National Rural Electric Cooperative Association
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April 10, 2012

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program
Mailstop EE-2J
EERE-2011-BT-STD-0048
1000 Independence Avenue SW
Washington, DC 20585-0121

Re: Energy Conservation Standards for Distribution Transformers, Docket No. EERE-2011-BT-STD-0048

Dear Ms. Edwards,

The National Rural Electric Cooperative Association (NRECA) appreciates the opportunity to submit additional comments on the Notice of Proposed Rulemaking (NOPR) for Energy Conservation Standards for Distribution Transformers, which was published by the Department of Energy (DOE or Department) in 77 *Fed. Reg*. 7282 (February 10, 2012).

NRECA is the national service organization for more than 900 not-for-profit rural electric utilities that provide electric energy to approximately 42 million people in 47 states or 12 percent of electric customers. Kilowatt-hour sales by rural electric cooperatives account for approximately 11 percent of all electric energy sold in the United States. NRECA members generate approximately 50 percent of the electric energy they sell and purchase the remaining 50 percent from non-NRECA members. The vast majority of NRECA members are not-for profit, consumer-owned cooperatives. NRECA's members also include approximately 65 generation and transmission ("G&T") cooperatives, which generate and transmit power to 668 of the 841 distribution cooperatives. Both distribution and G&T cooperatives were formed to provide reliable electric service to their owner-members at the lowest reasonable cost.

NRECA member cooperatives purchase approximately 400,000 overhead liquid immersed distribution transformers and approximately 150,000 Pad-Mounted liquid immersed distribution transformers each year. NRECA members purchase few if any dry type distribution transformers, therefore these comments will be limited to Liquid immersed transformers NRECA makes these comments on behalf of our membership and the T&D Engineering System Planning Subcommittee. (See list of subcommittee members at the conclusion of this letter.)

NRECA strongly supports the Department's energy conservation standards program for consumer products and certain commercial and industrial equipment. We believe that the program has been one of the most successful energy efficiency efforts ever created due to its focus on setting standards that are both technically feasible and economically justified for a majority of consumers. The program's success can be largely attributed to its historical reliance on setting standard levels that ensure that customers who purchase the product save money.

Our comments contained in this letter consist of general comments and specific comments related to the issues raised in the *Federal Register* notice.

General Comments:

1) NRECA supports the efficiency levels shown in the *Federal Register* notice, with the following corrections to Table II.2 (Energy Conservation Standards for Liquid-Immersed Distribution Transformers) and the table on Page 7380 of the *Federal Register* notice, which will make the efficiency levels match the TSL 1 values shown in Table V.1 and that were analyzed in the Technical Support Documents and summarized in the NOPR:

   Design Line 2, 25 kVA single-phase: 98.91%

   Design Line 3, 500 kVA, single-phase: 99.48%

   We especially support the fact that the proposed efficiency levels considers the required factor of the "Impact of any lessening of competition" by correctly striking a balance where both steel core and amorphous core transformers are price competitive. This also alleviates the concern that certain small transformer manufacturers will not be able financially to convert from steel core assembly process to the amorphous process. If higher standards are adopted in the final rule, these considerations will not be met.

2) NRECA has submitted initial comments focusing on the life cycle cost (LCC) analysis. If DOE decides to review or revise the analysis, NRECA would only support such a revision if DOE would use data that has been provided from the electric industry on wholesale power prices and transformer loading, and if the revision can be completed by the end of April.

   If any such revised analysis shows that the proposed efficiency levels are not economically justified, then DOE should revise the efficiency levels downward to reach efficiency levels that provide energy savings are economically justified for the vast majority of transformer purchasers.

   Under any revised analysis, DOE should not consider increasing the proposed efficiency levels, as the evidence has shown that there would be many negative impacts on domestic steelmakers, domestic transformer manufacturers, electric utilities, and end-use customers, including the lessening of competition in the transformer manufacturer sector.

3) To provide regulatory certainty and enough lead time to supplier and utilities, as well as to meet court ordered deadlines, NRECA is in favor of DOE publishing the Final Rule in the Federal Register by October 1, 2012 or earlier, if possible. If there are any delays, NRECA would be concerned that DOE would be attempting to increase proposed transformer efficiency levels to unjustified and uneconomic levels. Also, if there are any delays in the publication of the Final Rule, then the effective date of the new efficiency standards should be delayed past the proposed January 1, 2016 effective date shown in the *Federal Register* notice.

4) While NRECA members use no network transformers and very few vault located transformers, NRECA supports a separate category of efficiency standards for network/vault transformers. Based on testimony and evidence provided, DOE should not increase the efficiency standards for transformers located in networks and vaults. During the negotiations on efficiency standards, there was general agreement that there should be a "carve out" for such situations. Any increase in size due to increased efficiency standards would eliminate any economic benefit from higher efficiency, due to the extremely high costs of modifying existing vault or other underground infrastructure in urban areas.

5) If DOE raises standards above the levels shown in the NOPR, then it is likely that costs will increase dramatically, increasing the likelihood that more existing transformers will be recycled via refurbishment, rewinding or rebuilding. NRECA agrees with the statements by people from the DOE general counsel office (made during the negotiations) that existing and recycled transformers are not "covered" products and would not have to meet the proposed energy efficiency standards for new products that are "covered."

   While we have no firm data to project the potential use of refurbished transformers, there is evidence that the interest level by both utilities and vendors is increasing. If transformer prices increase sharply, as they will if the efficiency level is increased above the proposed levels, there will be an increase in the use and production of refurbished transformers. As the use of refurbished distribution transformers increases, the expertise of the refurbish vendor will increase, and therefore, reliability of the transformers will increase. It should be noted that in some cases, the actual efficiency of distribution transformers may actually increase as a result of refurbishment or rewinding. In other cases, the efficiency will stay the same, but the efficiency level of refurbished distribution transformer will most likely not meet the proposed efficiency level.

6) An important issue for DOE to consider is to preserve the competitive market by allowing both steel and amorphous core transformers to be price competitive. The DOE analysis shows that at a higher efficiency than recommended by the NOPR, it is impossible for steel to complete with amorphous because of weight and other design factors. NRECA feels that the required EPCA Factor on the Impact of any lessening of competition is a very important in this rulemaking and that any efficiency level above those recommended in this NOPR will greatly impact competition. In addition, NRECA is concerned about the availability and price of the core materials if only one product is competitively viable. This will affect jobs for steel manufactures and also small transformer manufacturers that may not be able to afford or have the expertise to convert their plants to accommodate amorphous core construction. NRECA is concerned that small transformer manufacturers, which includes some NRECA members, will be forced to go out of business. NRECA feels that DOE has achieved the correct balance of high transformer efficiency, while maintaining a viable competitive market

Comments on Specific Issued Raised by DOE

In the Federal Register notice, DOE provided a list of 30 issues for stakeholders to comment on. Below are the responses of NRECA to those issues:

1. DOE requests comment on primary and secondary winding configurations, on how testing should be required, of efficiency differences related to different winding configurations, and on how frequently transformers are operated in various winding configurations.

RUS Specifications for single phase transformers are wye connected (phase to ground) connected on the high side. For 3-single phase banked and three phase transformers, RUS Specifications also call for a wye connected primary configuration. Generally, but not always, the secondary winding configuration is wye connected also. NRECA has no opinion on how testing should be required and no knowledge of the efficiency differences related to different winding configurations.

2. DOE requests comment on its proposal to require transformers with multiple nameplate kVA ratings to comply only at those ratings corresponding to passive cooling.

NRECA members rarely purchase distribution transformers with multiple nameplate kVA ratings; therefore NRECA agrees with the NEMA position on this issue.

3. DOE requests comment on its proposal to maintain the requirement that transformers comply with standards for the BIL rating of the configuration that produces the highest losses.

NRECA has no knowledge of the differences in efficiency with respect to BIL ratings, therefore NRECA will agree with the NEMA position on this issue.

4. DOE Requests comment on its proposal to maintain the current test loading value requirements for all types of distribution transformers.

In terms of <u>testing</u> transformer efficiency, NRECA feels that the current loading levels are sufficient. However, in terms of energy use or economic analysis or efficiency standards rulemakings, DOE should use data provided by NRECA member cooperatives on actual transformer loading patterns. This improves the analysis by making the results more consistent actual efficiencies seen in the field.
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5. DOE requests comment on its proposal to require rectifier and testing transformers to indicate on their nameplates that they are for such purposes exclusively.

NRECA is not aware that there has ever been an issue with NRECA member cooperatives using rectifier or testing transformers as replacements or substitutes for distribution transformers.

6. DOE requests comment on its proposal to maintain the definition of mining transformer but also requests information useful in precisely expanding the definition to encompass any activity that entails the removal of material underground, such as digging or tunneling.

NRECA members generally do not purchase these types of transformers, but recognizes that there are space limitations for certain activities and locations that need to be addressed.

7. DOE requests comment on its proposal to maintain the current kVA scope of coverage.

NRECA agrees with the DOE proposal not to expand the current kVA scope. While some NRECA members may purchase distribution transformers outside the scope of coverage (10 kVA to 833 kVA

single-phase and 15 kVA to 2500 kVA three-phase), so few of these types of transformers are made that it would not be prudent to change at this time.

8. DOE requests comment on its proposal to continue not to set standards for step-up transformers.

NRECA member cooperatives do use step-up transformers in the process of converting a system from one distribution voltage to another, or tying two systems together with different voltages. Occasionally, mostly in emergency conditions, a step-up transformer may be used in a step-down configuration. These situations are rare and will not be significant in overall distribution transformer efficiency. Therefore, NRECA agrees with the DOE decision not to set standards for step-up transformers.

9. DOE requests comment on the negotiating committee's proposal to establish a separate equipment class for network/vault transformers and on how such transformers might be defined.

While NRECA members don't use network transformers and very rarely have vault located transformers, NRECA supports a separate category of efficiency standards for network/vault transformers. Based on testimony and evidence provided, DOE should not increase the efficiency standards for transformers located in networks and vaults. During the negotiations on efficiency standards, there was general agreement that there should be a "carve out" for such situations. Any increase in size due to increased efficiency standards would eliminate any economic benefit from higher efficiency, due to the extremely high costs of modifying existing vault or other underground infrastructure in urban areas. The negotiating committee established a subgroup to work on this issue, and NRECA believes that they were able to provide a technically sound definition of these units.

10. DOE requests comment on the negotiating committee's proposal to establish a separate equipment class for data center transformers and on how such transformers might be defined.

NRECA member cooperatives purchase few if any of these types of transformers, therefore, NRECA cannot comment on this issue.

11. DOE seeks comment on the operating characteristics for data center transformers. Specifically DOE seeks comment on appropriate load factors and peak responsibility factors of data center transformers.

Few NRECA member cooperatives serve data centers. NRECA does not have any data on load factors and peak responsibility factors for data centers. Information on energy usage at data center is available from various sources, such as the Uptime Institute and Lawrence Berkeley National Laboratories.

12. DOE requests comment on whether separate equipment classes are warranted for pole-mounted, pad-mounted, or other types of liquid-immersed transformers.

NRECA supports this concept, since there can be significant issues when replacing existing units due to size and/or weight issues, especially for pole-mounted units. The National Electrical Safety Code (NESC) has specific rules on clearance (Section 23) and loading (Section 25) that all utilities must

follow. However, due to the necessity to complete this rulemaking by October 1, 2012, NRECA would suggest that this topic be addressed in the next rulemaking.

13. DOE requests comment on setting standards by BIL rating for liquid-immersed distribution transformers as it currently does for medium-voltage, dry-type units.

Again, NRECA supports the concept. However, NRECA has not seen any proposals for the breakout of efficiency levels by BIL range, and at this point of the rulemaking, there would be no chance to review any such efficiency levels for technical feasibility or economic justification. In addition, due to the necessity to complete this rulemaking by October 1, 2012, NRECA would suggest that this topic be addressed in the next rulemaking.

14. DOE requests comment on how best to scale across phase counts for each transformer type and how standards for either single-or three-phase transformers may be derived from the other type.

NRECA notes that in the 2007 Final Rule, there was efficiency level "matching" between single-phase and three-phase liquid-filled units (e.g, the efficiency standard of the 25 kVA single-phase unit was the same as the 75 kVA three-phase unit). In this NOPR, only the 333 kVA single-phase and the 1000 kVA three-phase units have the same efficiency level. There are no other "matches" for any of the other liquid-filled units.

It is not clear if the lack of "matching" will tend to increase the costs of new transformers. However, certain matching could lead to increased efficiency values that would have negative effects on transformer suppliers, steelmakers, utilities, and end-use customers.

If there is to be any "matching", then NRECA would suggest that any such match use the efficiency level that is the lower value, to ensure that any cost increases due to higher efficiency levels are mitigated.

15. DOE requests comment on its proposal to scale standards to unanalyzed kVA ratings by fitting a straight line in logarithmic space to selected efficiency levels (ELs) with the understanding that the resulting line may not have a slope equal to 0.75.

During the workshop, there was discussion of how the "scaling" led to efficiency levels that was higher than shown in the TSL 1 tables. While NRECA understands the use of "design lines" to assist with the analysis, NRECA remains concerned that the analysis of 5 units is being used to set efficiency levels for 27 products (13 single-phase and 14 three-phase).

It might be helpful for DOE to start analyzing some of the currently "unanalyzed" units to make sure that results found for the nearest "design line" unit are consistent with the results found for the previously "unanalyzed" unit.

NRECA understands that the resulting line may not have a slope of 0.75, and as long as DOE uses real data to determine the outcome, the slope should reflect that data, not the other way around.

16. DOE seeks comment on symmetric core designs.

At the public workshop in February, one of the slides stated that DOE "has been unable to obtain or produce sufficient data to consider symmetric core designs in its NOPR analysis." There are several comments from utilities and utility organizations in the Federal Register notice about this technology, and the significant issues with its use.

NRECA is pleased to see that there are no requirements for the use of symmetric cores in the NOPR, and recommends that DOE not require their use in the Final Rule.

17. DOE seeks comment on nanotechnology composites and their potential for use in distribution transformers.

Based on the information provided in the *Federal Register* notice and the public workshop, NRECA believes that this type of technology is not available for distribution transformers at the present time, or in the near future. However, NRECA and its member cooperatives are always interested in the development of advanced technologies that could result in transformers that are more efficient and less costly and have other benefits (e.g., longer lifetimes). In this area, performing research projects with the Electric Power Research Institute (EPRI) may be of interest to DOE.

NRECA agrees with the DOE decision that DOE "does not propose to consider nanotechnology composites in the current rulemaking".

18. DOE requests comment on its materials prices for both 2010 and 2011 cases.

During the negotiations and at the public workshop, the utility contingent made several comments about this issue. It appears that while material prices were updated to be as recent as possible, power costs were based on 2008 wholesale data, (which were very high for several reasons) combined with EIA *Annual Energy Outlook* 2011 projections and estimates for <u>retail</u> electric prices, However, DOE did not revise its analysis to use the most up to date (2011 or 2012) wholesale electric prices, and therefore did not account for the significant drop in wholesale prices (which was much lower than the projections shown by the Annual Energy Outlook). This is analytically inaccurate and inconsistent. If DOE insists on using the most recent material and transformer prices, then DOE should use the most recent wholesale power prices as well.

See the NRECA comments submitted on April X, 2012 for the inaccurate power cost figures used in the analysis, which has a significant impact on the life cycle analyses including total owning costs and paybacks.

19. DOE requests comment on the current and future availabilities of high-grade steels, particularly amorphous and mechanically-scribed steel in the United States.

NRECA is very concerned about the availability of steels if DOE decides to increase any efficiency levels above those proposed in the NOPR. As DOE's life cycle analyses have shown, the "tipping" point where many domestic steelmakers are not competitive is usually at levels that are equal to or less than TSL 1.

NRECA members also have very strong memories of the 2006-2008 time frame, when there were transformer shortages and utilities were told that there would be delays of months or even years before certain transformers would be available. NRECA members do not want to face such a situation again when the economy recovers and demand for distribution transformers and their components increases.

NRECA and its member cooperatives are very concerned about the availability of a quality steel supply to the transformer manufacturers. In 2008, shortages of silicon steel led to a threat of rationing of transformers which would have endangered the ability to serve cooperative member owners. During that time, suppliers made spot purchases of off-shore steel only to find that the quality (i.e. loss requirements) did not meet the quality of steel being supplied by US manufacturers. It is extremely important to NRECA and its member cooperatives that an ample supply of quality core steel be available to the transformer manufacturers to ensure supply availability of transformers as dictated by the market demand. NRECA and its member cooperatives fears that as the economy recovers, we will return to the threat of transformer rationing which will have a major effect on the ability to meet the obligation to serve customers.

We appreciate the analysis that has been performed by DOE in preparation for the issuance of the NOPR, and fully agree with DOE's concern about the supply of amorphous and mechanically-scribed metals. No National Standard should be set based upon questionable promises of supply or unusually high costs to re-tool for core materials that are so vital to the electrical grid components such as distribution transformers. All of the studies preformed to set the Standard could be very wrong if price does not have stability. Availability of distribution transformers on a timely basis to match the distribution cooperative member's requirements is extremely important to cooperatives, their members, and the national economy.

20. DOE requests comment on particular applications in which transformer size and weight are likely to be a constraint and any data that may be used to characterize the problem.

NRECA member cooperatives and the NRECA T&D Engineering System Planning Subcommittee have provided information to DOE about the issues of increased size and weight.

Weight: Several have expressed concern that the more efficient transformers would have much higher weights, which would increase costs in terms of installation and pole structural integrity (for retrofits of existing pole-mounted transformers). It is difficult to predict the "nationwide average costs" for certain construction activities regarding installing or changing poles and the equipment required for doing such work. NRECA feels that DOE has done an adequate job based on the information supplied by NRECA, NRECA member cooperatives and other utilities.

Size: Several have expressed concern that the more efficient transformers will be larger in size (height, width, and depth), which will have an impact for all retrofit situations – on poles (in terms of structural support and safe clearance from other utility infrastructure on the same pole or in the same urban area), on pads (in terms of dimensions or a need to expand the pad size to accommodate the new units), and especially in underground vaults, which in many urban areas, cannot be physically expanded, or can only be expanded at a great cost in terms of materials, labor, and street closures.

NRECA supports the proposed efficiency levels in the NOPR as they minimize the concerns associated with size and weight issues. However, if DOE decides to analyze any increase the efficiency levels for the Final Rule, these issues will have a significant impact on the economics,

especially in replacement situations. Information provided by NRECA, NRECA member cooperatives and other utilities as to the actual costs due to increase size and weight should be included in any new analysis.

21. DOE requests comment on its steel supply availability analysis, presented and appendix 3A of the TSD.

NRECA notes that the analysis in appendix 3A of the TSD discusses conditions that existed through the end of 2010. The analysis provides good information about prices from 2006 to 2010, but it does not include information about the overall and significant increase in prices compared to 2002-2003 levels.

NRECA is very concerned about the availability of steels if DOE decides to increase any efficiency levels above those proposed in the NOPR. As DOE's life cycle analyses have shown, the "tipping" point where many domestic steelmakers are not competitive is usually at levels that are equal to or less than TSL 1.

NRECA member cooperatives have very strong memories of the 2006-2008 time frame, when there were transformer shortages and utilities were told that there would be delays of months or even years before certain transformers would be available. NRECA member cooperatives do not want to face such a situation again.

NRECA and its member cooperatives are very concerned about the supply chain of core material used in the manufacture of distribution transformers. We appreciate the analysis that has been done by DOE in preparation for the issuance of the NOPR, and fully agree with DOE's concern about the supply of amorphous and mechanically-scribed metals. No National Standard should be set based upon questionable promises of supply or unusually high costs to re-tool for core materials that are so vital to the electrical grid components such as distribution transformers. All of the studies done to set the Standard could be very wrong if price does not have stability. Availability of distribution transformers on a timely basis to match the distribution cooperative member's requirements is extremely important to cooperatives, their members, and the national economy.

22. DOE seeks comment on its proposed additional distribution channel for liquid-immersed transformers that estimates that approximately 80 percent of transformers are sold by manufacturers directly to utilities.

NRECA does not have specific data as to the percentage of member companies that purchase transformers directly from manufacturers, but we do believe that the number is well below 50% for NRECA member distribution cooperatives. Most small utilities do not have the access to manufacturers directly, but many distribution cooperatives pool their efforts by utilizing NRECA member material distributers that can leverage quantities of scale for a better price and availability of distribution transformers than could be available to individual cooperatives.

23. DOE seeks comment on any additional sources of distribution transformer load data that could be used to validate the Energy Use and End-Use Load Characterization analysis. DOE is specifically interested in additional load data for higher capacity three phase distribution transformers.

NRECA, NRECA member cooperatives and the T&D Engineering System Planning Subcommittee furnished a significant amount of data on loading of single- and three-phase distribution transformers during the negotiating sessions. This information was provided directly to DOE's contractor, LBNL. NRECA member cooperatives may have additional information being sought by DOE, but we would appreciate DOE defining their meaning of "higher capacity three phase distribution transformers" so that this information could be obtained.

24. DOE seeks comment on its pole replacement methodology that is used to estimate increased installation costs resulting from increased transformer weight due the proposed standard. The pole replacement methodology is presented in chapter 6, section 6.3.1 of the TSD.

In previous testimony and at public workshops, NRECA, NRECA member cooperatives, the T&D Engineering System Planning Subcommittee and other utilities described many situations where significant costs occurred when the transformer weight exceeded 900 pounds, and described other significant costs that occur as a result of increased size (e.g., moving other non-electric utility infrastructure to provide proper clearance).

NRECA agrees with the analysis for rural areas, but for more urban areas, the change-out fraction may need to be increased. NRECA agrees with the comment submitted by EEI on this issue. Therefore, NRECA also suggests that the change-out fraction be increased to as high as 50 or 75% of units located in town centers / urban areas / cities with populations of at least 25,000, and to increase the pole change-out cost estimates to a range of values (or a weighted average) provided by EEI member companies.

25. DOE seeks comment on recent changes to utility distribution transformer purchase practices that would lead to the purchase of a refurbished, specifically re-wound, distribution transformer over the purchase of new distribution transformer.

During the negotiations and public workshop, several utilities discussed their use of recycled transformers and transformer maintenance practices. As the testimony indicated, the higher the initial cost increase due to energy efficiency standards, the higher the likelihood of using more recycled products. It should be noted that in some cases, this practice will lead to increased energy efficiency, and such a practice is considered to be a "green" activity, as part of a "reuse and recycle" action plan.

26. DOE seeks comment on the equipment lifetimes of refurbished, specifically re-wound distribution transformers and how it compares to that of a new distribution transformer.

NRECA does not have specific information that can be furnished at this time. It is likely that refurbished transformers will last for at least 10 or 15 years. NRECA is aware that at least one transformer refurbishment company offers a 5 year warranty on their work. Over time, with more experience, utilities will be able to furnish more information as it becomes available.

27. DOE seeks comment on recent changes in distribution transformer sizing practices. In particular, DOE would like comments of any additional sources of data regarding trends in market share across equipment classes for either liquid-immersed or dry-type transformers that should be considered in the analysis.

NRECA, NRECA member cooperatives and the T&D Engineering System Planning Subcommittee have provided information to DOE on liquid-immersed transformers over the past several years. NRECA believes that as costs for distribution transformers increase, cooperatives must re-evaluate their purchasing and loading practices. This is particularly challenging to cooperatives in rural areas because of low load factor end-use patterns.

28. DOE requests comment on the possibility of reduced equipment utility or performance resulting from today's proposed standards, particularly the risk of reducing the ability to perform periodic maintenance and the risk of increasing vibration and acoustic noise.

NRECA, NRECA member cooperatives and the T&D Engineering System Planning Subcommittee have provided DOE with data based on their experiences with higher efficiency amorphous core transformers purchased in the 1980's and 1990's. Based on the data provided, the higher efficiency amorphous core transformers that were installed during that time period have significantly higher failure rates than the more traditional steel core transformers installed during the same time period.

It may be harder to perform maintenance if utilities are forced to use existing vaults and existing clearances for larger and heavier transformers. Reducing space may mean that maintenance personnel may not be able to manually maintain transformers on-site (e.g., no room to stand or reach the affected area), so that transformers will have to be moved away from their service locations to be maintained.

In terms of increasing vibration and acoustic noise, NRECA is not aware of vibration or acoustic noise issues associated with higher efficiency transformers. However, if the higher efficiency transformers have more vibration and noise than standard efficiency transformers, then there could be issues, especially in residential areas. Louder transformers may have an impact on customer satisfaction, especially if the sound is considered to be a form of "noise pollution."

29. DOE requests comment and corroborating data on how often distribution transformers are operated with their primary and secondary windings in different configurations, and on the magnitude of the additional losses in less efficient configurations.

NRECA has no knowledge of the frequency that distribution transformers are operated with different primary or secondary configurations than the transformer was designed, but we suspect that this is rare.

30. DOE requests comment on impedance values and on any related parameters (e.g., inrush current, X/R ratio) that may be used in evaluation of distribution transformers. DOE requests particular comment on how any of those parameters may be affected by energy conservation standards of today's proposed levels or higher.

Transformers must meet IEEE Standards concerning impedance values and at the same time meet or exceed DOE Minimum Efficiency Standards. Limiting secondary fault currents is an issue in some situations to avoid consumers from installing/replacing protective with excessive fault current ratings. Manufacturers and designers of distribution transformers should be able to make more meaningful comments to this question.

NRECA appreciates the opportunity to respond to these specific issues raised in this NOPR and to offer comments to the proposed liquid-filled distribution transformer efficiency standards. Thank you for your review of our comments.

Respectfully submitted,

Bob Saint
Principal Distribution Engineer
National Rural Electric Cooperative Association

Cc: Dave Mohre
Jay Morrison
T&DEC System Planning Subcommittee

Transmission and Distribution Engineering Committee System Planning Subcommittee members include:

- Jon Joyce – Chair, First Electric Cooperative, AR
- Ken Winder – Lead on this project, Moon Lake Electric Assn., UT
- Brian Bartos, Bandera Electric Cooperative, TX
- Robin W. Blanton, Piedmont EMC, NC
- Robert Dew, Hi-Line Engineering, GA
- Joe Dorough, Jackson EMC, GA
- Patrick Grace, Oklahoma Electric Cooperative, OK
- Joe Perry, Patterson & Dewar Engineers, GA
- Kenneth Rush, USDA-RUS, DC
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- Pat Williams, East Mississippi EPA, MS