



**6450-01-P**

**DEPARTMENT OF ENERGY**

**[EERE-2019-BT-PET-0019]**

**Energy Efficiency Program for Industrial Equipment: Petition of North Carolina Advanced Energy Corporation Efficiency Verification Services for Classification as a Nationally Recognized Certification Program for Electric Motors and Small Electric Motors**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Notice of petition and request for public comments.

**SUMMARY:** This notice announces receipt of a petition from North Carolina Advanced Energy Corporation Efficiency Verification Services seeking classification as a nationally recognized certification program. The petition, which appears at the end of this notice, includes documentation to help substantiate company's position that its certification program for electric motors and small electric motors satisfies the evaluation criteria for classification as a nationally recognized certification program. This notice summarizes the substantive aspects of these documents and requests public comments on the merits of the petition.

**DATES:** DOE will accept comments, data, and information with respect to the Advanced Energy Petition until [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

**ADDRESSES:** You may submit comments, identified by docket number “EERE-2019-BT-PET-0019,” by any of the following methods:

*Federal eRulemaking Portal:* <http://www.regulations.gov>. Follow the instructions for submitting comments.

*Email:* [AdvEnergyElecMotorsPet2019PET0019@ee.doe.gov](mailto:AdvEnergyElecMotorsPet2019PET0019@ee.doe.gov) Include the docket number and/or RIN in the subject line of the message.

*Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc (“CD”), in which case it is not necessary to include printed copies.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting written comments and additional information on the rulemaking process, see section V of this document (Public Participation).

*Hand Delivery/Courier:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L’Enfant Plaza,

SW., Suite 600, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

*Docket:* For access to the docket to review the background documents relevant to this matter, you may visit the U.S. Department of Energy, 950 L'Enfant Plaza SW., Washington, DC 20024; (202) 586-2945, between 9:00 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays. Please call Ms. Brenda Edwards at the above telephone number for additional information.

**FOR FURTHER INFORMATION CONTACT:**

Mr. Jeremy Domm, U.S. Department of Energy, Building Technologies Program, EE-5B, 1000 Independence Avenue SW., Washington, DC 20585-0121. Telephone: (202) 586-9870. Email: *Jeremy.Domm@ee.doe.gov*.

Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue SW., Washington, DC 20585-0103. Telephone: (202) 586-8145. Email: *Michael.Kido@hq.doe.gov*.

For further information on how to submit a comment, review other public comments and the docket, or to request a public meeting, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov*.

## **SUPPLEMENTARY INFORMATION:**

### **I. Background and Authority**

Part C of Title III of the Energy Policy and Conservation Act contains energy conservation requirements for, among other things, electric motors and small electric motors, including test procedures, energy efficiency standards, and compliance certification requirements. 42 U.S.C. 6311–6316.<sup>1</sup> Section 345(c) of EPCA directs the Secretary of Energy to require manufacturers of electric motors “to certify through an independent testing or certification program nationally recognized in the United States, that [each electric motor subject to EPCA efficiency standards] meets the applicable standard.” 42 U.S.C. 6316(c). The United States Department of Energy (“DOE” or, in context, “the Department”) codified this requirement at 10 CFR 431.17(a)(5). DOE also established certain compliance testing requirements for manufacturers of small electric motors. 77 FR 26608 (May 4, 2012) Manufacturers of small electric motors have the option of self-certifying the efficiency of their small electric motor using a certification program nationally recognized in the U.S to certify the efficiency of these motors. (10 CFR 431.445) DOE developed a regulatory process for the recognition, and withdrawal of recognition, for certification programs nationally recognized in the U.S. The criteria and procedures for national recognition of an energy efficiency certification program for electric motors are codified at 10 CFR 431.20 – 10 CFR

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<sup>1</sup> For editorial reasons, upon codification in the U.S. Code, Part C was re-designated Part A-1.

431.21 for electric motors and at 10 CFR 431.447 – 10 CFR 431.448 for small electric motors. Each step of the process and evaluation criteria are discussed below.

For a certification program to be classified by DOE as being nationally recognized in the United States for the testing and certification of electric motors and small electric motors, the organization operating the program must submit a petition to the Department requesting such classification, in accordance with aforementioned sections.

For the Department to grant such a petition, the petitioner's certification program must:

- (1) Have satisfactory standards and procedures for conducting and administering a certification system, and for granting a certificate of conformity;
- (2) Be independent of electric motor and small electric motor manufacturers (as applicable), importers, distributors, private labelers or vendors;
- (3) Be qualified to operate a certification system in a highly competent manner; and
- (4) Be expert in the following test procedures and methodologies:
  - (a) For electric motors it must be expert in the content and application of the test procedures and methodologies in IEEE Std 112-2004 Test Method B or CSA C390-10. It must have satisfactory criteria

and procedures for the selection and sampling of electric motors tested for energy efficiency. (10 CFR 431.20(b)); and

- (b) For small electric motors it must be expert in the content and application of the test procedures and methodologies in IEEE Std 112-2004 Test Methods A and B, IEEE Std 114-2010, CSA C390-10, and CSA C747, or similar procedures and methodologies for determining the energy efficiency of small electric motors. It must have satisfactory criteria and procedures for the selection and sampling of electric motors tested for energy efficiency. (10 CFR 431.447(b))

The petition requesting classification as a nationally recognized certification program must contain a narrative statement explaining why the organization meets the above criteria, be accompanied by documentation that supports the narrative statement, and be signed by an authorized representative. (10 CFR 431.20(c), and 10 CFR 431.447(c)).

## **II. Discussion**

Pursuant to sections 431.20, 431.21, 431.447 and 431.448, on February 11, 2019, North Carolina Advanced Energy Corporation Efficiency Verification Services (“Advanced Energy”) submitted to DOE a Petition for Recognition related to the group’s motor efficiency verification services. That petition, titled, “Energy Efficiency Evaluation of Electric Motors and Small Electric Motors to US Department of Energy Regulations as stipulated in 10 CFR part 431, Subpart

B and Subpart X” (“Petition” or “Advanced Energy Petition”), was accompanied by a cover letter from Advanced Energy to the Department containing four separate sections including individual narrative statements—(1) Standards and Procedures, (2) Independent Status, (3) Qualification of Advanced Energy to Operate a Certification System, and (4) Expertise in Electric Motor Test Procedures. The petition included supporting documentation on these subjects. The Department is required to publish in the *Federal Register* such petitions for public notice and solicitation of comments, data and information as to whether the Petition should be granted. 10 CFR 431.21(b) and 10 CFR 431.448(b). A copy of Advanced Energy’s petition and accompanying cover letter have been placed in the docket.

The Department hereby solicits comments, data and information on whether it should grant the Advanced Energy Petition. 10 CFR 431.21(b) and 10 CFR 431.448(b). Any person submitting written comments to DOE with respect to the Advanced Energy Petition must also, at the same time, send a copy of such comments to Advanced Energy. As provided under §§431.21(c) and 431.448(c), Advanced Energy may submit to the Department a written response to any such comments. After receiving any such comments and responses, the Department will issue an interim and then a final determination on the Advanced Energy Petition, in accordance with §431.21(d) and (e), and §431.448(d) and (e) of 10 CFR part 431.

In particular, the Department is interested in obtaining comments, data, and information respecting the following evaluation criteria:

- (1) Whether Advanced Energy has satisfactory standards and procedures for conducting and administering a certification system, including periodic follow up activities to assure that basic models of electric motors and small electric motors continue to conform to the efficiency levels for which they were certified, and for granting a certificate of conformity. DOE is also interested in obtaining comments as to how rigorously Advanced Energy operates its certification system under the guidelines contained in ISO/IEC Guide 65, General requirements for bodies operating product certification systems.
- (2) Whether Advanced Energy is independent of electric motor and small electric motor manufacturers, importers, distributors, private labelers or vendors. To meet this requirement, it cannot be affiliated with, have financial ties with, be controlled by, or be under common control with any such entity.
- (3) Whether Advanced Energy is expert in the content and application of the test procedures and methodologies for both electric motors and small electric motors. Specifically, for electric motors, that Advanced Energy is expert in the content and application of the test procedures and methodologies IEEE Std 112–2004 Test Method B or CSA C390–10. (See

10 CFR 431.20(c)(4)). And, for small electric motors, that Advanced Energy is expert in the content and application of the test procedures and methodologies IEEE Std 112–2004, Test Methods A and B, IEEE Std 114–2010, CSA C390–10, and CSA C747 and with similar procedures and methodologies. (See 10 CFR 431.447(c)(4)).

(4) DOE is also interested in receiving comments on whether Advanced Energy’s criteria and procedures are satisfactory for the selection and sampling of electric motors and small electric motors tested for energy efficiency.

Signed in Washington, DC, on June 28, 2019.

**Alexander N. Fitzsimmons,**  
*Acting Deputy Assistant Secretary for  
Energy Efficiency,  
Energy Efficiency and Renewable Energy.*

**Petition for Recognition**

**Energy Efficiency Evaluation of Electric Motors to United States**

**Department of Energy**

**Requirements as Documented in 10 CFR Part 431—Subpart B and**

**Subpart X**

State of NORTH CAROLINA

SS: County of WAKE

Before me, the undersigned notary public, this day, personally, appeared Brian Coble to me known, who being duly sworn according to law, deposes the following:

/s/ Brian Coble Subscribed and sworn to before me this 12 day of February 2019.

/s/Terri Bowling, Notary Public

**Petition for Recognition**  
**Advanced Energy**  
**Motor Efficiency Verification**  
**Services**



**Energy Efficiency Evaluation of Electric Motors and  
Small Electric Motors to US Department of Energy  
Regulations as stipulated in 10CFR 431 – Subpart B  
and Subpart X**

State: \_\_\_\_\_

County: \_\_\_\_\_

Before me the undersigned notary public, this day personally appeared  
\_\_\_\_\_, who being duly sworn according to law, deposes the following:

On behalf of Advanced Energy

\_\_\_\_\_ (Signature of Affiant)

Brian Coble, Senior Vice President  
Advanced Energy

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_

My Commission Expires: \_\_\_\_\_

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## 1. Program Criteria Narrative

This document is a petition for the recognition, by US Department of Energy (DOE), of North Carolina Advanced Energy Corporation (Advanced Energy) Efficiency Verification Services as a nationally recognized certification program for certifying electric motors to the DOE standards currently in effect in the United States.

North Carolina Advanced Energy Corporation (Advanced Energy) has been operating as an independent electric motor efficiency testing facility since 1989. In 1992 Advanced Energy began working with the U.S. Department of Energy (DOE) and many other public stakeholders in the Notice of Proposed Rule (NOPR) making process for motor efficiency. Our test facility provides motor efficiency testing to various entities, including subcontractors of DOE, motor manufacturers, motor distributors, motor service centers, motor end users, motor inventors and others. Advanced Energy has tested thousands of motors for efficiency.

Below is our summarized responses to each of the four DOE evaluation criteria. Detailed response can be found in subsequent sections of the document.

*(1) It must have satisfactory standards and procedures for conducting and administering a [certification system](#), including periodic follow up activities to assure that [basic models](#) of [electric motor](#) continue to conform to the efficiency levels for which they were certified, and for granting a [certificate of conformity](#).*

Advanced Energy's test lab has been ISO 17025 certified since 1997. ISO 17025 ensures our lab strictly follows standards and adheres to procedures to ensure quality. Our lab has been audited annually by the National Institute of Standards and Technology since 1997. In addition our lab is audited for motor efficiency testing by Asociacion Nacional de Normalizacion y Certification (ANCE). We have other programs and clients in our lab often requiring a review of our records. As a result we are expert in how motor labs should be audited for motor efficiency testing.

Advanced Energy's test lab recently added ISO 17065 for electric motor efficiency certification by the American National Standards Institute (ANSI). ISO 17065 ensures Advanced Energy's has satisfactory standards and procedures for conducting and administering a certification system. Our processes for motor efficiency certification, including periodic follow up activities to assure basic models conform to prescribed efficiency levels, are clearly defined in our required ANSI scheme. As our ANSI scheme

represent our services for motor efficiency certification we provide the full scheme in a section marked “confidential”. As a result of our ISO 17065 certification we have established and registered a mark with the US Patents and Trademark Office (mark is noted on the cover page) and we are capable of issuing a certificate of conformity for electric motor efficiency.

Advanced Energy has well established standards and procedures in place for administering Certification programs. The company currently operates several Certification programs relating to multiple products, such as residential affordable homes, HVAC Contractor systems, Solar Installations and Electric Motor Repair. These are described under item (3) below.

*(2) It must be independent of [electric motor](#) manufacturers, importers, distributors, [private labelers](#) or vendors. It cannot be affiliated with, have financial ties with, be controlled by, or be under common control with any such entity.*

Advanced Energy is 501 (c) 3 corporation chartered in North Carolina by the North Carolina Utilities Commission in 1980, to fulfil the mission for which it was established. Our Board of Directors comprises public members appointed by the sitting Governor and our electric utility members in North Carolina. Advanced Energy is a nonprofit energy services and engineering firm working with electric utilities, government agencies, public and private organizations to provide research, testing, training, consulting and program design services in the residential, commercial and industrial sectors markets. Our vision is to ensure energy is clean, affordable, reliable, efficient, and safe for all people.

While Advanced Energy regularly tests electric motors and small electric motors for all of the client categories noted at the beginning of this narrative, Advanced Energy does not have any affiliation, financial or otherwise with any of its clients. Advanced Energy is solely controlled by its Management and Board of Directors.

*(3) It must be qualified to operate a [certification system](#) in a highly competent manner.*

Advanced Energy has offered accreditation services to the motor repair industry since 2000. Our Proven Efficiency Verification program requires site audits of the motor service center and annual testing to prove motor repair processes are not degrading efficiency. We are also one of four Electrical Apparatus Service Association auditors for the EASA Accreditation program for electric motor repair.

Advanced Energy has operated a HVAC contractor Certification program launched in 2012. Our certification services for HVAC contractors was developed in response to and as a requirement of the Environmental Protection Agency (EPA)'s Energy Star New Homes Program - HQUITO. Our program serves to not only help HVAC contractors become Certified in the ENERGY STAR program, but also supports their growth and success with technical assistance and best-in-class training and resources.

SystemVision™ is an Advanced Energy Certification Program for affordable homes whereby homes that are built to Advanced Energy's specifications are guaranteed a specific heating and cooling energy consumption at a specified comfort level. **SystemVision™** Certified homes that have their heating and cooling expenditure above the pre-set threshold are reimbursed by the program. Advanced Energy provides the training and technical support that helps affordable housing market players in the design, construction and certification of energy-efficient affordable homes. The **SystemVision™** homes are reputed to contribute to improved health, safety, durability, comfort and energy efficiency in the state of North Carolina.

*(4) It must be expert in the content and application of the test procedures and methodologies in [IEEE Std. 112-2004 Test Method B](#) or [CSA C390-10](#), (incorporated by reference, see [§ 431.15](#)). It must have satisfactory criteria and procedures for the selection and sampling of [electric motors](#) tested for energy efficiency*

Advanced Energy Motor Engineers actively participate in motor and drive test standard development with IEEE, CSA, and IEC. We not only conduct these tests daily, our staff contributes to the development of these standards and others recognized in 10 CFR 431.15 including IEEE 114, IEEE 112 Method A, IEC 60034-2-1, IEC 61800-9-2 and many others. Our many years of experience operating our ISO 17025 test lab, participating on standard setting committees, and participation in DOE's NOPR process make us experts in the content and application of all prescribed test procedures and methodologies incorporated in 10 CFR Part 431.15.

Advanced Energy utilizes a simple random number generator process for test sample selection when advising clients requiring random model selection. In addition we test drives for the Air Condition Heating and Refrigeration Institute's (AHRI) variable frequency drive certification program, partnering with Underwriters Laboratories (UL), where samples are selected at sites randomly and shipped to our lab for testing.

## **2. Standards and procedures for conducting and administering a certification system, and for granting a certificate of conformity** **(CONFIDENTIAL)**

### **2.1 Scope of Covered Products**

DOE's Energy Efficiency Regulations cover certain electric motors and small motors.

Electric motors manufactured and distributed in commerce, as defined by [42 U.S.C. 6311\(7\)](#), must meet the energy conservation standards specified in the Code of Federal Regulations at [10 CFR 431.25 through 431.26](#)

Small electric motors manufactured and distributed in commerce, as defined by [42 U.S.C. 6291\(16\)](#), must meet the energy conservation standards specified in the Code of Federal Regulations at [10 CFR 431.446 through 431.448](#)

Detailed provisions are available in the following references:

#### Electric Motors:

[https://www1.eere.energy.gov/buildings/appliance\\_standards/standards.aspx?productid=6&action=viewlive](https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=6&action=viewlive)

#### Small Motors:

[https://www1.eere.energy.gov/buildings/appliance\\_standards/standards.aspx?productid=7](https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=7)

#### Electronic Code of Federal Regulations:

<https://www.ecfr.gov/cgi-bin/retrieveECFR?n=pt10.3.431>

### **2.2 Summary of Elements of the Certification Program**

The following is a brief overview of the major elements of Advanced Energy's (AE) Motor Energy Efficiency Certification Service used for qualifying manufacturers' motors. Detailed descriptions of the items below are provided in section 2.3.

#### **Application**

Customer requests motor energy efficiency certification service through an application. The application is evaluated. A Motor Efficiency Verification Services Agreement shall be executed by both sides.

#### **Initial Product Evaluation**

At this stage the Applicant's product is evaluated. The AE staff requests pertinent information to that will be required in order to properly evaluate the product for compliance. The AE personnel will request all data that will help to properly evaluate the product including information about the manufacturer's production and test facilities used to manufacture and characterize the product.

### **Test Facility Evaluation**

A client utilizing AE's certification services for motor efficiency may or may not utilize AEs lab for testing. For the purposes of ensuring that test facilities meet the highest standard required to ensure confidence in test result, all test facilities will be evaluated by Advanced Energy for conformance to ISO/IEC 17025 Standard (see details in Section 3 (TFE)).

### **Sample Selection**

Manufacturer would provide to AE, a list of all covered motors that it manufactures. Representative samples from the manufacturer's production line or stock are selected by AE's engineering staff for testing subsequent to evaluation and certification (see below).

### **Motor Build and Construction Evaluation**

While sample testing provides a good indication of performance of samples at a point in time, Advanced Energy is capable of comprehensively evaluating the physical product to assess the manufacturer's design and construction philosophy in general and to a lesser extent, consistency between the electromagnetic design and test results. The manufacturer's motor design and construction will be evaluated to identify the critical design decisions and construction features that would affect its energy efficiency performance.

### **Initial Certification Testing**

The samples selected per DOE sampling guidelines will be tested in an approved facility according to DOE test procedures and the results are evaluated in order to determine compliance.

### **On-Going Production Testing**

After the initial certification, ongoing production testing will be required for continued compliance verification. Manufacturers will test samples of their products as part of their ongoing production procedures to determine continued compliance with the energy efficiency requirements. The results of the ongoing tests will be reviewed by AE.

## **Follow-Up Visits and Testing**

AE staff would reserve the right to conduct follow up visits to manufacturer's facilities for random inspections to check compliance of production issues or test lab's ability to perform accurate testing of products.

## **Non-Conformance**

For non-conforming test results found during testing at the manufacturer's own or other qualified test facilities, or any other forms of non-conformance Advanced Energy will apply its procedures to resolve the non-conformity of the applicant.

## **File Review**

A Reviewer shall be appointed to review the work of the Evaluator. This is a critical step that precedes the Certification decision. In line with the ISO/IEC 17065 Guidelines, the Evaluator shall not serve as the Reviewer.

## **Certification Decision**

Certification decision shall follow Evaluation and Review. After determination that the motors meet the applicable standards, through the key activities of the preceding steps, the applicant is formally notified that the energy efficiency of their motors is duly verified and in compliance and is issued a Certificate of Conformity by AE.

## **Follow Up Service (FUS) Agreement**

Advanced Energy and the manufacturer or Applicant will enter into a follow-up services agreement in conformity to ISO/IEC 17065.

## **2.3 Detailed Description of Key Elements of Certification Program**

### **2.3.1 Application (APP)**

The customer applies for motor energy efficiency verification and certification service. The application is made available to download online at the Advanced Energy website. Upon receipt of the application, AE will assign a qualified staff member to be responsible for handling the project. A Motor Efficiency Verification Services Agreement (also known as "Advanced Energy Motor Efficiency Certification Services - Terms of Service") shall be sent to the customer and shall be executed by both sides. A project initiation checklist (Form 101) shall be invoked after the

execution of the necessary agreements. The assigned staff member will also serve as the Evaluator and proceed with the initial product evaluation steps and other subsequent steps as laid out below. At the time of appointment of an Evaluator, a File Reviewer will be designated. The Evaluator and File Reviewer shall NOT be the same person.

### **2.3.2 Initial Product Evaluation (EVAL)**

As part of the Initial Product Evaluation, the following information is obtained by the Evaluator prior to and/or during the initial visit (if required) to the manufacturer's or applicant's facilities for the purposes of the test facility evaluation step (discussed below):

- a) Description of the products being submitted by basic specification such as type, brand name, model designations or model number, frame, poles or speed, rated voltage, phase, efficiency and any other pertinent information specific to the products.
- b) Design data and Alternative Efficiency Determination data and description of AEDM methods.
- c) Test data and information on energy consumption, and product test methods applied, test conditions, test reports, declaration and proof that the tests for the products being submitted were conducted in accordance with the applicable DOE test standards and information on the test facilities used to obtain the test data.
- d) Description of test facility, list of major equipment and test facility layout such as power supply, autotransformer, loading device, ambient control; list of instrumentation and calibration records and practices, measurement accuracy of instruments used in making measurements; with particular emphasis on torque, speed, electrical power, temperature instrumentation, and Accreditation if applicable.
- e) Information on the product design and construction, including the critical product features which would affect product energy efficiency performance. Information on quality control practices and parameters which must be controlled by the manufacturer in order to maintain a consistent product performance.

### **2.3.3 Test Facility Evaluation (TFE)**

Advanced Energy Motor Efficiency Certification Service may use AE's lab, manufacturers' lab or other test facilities approved by AE for conducting testing (lab selection process is done using Form 103 Flow Chart).

The use of a manufacturer's test facility or other facility to conduct testing upon which Advanced Energy Motor Efficiency Certification service can be based, is contingent upon an evaluation conducted by Advanced Energy of the test facilities, equipment and competence of personnel conducting the

testing and overall competency and capability of the facility to test motors to applicable DOE test procedures while complying with requirements of ISO/IEC 17025. The test facility used for conducting the tests shall be either ISO/IEC 17025 accredited or shall be evaluated for conformance to ISO/IEC 17025 standard by Advanced Energy using NIST Handbook 150 checklist and NIST Handbook 150-10 Checklist. The Evaluator shall follow Advanced Energy's Form 103 flow chart for determining the test facility where testing can be conducted for Certification purposes.

Advanced Energy's evaluation of test facility (or Facility Evaluation) may include at least two of the following:

- Lab document and management system review
- Site visit for lab audit and witness testing
- Inter-lab test comparison
- Annual re-verification

The initial lab document review of test facility may include but not limited to, review of documents pertaining to equipment (specifications), calibration records, test lab layout, wiring and specifications, equipment accuracy and tolerances, past test reports, operating manuals, and quality system.

If a site visit is required as part of the Facility evaluation, it will involve Advanced Energy visiting the Client's lab to witness physical resources of the facility, general lab practices, the lab setup and equipment, calibration practices and calibration records, operational practices, setup and testing of motors (used to further evaluate the equipment), documentation and control of data, processing of test data, calculations and general assessment of engineering competence of lab staff. It is expected during this trip that data from benchmark motors tested in the Client's lab in the presence of Advanced Energy will be subjected to calculation of efficiency by both the lab and simultaneously and independently by AE. The results of this calculation comparison on same set of motors will highlight areas, if any, that needs attention in the Client's lab. During this visit the detailed evaluation of the calibration procedures and techniques are performed that are critical to obtaining the required accuracy of  $\pm 0.2\%$ . Advanced Energy staff will use personal observation and face to face communication during the visit to ensure that the Client's lab is suited to perform efficiency testing accurately.

If inter-lab testing is required as part of the Facility evaluation, AE will require the Client to supply three motors for comparison (benchmark) testing to be shipped to Advanced Energy's lab for testing. These same motors will be shipped back to the Client's facility for subsequent testing and the inter-lab results will be compared. Advanced Energy will specify

the three motors based on the equipment list (dynamometers sizes and ranges) such that all equipment is evaluated equally. Benchmarking test results between Advanced Energy's NVLAP accredited lab and Client's lab will provide a strong indication of the relative accuracy of the Client's lab and can be used as a guide for lab evaluation.

If an annual reverification is included as part of the Client Facility evaluation it will take the form of one or more of the following: subsequent site visit, lab document review, inter-lab test comparison, as previously described.

#### **2.3.4 Sample Selection (SAMP)**

Manufacturer would provide a list of all covered motors that it manufactures to AE. Representative samples from the manufacturer's production line or stock are selected by AE's engineering staff for testing, subsequent to evaluation and certification. The main objective in sampling is to ensure that the motors meet the applicable energy efficiency standard with high confidence while reducing testing burden. The sampling plan that is adopted by AE shall follow the requirements of 10 CFR Part 431 and statutory revisions applicable at the time of application.

From Advanced Energy's experience, most manufacturers use an Alternative Efficiency Determination Method (AEDM) for larger populations of covered product. If the manufacturer uses an AEDM, information of the AEDM would be submitted and evaluated at the initial product evaluation stage (EVAL). AEDM information shall again be reviewed during sample selection. Following 10 CFR 431, there shall be 5 samples of no fewer than 5 motors (25 motors) tested and the efficiency results compared with the AEDM predicted values according to the regulations.

The factors to consider, including two of the basic models among the five basic models, being with the highest unit volumes of production in the prior year, and basic models being of different horsepower and frame numbers without duplication, and all other sample criteria shall be followed strictly.

#### **2.3.5 Motor Build Inspection Analysis and Construction Evaluation (MBIA)**

The manufacturer's motor design and construction is evaluated to identify the critical design decisions and construction features that would affect its energy efficiency performance. Advanced Energy has significant experience in this area. During MBIA's, AE obtains sample motors from

the customer and tears them down and measures and analyzes critical motor dimensions, such as active stack length, air gap, lamination thickness, and bearings specifications. The analysis results in a detailed report with photographs and data tables. The MBIA is non-destructive and motors are reassembled to their original as received condition. In addition to the evaluation of motor design and build, the manufacturer's factory quality assurance procedures in certain areas that affect the key performance indicators for energy efficiency will be reviewed. The manufacturer's in-process testing during production runs will also be reviewed.

### **2.3.6 Initial Certification Testing (ICT)**

The samples selected shall be tested according to 10 CFR Part 431 and the test results shall be processed in order to determine compliance.

Prior to ICT, Advanced Energy would have already evaluated and qualified a test facility that would be used to obtain the test data. The qualification would ensure that the lab is capable of performing testing according to DOE's test procedures. The test facility shall maintain the most up-to-date data processing sheets to perform tests according to the relevant standards such as IEEE 112, IEEE 114, CSA C390, and CSA C747.

Advanced Energy reserve the right to request raw data for any selected basic model(s) and process same, using data processing sheet of its own laboratory in order to check the work of the test facility.

The test data and full load efficiency of the sample set shall be processed in accordance with 10 CFR 431. Non-conformance of test results for the ICT would be addressed in accordance with 10 CFR431 and in line with Advanced Energy guidelines.

### **2.3.7 On-Going Production Testing (OGT)**

On-going production testing will be required for continued compliance verification. These will be carried out in the same facilities as the ICT or in an approved facility. Manufacturers will test samples of their products as part of their ongoing production procedures to determine continued compliance with the energy efficiency requirements.

The on-going production testing shall include an AEDM subsequent verification. Statistically valid samples of the manufacturer's production shall be selected for the subsequent verification of the AEDM, in line with 10 CFR 431.

The process for review of results of the ongoing tests by AE will be in similar fashion as the review of the ICT test results.

### **2.3.8 Follow-Up Visits and Testing (FUV)**

Advanced Energy considers it an important goal that manufacturers using its Certification Services do not relent in their efforts to ensure that their products meet compliance requirements on an on-going basis. In order to meet this goal, Advanced Energy would reserve the right to conduct follow-up visits for inspections to check compliance of production issues or test facility's ability to perform accurate testing of products.

One visit may be conducted to a manufacturer's facility each year to observe that the manufacturers' production and control practices are consistent with Advanced Energy's expectations and. During this visit, samples of the product shall also be selected by the Advanced Energy staff representative and tested by the manufacturer for verification. Data processing shall follow similar practices as ICT and the test results are compared to the AEDM generated values. The manufacturer may use the reported data to meet the requirements of the AEDM subsequent verification.

### **2.3.9 Non-Conformance (NCF)**

For non-conforming test results found during testing at an approved test facility, or any other forms of non-conformance, including any violation or not meeting the conditions of certification, Advanced Energy shall inform the client of the nonconformities. Advanced Energy shall provide information regarding additional evaluation tasks that are needed to verify that all nonconformities have been corrected. If the client agrees to completion of the additional evaluation tasks, the process of EVAL shall be repeated to complete the additional evaluation tasks. The results of all evaluation activities shall be documented for the purposes of the file REVIEW step.

All such non-conformities will be addressed on a case by case basis. Options available include but not limited to:

- a) remove the non-conforming products from consideration
- b) perform comprehensive analysis to determine the cause of non-conformance, determine remedies, evaluate effectiveness of remedies, subject to re-evaluation.

### **2.3.10 File Review (REVIEW)**

This is a critical step that precedes the Certification decision and it is meant to ensure that all the important preceding steps and requirements are met during the Evaluation of the products for Certification. An Advanced Energy staff member shall be appointed as a Reviewer to review the work of the Evaluator and to determine if the necessary provisions of ISO/IEC 17065 are followed. In line with the procedures, the Evaluator shall not serve as the Reviewer.

The outcome of the REVIEW is a recommendation. The recommendation may identify a non-conformity that had been a result of oversight at the EVAL stage or may have occurred during the period between the EVAL and REVIEW. Recommendation may also be for a Certification decision. All recommendations based on the REVIEW shall be documented. It is acceptable for the review and the certification decision to be completed concurrently by the same AE Staff Member.

#### **2.3.11 Certification Decision (CERT)**

The project for certifying motors, following the application to Advanced Energy, Evaluation, Assessment and Qualification of test facility, testing to DOE Standards, Review and Processing of Data, File Review and Recommendation for Approval concludes with the issuance of a Certificate of Conformity by Advanced Energy and subsequent issuance of a Compliance Certificate number by the US Department of Energy. The designated AE staff member responsible for the Certification decision will also be responsible for ensuring that Follow-up surveillance activities are in place.

#### **2.3.12 Follow-Up Service (FUS) Agreement**

Advanced Energy and the Applicant will enter into a follow-up services agreement. The FUS agreement defines the conditions for maintaining certification such as access to manufacturing sites, records, follow-up inspections, product re-testing and AEDM Subsequent Verification.

### **3. Qualifications of Advanced Energy to Certify Motors and its Expertise in Test Procedures**

#### **3.1 Introduction**

In 1997, Advanced Energy's motor testing lab became the first motor lab in the world to be accredited for motor efficiency testing by the National Institute of Standards and Technology (NIST), under the National Voluntary Laboratory Accreditation Program (NVLAP Code: 200081-0). It remains the only independent motor lab in North America to hold this accreditation which makes it uniquely qualified to help evaluate and validate motors, drives and related products.

Energy efficiency testing is what Advanced Energy is known for globally. Through the testing services of Advanced Energy, several motor manufacturers around the globe have been certified to U.S. Department of Energy (DOE) requirements for motor efficiency through self-certification. Our testing capabilities apply to a wide variety of international standards

and our knowledge and reputation for accuracy has helped Advanced Energy to gain the trust of motor manufacturers and users worldwide, and has enabled us to help manufacturers and users to validate performance claims and to achieve compliance with US DOE regulations and government regulations in other jurisdictions.

Specifically, with regard to electric motors (and drives), Advanced Energy's past activities include:

- Testing to US Department of Energy (USDOE) requirements
- Testing to Natural Resources of Canada (NRCAN) requirements
- Testing to IEEE Standards and other International standards
- Testing to International Electro technical Commission (IEC) requirements
- Testing to NOM (Mexico) Standards and requirements
- Testing to AHRI standards
- Engineering Services to Develop Electric Motor Labs around the world
- Certification of motor energy efficiency and performance for global R&D Companies, inventors and product developers
- Engineering Services for Motor Designers and Application Customers
- Performance of Motor Build and Inspection Analysis (MBIA)
- Development of Technical Standards for Motor Testing
- Applied Research on Motor Design, Application and Testing
- Research in collaboration with utilities on the effect of electric power quality and smart grid on electric motors
- Reliability testing of Motors for OEM Equipment

The bulk of Advanced Energy motors related work is carried out in its state-of-the-art motor test laboratory. The laboratory has maintained an ISO/IEC 17025 accreditation since 1997 through NIST/NVLAP. The lab has also maintained a NOM designation through ANCE, the first laboratory outside Mexico to gain such designation. From 2010 to 2014 the laboratory participated in UL's data acceptance program and has worked closely with UL to test motors intended for certification for UL clients. The laboratory has also in the past assisted CSA to certify motors for its clients, following a witness by CSA staff.

Advanced Energy's Motor Efficiency Verification Services program is an ISO/IEC Guide 17065 compliant program that is subjected to ANSI accreditation as evidenced by the issuance of accreditation by this august body ([see Appendix](#)).

The certification of motors under AE's Motor Energy Efficiency Certification Service is based upon the satisfactory evaluation and testing

to the requirements of the applicable US DOE standards in effect in an approved test facility, which is either the AE test facility, the client's facilities or other facility approved by Advanced Energy.

### **3.2 Summary of Advanced Energy Qualifications**

- a) Advanced Energy's credentials in the motor efficiency field is unmatched. The company has been testing motors since 1989 and has operated an independent test lab since that time. The lab has helped motor manufacturers, OEMs, utilities and industrial customers since 1989. A Motors and Drives group's history and summary of milestones of the can be found at:  
[https://www.advancedenergy.org/portal/mad/images/pdf\\_documents/Motor\\_History\\_Timeline\\_2014.pdf](https://www.advancedenergy.org/portal/mad/images/pdf_documents/Motor_History_Timeline_2014.pdf)
- b) Advanced Energy has maintained an ISO/IEC 17025 based accreditation with NVLAP/NIST for the past 20 years. AE is familiar with running and operating a quality system. Advanced Energy has achieved ISO/IEC 17065 product certification accreditation with ANSI and plans to maintain this accreditation on an ongoing basis. With the company's strong knowledge of motors, motor testing and DOE rules on which the Certification is based, Advanced Energy is capable of operating a program for certifying electric motors and small electric motors in a highly competent manner.
- c) Advanced Energy has been involved in DOE rulemaking process since 1992 and has extensive knowledge of the regulations. The company has actively participated in DOE public meetings for the rule making process and has contributed white papers and comments to guide the process since 1992. Several comments provided by Advanced Energy for the small motors and electric motors rule making are often referenced in the Code of Federal Regulations publications.
- d) Advanced Energy's motor test lab is globally recognized for its accuracy in applying the IEEE 112, CSA C390, IEEE 114 and CSA C747 standard that are required for certifying motors. Advanced Energy's lab has served as a benchmark laboratory for other laboratories to evaluate their own performance. In this regard, Advanced Energy's test results was used as the standard to judge other labs' performance. Advanced Energy has also provided engineering services to several other labs around the world to enable them achieve ISO/IEC 17025 accreditation from NVLAP.
- e) Advanced Energy has contributed expertise in developing the applicable test standards required for the motor tests and is well familiar with these standards. Advanced Energy staff have been involved in various capacities to develop the IEEE and CSA motor efficiency test standards.
- f) Advanced Energy staff members frequently serve as subject matter expertise on motors in several national and international forums. Staff

- members make presentations and conduct several trainings yearly on motor basics and applications to industry and utility customers. Staff members also write and present technical papers in scientific settings and in industry and trade publications of the electric motor industry
- g) Advanced Energy is independent and does not have or maintain any relationship, direct or indirect, with any electric motor manufacturer, importer, distributor, or any other related entity that might pose a conflict of interest in any way shape or form. The Company similarly does not have any relationship with the US Department of Energy that might hinder its ability to serve as an independently recognized national certification program for operating a certification system for certifying the efficiency and compliance of electric motors and small electric motors with the applicable energy efficiency standards.
  - h) Advanced Energy has developed extensive measures to ensure impartiality, through various checks at every stage of a given project

### **3.3 Advanced Energy's Experience with Certification Matters**

- 1) Advanced Energy has significant experience with certification matters. Since 2000, Advanced Energy currently operates its own Quality Assurance Program for Motor Repair Centers. This national program, known as Proven Efficiency Verification program, conducts audits of motor repair centers, including before and after testing and issues Motor Repair Centers that have met the requirements a Certificate that is renewed every year. Launched in 1999, the PEV program precedes a similar program started in 2014 by the Electrical Apparatus Serves Association, the trade association for Motor Repair Centers. Advanced Energy was consequently selected as one of the approved Auditors for the EASA program.
- 2) Advanced Energy runs a certification program in the residential housing market called *SystemVision*<sup>™</sup>. *SystemVision*<sup>™</sup> is an Advanced Energy Certification Program for affordable homes whereby homes that are built to Advanced Energy's specifications are guaranteed a specific heating and cooling energy consumption at a specified comfort level. *SystemVision*<sup>™</sup> Certified homes that have their heating and cooling expenditure above the threshold are reimbursed by the program. Advanced Energy provides the training and technical support that helps affordable housing market players in the design, construction and certification of energy-efficient affordable homes. The *SystemVision*<sup>™</sup> homes are reputed to contribute to improved health, safety, durability, comfort and energy efficiency in the state of North Carolina. For the last 17 years the Certification Program has been guaranteeing the heating and cooling bills as well as homeowner comfort for the residential new construction, affordable

- housing market in the State. For more information visit:  
<https://www.advancedenergy.org/portal/systemvision/>
- 3) Advanced Energy has operated a HVAC contractor Certification program, launched in 2012. Advanced Energy's certification services for HVAC contractors was developed in response to and as a requirement of the Environmental Protection Agency (EPA)'s Energy Star New Homes Program - HQUITO. Our program serves to not only help HVAC contractors become certified in the ENERGY STAR program, but to also support their growth and success with technical assistance and best-in-class training and resources. More information at: <https://www.advancedenergy.org/portal/hvac/>
  - 4) Advanced Energy is the only organization in North Carolina selected by the utilities to certify solar installations for commissioning onto the grid. This activity comprises going on site to inspect installations to ensure that they meet the Duke Energy design codes as well as related UL and IEEE standards.

#### **4. Independent Status of Advanced Energy**

Advanced Energy is an independent organization, chartered by the North Carolina Utilities Commission to fulfil the mission for which it was setup. Advanced Energy is a nonprofit energy services and engineering firm working with electric utilities, government agencies, public and private organizations to provide research, testing, training, consulting and program design services in the residential, commercial and industrial sectors markets.

Advanced Energy's delivery team is organized into the following business divisions – Building Science, Energy Efficiency Services, Transportation Services, Solar, and Motors and Drives. The company does business in those key markets.

As noted above in section 1 (Program Criteria Narrative) Advanced Energy does have clients including electric motor manufacturers, importers, distributors, private labelers, vendors, trade associations and others that utilize our lab for testing and pay us for those services. In all cases we perform testing to prescribed standards and offer test results. We do not offer advice or consultation in motor design or motor efficiency improvement. There are consultants in the motor industry that do that and many of them utilize our lab as new electric motor products are developed. In these cases Advanced Energy's accuracy and repeatability in motor testing is valued and used by others to improve products. Other clients use our test data to improve their products at times but they do that

solely on their own with nothing further than test data offered from Advanced Energy. For motor efficiency certification clients either pass or fail the test and it is solely up to them to determine next steps.

We also tear motors down documenting findings providing reports of all observations and a comment on the overall quality of construction. We have done this for costing purposes too with DOE subcontractors seeking to define the cost of materials required to achieve prescribed efficiency levels in the DOE rules. Providing test data and observation reports to our clients for compensation may appear to some to constitute a conflict. We assert all other approved DOE third parties certification programs for motor efficiency offer similar test services to their clients and that by doing so we are all expert in certification processes as required by the DOE program criteria.

We assert that Advanced Energy does not have affiliation, financial or otherwise with any motor manufacturer or any of the client categories mentioned above. Neither is the company controlled by any other entity than its Management and Board of Directors, appointed by the sitting Governor of North Carolina.

Further we assert Advanced Energy has no conflict of interest with any of its clients with respect to operating a nationally recognized motor certification program.

## **5. APPENDICES<sup>2</sup>**

**5.1 Accreditation Certificate from ANSI**  
(attached)

**5.2 Accreditation Certificate from NVLAP**  
(attached)

**5.3 Accreditation Certificate from NOM?**  
(attached)

**5.4 Form 103**  
(attached)

**5.5 MBIA**  
(attached)

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<sup>2</sup> Attachments and data submitted by Advanced Energy with its petition for rulemaking are available in the docket at <http://www.regulations.gov>

[FR Doc. 2019-14462 Filed: 7/5/2019 8:45 am; Publication Date: 7/8/2019]