May 5, 2023

Mr. Jeremy Dommu and Mr. Matthew Ring
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0121
Submitted via: DistributionTransformers2019STD0018@ee.doe.gov

Re: Supplement to Comments of the Edison Electric Institute on the Proposed Energy Conservation Program: Energy Conservation Standards for Distribution Transformers Docket No. EERE-2019-BT-STD-0018

Dear Mr. Dommu and Mr. Ring,

The Edison Electric Institute (EEI) appreciates the opportunity to supplement its March 27, 2023, comments on the U.S. Department of Energy's (DOE's or Department's) *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 *Fed. Reg.* 1,722 (Jan. 11, 2023). EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for about 235 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States.

On April 7, 2023, the Department issued a Request for Information Regarding Innovative Advanced Transformers— DE-FOA-0003021 (RFI) seeking feedback on several topics related to distribution and power transformers, including supply chain issues. Given the significant overlap between the RFI and DOE's proposed efficiency standards in the instant docket, EEI submits the attached comments filed in response to the RFI. EEI and its members remain deeply concerned about the supply chain constraints associated with distribution transformers and the broader value chain. These challenges impact our ability to continue the important work of the clean energy transition and risk the reliability, resilience, and security of the U.S. electric grid.

EEI urges the Department to take a holistic approach to transformer supply chain issues. In addition to the Department's proposed efficiency standard in the instant docket, DOE (1) issued the RFI; (2) is hosting an in-person workshop on May 23-24, 2023, at the National Energy Technology Laboratory to discuss the advanced transformer design, components, and materials required to address the challenges facing the electric industry as it works to meet evolving security, reliability, resilience, and clean energy demands; and (3) continues to engage, along with other federal partners, with the Electricity Subsector Coordinating Council to address the serious threats to national security and resilience posed by ongoing shortages of critical equipment, including the sector's ability to effectively respond to and recover from catastrophic natural disasters and malicious cyber and physical attacks.

A holistic approach would consider the outcomes of these fora; look to harmonize DOE actions across the various DOE offices, national labs, and rulemakings; and would consider how to use all existing tools, including the Defense Production Act, to mitigate (and not worsen) these supply chain challenges. Without such an approach, DOE's efforts will at best conflict and at worst undermine each other. Either outcome would further imperil electric companies' ability to continue to meet our and the Biden Administration's clean energy goals and to deliver reliable, resilient, and affordable electricity to the American people.

If you have any questions or need additional information regarding our comments, please feel free to reach out to me.

Sincerely,

/s/ *Scott Aaronson*

Scott Aaronson
Senior Vice President, Security and Preparedness
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Attachments

EEI May 5, 2023, Response to DOE Request for Information
Regarding Innovative Advanced Transformers
DOE-FOA-0003021

May 5, 2023

Mr. Thomas Miante
U.S. Department of Energy (DOE)
Office of Electricity (OE)
1000 Independence Avenue SW
Washington, DC 20585

Submitted via: RFI-3021@netl.doe.gov

Re: Comments of the Edison Electric Institute on the Request for Information Regarding Innovative Advanced Transformers
DE-FOA-0003021

Dear Mr. Thomas Miante,

The Edison Electric Institute (EEI) appreciates the opportunity to provide comments on the U.S. Department of Energy's (DOE's or Department's) April 7, 2023, request for information (RFI) regarding innovative advanced transformers. These comments specifically respond to **Category 1, Category 3, and Category 7** of the RFI. EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for about 235 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States.

EEI's member companies are woven tightly into the fabric of our nation. For nearly 140 years, we have provided the energy that has sustained our customers and our communities, while powering our economy. EEI members are united in their commitment to get the energy they provide as clean as they can, as fast as they can, while keeping reliability and affordability front and center, as always, for the customers and communities they serve. Fifty EEI members have announced forward-looking carbon reduction goals, 41 of which include a net-zero by 2050 or earlier equivalent goal, and members are routinely increasing the ambition or speed of their goals or altogether transforming them into net-zero goals.

EEI supports the Department's continued efforts to advance grid modernization and resiliency through programs like the Transformer Resilience and Advanced Components (TRAC) program and the Applied Grid Transformation Solutions (AGTS) program. Innovative research, development, and demonstration (RD&D) programs like TRAC and AGTS can significantly advance critical grid technologies, including distribution and power transformers. EEI members also strongly support energy efficiency efforts that help them reduce emissions and meet electricity demand with fewer resources.

The RFI rightly recognizes that understanding the challenges that the electric sector is facing—including supply chain issues—is essential to ensuring that RD&D efforts target advancements that are feasible and can be applied in the real world. EEI supports DOE's stated goal of "establish[ing] a robust and secure manufacturing capability for distribution [and power] transformers, domestically and with our partners." However, as discussed in greater detail below, the Department must take a holistic approach to issues related to transformers. This includes, in particular, its approach to understanding and addressing supply chain constraints for this critical infrastructure. Supply chain constraints across multiple components of the transformer value chain have persisted and are significantly impacting current transformer availability. These constraints imperil EEI members' ability to continue the important work of the clean energy transformation and put electric grid reliability, resilience, and security at a potential risk.

As EEI noted in its March 27, 2023, response to DOE's *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 *Fed. Reg.* 1,722 (Jan. 11, 2023) (DOE Distribution Transformer Efficiency Standards NOPR), attached hereto as Attachment 1 and incorporated by reference into EEI's response to the RFI, the timing and scope of Department's proposed modifications to the efficiency standards create further, significant risk to the U.S. electric grid. While EEI supports DOE's efforts under this RFI, any actions that the Department might take pursuant to this RFI, including potential federal funding opportunities, will not be sufficient to address the significant near-term consequences should DOE finalize as is the standards proposed in the DOE Distribution Transformer Efficiency Standards NOPR.

A. Transformer-Related Supply Chain Constraints

The capacity of the existing grid must increase by as much as 60 percent by 2030, and it may need to triple in size by 2050 to meet the growing demand for clean electricity to support a carbon-free economy.[1] Notably, and as DOE has reported, more than 930 gigawatts (GW) of solar, wind, hydropower, geothermal, and nuclear capacity currently are in interconnection queues seeking transmission access, as are more than 420 GW of energy storage.[2] The Biden Administration also has set a 2030 goal to deploy 500,000 electric vehicle (EV) chargers and for EVs to account for 50 percent of new light-duty vehicle sales. The growth and development of other sectors, including domestic manufacturing, commercial and residential buildings, and other

[1] *See* Eric Larson et al., Net-Zero America by 2050: Potential Pathways, Infrastructure, and Impacts, Final Report Summary, at 76 (Princeton University, Oct. 29 2021), https://netzeroamerica.princeton.edu/img/Princeton%20NZA%20FINAL%20REPORT%20SUMMARY%20(29Oct2021).pdf.

[2] DOE, Queued Up…But in Need of Transmission: Unleashing the Benefits of Clean Power with Grid Infrastructure (Apr. 2022), https://www.energy.gov/sites/default/files/2022-04/Queued%20Up%E2%80%A6But%20in%20Need%20of%20Transmission.pdf. This study was concluded before Congress passed the clean energy tax incentives in the Inflation Reduction Act, which will spur increased renewable energy and other clean technology deployment and interconnection.

critical infrastructure such as water and telecommunications, require additional electric grid capacity and increase the demand for critical grid components. To support the deployment of these resources and the concomitant expansion of the grid, a significant number of new transformers will be needed. Accordingly, delivering electricity to customers, responding to extreme weather, and continuing to meet the industry's—and the Administration's—clean energy goals will require reliable access to distribution transformers and related equipment.

As further detailed in EEI's response to the DOE Distribution Transformer Efficiency Standards NOPR, the power sector has been experiencing severe and ongoing supply chain challenges that have prolonged and complicated availability of critical equipment. This includes persistent shortages of distribution transformers, smart meters, conductors, poles, and other critical equipment as electric companies continue the clean energy transition while also responding to storms and other natural hazards. In particular, distribution transformer production and availability has been a challenge since 2020, and EEI and its members have continued to raise awareness and concern regarding these shortages with DOE since 2021. The inability to quickly manufacture and deliver these critical components threatens the electric sector's ability to service current and planned housing markets and commercial enterprises, swiftly recover and restore service following natural disasters or other destructive events, and to deliver the benefits of economy-wide electrification.

As EEI and others have explained,[3] the federal government must prioritize the electric power industry and domestic critical equipment manufacturers for available funding. Manufacturers have reported that labor shortages are the most immediate barrier to increased production. Possible opportunities to increase the labor pool include providing relocation incentives to employees and providing legal support to non-documented workers. Manufacturers have also expressed a hesitancy to invest in grid component production due to uncertainty that demand will continue to stay high. Possible opportunities to mitigate this concern include providing a "purchase guarantee" or "loan guarantee" to manufacturers to ensure they can invest with confidence in long term capacity growth.

1. Distribution Transformer Supply Chain Constraints (Categories 3 and 7)

Under existing production output capabilities, manufacturers estimate the current order-cycle for most new distribution transformers to be longer than 16 months, while historically this equipment had a lead time of fewer than 10 weeks (2.5 months). Last June, DOE and the Electricity Subsector Coordinating Council agreed to establish an industry-government "Tiger Team" to examine the supply chain crisis. In August 2022, the Tiger Team surveyed investor-owned electric companies, public power utilities, and electric cooperatives to provide DOE with data on existing stocks of distribution transformers, lead times to procure new distribution transformers, and project delays and cancelations caused by distribution transformer shortages.

[3] *See* Attachment A to Attachment 1, Joint Comments of EEI, APPA, and NRECA in Response to DOE Request for Information on Defense Production Act (Nov. 30, 2022); and Attachment B to Attachment 1, Joint Letter from National Electrical Manufacturers Association, APPA, NRECA, EEI, Leading Builders of America, National Association of Homebuilders, and GridWise Alliance to Sec. Granholm (Feb. 15, 2023).

Despite electric companies taking any and all steps available to continue providing reliable electric power to U.S. customers,[4] the August 2022 Tiger Team survey results showed that 90 percent of investor-owned electric companies reported a "high" (within one month) or "medium" (within one quarter / three months) risk of running out completely of at least one distribution transformer voltage class.

Notably, EEI members reporting a "high" risk of stocking out accounted for 40 percent of that total. The survey also found that lead times to procure distribution transformers had increased more than 400 percent between 2020 and 2022, that current transformer production is not meeting demand, and, critically, that demand is expected to increase significantly for the foreseeable future. *See* Attachment B – Joint Comments of EEI, APPA, and NRECA in Response to DOE Request for Information on Defense Production Act (Nov. 30, 2022).[5]

In October 2022, the Tiger Team developed near-term and long-term recommendations informed by the August 2022 survey data, discussions with domestic manufacturers, and additional research for mitigating the national security and resilience threats posed by ongoing shortages of critical equipment. These recommendations were provided to DOE in October 2022. In March 2023, DOE hosted a summit for the Tiger Team and several large domestic manufacturers to come together to discuss the potential national security and resilience impacts and identify the root causes of distribution transformer shortages in depth.

In addition to potential impacts to national security resulting from increased reliance on foreign manufacturers and impacts to the electric industry's ability to respond to and recover from natural disasters and malicious attacks on equipment,[6] prolonged shortages of critical grid components can impact the economic growth of other sectors. This includes growth of domestic manufacturing, commercial and residential building, and other critical infrastructure such as water and telecommunications. In fact, the August 2022 Tiger Team survey found that 60 percent of investor-owned electric companies have had to delay or cancel scheduled projects because of a shortage of distribution transformers, which directly affects development in other sectors.

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[4] Electric companies have been taking extraordinary measures to meet current demand with the limited supply of equipment that is available, including refurbishing and repairing older equipment to extend its lifespan as much as possible. Furthermore, while domestic procurement is highly preferred for critical grid components to protect the security of the grid, electric companies have resorted to purchasing more equipment from overseas manufacturers.

[5] Attachment B to Attachment 1, which also provides information on the barriers to U.S. manufacturing, development, and deployment of transformers and electric grid components.

[6] In recent years, the electric industry has seen a trend of increasingly frequent and severe extreme weather events, including hurricanes, snowstorms, and wildfires, that require increasingly resource-intensive restorations. The electric industry also has experienced a recent uptick in physical attacks on critical grid equipment, including transformers.

For example, one EEI member has reported that its distribution transformer stocks currently are 50 percent below normal levels going into storm season and that it is delaying projects to ensure it is ready and prepared for storm season. Another EEI member reported that its supplier is now taking orders for delivery in 2027. Delivery delays have reached the point that the member company holds a meeting each Friday morning to ration transformers, determining which customer projects will receive a transformer and which projects will not. Many customer projects have been delayed by several months. Another EEI member has noted that it is continuing to experience long lead times and face challenges in limited availability of distribution transformers across several voltage classes. As it continues to operate at low inventory levels, this member company reports that it is at medium to high risk of not being able to support emergency outages and meet reliability expectations. Additionally, with the extended lead times and increased demand this member's distribution transformer inventory is at 52 percent of what is needed to support customer growth and respond to emergencies effectively.

2. Wood Pole Supply Chain Constraints (Categories 3 and 7)

In addition, utility poles are vital to continuing to meet the need to hold overhead utility lines and distribution transformers. Wood poles are particularly critical given that alternatives such as steel, composite, or fiberglass, are considerably more expensive—and face their own supply chain challenges as well. As noted, the wood pole industry currently is facing shortages.[7] For example, one EEI member has reported that the lead times for one type of wood pole have increased from 5-10 days to 6-8 weeks, which will only be exacerbated by DOE's proposed rule. The increased frequency and severity of natural disasters have increased the need for replacement pole production, as has the need to exchange existing poles with larger and taller poles to allow for broadband line clearance.[8] Combined with increased government funding for infrastructure, this increased demand is causing a ramp-up in projects planned through 2027 and beyond.[9]

[7] On the production side of wood poles, the bottleneck of the process is treating the wood to become a utility wood pole. With the global supply chain crisis and delays in container ships crossing the Pacific Ocean, suppliers have struggled to get maintenance parts for their treatment machinery. Similarly, treatment chemicals have been in short supply from their sources worldwide when production is unpredictable with COVID-19 outbreaks and shutdowns. These two causes tighten an already constrained treatment process and exacerbate wood pole shortages further.

[8] These larger class poles are already much more difficult to obtain than the scarce smaller class wood poles. The smaller poles more closely fit how trees naturally grow. Fewer trees reach the size required for larger class poles, and timber owners are much less willing to wait for trees to grow larger.

[9] Wood poles are larger freight and therefore are frequently shipped via rail. With rail capacity constrained, shipping via truck has increased for wood poles—but it requires four trucks to ship the equivalent of one railcar. There is also a shortage of boom trucks able to unload poles at their destination. New boom trucks have been difficult to source with the shortage of semiconductor chips constraining availability of truck chassis.

3. *The Need to Focus on RD&D (Category 1)*

There are other long-term issues that are important. As the RFI aptly notes: "As the electric power system evolves to enable a more resilient and clean energy future, Research, Development and Demonstration (RD&D) will be needed to understand the physical impact these changes have on transformers and other vital grid components and to encourage adoption of new technologies and approaches." EEI is aware that some transformer designs have remained static over a great period of time and encourages DOE to pursue RD&D in advanced designs, including smaller and lighter designs, such as solid-state transformers, as well as the deployment of advanced data analytics that could help extend transformer life.

EEI member companies would welcome opportunities to collaborate with the National Laboratories supported by DOE funding in the pursuit of these worthwhile RD&D efforts.

B. *The Need for a Holistic DOE Approach (Categories 3 and 7)*

A holistic Department approach to these supply chain issues is vital. This RFI is one of several DOE efforts currently underway related to transformers. The Department also recently issued and accepted comments on the DOE Distribution Transformer Efficiency Standards NOPR, which proposes an efficiency standard that would functionally require that all or nearly all new (and replacement) voltages of liquid-immersed distribution transformers use amorphous core steel. This requirement represents a significant scope of change and raises real concerns regarding the practicability of manufacturing and of reliably installing and servicing amorphous core distribution transformers by the proposed effective date. In addition, the Department is hosting an in-person workshop on May 23-24, 2023, at the National Energy Technology Laboratory (NETL) to discuss the advanced transformer design, components, and materials required to address the challenges facing the electric industry as it works to meet evolving security, reliability, resilience, and clean energy demands. This workshop is intended to bring together a diverse set of stakeholders with a very specific focus on discussing research, development, and demonstration (RD&D) opportunities for advanced distribution service and power transformers, identification of technology gaps, and opportunities for innovation.

The Department of Energy and other federal partners are encouraged to continue to engage with the Electricity Subsector Coordinating Council via forums like this to address the serious threats to national security and resilience posed by ongoing shortages of critical equipment, including the sector's ability to effectively respond to and recover from catastrophic natural disasters and malicious cyber and physical attacks. A holistic approach would consider the outcomes of these fora; look to harmonize DOE actions across the various DOE offices, national labs, and rulemakings; and would consider how to use all existing tools, including the Defense Production Act, to mitigate (and not worsen) these supply chain challenges.

EEI strongly urges the Department to coordinate its various activities related to distribution and power transformers, particularly on issues related to supply chain challenges, and to develop a holistic approach. Without such an approach, DOE's efforts will at best conflict and at worst undermine each other. Either outcome would further imperil electric companies' ability to

continue to meet our and the Biden Administration's clean energy goals and to deliver reliable, resilient, and affordable electricity to the American people.

If you have any questions or need additional information regarding our comments, please feel free to reach out to me.

Sincerely,

/s/ *Scott Aaronson*

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Attachments

ATTACHMENT 1

EEI March 27, 2023, Comments on to DOE on Distribution Transformer Efficiency Standard Proposed Rule with Attachments

March 27, 2023

Mr. Jeremy Dommu and Mr. Matthew Ring
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0121
Submitted via: DistributionTransformers2019STD0018@ee.doe.gov

Re: Comments of the Edison Electric Institute on the Proposed Energy Conservation Program: Energy Conservation Standards for Distribution Transformers
Docket No. EERE-2019-BT-STD-0018

Dear Mr. Dommu and Mr. Ring,

The Edison Electric Institute (EEI) appreciates the opportunity to provide comments on the U.S. Department of Energy's (DOE's or Department's) *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 *Fed. Reg.* 1,722 (Jan. 11, 2023). EEI is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for about 220 million Americans and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States.

EEI's member companies are woven tightly into the fabric of our nation. For nearly 140 years, we have provided the energy that has sustained our customers and our communities, while powering our economy. EEI's member companies are proud to provide America's resilient clean energy and to be leading the transformation of energy. Fifty-one EEI members have announced forward-looking carbon reduction goals, 41 of which include a net-zero by 2050 or earlier equivalent goal, and members are routinely increasing the ambition or speed of their goals or altogether transforming them into net-zero goals.

EEI and its members are deeply concerned about the impacts that the timing and scope of change required by the proposed rule will have on electric companies' ability to continue to meet their obligation to serve amid a number of supply chain constraints and on our ability to continue the important work of the clean energy transition. As further detailed in EEI's comments, there are several alternatives to finalizing the proposed rule that would allow DOE to accomplish its goals while supporting the Administration's and the industry's clean energy goals. Instead of finalizing the proposed rule, DOE should either (1) adopt a lower trial standard level (TSL) that does not require a full move to amorphous steel; or (2) use its authority to issue a final determination that no new standard is required, which DOE then would be required to revisit within three years. In the interim period, and under either scenario, the Department should take decisive action to build critical domestic supply chain capacity *now* by investing significant funding to build up domestic supply chains and steel production capabilities.

If you have any questions or need additional information regarding our comments, please feel free to reach out to me.

Sincerely,

/s/ *Scott Aaronson*

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Senior Vice President, Security and Preparedness
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COMMENTS OF THE EDISON ELECTRIC INSTITUTE ON THE U.S. DEPARTMENT OF ENERGY'S ENERGY CONSERVATION PROGRAM: ENERGY CONSERVATION STANDARDS FOR DISTRIBUTION TRANSFORMERS

EERE-2019-BT-STD-0018

March 27, 2023

The Edison Electric Institute (EEI) appreciates the opportunity to submit comments on the U.S. Department of Energy's (DOE's or Department's) *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 *Fed. Reg.* 1,722 (Jan. 11, 2023). DOE proposes to adopt trial standard level (TSL) 4 as the new federal minimum efficiency standard for both single- and three-phased liquid-immersed distribution transformers, with an effective date of January 1, 2027. *See id.* at 1,833. DOE's proposal would functionally require that new liquid-immersed distribution transformers use amorphous core steel. And, indeed, DOE asserts that the energy savings under TSL-4 are "primarily achievable by using amorphous steel."[1] *Id.* at 1,832. However, at the present time, most transformers do not use amorphous core steel and the shift that DOE expects to its production has not yet occurred, meaning that access currently—and in the next several years—to transformers that would comply with the proposed standards is constrained. Improved transformer efficiency is important but cannot come at the expense of reliability.

[1] The Department therefore anticipates that manufacturers will undertake a shift to amorphous steel to meet this standard and as a result DOE assumes that "[a]lmost all transformers produced under the new standard would feature amorphous steel cores." U.S. Dep't of Energy, DOE Proposes New Efficiency Standards For Distribution Transformers, https://www.energy.gov/articles/doe-proposes-new-efficiency-standards-distribution-transformers.

EEI is the association that represents all U.S. investor-owned electric companies. EEI members provide electricity for more than 235 million Americans and operate in all 50 states and the District of Columbia. The electric power industry supports more than seven million jobs in communities across the United States. EEI members invest more than $130 billion annually to make the energy grid smarter, cleaner, more dynamic, more flexible, and more secure; to diversify the nation's energy mix; and to integrate new technologies that benefit both customers and the environment. EEI members are united in their commitment to get the energy they provide as clean as they can, as fast as they can, while keeping reliability and affordability front and center, as always, for the customers and communities they serve. Across the nation, EEI members are leading a clean energy transformation, making significant progress to reduce greenhouse gas (GHG) emissions, while also creating good-paying jobs and an equitable clean energy future. Efficiency and efficiency standards play an important role in the clean energy transition, and EEI's members support DOE's equipment efficiency standards when they are economically justified and technically feasible.

The continued clean energy transformation will require not only widespread deployment of new renewable electricity and other clean generating resources, but also new transmission lines to interconnect those resources to the energy grid and to keep that grid reliable and resilient in the face of extreme weather events. Critically, electric companies will need to install new distribution transformers to ensure the safe and reliable operation of the grid as it becomes more resilient and incorporates increasing amounts of renewable energy. Distribution transformers play the critical role of outputting the correct voltage of clean, reliable electricity directly to customers connected to the distribution system.

The capacity of the existing grid must increase by as much as 60 percent by 2030, and it may need to triple in size by 2050 to meet the growing demand for clean electricity to support a carbon-free economy.[2] Notably, and as DOE has reported, more than 930 gigawatts (GW) of solar, wind, hydropower, geothermal, and nuclear capacity currently are in interconnection queues seeking transmission access, as are more than 420 GW of energy storage.[3] The Biden Administration also has set a 2030 goal to deploy 500,000 electric vehicle (EV) chargers and for EVs to account for 50 percent of new light-duty vehicle sales. The growth and development of other sectors, including domestic manufacturing, commercial and residential buildings, and other critical infrastructure such as water, telecommunications, and natural gas, require additional electric grid capacity and increase the demand for critical grid components. To support the deployment of these resources and the concomitant expansion of the grid, a significant number of new transformers will be needed. Accordingly, delivering electricity to customers, responding to extreme weather, and continuing to meet the industry's—and the Administration's—clean energy goals will require reliable access to distribution transformers and related equipment.

EEI members strongly support energy efficiency efforts that help us reduce emissions and to meet electricity demand with fewer resources, including the Department's energy conservation

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[2] *See* Eric Larson et al., Net-Zero America by 2050: Potential Pathways, Infrastructure, and Impacts, Final Report Summary, at 76 (Princeton University, Oct. 29 2021), https://netzeroamerica.princeton.edu/img/Princeton%20NZA%20FINAL%20REPORT%20SUMMARY%20(29Oct2021).pdf.

[3] DOE, Queued Up…But in Need of Transmission: Unleashing the Benefits of Clean Power with Grid Infrastructure (Apr. 2022), https://www.energy.gov/sites/default/files/2022-04/Queued%20Up%E2%80%A6But%20in%20Need%20of%20Transmission.pdf.

standards program for consumer products and certain commercial and industrial equipment. The program has been one of the most successful energy efficiency efforts, due in large part to its focus on setting standards that are technically feasible and economically justified for a large 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. According to a recent report by the Edison Foundation's Institute for Electric Innovation, electric companies spent nearly $7 billion on efficiency programs in 2021, saving 237 billion kWh of electricity—enough to power 33 million U.S. homes for one year.

Despite the successes of the larger energy conservation standards program, the scope and effective date of DOE's proposed changes in the instant proceeding present significant concerns for the reliability, resilience, and security of the U.S. electric grid in the near- and medium-term. The electric power sector *already* is experiencing shortages of distribution transformers, smart meters, conductor, poles, and other critical equipment as electric companies continue the clean energy transition. Ensuring the electric industry's ability to respond to and recover from increasingly frequent and severe extreme weather events, often requiring more resource-intensive restorations, as seen over the past several years, also increases the demand for critical grid components. Electric companies must be focused on ensuring that sufficient critical equipment—including distribution transformers—is available when needed to help restore or rebuild following major events, while also building a cleaner, more reliable, and more resilient grid that can respond to coming storms and future challenges.

Ensuring an appropriate supply of distribution transformers is essential to EEI members' deployment of increasing amounts of clean energy, and to the resilient, reliable, and affordable grid operations that customers expect. DOE's proposal would exacerbate the existing supply chain concerns electric companies face by requiring that all distribution transformers be made from amorphous steel. As discussed in these comments, the Department should consider alternate paths that would allow DOE to accomplish its goals while supporting the Administration's and the industry's clean energy goals. These options would allow the United States to build critical domestic supply chain capacity that supports the clean energy transition in the long term, rather than finalizing a rule that puts electric grid reliability, resilience, and security at a potential risk. At the same time, DOE also should affirmatively invest significant funding to grow domestic supply chains and steel production capability to support grid reliability, resilience, and security. Investment must start now to build the capacity needed to meet transformer demand.

I. Electric Companies Continue to Lead the Clean Energy Transformation.

EEI members are engaged in a profound, long-term transformation in how electricity is generated, transmitted, and used. Preliminary full-year estimates are that electric power sector carbon emissions were 36 percent below 2005 levels as of the end of 2021, as low as they were in 1984.[4] These reductions will continue. Fifty-one EEI members have announced forward-looking carbon reduction goals, 41 of which include a net-zero by 2050 or earlier equivalent goal, and members are routinely increasing the ambition or speed of their goals or altogether transforming them into net-zero goals. EEI members are well-positioned to continue to lead the

[4] *See* EIA, Monthly Energy Review, Table 11.6—Electric Power Sector (Mar. 29, 2022), https://www.eia.gov/totalenergy/data/monthly/.

nation's clean energy transformation; across the industry, companies are investing in a broad range of affordable, carbon-free technologies and approaches with the goal of finding the most cost-effective ways to deliver resilient clean energy.

EEI's member companies see a clear path to continued emissions reductions over the next decade using current technologies, including nuclear power, natural gas-based generation, energy efficiency, energy storage, and deployment of new renewable energy—especially wind and solar—as older coal-based and less-efficient natural gas-based generating units retire. These technologies will continue to enable significant, cost-effective carbon reductions. In addition, EIA notes that coal use will continue to decline with the retirement of most of the relatively old and inefficient coal-fired electricity generating units in the United States.[5]

In the long term, reaching net-zero carbon emissions also will require the deployment of next-generation, carbon-free, 24/7, dispatchable technologies not currently available commercially. Developing a broad range of advanced clean energy technologies can help further expedite the transition of the electric power sector to one that is low- or non-emitting while keeping electricity affordable and reliable for customers.

II. There Are Significant Concerns Regarding Existing and Future Availability of Distribution Transformers.

The power sector has been experiencing severe and ongoing supply chain challenges that have prolonged and complicated availability of critical equipment to support this extraordinary

[5] *See* EIA, Annual Energy Outlook 2022: With Projections To 2050 – Narrative at 6-7 (Mar. 3, 2022*)*, https://www.eia.gov/outlooks/aeo/pdf/AEO2022_Narrative.pdf.

transformation. This includes persisting shortages of distribution transformers, smart meters, conductors, poles, and other critical equipment as electric companies continue the clean energy transition while also responding to storms and other natural hazards. In particular, distribution transformer production and availability has been a challenge since 2020 and EEI and its members have continued to raise awareness and concern regarding these shortages with DOE since 2021. The inability to quickly manufacture and deliver these critical components threatens the electric sector's ability to service current and planned housing markets, swiftly recover and restore service following natural disasters or other destructive events, and to deliver the benefits of economy-wide electrification. Under existing production output capabilities, manufacturers estimate the current order-cycle for most new distribution transformers to be longer than 16 months, while historically this equipment had a lead time of fewer than 10 weeks (2.5 months).

Last June, DOE and the Electricity Subsector Coordinating Council agreed to establish an industry-government "Tiger Team" to examine the supply chain crisis. In August 2022, the Tiger Team surveyed investor-owned electric companies, public power utilities, and electric cooperatives to provide DOE with data on existing stocks of distribution transformers, lead times to procure new distribution transformers, and project delays and cancelations caused by distribution transformer shortages. Despite electric companies taking any and all steps available to continue providing reliable electric power to U.S. customers,[6] the August 2022 Tiger Team survey results showed that 90 percent of investor-owned electric companies reported a "high"

[6] Electric companies have been taking extraordinary measures to meet current demand with the limited supply of equipment that is available, including refurbishing and repairing older equipment to extend its lifespan as much as possible. Furthermore, while domestic procurement is highly preferred for critical grid components to protect the security of the grid, electric companies have resorted to purchasing more equipment from overseas manufacturers.

(within one month) or "medium" (within one quarter / three months) risk of running out completely of at least one distribution transformer voltage class. Notably, EEI members reporting a "high" risk of stocking out accounted for 40 percent of that total. The survey also found that lead times to procure distribution transformers had risen more than 400 percent between 2020 and 2022, that current transformer production is not meeting demand, and, critically, that demand is expected to increase for the foreseeable future. *See* Attachment A, Joint Comments of EEI, APPA, and NRECA in Response to DOE Request for Information on Defense Production Act (Nov. 30, 2022).

In addition to potential impacts to national security resulting from increased reliance on foreign manufacturers and impacts to the electric industry's ability to respond to and recover from natural disasters and malicious attacks on equipment,[7] prolonged shortages of critical grid components can impact the economic growth of other sectors. This includes growth of domestic manufacturing, commercial and residential building, and other critical infrastructure such as water, telecommunications, and natural gas. In fact, the August 2022 Tiger Team survey found that 60 percent of investor-owned electric companies have had to delay or cancel scheduled projects because of a shortage of distribution transformers, which directly affects development in other sectors.

[7] Over the past few years, the electric industry has seen a trend of increasingly frequent and severe extreme weather events, including hurricanes, snowstorms, and wildfires, that require increasingly resource-intensive restorations. The electric industry also has experienced a recent uptick in physical attacks on critical grid equipment, including transformers.

For example, one EEI member has reported that its distribution transformer stocks currently are 50 percent below normal levels going into storm season and that it is delaying projects to ensure it is ready and prepared for storm season. Another EEI member reported that its supplier is now taking orders for delivery in 2027. Delivery delays have reached the point that the member company holds a meeting each Friday morning to ration transformers, determining which customer projects will receive a transformer and which projects will not. Many customer projects have been delayed by several months. Another EEI member has noted that it is continuing to experience long lead times and face challenges in limited availability of distribution transformers across several voltage classes. As it continues to operate at low inventory levels, this member company reports that it is at medium to high risk of not being able to support emergency outages and meet reliability expectations. Additionally, with the extended lead times and increased demand this member's distribution transformer inventory is 52 percent of what is needed to support customer growth and respond to emergencies effectively.

II. DOE's Proposed Standard Raises Significant Concerns Under EPCA.

DOE derives its authority to set efficiency standards for covered products from the Energy Policy and Conservation Act (EPCA). Pursuant to EPCA, DOE is required to consider specific information when prescribing new or amended standards. Critically, this includes consideration of the availability of covered products, as well as the practicability to manufacture, install, and service the technology at the time of the effective date of the standard and the economic impact of the standard on consumers. The proposed standard raises significant concerns with respect to each of these points and should not be finalized. Instead, DOE should either make a "no new standard" final determination or finalize a standard at a level that allows multiple higher efficiency models of GOES and amorphous steel core transformers to be available to electric

companies. Either is a decision that DOE could modify when it next revisits the efficiency standards, at which point the relevant supply chains may be sufficiently mature to support broader use of amorphous steel core transformers without significantly risking U.S. electric grid reliability, security, and resilience. Deferring action now would recognize the significant reliability concerns inherent in constrained access to distribution transformers. However, DOE can revisit the appropriateness of the decision in three years and, if the changes in the steel production market have come to fruition, move forward with stricter standards. *See* 42 U.S.C. § 6313(a)(6)(C)(iii)(II).

A. DOE's Proposal Raises Significant Concerns Regarding the Availability of Distribution Transformers.

In pertinent part, EPCA provides that "[t]he Secretary may not prescribe an amended or new standard if interested persons have established by a preponderance of the evidence that the standard is likely to result in the unavailability in the United States of any covered product type (or class) of performance characteristics (including reliability), features, size, capacities, and volumes that are substantially the same as those generally available in the United States." 42 U.S.C. § 6316(a), 42 U.S.C. § 6295(o)(4).

As DOE is aware, the electric power sector is experiencing shortages of distribution transformers, smart meters, conductor, poles, and other critical equipment as we continue our sector's clean energy transition while also responding to recent storms and disasters. The power sector's primary objective is to ensure that we have enough critical equipment—including

distribution transformers—available when needed to help build a cleaner, more reliable, and more resilient grid that can respond to coming storms and other challenges.[8]

As an overwhelming number of commenters explained during DOE's February 16, 2023, public hearing on the proposed standards, DOE's proposal would exacerbate the existing supply chain concerns faced by entities across the distribution transformer value chain, including EEI members.[9] Requiring all distribution transformers to be made from amorphous steel cores to

[8] It is worth noting that current distribution transformers are highly efficient infrastructure, and that they play an important role in delivering electricity to customers safely, efficiently and cost effectively.

[9] Approximately 85 percent of the discussion captured in the February 16 Hearing Transcript that is not attributable to DOE staff or its contractors was provided by commenters raising concerns about the proposed rule. OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T. OF ENERGY, TRANSCRIPT: IN THE MATTER OF: NOTICE OF PROPOSED RULEMAKING (NOPR) FOR DISTRIBUTION TRANSFORMERS (STANDARDS) (Feb. 16, 2023) (hereinafter "Hearing Transcript"). These commenters comprise 26 of the 29 non-DOE related entities that provided public hearing comments. *See, e.g.,* Hearing Transcript, Comments of Howard Industries at pp 9-12 ("[A]ll this is going to do is exacerbate a problem that we have already in today's supply-chain issues."); Hearing Transcript, Comments of Cleveland-Cliffs at pp 16-20 ("The proposed efficiency standard, if implemented as-is. . . would severely exacerbate the already-strained availability of distribution transformers needed to maintain, modernize, and green the electric grid."); Hearing Transcript, Comments of Xcel Energy at pp 20-22 ("Currently, you know, we're suffering through being able to get adequate supply. . . . Transformers form the backbone of the distribution system, and all of this is going to be placed in jeopardy and is currently delaying, frankly, as things sit right now. Our manufacturing base needs additional time to have capacity available to supply the transformer manufacturers who, in turn, supply us. This runway is not long enough to allow for that."); Hearing Transcript, Comments of Idaho Falls Power at pp 29-30 ("I can't help but think that that's only going to compound the problem of demand for transformers in an environment where we're having to totally change over how they're manufactured and made."); Hearing Transcript, Comments of Theresa Pugh Consulting at pp 38-40 ("This 45-to-56-month delay is reflecting current use of steel, not any changes or any sort of manufacturing transformations that would have to take place. There's no question in my mind that this is going to create additional vendor supply problems beyond what the current transformer technology situation is with electric utilities having to wait for transformers."); Hearing Transcript, Comments of the Coalition for a Reliable Electric System at pp 45-47 ("[W]e are very concerned about disruptions in an already-fragile supply chain environment. I'm not saying we're against this in the very long run, but right now I am not sure that this is the time to undertake a rulemaking which would have such wide-reaching and long-term impacts in such

meet the proposed efficiency level will negatively impact availability and production capacity in the near- and medium-term. In the United States today, there is only one relatively small domestic producer of amorphous core steel, which represents less than five percent of the existing distribution transformer market. This producer has stated publicly that it could increase its operations and scale up to 20 percent of the market share.[10] This clearly is not sufficient to meet existing demand,[11] let alone the increased demand anticipated as a result of a shift towards greater electrification and the clean energy transition.

Compounding this concern, without federal support to transition its production to amorphous steel, the sole domestic producer of grain-oriented electrical steel (GOES)—which currently dominates the distribution transformer market—will either shift production away from

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a short period of time."); Hearing Transcript, Comments of JEA at pp 56-57 ("[W]e've been struggling for several years now because of COVID, supply chain issues, to get distribution transformers. And so we have. . . a serious concern how this is going to further impact or exacerbate that problem . . . forcing manufacturers to adopt this and utility is just going to be detrimental, honestly."); and Hearing Transcript, Comments of ComEd at pp 58-59 ("Hearing about the transition issues, we have severe concerns about exacerbating existing supply chain issues which will put federal reliability at-risk. And if lead times don't come down to, kind of, historical norms, the longer this continues, the more we place the grid at risk.").

[10] Walton, R., Utility Dive, *Proposed distribution transformer standards 'could significantly impact' grid reliability, utilities warn DOE*, (Feb. 17, 2023), https://www.utilitydive.com/news/doe-efficiency-distribution-transformers-eei-appa/642912/. *See also* Hearing Transcript, Comments of Metglas at p 38 ("Metglas here in Conway, South Carolina, currently has an installed capacity of 45,000 metric tons and can readily increase capacity another 75,000 metric tons within 30 months.").

[11] During the February 16 public hearing, commenters noted the challenges with meeting this demand. For example, Howard Industries explained that "[t]here is not enough amorphous capacity in the world to handle the market today. . . . there would have to be 15 to 20 lines to put in to be able to compensate for the capacity associated with the needs for the distribution transformer market. And the timeline associated with that is unreasonable to be able to do that – plus the conversions that we would have to make." Hearing Transcript at pp 79-80.

transformer GOES or will discontinue GOES production entirely well in advance of the January 1, 2027, proposed effective date.[12] Either option further imperils the current and future supply of distribution transformers, and with it the availability of distribution transformers that electric companies need to continue building a clean, reliable, and resilient grid.

The type of steel utilized in distribution transformers is not the only challenge presented by the proposed standards. As DOE heard in its February 16 hearing on the proposed rule, the vast majority of existing distribution transformer manufacturers have created manufacturing lines geared towards the production of GOES-based transformers.[13] In order for these production lines to switch to the use of amorphous core steel, they will need to be retooled and redesigned—which will result in significant downtime when those lines will not be producing distribution transformers the industry can deploy. More specifically, manufacturers noted during the February 16 public hearing that they would require significant time to make this transition.[14]

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[12] *See* Hearing Transcript, Comments of Cleveland-Cliffs at pp 53-54 (explaining that "the vast majority of the electrical steels that Cleveland-Cliffs produces out to its Butler Works and Zanesville Works steel mills are those materials that are bound for incorporation into distribution transformers. And without that volume, without that business, it fundamentally breaks the economics of our electrical steel production; meaning that if this rule were to go forward as-proposed, we would be jeopardizing not only the availability of GOES for distribution transformers, but also the availability of GOES for power transformers and the availability of NOES for use in the most highly efficient electric motors, as well as in EV motors.").

[13] *See infra* note 14.

[14] Hearing transcript, Comments of Howard Industries, p 10, lines 7-14 ("The three years that you discussed in that time period is really no three years; it's more like 18 months, because we had to start our conversions much faster than the three-year time period. It's not like flipping on a light switch to change over from one to another. . . ."); Comments of Central Moloney, Incorporated, at pp 14-15 ("To my knowledge, the transformer manufacturers use very little amorphous . . . and none of the transformer manufacturers are set up to be able to run amorphous steel. And that is not going to be achievable by 2027, by any stretch. So if we think we've got transformer problems now, go this route."); Comments of WEG Manufacturers at pp 24-25 ("The timeline itself is very tight. I think we would be looking at a minimum five-to-seven-year

This lack of active production capacity while existing stockpiles already are low presents a deeply concerning risk to the industry and could result in a widespread lack of availability.[15] Already long lead times not only could be compounded, but DOE's proposal creates the real potential that the industry will not have the distribution transformers needed to respond to natural disasters or other destructive events while also continuing to build and expand a clean, reliable, and resilient grid.

A lack of distribution transformers also can negatively impact the electric sector's ability to provide mutual assistance. Mutual assistance is an essential part of the electric power industry's service restoration process and contingency planning and a hallmark of the electric industry's culture of coordination. EEI's mutual assistance programs are built on a voluntary partnership of investor-owned electric companies across the country committed to helping restore power whenever and wherever assistance is needed. Through mutual assistance, electric companies impacted by a major outage event can request help from electric companies across the country. When called upon, a company will send skilled restoration workers—both company employees

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transition from our side, and like Howard said, the investment along is tremendous."); Comments of Carte International at pp 26-28 ("This is a very big change, to go to amorphous. We do no amorphous core steel, at the moment. We have a large-order backlog of two-plus years, so a changeover in anything that's going to happen would have to be further out than that."); and Comments of Hitachi Energy, USA at pp 28-29 ("I would also like to voice similar concerns to some of the other manufacturers in regards to material availability. . . [a]nd also, again, similar concern when it comes to the timeframe required to implement these manufacturing changes for the use of amorphous core steel in our factories.").

[15] DOE also must consider that manufacturers will need time to optimize software, which is often proprietary, and type-test new core and coil designs as very few manufacturers have real world experience with amorphous core material. In addition, amorphous steel is thinner and more brittle than traditional core steel. This will require different core construction techniques and must be resolved in order to maintain transformers' useful life.

and contractors—along with specialized equipment to help with the restoration efforts of a fellow company. The ability to pool resources, including people and equipment, is essential to allowing electric companies to respond quickly and effectively to restore power when confronted by significant weather events. These programs rely on a ready supply of distribution transformers and other equipment to support power restoration. Without that ready supply, which is a realistic possibility if DOE moves forward with its proposal, mutual assistance and system resilience likely will suffer as companies will be less likely to share equipment that already is in short supply, in order to preserve it to serve their own customers.

Key stakeholders—including the electric companies who install and service distribution transformers and rely on their availability to provide reliable service to customers, distribution transformer manufacturers, and domestic steel producers—have provided evidence to DOE demonstrating that the proposed standard will result in the unavailability of compliant distribution transformers in the near- to medium-term. The provision of this information predominated the Department's February 16 public hearing[16] and is evident in multiple stakeholders' written comments. Accordingly, pursuant to EPCA's statutory requirements, DOE should not finalize the proposed standard.

B. DOE's Proposal Raises Significant Concerns Regarding the Practicability to Manufacture, Install and Service Amorphous Core Distribution Transformers at the Time of the Effective Date.

In its regulations implementing EPCA, DOE explains that "[t]he factors for screening design options include: . . . (ii) Practicability to manufacturer, install and service. If mass production of a technology under consideration for use in commercially-available products (or equipment) and

[16] *See, e.g., supra* notes 9 and 11-14 and *infra* notes 18 and 27-29.

reliable installation and servicing of the technology could be achieved on the scale necessary to serve the relevant market at the time of the effective date of the standard, then that technology will be considered practicable." 10 C.F.R. Part 430, Subpart C, Appendix A, § 6(c)(3)(ii). DOE's regulations further explain that "[i]f it is determined that mass production of a technology in commercial products and reliable installation and servicing of the technology could not be achieved on the scale necessary to serve the relevant market at the time of the compliance date of the standard, *then that technology will not be considered further*." *Id.* at § 7(b)(2) (emphasis added).

As discussed in greater detail below, in the midst of existing supply chain constraints, DOE's proposed standards will require significant changes across the value chain associated with distribution transformers. The scope of these changes raises significant concerns regarding the practicability of manufacturing and of reliably installing and servicing amorphous core distribution transformers by the proposed effective date. To the extent that GOES manufacturers respond to finalization of the proposed rule by reducing or discontinuing GOES operations in advance of the effective date, the need to rely on amorphous core distribution transformers may arise much earlier than January 1, 2027. Moving this goal post back will only further reduce the amount of time to resolve challenges across the relevant supply chains and further impact the practicability of implementing DOE's proposal while maintaining reliability, security, and resilience.

As noted, distribution transformers are a critical component of a larger system that enables electric companies to meet their obligation to serve. To ensure that it is not impeding the ability

to meet this important responsibility and that it is adequately protecting the reliability, security, and resilience of the U.S. electric grid, the Department must carefully consider amended or new efficiency standards for distribution transformers. In doing so, DOE must avoid proposed standards, such as this one, that would compound and exacerbate existing constraints and thereby imperil electric companies' ability to reliably install and service this critical equipment.

1. There are Significant Concerns with the Practicability of Manufacturing Distribution Transformers Under the Proposed Standard by the Proposed Effective Date.

As noted above, not only are existing supply constraints causing protracted lead times for current distribution transformers, but distribution transformer manufacturers have reported the need for significant time to retool and redesign their production lines to accommodate amorphous steel core designs.[17] During DOE's February 16 public hearing, several manufacturers explicitly noted that it would be impracticable, if not impossible, to meet DOE's proposed effective date given the changes required. Moreover, electric companies will need to update and redesign the specifications that they provide to manufacturers. In addition to raising significant concerns with the practicability of manufacturing compliant distribution transformers by the proposed effective date, these circumstances considerably increase the likelihood that electric companies will not have the necessary supplies of distribution transformers to continue to deliver electricity to our customers, restore service after the increasing and increasingly damaging extreme weather and wildfire events, and continue the important work of the clean energy transition.

[17] *See supra* note 14.

2. There are Significant Concerns with the Installation and Service of Distribution Transformers Under the Proposed Standard by the Proposed Effective Date.

As discussed in greater detail below, distribution transformers that comply with the proposed standards are expected to be larger and heavier than those currently deployed. This increased size and weight are expected to have multiple impacts on installation and service equipment,[18] including requiring: (1) additional wood pole replacements to accommodate the greater size and load that new distribution transformers will require while protecting safety and reliability; (2) additional or modified truck fleets to ensure adequate space and payload for transporting distribution transformers for installation; and (3) modified equipment and labor for installation and service, including the use of cranes, to support the increased size and weight of new distribution transformers.

As further detailed below, wood poles currently are facing supply chain constraints that would be compounded and exacerbated by the increased need for pole replacements anticipated to stem from DOE's proposed standard. The combination of this expected increased need and the ongoing supply chain constraints in the wood pole market make it impracticable to reliably install and service compliant distribution transformers by the proposed effective date.

Moreover, current delays in receiving transformers will be exacerbated by the need for additional fleet vehicles to deliver units. From a fleet management perspective, there is currently an 18-

[18] *See, e.g.,* Hearing Transcript, Comments of ComEd at p 58 (explaining that "larger and heavier transformers will potentially increase customer outage durations as the result of needing to upgrade other infrastructure, such as poles and foundations, to accommodate larger and heavier transformers.").

month lead time for procuring new trucks and cranes for distribution transformer installations, and some EEI members are being asked to provide three-year projections of their fleet vehicle needs. EEI members also have reported that fleet suppliers have seen shortages across multiple critical aspects of their supply chains, including chips, components, and fiberglass material. The combination of the expected increased need for trucks and cranes to install compliant distribution transformers and the ongoing supply chain constraints for the required fleets would make it impracticable to reliably install and service compliant distribution transformers by the proposed effective date.

i. DOE's Proposal Will Exacerbate Ongoing Supply Constraints for Utility Poles and Significantly Impact the Ability to Reliably Install and Service New Distribution Transformer at the Time of the Effective Date.

In the Technical Support Document (TSD), DOE provides estimates of the weights of different transformers at different efficiency levels (minimum, maximum, and typical weights). For liquid immersed distribution transformers under TSL-4, the "typical" total weight as shipped increases by between 7.7 percent to 44.5 percent, with the majority of weight increases being more than 16 percent.[19] Representative units 1 and 2 in Table 8.2.3 of the TSD are the single-phase units that EEI members (and the rest of the industry) rely on most heavily. Notably, the "typical" total weight as shipped for representative units 1 and 2 increases under TSL-4 by 44.5 percent (a 397-pound increase) and 29.2 percent (a 154-pound increase), respectively.[20]

[19] U.S. Dep't of Energy, *Technical Support Document: Energy Efficiency Program for Consumer Products and Commercial and Industrial Equipment: Distribution Transformers*, at Table 8.2.3, pp. 8-15 (Dec. 2022).

[20] *Id.*

The total weight as shipped is critical as it is used to determine whether the design of equipment to install and service distribution transformers is sufficient to protect safety and reliability. The increased weight and size of transformers under TSL-4 is likely to necessitate wood pole replacements, bracket replacements, and larger new or replacement concrete pads. For example, Duke Energy notes in its comments on this proposed rule that "[i]n many instances, a 20% increase in transformer weight will require pole changeouts." As noted above, "typical" total weight for representative units 1 and 2 under TSL-4 is expected to significantly exceed 20 percent. In addition, the increased weight and size will require more or larger new trucks to transport distribution transformers to the point of installation and different equipment to support installation.

Utility poles are vital to continuing to meet the need to hold overhead utility lines and distribution transformers. Wood poles are particularly critical given that alternatives such as steel, composite, or fiberglass, are considerably more expensive—and face their own supply chain challenges as well. As noted, the wood pole industry currently is facing shortages.[21] For example, one EEI member has reported that the lead times for one type of wood pole have increased from 5-10 days to 6-8 weeks, which will only be exacerbated by DOE's proposed rule. The increased frequency and severity of natural disasters have increased the need for replacement pole production, as has the need to exchange existing poles with larger and taller

[21] On the production side of wood poles, the bottleneck of the process is treating the wood to become a utility wood pole. With the global supply chain crisis and delays in container ships crossing the Pacific Ocean, suppliers have struggled to get maintenance parts for their treatment machinery. Similarly, treatment chemicals have been in short supply from their sources worldwide when production is unpredictable with COVID-19 outbreaks and shutdowns. These two causes tighten an already constrained treatment process and exacerbate wood pole shortages further.

poles to allow for broadband line clearance.[22] Combined with increased government funding for infrastructure, this increased demand is causing a ramp-up in projects planned through 2027 and beyond.[23]

A move to amorphous steel core distribution transformers will require poles with sufficient strength and pole space to accommodate their heavier weight and larger size. Replacements of current poles with larger pole classes are anticipated to be a necessary consequence of DOE's proposal. This is the case even where larger class poles already are deployed as other technologies—e.g., broadband, fiber optics, 5G wireless and other pole attachments—have been utilizing space on EEI member company utility poles.[24]

Requiring a change that is likely to necessitate wood pole replacements at a time when there already is shortage will further strain this market and negatively impact the ability to reliably

[22] These larger class poles are already much more difficult to obtain than the scarce smaller class wood poles. The smaller poles more closely fit how trees naturally grow. Fewer trees reach the size required for larger class poles, and timber owners are much less willing to wait for trees to grow larger.

[23] Wood poles are larger freight and therefore are frequently shipped via rail. With rail capacity constrained, shipping via truck has increased for wood poles—but it requires four trucks to ship the equivalent of one railcar. There is also a shortage of boom trucks able to unload poles at their destination. New boom trucks have been difficult to source with the shortage of semiconductor chips constraining availability of truck chassis.

[24] Electric company poles increasingly represent a critical input in broadband and 5G wireless deployments, as attachment to existing pole networks is the most efficient means to expand high-speed broadband access to currently unserved areas of the country. *See* Michael O'Rielly, Inside Sources, *Boring Poles are Secret to More Broadband*, (Dec. 8, 2021), https://insidesources.com/boring-poles-are-secret-to-more-broadband/ (Former Federal Communications Commission (FCC) Commissioner O'Rielly states that "[t]hese poles, along with rights-of-way, are essential to bringing high-speed broadband to unserved Americans and offering new choices"). The increased size and weight of amorphous steel core distribution transformers has the potential to limit the space available on electric company poles to deploy critical broadband and 5G wireless technologies.

install and service the distribution transformers by the proposed effective date. Wood poles are a critical component to deploying distribution transformers and to ensuring the reliability and resilience of the U.S. electric grid. This includes responding to weather events, which are increasing in frequency and impact, as well as continuing progress towards EEI members' and the Administration's clean energy goals.

EEI members report that pole replacement during storms range based on the size and impact of the storm. This can range from hundreds to thousands per storm. One EEI member reports that in the last five years, it has seen as many as 4,200 poles used in one storm that hit its territory and that, for most storms, the ratio of transformer replacements to pole replacements is close to one-to-one.[25] Given that existing wood poles would have to be replaced to accommodate amorphous core distribution transformers, there will be further strain on the availability of this critical equipment that is necessary for power restoration following storms, natural disasters, and other destructive events.

In light of these related supply chain issues, which DOE has not contemplated or addressed in the proposed rule, DOE should consider alternatives that would reduce the need for wood pole replacements in the near- to medium-term to allow the wood pole market to stabilize.

[25] Moreover, EEI members are reporting labor shortages, particularly during storms.

ii. The Proposal Also Would Impact Replacement Capabilities Across the Industry and Significantly Affect the Ability to Reliably Install and Service New Distribution Transformer at the Time of the Effective Date.

The increased size of distribution transformers that comply with the proposed rule also increases space demand in flatbed trucks and may require new trucks to transport transformers, as well as new or additional warehouse space and equipment, such as forklifts.[26] For example, an EEI member has reported that a 1-inch increase in the distribution transformer size diameter would result in a loss of up to 35 percent of truck space on one-quarter of the deliveries from their distribution transformer supplier. In addition, the increased weight of compliant distribution transformers will have an impact on the number of distribution transformers that an individual truck can carry. This is due to both truck weight limits and weight limits for roads and bridges, particularly in rural areas.

The increased size and weight of the distribution transformers also will present challenges at the installation site. For example, the increased weight may exceed overhead weight restrictions for pole and pad-mounted installation. Duke Energy notes in its comments to the Department on this proposed rule that "[i]f pole mounted transformers increase in height, there will also be instances of consequential National Electric Safety Code ("NESC") clearance violations that will need to be addressed, most likely through changing the pole out to accommodate adequate clearance and working space." The larger size of amorphous core distribution transformers may require that the pads for pad mounted transformers "be redesigned and replaced to avoid potential safety hazards

[26] *See, e.g.,* Comments of Duke Energy on DOE's Energy Conservation Program: Energy Conservation Standards for Distribution Transformers, EERE-2019-BT-STD-0018.

and NESC violations. Additionally, any transformer replacements requiring a pole or pad changeout due to the increased size and weight will result in longer outage durations." *Id.*

Additionally, heavier transformers may exceed the weight limits for line trucks. As a result, there also may be a need to coordinate the use of cranes to install the heavier transformers.[27] For example, some EEI members have reported that they use cranes to install transformers exceeding 5,000 pounds, which at present generally applies to distribution transformers rated from 750 to 2,500 kVA. It is anticipated that the increased weight of distribution transformers that would comply with DOE's proposed rule will result in the need to use cranes for 500 kVA distribution transformers as well. For at least one EEI member, this would more than double the total number of sites where a crane is required.

Requiring new or additional trucks, as well as cranes, not only will have environmental impacts by increasing the amount of heavy-duty vehicle traffic, but also will require additional time to restore electrical systems that have been impacted by severe weather conditions and could strain existing resources by requiring greater numbers of trained crews to install more complex distribution transformers transported on a greater number of vehicles.[28]

[27] As ComEd explained during the February 16 public hearing, "we have legacy overhead installations where the pole is installed between two backyards behind homes, but there's no alley or driveway in order to get a boom truck to replace a failed transformer, in which case the crews have to roll what we call. . . a rear lot cart, to raise the transformer to be able to install it on the pole. And those rear-lot carts to have a limited capacity, so having a larger, heavier transformer, the pole may be able to support, but we may have difficulty, based on the capacity of the rear-lot cart, lifting it and getting it up and installing it in that rear-lot application." Hearing Transcript at pp. 119-20.

[28] *See, e.g.,* Hearing Transcript, Comments of Howard Industries at p 128 ("[Y]ou've got to take that consideration where you had a two-man crew going in to replace the transformer when you

This increased size also could have significant impacts on replacing distribution transformers in space and weight constrained environments. As ComEd explained during the February 16 public hearing, "there is an existing defined vault space and egress path through a building to get to a vault, which are difficult, if not impossible, to expand. And those requirements are typically on the customer to provide the utility the vault and the path to the vault, and for them to have to expand paths to the vault or increase the size of a vault could be a real financial hardship on a customer. As well as freight elevator weight limits that, if a larger and heavier transformer doesn't fit in the freight elevator or it can't support the weight, the customer needs to be upgraded to be able to transport that transformer to their vault."[29] Another EEI member has reported that it has a number of transformers in urban areas that would be very challenging to replace as they are located in buildings and vaults that are not accessible with equipment, or have access points that are smaller than the transformers themselves. Currently, if there is a need for maintenance or repair, this member's technicians go onsite to work on the distribution transformers rather than transport them to the shop due to these constraints. Replacing these transformers would be very time, labor, and cost intensive.

There are alternatives to the proposed rule that would provide additional time to build up these aspects of the larger ecosystem and avoid placing the reliability, security, and resilience of the

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had an outage. Now, you're going to have a three-truck crew going out there to do the same thing. And so that relates to efficiency of them for outage times related to utilities.").

[29] Hearing Transcript, Comments of ComEd at pp 58-59. *See also id.* at p 120 (explaining that "one of my biggest concerns are emergency replacements, where you have a vault, a failure, you need to replace it. You certainly can't expand the vault in a short period of time, and something larger and heavier trying to maneuver it through a building and through the equipment opening into the existing vault. I mean, we do have limitations, and this is why our specifications have strict size dimensions and weight limitations for indoor applications.").

U.S. electric grid and the progress towards clean energy goals at risk. The Department can and should avail itself of these options.

C. Maintaining a Reliable Grid is Essential to Customers and the Economy.

In determining whether a proposed standard is economically justified under EPCA, DOE must determine that the benefits of the proposal outweigh the burdens. In reaching that conclusion, DOE must evaluate seven factors, including "the economic impact of the standard on . . . consumers of the products subject to the standard." 42 USC 6316(a), 42 USC 6295(o)(2)(B)(i)(I)-(VII)).

The principal consumers of distribution transformers are electric companies, since they are purpose-built to allow homes, businesses, and factories to interconnect to the electric grid. If DOE moves forward with an efficiency standard that substantially limits the availability of these crucial products, then DOE's analysis must consider the significant economic consequences that will result, including the potential impacts on electric customers.

As set forth above, DOE's proposed rule will exacerbate existing supply constraints for distribution transformers and related equipment at a time when demand to meet the electric sector and nation's needs is high and expected to increase. Further limiting the supply of this necessary equipment will increase costs to electric companies and customers. Moreover, such action would imperil electric companies' ability to provide reliable power and restore power quickly following a significant weather event or natural disaster. Delayed power restoration and system outages have significant negative economic impacts for American customers. These include disruption of business activities; loss of perishable items that would require refrigeration; loss of telecommunications capacity; impacts on emergency operations; and many other essential

functions. The more acute the supply limitations for any of the necessary equipment discussed in these comments, the more significant these impacts will be.

DOE must factor these potential economic impacts into its analysis of the proposed standard under EPCA and should not finalize the proposed standard.

III. The Proposed Standards Undermine the Administration's Goals to Onshore Energy Jobs and Strengthen Domestic Supply Chains.

A consistent goal of the Biden Administration has been to increase American jobs and to bolster U.S. supply chains and reduce our dependence on foreign suppliers. The proposed standards undermine these goals in several ways.

With respect to domestic supply chains, the proposed rule will replace a fully domestic supply chain with one that relies on foreign imports. More specifically, the current domestic supplier of GOES steel is a mining to production operation with a fully domestic and integrated supply chain. The sole domestic amorphous steel producer uses imported iron-ore substrate, and it is anticipated that such reliance on foreign suppliers would increase if the proposed standard is finalized.

In addition, the proposed rule will increase need for foreign-sourced products. DOE's proposal will cause a shift from GOES, for which the current domestic supplier serves the majority of the U.S. distribution transformer market, to a type of steel that currently comprises less than 5 percent of the market, with the reported potential to scale up domestic production to a maximum of 20 percent, as discussed above. Relying on foreign manufacturers increases risks related to physical and cybersecurity and reduces confidence in the ability to consistently and reliably

procure equipment. In addition, a shift to foreign suppliers will have a negative impact on delivery times while eliminating American jobs. Outside the United States, there is amorphous steel production in China and Japan, with capacity in Germany and South Korea. The United States has experienced challenging relations with China in multiple Administrations and those issues continue in the current Administration. Furthermore, there is the potential that the United States will increase trade sanctions with China as a result of Russia's ongoing war in Ukraine. As recent events have demonstrated, reliance on such a trading partner can have real-world consequences and can significantly constrain energy markets. This outcome for distribution transformers would not only negatively impact the United States' ability to meet it clean energy goals, but could have substantial impacts on the reliability, security, and resilience of the U.S. electric grid.

In addition to potential security concerns, procuring amorphous steel from these counties will require transportation on vessels. This, in turn, will significantly increase transit time and exacerbate existing supply chain challenges while shortages already exist for distribution transformers.

IV. The Department Should Choose a Standard That Allows the Continued Use of GOES In Distribution Transformers

As EEI and others have explained,[30] the federal government must prioritize the electric power industry and domestic critical equipment manufacturers for available funding. Manufacturers have reported that labor shortages are the most immediate barrier to increased production.

[30] *See* Attachment A; and Attachment B, Joint Letter from National Electrical Manufacturers Association, APPA, NRECA, EEI, Leading Builders of America, National Association of Homebuilders, and GridWise Alliance to Sec. Granholm (Feb. 15, 2023).

Possible opportunities to increase the labor pool include providing relocation incentives to employees and providing legal support to non-documented workers. Manufacturers have also expressed a hesitancy to invest in grid component production due to uncertainty that demand will continue to stay high. Possible opportunities to mitigate this concern include providing a "purchase guarantee" or "loan guarantee" to manufacturers to ensure they can invest with confidence in long term capacity growth.

There are several alternatives to finalizing the proposed rule that would allow DOE to accomplish its goals while supporting the Administration's and the industry's clean energy goals. These options would allow the U.S. to build critical domestic supply chain capacity, rather than finalizing a rule that puts electric grid reliability, resilience, and security at a potential risk. Instead of finalizing the proposed rule, DOE should either (1) adopt a lower trial standard level (TSL) that does not require a full move to amorphous steel; or (2) use its authority to issue a final determination that no new standard is required, which DOE then would be required to revisit within three years. In the interim period, and under either scenario, the Department should take decisive action to build critical domestic supply chain capacity *now* by investing significant funding to build up domestic supply chains and steel production capabilities. Such action should include leveraging existing authorities and funding designed for these purposes, including funding under the Inflation Reduction Act and DOE's Title 17 loan authorities.

V. Conclusion

EEI appreciates the opportunity to comment on this proposed rule and looks forward to continuing to engage with the Department on this important issue. If you have any questions, please contact Scott Aaronson at saaronson@eei.org.

COMMENTS OF THE EDISON ELECTRIC INSTITUTE ON THE U.S. DEPARTMENT OF ENERGY'S ENERGY CONSERVATION PROGRAM: ENERGY CONSERVATION STANDARDS FOR DISTRIBUTION TRANSFORMERS

EERE-2019-BT-STD-0018

March 27, 2023

ATTACHMENT A

November 30, 2022

Submitted via *dpaenergy@hq.doe.gov*

RE: Request for Information (RFI) on Defense Production Act

To Whom It May Concern:

We appreciate the opportunity to provide our perspective in response to the Department of Energy's (DOE) Request for Information (RFI) on the Defense Production Act (DPA).

The American Public Power Association (APPA) is the national trade organization representing the interests of the nation's 2,000 not-for-profit, community-owned electric utilities. Public power utilities are located in every state except Hawaii. They collectively serve over 49 million people and account for 15 percent of all sales of electric energy (kilowatt-hours) to end-use customers. Public power utilities are load-serving entities, with the primary goal of providing the communities they serve with safe, reliable electric service at the lowest reasonable cost, consistent with good environmental stewardship. This orientation aligns the interests of the utilities with the long-term interests of the residents and businesses in their communities.

The Edison Electric Institute (EEI) is the association that represents all U.S. investor-owned electric companies. Our members provide electricity for more than 235 million Americans, and operate in all 50 states and the District of Columbia. As a whole, the electric power industry supports more than 7 million jobs in communities across the United States. In addition to our U.S. members, EEI has more than 65 international electric companies as International Members, and hundreds of industry suppliers and related organizations as Associate Members.

The National Rural Electric Cooperative Association (NRECA) is the national trade association representing nearly 900 local electric cooperatives and other rural electric utilities. America's electric cooperatives are owned by the people that they serve and comprise a unique sector of the electric industry. From growing regions to remote farming communities, electric cooperatives power 1 in 8 Americans and serve as engines of economic development for 42 million Americans across 56 percent of the nation's landscape. Electric cooperatives operate at cost and without a profit incentive.

Security and reliability of the energy grid is foundational to U.S. economic and national security, and critical energy infrastructure is uniquely necessary to support the operations of other critical sectors. To this end, we are very focused on finding solutions to meet our members' needs in response to the unprecedented supply chain challenges they are facing in securing equipment and material to provide reliable electric service to customers. Recent surveys show our members are waiting longer than ever for transformers of all sizes, conductors, meters, circuit breakers, and other products. Industry cannot solve this challenge alone and thus we are pleased to see the government may use its authority under the DPA to address challenges created by shortages of transformers and other key components of the energy grid.

We respectfully urge DOE to prioritize distribution transformers, large power transformers, and other critical grid components ahead of the other technologies considered in the RFI. Until we can address the shortages and supply chain challenges that are directly impacting reliability, we may not be able to accomplish many of the goals this administration has laid out for advancing clean technologies or expanding electrification. Most urgently, in the near-term, we urge DOE to act quickly to alleviate distribution transformer shortages, as this is the most acute supply chain challenge the electric industry is facing. We also ask DOE to establish longer-term efforts dedicated to supporting expanded domestic manufacturing capacity for large power transformers and other grid components that may take longer to address but are nonetheless critical to grid operations and therefore national security.

We provide our views in response to the questions posed in the RFI as follows.

Area 1: Technology Supply Chain Challenges and Opportunities

1. **For which of the technology areas covered in this RFI, or products therein, do you think most urgently require support from DPA tools and why?** Please fill out chart below for the technology(ies) for which you are providing input (among transformers and grid components; solar; insulation; and/or hydrogen components).

Technology	What are the decision criteria for your answer?
Transformers and grid components	Electric utilities are facing unprecedented challenges procuring transformers and other grid components needed to keep the lights on. Distribution transformers present the most urgent challenge, while challenges related to large power transformers and other grid components continue to emerge. Lead times for distribution transformers have increased on average from two to three months to more than a year. Lead times for large power transformers range from a year to over three years. In some cases, utilities are unable to even be quoted for a bid because the manufacturer is no longer taking further orders. Unless this situation is addressed, utilities will be hampered in their ability to restore power following natural disasters and storms, extend new electric service to customers, or support electrification initiatives being driven by federal and state policies.

2. What are the **greatest barriers (e.g., financing or market constraints)** to U.S. manufacturing, development, and deployment that the DPA tools described in the background can help address? Please respond for one or more technology areas below:

    a. Transformers and electric grid components: In the short term, it is our understanding from conversations with U.S. manufacturers that labor and material acquisition are the greatest barriers to increasing output for distribution transformers. High employee turnover and lack of available, eligible workers near manufacturing facilities make it difficult for U.S. manufacturers to immediately respond to increased demand for domestically manufactured transformers from utilities. Constrained access to domestically produced grain-oriented electrical steel (GOES), a material necessary to produce transformers, poses a significant material acquisition challenge. Although supplies of GOES are limited now, manufacturers will require more material to meet the increased demand for transformers as electrification continues. That need for sufficient material continues to grow as competing technologies that utilize the same materials are also growing. The present situation in which there is just one U.S. producer of GOES represents a serious national security risk.

    Additionally, U.S. manufacturers have indicated that certainty in demand will drive their decisions to invest in increased capacity. We've heard from manufacturers that they are unclear on whether the increased demand from electric utilities for transformers and other grid components is temporary or expected to

remain high and will continue to grow. Tools like loan guarantees and purchase guarantees can provide manufacturers with the certainty they need to invest in increased capacity.

In the longer term, there is a significant risk to grid reliability and national security in that there are no domestic manufacturers of large power transformers. This problem did not begin overnight and is well-documented in studies conducted by the U.S. government. We urge DOE to revisit the drivers for the outsourcing of large power transformer manufacturing to overseas markets and consider ways to entice manufacturers back to the United States.[1]

3. Which **DPA tool(s) and contracting vehicles would best help address the barriers** identified in Question #2, to strengthen U.S supply chains: purchases, purchase commitments, financial assistance, subsidy payments, or other (e.g. use of Other Transactions Authority or a Partnership Intermediary Agreement)? Please respond for one or more technology areas below:

   a. Transformers and electric grid components: Based on our discussions with U.S. manufacturers, it is our view that financial assistance that immediately supports distribution transformer manufacturers' ability to attract and retain a larger workforce over the next two years is critical to addressing the current and growing backlog. This is the most important piece to address in the short term and the most immediate DPA tool that we believe could be used to make headway on this challenge.

   The federal government should also consider using funds made available through the DPA in the near- and mid-term to provide financial assurances, including subsidy payments, loan guarantees, or purchase commitments, that enable U.S. distribution transformer manufacturers to invest in increased production capacity by lowering their financial risk. With a purchase commitment in place, any excess supplies the electric utilities do not purchase could be guaranteed purchase by the federal government once this supply chain crisis abates. Such excess could be used in case shortages exist in the future or to meet immediate challenges following natural disasters or storms.

   On a longer time horizon, these same tools could be used to address the dearth of U.S. manufacturers for large power transformers (LPTs). We encourage DOE to consider subsidy payments, loan guarantees, purchase commitments, and other available incentives that would bring manufacturers back to the United States and to look at how U.S. trade policy has impacted manufacturer decisions on investing in LPTs in the United States.

   Additionally, to have sufficient domestic supplies of GOES to support transformers and other grid components, the federal government should consider subsidy payments, loan guarantees, and purchase commitments to give U.S. steel producers the certainty they need to maintain, as well as to invest in, new and expanded capacity to produce GOES. In addition to supporting existing manufacturers, the electric power industry would benefit greatly from the addition of more entrants into the electrical steel market. It is critical to national security that the U.S. not lose domestic production of this vital material, especially as production of non-oriented electrical steel (NOES) increases to meet electric vehicle demand. The

[1] See the U.S. Department of Commerce report on "The Effect of Imports of Transformers and Transformer Components on the National Security" (October 15, 2020), available at: https://www.bis.doc.gov/index.php/documents/section-232-investigations/2790-redacted-goes-report-20210723-ab-redacted/file

government must signal the importance of maintaining as well as growing U.S. capacity to produce GOES and ensure that the increasing production of NOES does not occur at the expense of GOES.[2].

4. For the eligible technology areas covered in this RFI, **which segments in the supply chain do you think DPA tools should prioritize and why?** Please fill out the chart below for technology(ies) for which you are providing input and add rows for multiple entries per technology as needed.

Technology	**Upstream** (Critical raw materials production)	**Manufacturing** (Critical processed materials, subcomponents/ components, end products)	**End of life** (Recycling)	**Deployment** (Installation, infrastructure)
Transformers and grid components	*Grain-oriented electrical steel* *Copper*	*Distribution transformers and large power transformers* • *Transformer laminations* • *Stacked cores* • *Wound cores*		
Transformers and grid components		*Aluminum-conductor steel-reinforced cable*		

5. **Appendix I** provides two **illustrative example scenarios for how DPA authority could be used for each clean energy technology covered in this RFI.** These are not official proposals, but rather concepts for discussion. Which are the most promising approaches for spurring domestic production? Respond only for the technology(ies) for which you are interested in providing input. If there are additional project ideas you have that DPA tools can support, please provide those ideas in response to Question #6.

   DOE should prioritize providing financial assistance to U.S. distribution transformer manufacturers to support efforts to attract and retain a larger workforce. Additionally, DOE should provide financial assistance to U.S. manufacturers, including for distribution transformers, large power transformers, and other critical grid components, to either expand existing capacity or build new capacity. DOE should purchase and install, or provide financial assistance for the installation of, specialized equipment for component production. To help lower the manufacturers' risk associated with investing new capital, DOE should provide loan guarantees or purchase commitments to buy any excess material or equipment produced that utilities ultimately do not purchase. Additionally, DOE should provide financial assistance to manufacturers of GOES steel specific for the production of distribution or large power transformers.

   As is widely recognized, including by DOE, the energy grid is the backbone of the clean energy transition. While our collective members are leading the clean energy transition, it is imperative that clean energy technologies are not prioritized over or instead of critical equipment that is necessary to run a reliable energy grid. Electric vehicles cannot be charged and new renewable generation cannot be integrated into the grid if electric companies and utilities do not have sufficient supplies to reliably operate the grid.

   DOE could also provide financial assistance to support U.S. manufacturers investing in or adding test capacity or dual-use space at domestic facilities for the production of large power transformers, which are almost exclusively manufactured outside of the U.S. at this time. Some LPT manufacturers produce both LPTs and non-LPTs using the same facility, so increasing test space could help resolve manufacturing bottlenecks.

[2] This is a preferred option to Section 232 trade subsidies, which only serve to increase the cost of imported GOES that industry must use until there is sufficient domestic supply, which could take several years.

6. Building on answers from **question #4** above, **which project(s) do you think will have the greatest social and economic impacts, including strengthening supply chains, to the United States?** If possible, identify specific DPA tool(s) that you think may be more favorable to support proposed project(s), and, where possible, please indicate the level of investment needed. Please fill out the chart below for technology(ies) for which you are providing input and add rows for multiple entries as needed.

Technology	**Supply chain segment**	**Project**	**DPA tool(s)**	**Project impact**	**Level of investment (in U.S. dollars)**	**Other policy tools needed to support selected DPA tools**
Name the eligible technology (e.g., transformers and grid components; solar; insulation; and hydrogen components)	*Identify the supply chain segment (e.g., upstream; manufacturing; end of life; or deployment)*	*Identify a project that can be supported by DPA tools (e.g., manufacturing of X material or component)*	*Identify possible DPA tool(s) that could be applied to this project (e.g., purchases; purchase commitment; financial assistance)*	*Identify the impact this project will have (e.g., add X production capacity, create X jobs in Y, lower cost of energy by $x etc.)*	*Identify the ideal investment level needed for this project*	*Identify complementary policies or programs (e.g., provision in Bipartisan Infrastructure Law, CHIPS Act, and Inflation Reduction Act) that would support selected DPA tool(s)*
Transformers and grid components	Manufacturing	Manufacturing of distribution transformers - labor	Financial assistance; Subsidy payments	Attract or retain workforce to distribution transformer manufacturing	$440 million over two years	
Transformers and grid components	Manufacturing	Manufacturing of distribution transformers – capital investments	Financial assistance; Subsidy payments; loan guarantees; purchase commitments	Enable manufacturers to grow capacity with minimal financial risk	As much as $1 billion	
Transformers and grid components	Material	Incentivize existing steel producers to maintain or grow their production lines for GOES	Financial assistance; Subsidy payments; loan guarantees; purchase commitments	Add production capacity for GOES	As much as $1 billion	
Transformers and grid components	Deployment	Incentivize utilities to hold larger inventories of grid components	Subsidy payments	Add production capacity; improve grid resiliency	TBD	

7. For the technology areas covered in this RFI, which technology(ies), supply chain segments, and project type(s) do you think DOE can leverage DPA **tools to attract foreign companies and foreign direct investment** to the United States? Please fill out the chart below for technology(ies) for which you are providing input and add rows for multiple entries as needed.

   No response provided.

8. What **criteria/requirements/procedures should the government consider for selecting qualifying projects for DPA support?** Please fill out technology(ies) for which you are interested in providing input.

   a. Transformers and electric grid components:

      The use of DPA authorities ,42 U.S.C. §5195(a)(3), is tied to "national defense," which the DPA defines as "programs for military and energy production or construction, military or critical infrastructure assistance to any foreign nation, homeland security, stockpiling, space, and any directly related activity." Such term includes emergency preparedness activities conducted pursuant to title VI of The Robert T. Stafford Disaster Relief and Emergency Assistance Act [42 U.S.C. §5195 et seq.] and critical infrastructure protection and restoration.

      DPA Section 2(a)(4); 50 U.S.C. Appx. §2062(a)(4). Title VI of the Stafford Act defines "emergency preparedness" activities as

      > "All those **activities and measures designed or undertaken to prepare for or minimize the effects of a hazard upon the civilian population,** to deal with the immediate emergency conditions which would be created by the hazard, and to effectuate emergency repairs to, or the emergency restoration of, vital utilities and facilities destroyed or damaged by the hazard." 42 U.S.C. §5195(a)(3).

      Therefore, the use of DPA authorities extends beyond military preparedness and capabilities as the authorities may also be used to enhance and support domestic preparedness, response, and recovery from hazards, terrorist attacks, and other national emergencies, among other purposes. These explicit DPA priorities should guide DOE as it considers projects and other measures for DPA support.

      Given that the electric grid is critical infrastructure and is becoming even more important with the electrification of other critical sectors, national security is at stake when there is not a sufficient and readily available supply of transformers and other grid components. Moreover, emergency preparedness requires an adequate supply of replacement transformers of all kinds. Accordingly, DOE should prioritize transformers and other grid components through the use of its delegated DPA authority. In addition, consistent with many of the requirements for programs and funding under the Infrastructure Investment and Jobs Act, the government should thoughtfully consider criteria and requirements for U.S. ownership and control of where the government is investing federal funds. It is critical that the U.S. maintain and grow its capacity to produce transformers, grid components, and GOES.

9. Is there **anything else** that government should be aware of as DOE designs potential implementation of DPA tools to support U.S manufacturers, developers, and installers?

We urge the government to consider and act on both short-term and long-term actions to increase the production of distribution transformers, large power transformers, and other critical grid components. As DOE has stated, "Ensuring that supply of grid components can swiftly meet demand and continue to meet demand long-term is vital to maintaining grid reliability; enabling quick recovery from hurricanes and other disasters; and supporting community, business, and demand growth."[3]

The existing and growing backlog of distribution transformer orders requires immediate action. We urge the government to prioritize this essential component crisis ahead of other technologies being examined for growth under this RFI. Without distribution transformers to distribute power from the grid to homes and businesses, these other technologies have limited value.

At the same time, we would urge the government to make a long-term commitment to investing in the U.S. production of grain-oriented electrical steel and large power transformers. The national security risks presented due to the lack of domestic capacity in this area are well documented.[4] Addressing these challenges will require a long-term commitment from the federal government to prioritize investing and maintaining this capacity in the interest of U.S. national security.

Area 2: Domestic Manufacturing, Including Small and Medium-Sized Scale Manufacturers (SMM)

10. **Which project types should DPA authority prioritize in supporting U.S manufacturers?** Where possible, please identify the level of investment needed. What criteria should DOE use to select these projects? Please fill out the chart below for technology(ies) for which you are providing input and add rows for multiple entries as needed.

Technology	**Manufacturing project**	**Manufacturing project impact**	**DPA tool (s)**	**Level of investment (in U.S. dollars)**	**Selection criteria**
Name the eligible technology (e.g., transformers and grid components; solar; insulation; and hydrogen components)	*Identify a manufacturing project that can be supported by DPA tools (e.g., manufacturing of X material or component)*	*Identify the impact this project will have (e.g., add X manufacturing capacity, create X jobs in Y, lower cost of energy by $x)*	*Identify possible DPA tool(s) that could be applied to this project (e.g., purchase; purchase commitment; financial assistance)*	*Identify the ideal investment level needed for this project*	*Identify the criteria that DOE should consider in selecting this type of project*
Transformers and grid components	Manufacturing of distribution transformers - labor	Attract or retain workforce to distribution transformer manufacturing	Financial assistance; Subsidy payments	$440 million over two years	U.S. distribution manufacturers who can increase output immediately with additional labor

[3] See "DOE Actions to Unlock Transformer and Grid Component Production" (October 20, 2022), available at: https://www.energy.gov/policy/articles/doe-actions-unlock-transformer-and-grid-component-production

[4] See the U.S. Department of Commerce report on "The Effect of Imports of Transformers and Transformer Components on the National Security" (October 15, 2020), available at: https://www.bis.doc.gov/index.php/documents/section-232-investigations/2790-redacted-goes-report-20210723-ab-redacted/file

Technology	Manufacturing project	Manufacturing project impact	DPA tool (s)	Level of investment (in U.S. dollars)	Selection criteria
Transformers and grid components	Maintain or increase U.S. production of GOES	Incentivize existing steel producers to maintain or grow their production lines for GOES	Financial assistance; Subsidy payments; loan guarantees; purchase commitments	As much as $1 billon	U.S. manufacturers
Transformers and grid components	Manufacturing of distribution transformers – capital investments	Enable manufacturers to grow capacity with minimal financial risk	Financial assistance; Subsidy payments; loan guarantees; purchase commitments	As much as $1 billon	U.S. manufacturers
Transformers and grid components	Manufacturing of large power transformers	Incentivize onshoring manufacturing of large power transformers and/or their components	Financial assistance; Subsidy payments; loan guarantees; purchase commitments	TBD	U.S. companies

11. For the eligible technology areas covered in this RFI, **which technology(ies) or supply chain segments do Small & Medium Sized Manufacturers (SMMs)** have capabilities or the most potential to grow their impact if supported by DPA tools? Please fill out the chart below for technology(ies) for which you are providing input, including supply chain segment, SMM capabilities, and the most relevant DPA tools. Add multiple rows per technology as needed.

    No response provided.

12. What are the **top three barriers that U.S. Small & Medium Manufacturers (SMM) face** that DPA tools combined with other government policy tools can help address? Please fill out the chart below for technology(ies) for which you are providing input, and add rows as needed.

Technology	Supply chain segment	SMM Barriers	DPA tool(s)	Other policy tools needed to support selected DPA tools
Name the eligible technology (e.g., transformers and grid components; solar; insulation; and hydrogen components)	*Identify the supply chain segment (e.g., upstream; manufacturing; end of life; or deployment)*	*Name one or more barriers inhibiting SMM participation growth in energy supply chain*	*Identify possible DPA tool(s) that could be applied to address barrier(s)* *(e.g., purchase; purchase commitment; financial assistance)*	*Identify complementary policies or programs (e.g., Bipartisan Infrastructure Law, CHIPS Act, and Inflation Reduction Act) that would support selected DPA tool(s)*
Transformers and grid components	Manufacturing distribution transformers	The uncertainty of whether demand will consistently grow, making capital investments risky	Purchase commitment	Advanced manufacturing tax credits; protection from foreign dumping

Technology	Supply chain segment	SMM Barriers	DPA tool(s)	Other policy tools needed to support selected DPA tools
Transformers and grid components	Manufacturing distribution transformers	Attracting and retaining workforce to distribution manufacturers	Financial assistance; Subsidy payments	

13. Historically, **what barriers have U.S manufacturers faced in accessing federal support** through the DPA or otherwise? What technical assistance or other support can DOE provide to overcome these barriers?

    No response provided.

14. Is there **anything else** that government should be aware of as DOE designs implementation of DPA tools to support U.S. manufacturers?

    The government must look holistically at the policies impacting manufacturers and ensure that U.S. trade policy does not result in unintended consequences for U.S. manufacturers. Further, trade policy can and has impacted the pace of various clean energy and grid modernization efforts that utilities are planning or working to implement.

Area 3: American Workforce Investment

15. **What kind of medium- or long-term market certainty would allow employers to feel confident about growing their staff and about investing in worker training?** Please include any related information in your response that you think is important to consider on technology(ies) for which you provide input below.

    a. Transformers and electric grid components: Our understanding is that distribution transformer manufacturers are willing to grow their staff and invest in worker training, but there are simply not enough people available from traditional workforce sources to fill open positions. For large power transformers, market certainty – which is impacted by trade policy – would help U.S. companies assess whether they can invest in building manufacturing capacity.

16. For the eligible technology areas covered in this RFI, **what workforce training program(s) or partnerships (for instance, employer/community college/labor consortia, on-the-job training, private sector training providers, sector strategies) do you think will be useful** for your technology(ies) of interest? What unions, worker groups, economic development centers, professional societies, community-based organizations, (post)secondary education facilities, and other stakeholders could be valuable partners in these training activities? Please fill out the chart below for technology(ies) for which you are providing input, and add rows as needed.

Supply chain activities	Labor skills need	Training programs/ partnerships to address need	Key Partners
Name the eligible technology supply chain activity (e.g., grain-oriented electrical steel production, solar PV cell fabrication)	*List the labor skills needed*	*Identify training programs and type of partnerships needed to address these labor skills*	*Identify the key partners needed*
Large power transformer manufacturing		Invest in workforce training that would require a change in training	Manufacturers U.S. Department of Labor

Supply chain activities	Labor skills need	Training programs/ partnerships to address need	Key Partners
		curricula and offering apprenticeships and internships in collaboration with industry	Educational institutions State and local governments
Distribution transformer manufacturing		Reentry to workforce programs, relocation programs, workforce eligibility programs, and other "outside-the-box" approaches	Manufacturers U.S. Department of Labor U.S. Department of Homeland Security U.S. State Department State and local governments

17. What specific labor standards and project **selection criteria** should guide the federal government in deciding which manufacturing firms benefit from DPA actions? These could include worker wages and benefits, access to unions, training opportunities, labor-management training programs, health and safety committees, or recruitment programs. What kinds of programs or partnerships do you participate in (or would you recommend) to support worker recruitment and retention in regarding the technology areas covered in this RFI?

    No response provided.

18. How can the federal government ensure that the jobs supported by any DPA actions in these clean energy technology sectors offer good wages and benefits and access to unions?

    No response provided.

19. Is there **anything else** that government should be aware of as DOE designs implementation of DPA tools to support the creation of high-quality jobs and high-road workforce development needed for the clean energy transition?

    No response provided.

Area 4: Energy Equity, Community Access, and Economic Benefit

20. How can DPA authority provide the greatest opportunity to create **broad regional economic benefits** including economic diversification, tax revenues, and economic cluster effects?

    Growing domestic manufacturing needs the support of an expanded workforce. Supporting a growing workforce for manufacturing transformers and grid components will bring more economic growth to the areas in which the workforce will live and work. These benefits should also be balanced with the need for additional resources that the area may need to invest in to support the workforce and their households, such as housing availability, schools, utilities, and other necessary resources.

21. How can DPA authority provide the greatest opportunity to **reuse/leverage existing industrial infrastructure** to support clean energy transition?

    No response provided.

22. How can DPA authority support **"regional clusters"** for clean energy manufacturing in underserved communities and communities where the economy is currently highly dependent on fossil fuel production

(such as coal communities) to transform their economy in the next 5 to 10 years? If possible, please include information explaining your answer.

No response provided.

23. **How could securing the national supply chain and increasing manufacturing and deployment in these technology areas impact underserved, overburdened, and frontline communities ("disadvantaged communities")?**

    a. **What could be the positive impacts of manufacturing initiatives supported by DPA authority? (For example: jobs, community enrichment, research opportunities).**

       Manufacturing of distribution transformers exists in identified "underserved, overburdened or disadvantaged communities." Expanding current production or creating new facilities that will secure a national supply chain means more opportunities or new jobs in all of those identified areas.

    b. **What could be the negative impacts of manufacturing initiatives supported by DPA authority, and how can DOE alleviate these negative impacts? (For example: pollution, potential exacerbation of existing harms to communities hosting these industries).**

       No response provided.

    c. **Are there any legal, policy, economic, or environmental barriers that would prevent disadvantaged communities from benefiting from DPA activities?**

       A potential barrier for disadvantaged communities might be the size of the labor force in a community, where migration into the area is deterred by a lack of infrastructure, such as shopping, dining, entertainment, housing, and other employment opportunities.

24. What project **selection criteria and qualifying requirement(s)** should the government consider or embed in DPA funded projects to ensure the DPA funded projects benefits the American public, support underserved communities, and do not cause unintended harm to the environment or communities?

    We encourage the government to factor into their criteria for selecting projects that value the ideals of diversity, equity, and inclusion (DEI) and encourage business practices that embrace DEI in their approach.

25. What **equity standards** should guide the government in carrying out DPA actions for the covered technologies?

    No response provided.

26. Is there **anything else** that government should be aware of as DOE designs potential implementation of DPA tools to ensure projects benefits the American public, support underserved communities, and do not cause unintended harm to the environment or communities?

    No response provided.

COMMENTS OF THE EDISON ELECTRIC INSTITUTE ON THE U.S. DEPARTMENT OF ENERGY'S ENERGY CONSERVATION PROGRAM: ENERGY CONSERVATION STANDARDS FOR DISTRIBUTION TRANSFORMERS

EERE-2019-BT-STD-0018

March 27, 2023

ATTACHMENT B

February 15, 2023

Secretary Jennifer Granholm
U.S. Department of Energy
1000 Independence Ave., SW
Washington, DC 20585

Dear Madam Secretary:

On behalf of a broad coalition representing critical stakeholders in the distribution transformer supply chain, we seek your immediate attention on an issue that could significantly impact national security and grid reliability. We write to strongly urge the Department of Energy (DOE) to reconsider its intention to increase energy conservation standards for distribution transformers, as signaled in its recent Notice of Proposed Rulemaking (NOPR).[i]

Our coalition, comprised of the National Electrical Manufacturers Association (NEMA), American Public Power Association (APPA), National Rural Electric Cooperative Association (NRECA), Edison Electrical Institute (EEI), Leading Builders of America (LBA), National Association of Homebuilders (NAHB), and GridWise Alliance (GridWise), is an assemblage of organizations whose members are at the forefront of the clean energy transition. Utilities and energy service providers, represented by APPA, EEI, and NRECA, provide electricity to all Americans. LBA and NAHB represent homebuilders constructing affordable and energy-efficient communities. Grid component manufacturers, represented by NEMA and GridWise, produce the critical equipment, including distribution transformers, needed to ensure its safe and reliable delivery.

Since 2021, our organizations have been communicating with DOE regarding the severe and ongoing supply chain challenges that have prolonged and complicated distribution transformer production and availability. The inability to quickly manufacture and deliver these critical components threatens the ability of the electric sector to service current and planned housing markets, swiftly recover and restore service following natural disasters, and deliver the benefits of economy-wide electrification.

Last June, working with electric service providers, you directed the Electricity Subsector Coordinating Council to establish a “Tiger Team” to examine the supply chain crisis. It concluded that current transformer production is not meeting demand—demand that is expected to increase for the foreseeable future. Moreover, both the electric and manufacturing sectors have raised awareness of the risks caused by lengthy lead-times in the production, procurement, and deployment of transformers. Under existing production output capabilities, manufacturers estimate the current order-cycle for most new distribution transformers to be longer than 16 months.

The Administration also recognized the severity of this crisis by issuing the June 6, 2022, Presidential Determination through the Defense Production Act (DPA) to prioritize the domestic production of transformers to bolster grid resiliency and national security. In response to that Determination and a subsequent Request for Information issued by DOE, manufacturers provided numerous recommendations on how best to scale up production. One such proposal included the standardization of “emergency-use” products, or transformers built to lower energy conservation standards to meet DPA expectations of greater output.[ii] Similarly, in a joint letter to you by APPA and NRECA on October 19, 2022, these organizations encouraged DOE to

reprioritize some Inflation Reduction Act funds under the DPA designated for heat pumps to distribution transformer production, including labor recruitment and retention.[iii]

Despite this information and our organizations' close work with DOE to explore short and long-term solutions to this crisis, on January 11, 2023, the Department issued a NOPR that would, through its various requirements, further exacerbate the supply chain situation. The proposed rule would dictate that manufacturers increase the efficiency of distribution transformers by a mere tenth of a percentage point.

DOE *already* mandates distribution transformers be manufactured to incredibly high efficiency standards. Currently, NEMA calculates a three-phase liquid-immersed distribution transformer with a kilovolt-ampere (kVA) output rating of 2500 is already 99.53% efficient; a similar single-phase type with a kVA of 833 is 99.55% efficient.[iv] Importantly, due to the intricate ways transformers are designed and assembled, increasing their efficiency even by a fraction of a percentage point could add months to an already lengthy order-cycle.

Our organizations agree that energy efficiency standards play an important role in reaching decarbonization benchmarks while transitioning our nation to a clean and increasingly electrified economy. However, as proposed, the rule would delay the realization of these benefits by worsening supply chain complications already well known to DOE.

Additionally, the proposed rule would require manufacturers to transition to a different type of steel, which is largely untested, less flexible, and more expensive.[v] Further, the existing supply chain of this alternative steel is very limited and mostly foreign-sourced. This rule would impose unnecessary cost burdens and further delay the delivery of such critical products. Simply put, this DOE proposal does nothing to address, and is likely to exacerbate, the current distribution transformer shortage crisis.

Given the unprecedented demand for distribution transformers, our organizations urge DOE to maintain the current efficiency levels required of these products. Getting these already highly efficient products into the market more quickly should be the highest priority and will result in the realization of electrification benefits much sooner—benefits that will far outweigh any gains achieved through a fractional percentage increase in efficiency.

Thank you for your time and consideration of this issue. We welcome the opportunity to discuss this with you further and appreciate your leadership in this area.

Sincerely,

American Public Power Association
Edison Electrical Institute
GridWise Alliance
Leading Builders of America
National Association of Home Builders
National Electrical Manufacturers Association
National Rural Electric Cooperative Association

CC: Rep. Kevin McCarthy – Speaker of the U.S. House of Representatives
Rep. Hakeem Jeffries – U.S. House Minority Leader
Sen. Charles Schumer – U.S. Senate Majority Leader
Sen. Mitch McConnell – U.S. Senate Minority Leader

Rep. Cathy McMorris Rogers – Chair, Energy and Commerce Committee
Rep. Frank Pallone – Ranking Member, Energy and Commerce Committee
Rep. Kay Granger – Chair, Appropriations Committee
Rep. Rosa DeLauro – Ranking Member, Appropriations Committee
Sen. Patty Murray – Chair, Appropriations Committee
Sen. Susan Collins – Ranking Member, Appropriations Committee
Sen. Joe Manchin – Chair, Energy and Natural Resources Committee
Sen. John Barrasso – Ranking Member, Energy and Natural Resources Committee
Alejandro Moreno – Asst. Sec. (Acting), Energy Efficiency & Renewable Energy, DOE
John Podesta – Sr. Advisor to the President: Clean Energy Innovation & Implementation
Elizabeth Sherwood-Randall – White House Homeland Security Advisor

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[i] *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 *Fed. Reg.* 1722 (Jan. 11, 2023).
[ii] https://www.nema.org/docs/default-source/advocacy-document-library/nema-gridwise-comments-doe-dpa-rfi-11.30.22.pdf?sfvrsn=2969fc7b_4
[iii] https://www.cooperative.com/news/Documents/Trades%20Letter%20Supply%20Chain%20DPA%20Final.pdf
[iv] https://www.nema.org/docs/default-source/nema-documents-libraries/doe-transformer-efficiency-regs.pdf?sfvrsn=8253222a_0

[v] U.S. Dep't of Energy, DOE Proposes New Efficiency Standards For Distribution Transformers, https://www.energy.gov/articles/doe-proposes-new-efficiency-standards-distribution-transformers (DOE explains that "[a]lmost all transformers produced under the new standard would feature amorphous steel cores").