

ENERGY STAR Distribution Transformers Draft 1 Specification Stakeholder Comment Summary and Response

Topic	Subtopic	Stakeholder Comment	EPA Response
Industry Applicability		<p>Several stakeholders expressed concern that the ENERGY STAR program may not be suitable for the distribution transformers (DTs) industry for varying reasons:</p> <ol style="list-style-type: none"> <li>1) ENERGY STAR solves a consumer information problem but is not appropriate for commercial and industrial products. DTs are a part of a complex grid system and are networked device products, not end-use devices.</li> <li>2) The differing characteristics of various service areas, including the differing age and design of networks, create complexity and results in hundreds of unique designs within a transformer equipment category. Many DTs are customized for a customer's need and application. The resulting variables required to be incorporated into a purchasing tool would require a large and unworkable database.</li> <li>3) Establishing performance levels will inherently give preference to amorphous core technology over high grade electrical steel which would distort competitive balance.</li> </ol>	<p>The ENERGY STAR program has specifications for over 60 products that span a variety of categories such as appliances, building products, electronics, commercial food service equipment, lighting, and data center equipment. While a majority of these products are intended for consumers, there are several commercial and industrial product categories with complex products, often highly customized to an end user's needs (i.e. data centers). Given EPA's experience working with a wide variety of product categories, stakeholders, and end-users, EPA considers that it is possible to develop a distribution transformers specification that reflects the highly customized needs of end users for a specific application, given the hundreds, if not thousands, of possible unique designs.</p> <p>With this Draft 2, EPA has proposed efficiency criteria that liquid-immersed medium voltage distribution transformers made with different core technologies, including high grade electrical steel, are able to meet.</p>
Labeling		<p>A stakeholder mentioned that a label would bring little value for industrial equipment and may detract from safety and maintenance labels that are applied to transformers. Considering the location of DTs, it would also not provide enhanced recognition.</p>	<p>EPA recognizes that a label may not yield program recognition by view from the street (or other locations where a transformer can be found). EPA is proposing a specification for distribution transformers to assist purchasers in highlighting which products deliver additional energy savings. EPA has asked for stakeholder input on how to best physically label the product for utility purchasers to differentiate it from other transformers.</p>
Stakeholder Involvement		<p>Several stakeholders believed that the program does not resonate with all stakeholders and that there is little interest in an ENERGY STAR DTs program.</p>	<p>Some stakeholders have expressed support for the program, seeking ways to help differentiate products that deliver additional cost savings when using a TOC approach and deliver additional energy savings. With Draft 2, EPA has proposed an approach that seeks to strike such a balance and address stakeholder concerns.</p>
Economic Consideration		<p>A stakeholder noted that the 2016 Federal standard eliminated all DT designs from the market that are purchased on a purely minimum first-cost basis, that would not be purchased when the economic value of losses is properly evaluated. Therefore, this stakeholder considers an ENERGY STAR program unnecessary to address a consumer search/cost or efficiency problems.</p> <p>Another stakeholder did not consider a product specification approach could be designed in a way to indicate superior performance consistent with the ENERGY STAR brand and suggested that ENERGY STAR focus on providing recognition on best practices in industry to achieve energy savings.</p>	<p>Based on data analyses including DOE's published data used to develop DOE's 2016 Final Rule, EPA found additional models that reflect a lower total ownership cost (TOC) when compared to the DOE minimum-compliant products. With the proposed approach outlined in Draft 2, EPA seeks to encourage industry best practices to purchasing transformers that deliver both cost savings and energy savings.</p>
Definitions	Transformer	<p>A stakeholder recommended that the term 'insulated wire' be replaced with 'insulated conductor' because manufacturers do not limit their choice of conductors to insulated wire.</p>	<p>EPA will maintain the definitions from Draft 1 in order to continue to align with the definitions presented in the Department of Energy Final Rule Energy Conservation Program: Energy Conservation Standards for Distribution Transformers, 78 FR 23384 to maintain harmonization.</p>
Definitions	Operational Power States	<p>A stakeholder noted that the definition of No Load Loss should read: "those losses that are incident to the excitation of the transformer at rated voltage."</p>	<p>EPA will maintain the definitions from Draft 1 in order to continue to align with the definitions presented in the Department of Energy Final Rule Energy Conservation Program: Energy Conservation Standards for Distribution Transformers, 78 FR 23384 to maintain harmonization.</p>

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Scope		<p>A stakeholder suggested a few changes to the scope of the specification:</p> <ul style="list-style-type: none"> <li>• Liquid-immersed DTs should incorporate 1 to 34.5 kV with a size rating of 10 to 500 kVA for single-phase and 15 through 2500 kVA for three-phase. Single phase units larger than 500 kVA should not be included since they are mostly pole-type units for which size and weight are critical parameters and utilities are already facing challenges using DOE-compliant pole-type DTs on existing infrastructure.</li> <li>• A maximum insulation level should be 150 kV Basic Impulse Level (BIL) as the efficiency levels established by DOE for units above 150 kV BIL is challenging to achieve.</li> <li>• EPA should limit the scope to units with only one kVA size rating listed on the nameplate due to a number of challenges to measuring and certifying efficiency of units with multiple kVA ratings. However, including duplex units with two kVA sizes would be more acceptable.</li> <li>• EPA should require all transformers to meet IEEE National Standards.</li> </ul>	<p>EPA appreciates these stakeholder suggestions. EPA will continue to propose the scope that aligns with the DOE Final Rule to maintain harmonization with the products covered. ENERGY STAR is a voluntary program with a goal to recognize approximately the top quartile of products with the ENERGY STAR label.</p> <p>EPA expects that all transformers will meet any national standards prior to testing for ENERGY STAR certification.</p>
Efficiency Criteria	Load Factor vs Capacity Factor	<p>Two stakeholders recommended that EPA use the term load factor over capacity factor as load factor is well understood in the industry and used by DOE. One stakeholder also requested that a definition be added for this term.</p>	<p>EPA agrees with this stakeholder recommendation to use the term load factor and has made the appropriate updates to the Draft 2 specification to indicate these edits, including the addition of a definition.</p>
Efficiency Criteria	Load Factor Increments	<p>Several stakeholders expressed concern with the number of load factor increments proposed in the Draft 1 specification. Stakeholders noted that having so many loading levels would be burdensome with little benefit, as utilities do not operate with such precision. Two stakeholders noted that DOE established practical efficiency levels for 50% loading so there is no need for EPA to establish a 50% loading level.</p> <p>A stakeholder suggested establishing 4 load factors (e.g., 10, 30, 50, and 70%). Another stakeholder recommended creating three capacity factors: a 20-30% low capacity factor, a 50% standard capacity factor, and a 70% high capacity factor.</p>	<p>With this Draft 2, per stakeholder recommendations, EPA has revised the approach to include only the following three load factor ranges for setting efficiency criteria: less than 30%, between 30 and 40%, and greater than 40% load factors. Based on load data from the DOE Technical Support Document, these load factors encompass the average load on transformers for the rural residential customer (15%), average nationwide load factor (35%) and for the heavy industrial customer (≥50%). EPA proposes criteria for each design line at each of the three load factors.</p>
Efficiency Criteria	kVA Sizes	<p>A stakeholder asked for clarification regarding the suggested method for calculating criteria at kVA sizes not listed in the specification. Another stakeholder requested that all IEEE kVA sizes with corresponding minimum efficiencies be listed in the specification.</p>	<p>With the Draft 2 specification, EPA is proposing energy savings requirements over the DOE minimum compliant design at 30–40% and &gt;40% load factors for all models, and at &lt;30% load factors for lower kVA rated designs, namely single-phase designs rated at &lt;167 kVA and three-phase designs rated at &lt;500 kVA. EPA seeks feedback from stakeholders on whether the proposed energy saving criteria would apply across all lower rated kVA designs to deliver both TOC savings and energy savings over minimum DOE-compliant unit. At this time, EPA lacks sufficient data to propose energy saving criteria for designs &gt;167 kVA single phase and &gt;500 kVA three phase (DL 3 &amp; DL5). As such, EPA requests additional data from stakeholders for such designs.</p>
Efficiency Criteria	Basic Impulse Level (BIL)	<p>A stakeholder noted that efficiency requirements must take basic impulse level (BIL) into account for safety and reliability reasons. Achieving a higher BIL usually requires more insulation which can decrease efficiency.</p>	<p>EPA agrees that it is more difficult to achieve increased efficiency as the BIL of the transformer increases. However, to be consistent with the DOE Final Rule, no differentiation has been made in the Draft 2 specification. EPA would appreciate any stakeholder data on assessing the effects that higher BIL will have on efficiency.</p> <p>EPA expects that all industry standard safety standards will be followed prior to certification for ENERGY STAR.</p>
Efficiency Criteria	DOE Database	<p>A stakeholder did not agree with the technical basis of the DOE Technical Support Document and mentioned that the modeling efforts were optimized for efficiency at a 50% load factor. They noted that the analysis relied on national average input costs that are now outdated and unsuitable for TOC evaluation today.</p>	<p>In Fall 2015, EPA asked stakeholders to provide data that may help inform the specification development process. Due to the lack of sufficient data received, EPA has continued to reference the DOE modeled data to develop proposed criteria for the 50% load factor. EPA continues to encourage stakeholders to provide any additional data that can inform the proposed criteria.</p>

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Total Ownership Cost (TOC)		<p>Stakeholders supported using a Total Ownership Cost (TOC) approach that would fit into the current manufacturing and purchasing process. Several stakeholders noted that a process-based approach would yield the most economic DT for any application and utilities would be able to easily incorporate this into their purchasing process. A stakeholder noted that the accuracy and credibility of a web-based software TOC tool (that would assist utilities in performing all required calculations for DT selection) would be paramount to the success of the program.</p> <p>Stakeholders also recommended the following:</p> <ul style="list-style-type: none"> <li>• Specify use of RUS Bulletin #61-16, NEMA-TP-1, or IEEE Guide for DT Loss Evaluation, C57.12.33 for calculating TOC,</li> <li>• Provide utilities with guidance on calculating suitable A/B factors and other input parameters such as maximum DT mass, size, warranties, and in-rush,</li> <li>• Issue guidance on annual utility reporting requirements,</li> <li>• Offer utilities a partnership status for participating, and</li> <li>• Explore the TOC approach with all stakeholders in working group meetings in order to yield better synergy among participants.</li> </ul> <p>Another stakeholder noted that it may be difficult to reach agreements on certain parameters that would shape the TOC tool because utilities will have different considerations and thus differing opinions on attributes like performance, size, weight, and cost.</p>	<p>EPA has sought to address this stakeholder feedback by drafting a specification that promotes a TOC approach and sets product efficiency criteria that deliver energy savings over conventional, baseline models- namely products that just meet the DOE standard. EPA is promoting a TOC approach such that purchasers are attuned to the total costs of losses over time and will more readily consider the potential for reduced operating costs to offset higher first costs. As such, with this draft, EPA encourages manufacturers to highlight transformers that deliver both energy and cost savings over a minimum DOE-compliant design when responding to RFPs. EPA has included industry-accepted calculations for determining TOC in Draft 2. Given EPA's promotion of TOC in the specification via inclusion of a formula for calculating TOC for a model and the Agency's careful consideration of cost effectiveness when developing efficiency requirements, EPA is not expecting to pursue the creation of an online tool for purchasers.</p> <p>EPA prefers to use IEEE PC57.120 (currently under development) as development work on IEEE C57.12.23 has been sunset. In the Draft 2, EPA has added in the TOC equation and a reference to the IEEE standard for best practices for utilities on calculating various input parameters.</p> <p>EPA plans to engage utilities, as is done for all other product categories, to help determine and foster incentives for them to purchase more efficient products.</p>
Certification and Verification Testing		<p>Stakeholders had concerns regarding the cost and process of certification and verification, stating that it would greatly increase burden and is unnecessary. One commenter noted that the testing may unintentionally cost more than the product itself. Several stakeholders noted that DOE allows self-certification given the constraints on the DT industry. The DOE testing requirements are taken very seriously in industry because failure to comply would be a violation of the law. A stakeholder noted the cost of developing and certifying an Alternative Efficiency Determination Method (AEDM) is also not trivial.</p> <p>A stakeholder noted that a process-based approach (or TOC) would eliminate the need for a testing and verification process, which would be complicated by the fact that DTs are customizable and built-to-order.</p> <p>One stakeholder supported a requirement where third-party agencies audit and certify a manufacturer's test system and procedures because this can be done without disruption of production. These tests can be witnessed and validated, not for a pre-designated set of units, but for regular production units.</p> <p>A commenter also suggested that the IEEE standard be used to define test conditions for loss testing because it is already incorporated into the production line testing. They mentioned that the resulting difference between IEEE and DOE test procedures would have a very small impact on service efficiency performance.</p>	<p>To ensure confidence in the ENERGY STAR label and to protect the investment of ENERGY STAR partners, EPA requires all ENERGY STAR products to be third-party certified. Products are tested in an EPA-recognized laboratory, which can include manufacturer owned laboratories, and reviewed by an EPA-recognized certification body before they can carry the label. In response to Draft 1, stakeholders expressed concern that ENERGY STAR's third-party certification requirements would add cost and burden to manufacturers responding in real-time to utility RFPs. EPA understands the importance of ensuring that transformer manufacturers are in a position to respond promptly to potential customer requests and that transformer designs are only manufactured once an order has been placed.</p> <p>For purposes of ENERGY STAR third-party certification, transformer manufacturers will be allowed to follow the same laboratory testing procedures they use when reporting their product performance to DOE. As such, manufacturers will be able to use both the same actual test results submitted to DOE as well as modeled results from the same alternative efficiency determination method (AEDM) they currently use to demonstrate DOE compliance, allowing for more timely response to potential customers regarding ENERGY STAR status of design options. Like other ENERGY STAR product categories where the majority of testing is conducted in manufacturers' labs, the lab would need to sign up with a Certification Body's (CB's) Supervised Manufacturers Testing Lab (SMTL) Program and to have the CB review the test data as part of the certification process. For third party verification, EPA envisions allowing for a desk review of ENERGY STAR transformer designs that are slated for manufacturing to ensure they are within the design parameters of the models certified.</p>
Timeline		<p>A stakeholder noted that EPA's timeline is aggressive due to technical issues with the specification as well as the resources that transformer component manufacturers will need to commit to meet the 2016 Federal standard.</p>	<p>At the time of the release of the Draft 2, the federal standard has already taken effect. EPA anticipates finalizing the Distribution Transformers specification in Fall 2016.</p>

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Alternate Proposal		One stakeholder offered an alternative approach in which EPA would focus on the entire distribution network from substations to DTs, as opposed to focusing on a specific component of the network.	EPA appreciates this proposal and will look into the feasibility of such a program in the future.