s=1 if task completed correctly)

Time to Complete Task 6, if s=1

### One Draft and One Final Report (Max 3 pages) Outlining

Issues that arose in attempting to perform the test procedure

How these issues were resolved

Suggestions for minimizing variability in:

- 1) how the test is performed
- 2) the test results

Recommendations for improving the test procedure

Suggestions for improving test script

Recommendations for appropriate user group size

Recommendations for appropriate user group composition

Recommendations for maximum time to complete tasks

- Is maximum time to complete tasks necessary?
- If so, what should the maximum time to complete each task be documented in the test procedure as?

**One Draft and One Final Report (Max 3 pages) Outlining**

Estimated cost for product qualification testing

Expert opinion on the value of parallel testing of a reference device and the UUT for purposes of improving test repeatability, with recommended test method implementation strategies for a reference device

Other relevant information and professional opinions to improve the test

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Test results and calculations will be provided on a standardized template (supplied by Navigant in Microsoft Excel). Such a sheet shall be filled out for each device tested.

The Contractor shall track issues and questions that arise while performing the test, as well as suggestions for improving the test method.

The Contractor shall have periodic informal email and telephone communications with Navigant.

The Contractor shall provide video of all tasks for each user evaluated. The recording shall begin at the beginning of the test, before the administrator starts giving directions; the view should be of the user's hands and the UUT (the user's face should not be visible in the recording); a clock or timer should also be visible. The recording shall end when the user has completed each of the tasks. The resolution of the video must be sufficient enough that it is clear which buttons the user is pushing.

Any deliverables associated with this Request for Proposal may not be disclosed to third parties or made public.

## Laboratory Requirements

### ***Confidentiality***

The Contractor shall not consult with the appliance manufacturer, or other parties having a business interest in the appliance under test, unless specifically authorized by Navigant. If authorized, such contact shall be for the purposes of obtaining information needed to reset the UUT in accordance with the proposed test procedure.

The Contractor shall keep confidential the nature of the testing, the appliance being tested, and all test results.

### ***Impartiality***

All testing must be conducted by parties having no vested interest in the results of the tests. The Contractor shall certify its impartiality as to the results of the test.

### ***Testing Location(s) and Use of Second-Tier Subcontractors***

The Contractor shall conduct all testing at test facilities that the Contractor owns and operates within the continental U.S. or Canada. The Contractor shall not subcontract the testing work or otherwise assign third parties to conduct testing work.

### ***Project Furnished Materials, Equipment, or Services***

- » All UUT delivered to the Contractor for testing will be provided
- » UUT shipping or removal after testing is completed will be provided

### ***Period of Performance / Schedule***

Preliminary work may begin as soon as the contract is awarded, including acquisition of devices to test and training of test administrators. The Contractor may begin recruiting the user group for testing as soon as the appropriate documents are reviewed and the test approach is approved by the Central Department of Energy Institutional Review Board (CDOEIRB).

All work must be completed by **July 28, 2011**. The Contractor shall deliver according to the dates listed below.

Date	Deliverable Due
February 14, 2011	Proposals
March 28, 2011	All documents required for IRB approval, which shall include, but may not be limited to: CDOEIRB Human Subjects Research Application (FWA00015568), test protocol describing in detail the procedure of the test and the human subjects' role, human recruitment materials, and a consent form indicating the risks of the test.

Date	Deliverable Due
6 weeks after receipt of CDOEIRB approval, or July 14, 2011, whichever is sooner	Data sheets and draft test reports* for each device tested
6 weeks after receipt of CDOEIRB approval, or July 14, 2011, whichever is sooner	Draft report of issues that arose in attempting to perform the test procedure and how they were resolved, as well as recommendations for improving the procedure and minimizing variability in how the test is performed. <b>Note:</b> include time for client to hold one to two debriefings with Contractor regarding draft report findings.
Two weeks after draft report or July 28, 2011, whichever is sooner	Final test reports for each device tested

\* The draft test reports shall be final in form and include all test data and initial recommendations. The Contractor shall be available for one month following the submission of the draft test reports to answer questions and before submitting the final test reports, which shall incorporate Client feedback.

***Personnel Qualifications / Laboratory Accreditation***

In conducting this assignment, the Contractor shall use test administration personnel who are trained in and are familiar with:

- » Laboratory testing practices, instrumentation, data acquisition, data analysis, and reporting
- » The use of applicable test methods, including all calculations required
- » Protection of human subjects

Lab accreditation to ISO 17025, while not required, will be considered strongly in selection of vendors. Applicants may submit alternate accreditations and/or certifications for consideration, which it believes to be equally relevant in indicating lab competence and impartiality.

***Proposal Acceptance Criteria***

A laboratory will be chosen to perform the work described above, based on cost of services, time to complete usability testing and required documentation, and former experience with similar testing. The proposal shall include a test protocol describing the lab’s approach and timeline for recruiting the user group and completing the required tasks.

## Acceptance of Services

The Contractor shall correct any deficiencies identified through on-site visits and inspections before the onset of testing (or the resumption of testing, if applicable). The Contractor shall submit to Navigant a Corrective Action Report upon correction of any deficiencies identified. Corrective Action Reports are due prior to the start of testing (or resumption of testing, as appropriate).

### ***Final Acceptance Method***

Navigant will determine whether deliverables are acceptable. The Contractor shall revise and/or correct deliverables, as needed, to secure Navigant's acceptance.

## Attachments

*ENERGY STAR Program Requirements Product Specification for Residential Climate Controls: Test Method – Usability, Rev. DRAFT (November 2010)*<sup>4</sup>: Used for determining product compliance with the Performance-Based Usability Requirements in the ENERGY STAR Eligibility Criteria for Residential Climate Controls.

*ENERGY STAR Residential Climate Controls Draft Specification Framework – Performance-Based Usability Requirements (November 30, 2010)*: Detailed proposed usability requirements for ENERGY STAR Residential Climate Controls, including revised language for prescriptive usability requirements and new performance-based usability test requirements.

*ENERGY STAR Program Requirements Product Specification for Residential Climate Controls: Usability Test Script – DRAFT (December 2010)*: Detailed script for test administrators to follow in order to provide instructions to users.

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<sup>4</sup> An updated version of the usability testing documents will be distributed before the start of testing. The changes made to the documents will be minor and will include updating terminology, reorder tasks, and eliminating tasks that are not appropriate for the UUT.