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Francisco Alejandro Moreno  
Acting Assistant Secretary for Energy Efficiency and Renewable Energy  
U.S. Department of Energy

Dear Acting Assistant Secretary Moreno:

Cleveland-Cliffs Inc. ("Cleveland-Cliffs") appreciates the opportunity to submit these comments in response to the Department of Energy's ("DOE") notice of proposed rulemaking ("NPRM") concerning energy efficiency standards for distribution transformers that was published in the Federal Register on January 11, 2023.<sup>1</sup> Public comment provides an opportunity for all affected stakeholders to provide critical input on these new efficiency requirements that could have far-reaching consequences for the economic and national security interests of the United States. Cleveland-Cliffs has particular insight into these issues as a leading supplier of Grain-Oriented Electrical Steel ("GOES") for distribution transformers and shares a strong interest that any standards adopted are well-reasoned and technologically and economically feasible. We have significant concerns with the proposed rule, including that the underlying factual assumptions in the NPRM are deeply flawed, and that finalizing the proposed standards in their current form will negatively impact U.S. economic and national security interests. Indeed, the NPRM, if finalized, will weaken domestic supply chains and increase the country's dependence on imported materials for transformers and related inputs critical to electric grid operations and energy transition efforts.

Cleveland-Cliffs is the sole domestic producer of GOES and Non-Oriented Electrical Steel ("NOES") in North America. The company manufactures this electrical steel at two manufacturing facilities, Butler Works in Butler, Pennsylvania and Zanesville Works in Zanesville, Ohio. These facilities employ approximately 1,500 employees in good-paying jobs with a significant portion of the workforce represented by the United Auto Workers ("UAW"). Cleveland-Cliffs' Butler Works and Zanesville Works facilities produce components essential to the domestic supply of distribution transformers and electric motors. As the only domestic producer of GOES for use in distribution transformers, Cleveland-Cliffs has a substantial interest in DOE's recently proposed energy efficiency standards for these products.

The NPRM seeks to achieve increased energy savings by adopting stringent new energy efficiency standards, but these benefits may prove illusory as the NPRM's modeling of anticipated impacts ignores crucial elements that undercut its projections of tangible benefits. Furthermore, the NPRM arbitrarily ignores how these new standards would disrupt the domestic supply chain for transformers, including GOES, which the federal government has identified on

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<sup>1</sup> *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722 (Jan. 11, 2023).

multiple occasions as a critical component of transformers. Specifically, the new standards would reduce the supply of transformers for the electrical grid, increase reliance on imports of steel, cores, and transformers, and cause the domestic industry for GOES and its workers to suffer substantial economic injury. For Cleveland-Cliffs, this would have impacts on both its GOES and NOES operations, as the latter would not be economically viable on a standalone basis if the market for GOES is suddenly and drastically diminished. Accordingly, all industries that rely on GOES and NOES produced at Cleveland-Cliffs' facilities would be negatively impacted by this proposed rule.

A rule with such far-reaching consequences should have been developed through close collaboration with interested stakeholders to help ensure a fully informed proposal based on the best available evidence that would strengthen U.S. energy and national security goals, rather than detracting from these vital interests. But DOE's rulemaking has been a black box, and only upon release of the proposed rule has DOE provided any visibility to affected stakeholders about the flawed assumptions and modeling contained in the NPRM. Moreover, by limiting public engagement in this manner, DOE failed to provide stakeholders adequate time to prepare their own detailed quantitative analyses demonstrating the full extent of the faulty assumptions and errors contained in the NPRM. However, our initial analysis of the NPRM demonstrates unequivocally that the proposed efficiency standards will not improve energy efficiency goals in any tangible manner, but will undermine the domestic supply chain for transformers as well as the country's interests in having a secure and reliable power sector. This NPRM is not only bad policy, but it is unlawful and vastly exceeds DOE's legal authority.

**I. *The NPRM Is Inconsistent with Government Policies Intended to Promote Domestic Supply Chains and Protect National Security Interests in this Very Industrial Sector***

DOE's proposed energy efficiency standards are directly contrary to established government policies designating GOES as a critical product essential to U.S. national security interests. Both the Executive and Legislative Branches have taken significant measures in furtherance of these goals. However, the NPRM does not grapple with the important interests that prompted these policies, which remain in place today, or attempt to explain and justify why this NPRM represents a major departure from recent U.S. Government policy to promote domestic GOES production.<sup>2</sup>

*First*, the NPRM contradicts federal policy on GOES and the transformer supply chain as implemented by the Department of Commerce ("Commerce"), which has identified preserving domestically produced GOES, and Cleveland-Cliffs' manufacturing facilities in particular, as a national security imperative. The NPRM casts aside those fundamental policy interests without

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<sup>2</sup> When an agency's "new policy rests upon factual findings that contradict those which underlay its prior policy" or "when its prior policy has engendered serious reliance interests," a "further justification" and "reasoned explanation is needed for disregarding facts and circumstances that underlay or were engendered by the prior policy." *F.C.C. v. Fox Tele. Stations, Inc.*, 556 U.S. 502, 515–16 (2009); *see also Manin v. Nat'l Transp. Safety Bd.*, 627 F.3d 1239, 1243 (D.C. Cir. 2011) ("When an agency departs from its own prior precedent without explanation . . . its judgment cannot be upheld.").

any meaningful discussion of the government's repeated determinations that GOES is essential to national security. That is the hallmark of arbitrary and capricious agency decision-making.<sup>3</sup>

U.S. policy with respect to GOES and the transformer supply chain stems, in part, from two separate Section 232 investigations. On May 4, 2020, Commerce announced the initiation of a Section 232 investigation covering transformers and transformer components. For purposes of a Section 232 investigation, "national security" includes the "general security and welfare of certain industries, beyond those necessary to satisfy national defense requirements, which are critical to minimum operations of the economy and government."<sup>4</sup> Thus, U.S. policy regarding "national security" broadly includes both the national defense industrial base and the strength and viability of the domestic economy. The Transformers 232 Report established that "GOES is necessary in order to ensure the ability of the United States to address threats facing our critical energy infrastructure."<sup>5</sup> **The Transformers 232 Report also concluded that "[t]he United States must maintain a secure supply and robust production capacity for GOES."**<sup>6</sup> The NPRM would do precisely the opposite by eliminating the primary market for U.S.-produced GOES, thereby disrupting the domestic supply chain used to manufacture transformers, in favor of amorphous metal ("AM"), which—as discussed below—is not readily available in the United States and cannot by itself reliably supply and sustain the U.S. electricity grid.

The Transformers 232 Report found that despite relatively strong domestic production capabilities, domestic manufacturers of transformers maintain a heavy dependence on foreign sources for critical components such as laminations and cores and the GOES from which they

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<sup>3</sup> See *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (holding that an agency must consider *all* "important aspect[s] of the problem" in its analysis and has not engaged in reasoned decision-making if it "entirely fail[s]" to do so); *accord Am. Farm Bureau Fed'n v. EPA*, 559 F.3d 512, 520 (D.C. Cir. 2008) (an agency's failure "to consider a relevant and significant aspect of a problem may render its rulemaking arbitrary and capricious") (citing *Chamber of Commerce v. SEC*, 412 F.3d 133, 140 (D.C. Cir. 2005)).

<sup>4</sup> U.S. Dept. of Commerce, Bureau of Export Administration, *The Effect of Imports of Iron Ore and Semi-Finished Steel on the National Security* (Oct. 2001) ("2001 Report") at 5; U.S. Dept. of Commerce, Bureau of Industry and Security, *The Effect of Imports of Steel on the National Security* (Jan. 2019) ("Steel 232 Report") at 1; U.S. Dept. of Commerce, Bureau of Industry and Security, *The Effect of Imports of Aluminum on the National Security* (Jan. 2019) ("Aluminum 232 Report") at 1; U.S. Dept. of Commerce, Bureau of Export Administration, *The Effect of Imports of Titanium Sponge on the National Security* (Nov. 2019) ("Titanium Sponge 232 Report") at 30; U.S. Dept. of Commerce, Bureau of Export Administration, *The Effect of Imports of Vanadium on the National Security* (Feb. 2021) ("Vanadium 232 Report") at 32.

<sup>5</sup> U.S. Dept. of Commerce, Bureau of Industry and Security, *The Effect of Imports of Transformers and Transformer Components on the National Security* (Oct. 15, 2020) ("Transformers 232 Report") at 231, <https://www.bis.doc.gov/index.php/documents/section-232-investigations/2790-redacted-goes-report-20210723-ab-redacted/file>.

<sup>6</sup> *Id.* (emphasis added).

are made.<sup>7</sup> The Transformers 232 Report explained that the high level of dependence on imports in this industry creates a critical infrastructure vulnerability—something also raised in previous DOE assessments.<sup>8</sup> The following key findings underscore this problem:

- “Because they serve the greatest number of customers, the failure or destruction of just a single unit can have a large impact on U.S. economic, public health, and security interests.”<sup>9</sup>
- “Based on the overwhelming dependence of domestic transformer manufacturers on foreign sources, the Secretary finds that transformer laminations, stacked cores and wound cores are being imported into the United States in such quantities and under such circumstances as to threaten to impair the national security.”<sup>10</sup>

As described below, Commerce and other parts of the federal government have taken concrete measures to shore up the domestic supply of GOES and transformers. However, the NPRM would undermine these efforts and add to the economic and national security concerns identified in the Transformers 232 Report by creating an even greater dependence on imports for the production of distribution transformers. The low volume of domestic AM production capacity is wholly inadequate to replace GOES as the primary input for cores used in distribution transformers.<sup>11</sup> In order to meet the demand of the U.S. energy market, transformer manufacturers will have no choice but to turn to foreign imports of AM, likely from producers in China or Japan. **With regard to the lack of domestic capacity of AM, it is important to note that GOES production cannot simply be repurposed for AM production as the production processes and associated equipment used for these two materials are distinct and not interchangeable.**

The U.S. government also conducted a Section 232 investigation into the effect of imports of steel mill products on U.S. national security. The Steel 232 Report found that steel articles, specifically those produced domestically, are essential to the nation’s overall defense

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<sup>7</sup> Transformers 232 Report at 14–15.

<sup>8</sup> *Id.* at 15 (citing “Large Power Transformers in U.S. Electric Grid,” Department of Energy, Office of Electricity and Energy Reliability, June 2012 [https://www.energy.gov/sites/prod/files/Large%20Power%20Transformer%20Study%20-%20June%202012\\_0.pdf](https://www.energy.gov/sites/prod/files/Large%20Power%20Transformer%20Study%20-%20June%202012_0.pdf)).

<sup>9</sup> *Id.*

<sup>10</sup> *Id.* at 17.

<sup>11</sup> *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722, 1755 (Jan. 11, 2023); Transcript of Proceedings in the Matter of: Notice of Proposed Rulemaking (NOPR) for Distribution Transformers (Standards) (Feb. 16, 2023) (“NPRM Meeting”) at 79 (Mr. Howard: “There is not enough amorphous capacity in the world to handle the market today.”).

objectives and U.S. critical infrastructure.<sup>12</sup> It recognized that “U.S. steel producers would be unable to survive purely on defense or critical infrastructure steel needs.”<sup>13</sup> Therefore, the investigation concluded that domestic producers of steel articles, including GOES, must have a viable marketplace beyond the defense industry for their products.

The domestic GOES industry has received some respite—at least in the short term—in the form of 25 percent Section 232 duties on imports of GOES. Imposed pursuant to Presidential Proclamation 9705, which implemented the findings of the Steel 232 Report, these duties have enabled certain new investments in the domestic GOES industry.<sup>14</sup> Notably even these remedies, which remain in effect today, have not cured the threat facing the domestic GOES industry as these measures fail to extend to imports of GOES laminations or cores. Worse yet, the NPRM would effectively negate any of the benefits that are currently being realized from the Section 232 duties on imports of GOES, thereby undermining the purpose of these Section 232 actions by eliminating the primary market for U.S.-produced GOES.<sup>15</sup>

*Second*, the NPRM disregards the important role that domestically produced GOES plays in strengthening the supply chain for critical infrastructure and the broader domestic energy sector, as recognized and codified by multiple executive orders and other agency measures. The federal government has recognized that GOES is a critical material essential to the performance of transformers and accounts for a significant portion of the cost of transformer production.<sup>16</sup> The U.S. government has designated GOES on its list of “critical goods and materials.” In Executive Order 14017 on “America’s Supply Chains,” President Biden described how resilient supply chains for “critical goods and materials” help build domestic manufacturing capacity and are vital to economic and national security interests. The Executive Order defined “critical goods and materials” as “goods and raw materials currently defined under statute or regulation as ‘critical’ materials, technologies, or infrastructure.”<sup>17</sup>

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<sup>12</sup> Steel 232 Report at 23–24.

<sup>13</sup> *Id.* at 25.

<sup>14</sup> Proclamation 9705 of March 8, 2018 (Adjusting Imports of Steel Into the United States); Economic Impact of Section 232 and 301 Tariffs on U.S. Industries (Mar. 2023), USITC Pub. No. 5405, *available at* [https://insidetrade.com/sites/insidetrade.com/files/documents/2023/mar/wto2023\\_0223a.pdf](https://insidetrade.com/sites/insidetrade.com/files/documents/2023/mar/wto2023_0223a.pdf) at 124–25.

<sup>15</sup> *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722, 1817 (Jan. 11, 2023) (“The Department expects that manufacturers with larger market shares will make the large investments needed to convert their core production to amorphous steel.”).

<sup>16</sup> Transformers 232 Report at 9.

<sup>17</sup> EO 14017: Executive Order on America’s Supply Chains (“EO 14017”), Sec. 6(b), *available at* <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/>.

In support of the objectives outlined in the Order, Commerce issued a draft list of such “critical goods and materials.” Notably, the draft list includes “Alloy silicon electrical steel (grain-oriented),” which is classified under HTSUS codes 7226.11.10 and 7226.11.90, and “Parts (other than printed circuit assemblies) of electrical transformers, static converters and inductors,” which are classified under HTSUS code 8504.90.96.<sup>18</sup> Notwithstanding these directives, the proposed standards contained in the NPRM would replace GOES as the primary input for cores used in distribution transformers by effectively mandating the use of AM.<sup>19</sup>

The majority of the GOES that Cleveland-Cliffs produces is used in the production of distribution transformers. As noted, the NPRM, if finalized, would eliminate the market for this product and make it economically untenable for Cleveland-Cliffs to maintain its manufacturing operations for either GOES or NOES. That would put at risk nearly 1,500 good-paying jobs and undermine the domestic supply chain for transformers, electric motors, and other important industries. Indeed, by eliminating the primary market for domestically produced GOES, DOE’s NPRM will have the effect of eliminating domestic manufacturing rather than building it, thereby moving supply chains for GOES exclusively outside the United States.

This would have devastating consequences for the reliability and integrity of the electric grid and the transformers needed to supply power for them. AM-based transformers currently comprise a small fraction of the marketplace for domestic transformer production and cannot be scaled in the near-term to meet the substantial need for capacity in the market for electrical power.<sup>20</sup>

If AM core materials are mandated as the only inputs capable of meeting the new efficiency standards – a result that DOE itself acknowledges – the entire supply chain for transformers would become less stable and secure. Many transformer OEMs would need to make significant capital investments as many transformer producers are not equipped to use AM cores. Those changes alone could prove overwhelming for an industry constrained by labor and supply chain shortages.

Moreover, only a single manufacturer in the United States currently supplies AM as a core material. The NPRM would thus effectively channel the entire domestic supply chain for distribution transformers through this one entity that currently produces only a limited quantity of AM. The ability of this single manufacturer to ramp-up AM production capacity essentially

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<sup>18</sup> See *Draft List of Critical Supply Chains*, U.S. Department of Commerce International Trade Administration, available at <https://www.trade.gov/data-visualization/draft-list-critical-supply-chains>.

<sup>19</sup> See, e.g., *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722, 1766, 1787, 1813, 1815, 1817 (Jan. 11, 2023). DOE explicitly states in the NPRM that “all LVDT distribution transformer cores manufactured are expected to use amorphous steel” and “all MVDT distribution transformer cores manufactured are expected to use amorphous steel.” *Id.* at 1813, 1815.

<sup>20</sup> See *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722 (Jan. 11, 2023) at Table IV.10.

overnight to meet the growing needs of the entire marketplace for distribution transformers is, at best, unproven, and there is no evidence that this is realistically possible in the foreseeable future.<sup>21</sup> The NPRM ignores these challenges entirely and the risks they pose to the domestic supply chain for energy infrastructure which the federal government has repeatedly recognized as a fundamental national policy interest.

In addition, we understand the steel billet for “domestic” AM is not always produced domestically, greatly compounding these risks. And the proposed rules would incentivize the import of AM from Japan and China, both of which are major producers of AM. Utility companies will also be forced to turn to imports of transformers from “[c]ountries with low cost labor – including China, Indonesia, and Mexico – [which] are major sources of imported dry-type transformers.”<sup>22</sup> **In short, the transformer supply chain would become even more dependent on foreign sources. These consequences would harm U.S. domestic transformer manufacturers and erode the resilience of supply chains for the domestic energy sector – directly at odds with the federal policies noted above.**

The NPRM is also at odds with other federal measures designed to strengthen domestic supply chains, including for domestically produced GOES. For example, the “Bulk Power Executive Order” highlighted that a reliable bulk power system is fundamental to national security, emergency services, critical infrastructure, and the economy.<sup>23</sup> This policy remains in effect under the current Administration, as evident by the April 2021 request for information from DOE to inform potential actions to address critical infrastructure security, including for energy infrastructure.<sup>24</sup>

Moreover, in its 2019 Report to Congress on Stockpile Requirements, the Defense Logistics Agency (“DLA”) identified a potential shortfall for GOES and recommended its inclusion in the National Defense Stockpile due to its importance for certain defense applications.<sup>25</sup> The Transformers 232 Report also recommended the establishment of “a strategic stockpile of domestic GOES and subsequent transformer-related products to satisfy

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<sup>21</sup> *Contra, e.g., Gas Appliances Mfrs., Ass’n v. Secretary of Energy*, 722 F. Supp. 792, 796 (D.D.C. 1989) (“[A]n agency cannot simply adopt the conclusions of a private group without disclosing and providing a meaningful opportunity for comment on that decision.”).

<sup>22</sup> Transformers 232 Report at 14.

<sup>23</sup> Executive Order 13920, “Securing the United States Bulk-Power System” (May 1, 2020), 88 Fed. Reg. 26595, *available at* <https://www.federalregister.gov/documents/2020/05/04/2020-09695/securing-the-united-states-bulk-power-system>.

<sup>24</sup> *See* Office of Cybersecurity, Energy Security, and Emergency Response, “Securing Critical Electric Infrastructure” (Jun. 14, 2021), *available at* <https://www.energy.gov/ceser/securing-critical-electric-infrastructure> (last visited Mar. 18, 2023).

<sup>25</sup> Transformers 232 Report at 7-8, 61-62.

U.S. defense and essential civilian transformer demand in case of a national emergency.”<sup>26</sup> The National Defense Authorization Act for Fiscal Year 2023 incorporated these recommendations in legislation, providing that “the National Defense Stockpile Manager may use up to \$1,003,500,000 for acquisition of . . . materials determined to be strategic and critical materials required to meet the defense, industrial, and essential civilian needs of the United States.”<sup>27</sup> This list of strategic and critical materials for stockpiling includes GOES.<sup>28</sup>

Moreover, the Cybersecurity and Infrastructure Security Agency (“CISA”) has noted that power infrastructure is a critical infrastructure sector, the incapacitation of which would debilitate national security, economic security, and public health and safety.<sup>29</sup> In its Energy-Sector Specific Plan, CISA notes that the failure of U.S. power infrastructure, and specifically large power transformers (“LPT”), could present a serious vulnerability to the electric grid. CISA further expresses concern that the United States inordinately relies on overseas manufacturers to meet its demand for LPTs and that the supply and procurement of LPTs can be challenging. For example, replacement of an LPT can take longer than 12 months due to its complex procurement process and its bespoke construction for the specific voltages and currents at the intended substation.<sup>30</sup> The NPRM would only exacerbate these concerns. If AM were to supplant GOES as the primary input for distribution transformers, the domestic GOES industry would be crippled, leading LPT producers to be even more dependent on foreign sourcing.

*Third*, the NPRM does not account for the adverse effects it would have on national defense applications. The Department of Defense’s (“DoD”) mission requirements, including weapons platforms and the installations and systems that support those capabilities around the globe, are dependent on resilient energy supply chains.<sup>31</sup> The U.S. electrical grid supplies the power required to support DoD installations, including military bases, arsenals, and laboratories. Per DoD, this supply is a key part of the “Defense Critical Electric Infrastructure.”<sup>32</sup>

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<sup>26</sup> *Id.* at 243.

<sup>27</sup> See James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, H.R.7776, 117th Cong., <https://www.congress.gov/bill/117th-congress/house-bill/7776>, § 1414(a).

<sup>28</sup> *Id.* § 1414(a)(5).

<sup>29</sup> See <https://www.cisa.gov/critical-infrastructure-sectors>.

<sup>30</sup> Transformers 232 Report at 51; CISA, “Energy-Sector Specific Plan,” <https://www.cisa.gov/sites/default/files/publications/nipp-ssp-energy-2015-508.pdf>.

<sup>31</sup> Department of Defense Annual Energy Management and Resilience Report (AEMRR) for Fiscal Year 2018, <https://www.acq.osd.mil/eie/Downloads/IE/FY%202018%20AEMR.pdf>.

<sup>32</sup> *Critical Electric Infrastructure Information; New Administrative Procedures*, 83 Fed. Reg. 54268 (Oct. 29, 2018), available at <https://www.federalregister.gov/documents/2018/10/29/2018-23459/critical-electric-infrastructure-information-new-administrative-procedures>.



DoD's efforts to improve the energy resilience of its installations mainly focuses on backup power generation to compensate when the commercial grid experiences a disruption. However, emergency power generation assets are ineffective if the surrounding distribution system is unable to convey power between the generation asset and final point of use.<sup>33</sup> This is particularly relevant given that AM cores will not be able to fully support current load requirements, much less keep up with increasing load requirements due to increased reliance on renewable electricity and the growing adoption of electric vehicles ("EVs").<sup>34</sup> Deliveries of transformers using presently available GOES core technology can take up to two years,<sup>35</sup> leaving networks potentially unable to distribute power in the event of failure of an AM transformer.

*Finally*, the United States has taken a number of other steps to strengthen its GOES production capacity and protect domestic industry. The NPRM would undermine the intended aims of these measures. Imports of GOES from China classified under HTS numbers 7225.11.00, 7226.11.10, and 7226.11.90 are subject to a 7.5 percent duty pursuant to "List 4" of the Office of the U.S. Trade Representative's Section 301 duties. Certain downstream products using GOES are also subject to trade measures. Specifically, in 2012, Commerce imposed antidumping duties ranging from 14.95 to 22 percent on LPTs from South Korea (classifiable under 8504.23.0040, 8504.23.0080, and 8504.90.9540 of the HTSUS). In its five-year review of the orders in 2018, the U.S. International Trade Commission determined that revoking the orders would likely lead to a continuation or recurrence of material injury to the domestic industry producing LPTs.

In sum, the federal government has repeatedly acted in recognition of the fact that GOES is a critical product essential to U.S. national security interests. However, despite this well-established federal policy of supporting the domestic market and related production capacity for GOES spanning multiple Presidential administrations, the NPRM would eliminate the market for GOES and, thereby, also undermine the resiliency of the U.S. electricity grid. In short, the NPRM, if finalized, would work against the very national security interests that prompted these various government actions in the first place.

## **II. *The NPRM Is Not Technologically Feasible, as Required by Law***

DOE's NPRM exceeds its authority under the Energy Policy and Conservation Act ("EPCA") to prescribe efficiency standards for distribution transformers. DOE only has authority to issue new or amended efficiency standards that are "technologically feasible and

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<sup>33</sup> Transformers 232 Report at 60.

<sup>34</sup> NPRM Meeting at 42–43 ("And yet, as we look forward, we have electric vehicles as well as conversions from natural gas over to electric heat pumps. And the conversions, as well as EV applications, are so extensive that my friends in the utility side have collected quite a database that shows that loading can be anticipated to increase by up to 50 percent over the next five-to-ten years. . . . And the implications as we go forward with what can be anticipated to be higher loadings are that amorphous core transformers at the higher loads are going to be less efficient than the silicon iron transformers.").

<sup>35</sup> *Id.* at 22.

economically justified.”<sup>36</sup> The agency is required to evaluate technological feasibility based on current information, and its technological feasibility analysis must account for the current market penetration of products capable of meeting the new standard.<sup>37</sup> In addition, the agency should meaningfully consult with a broad swath of interested parties during the rulemaking period.<sup>38</sup> However, the substantive requirements of the NPRM and the process by which DOE promulgated them flout these requirements. While Cleveland-Cliffs appreciates the opportunity to comment in response to the NPRM, DOE’s overall rulemaking process has been needlessly insular without adequate engagement with interested stakeholders. Prior to the issuance of the NPRM, DOE had not provided any meaningful indication that it was considering such a drastic policy change as effectively mandating the use of AM in distribution transformers and excluding GOES from this market entirely.<sup>39</sup> Nor did the agency make any of its supporting evidence publicly available so that interested stakeholders could share with the agency the many shortcomings of this analysis and ill-founded assumptions that supported it.<sup>40</sup>

Since DOE failed to engage with stakeholders in this manner *before* issuing the NPRM, and then provided a compressed timeframe for commenters to prepare and submit comments to the proposed rule, Cleveland-Cliffs did not have an opportunity to develop a comprehensive analysis of all of the shortcomings with the NPRM’s underlying assumptions and resulting findings. However, in the limited time Cleveland-Cliffs has had to review the NPRM, it has identified several significant flaws with DOE’s analysis, as described in greater detail below.

DOE’s NPRM is not technologically feasible because the standards cannot be met using the materials and design parameters *currently available*.<sup>41</sup> There is only limited AM manufacturing volume and capacity in the United States relative to the expected demand of AM annually needed to substitute for the 200,000 tons of GOES presently used to meet the needs of distribution transformers.<sup>42</sup> Notably, this 200,000 tons figure underrepresents the actual volume

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<sup>36</sup> 42 U.S.C. § 6295(o)(2)(A), (o)(3)(B).

<sup>37</sup> See *N.R.D.C. v. Herrington*, 768 F.2d 1355, 1409 (D.C. Cir. 1985) (noting that “technologically feasible” means “technologically feasible based on information that is reasonably current at the time the final rules are validly adopted”).

<sup>38</sup> See *Gas Appliances Mfrs., Ass’n*, 722 F. Supp. at 796–97.

<sup>39</sup> See *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722, 1766, 1787, 1813, 1815, 1817 (Jan. 11, 2023).

<sup>40</sup> *Contra, e.g., Gas Appliances Mfrs., Ass’n*, 722 F. Supp. at 797 (DOE has obligation “to put the studies on which it relied in the record or to respond publicly and specifically to [commenters’] still unanswered objections”).

<sup>41</sup> See, e.g., *Energy Conservation Standards for Distribution Transformers*, 77 Fed. Reg. 7282-01, 7296 (Feb. 10, 2012).

<sup>42</sup> NPRM Meeting at 154 (Mr. Carter); see also *Transformers 232 Report* at 103 (“U.S. consumption of GOES is estimated at approximately 220,000 metric tons per year.”).

of AM that would be required to replace GOES given that AM-based distribution transformers will require a larger core and therefore more AM.<sup>43</sup> DOE has only been able to identify a *single* domestic manufacturer of AM, and it operates at current production levels between 20,000 and 25,000 tons annually, with only 15,000 tons of additional production capacity available for AM core production. Thus, this manufacturer does not have the capacity to supply the requisite volumes of AM to meet market requirements.<sup>44</sup> In fact, even if all *global capacity* for AM were earmarked for the U.S. transformer market, it still would not be enough to meet the needed demand.<sup>45</sup> Instead of considering these important issues in a thoughtful and empirically-driven manner, the NPRM instead relies on assertions from that single AM manufacturer that it can substantially increase production to meet market demand. The NPRM credits these unsubstantiated statements without independent verification or meaningful consideration of supply chains and other market dynamics. This approach does not qualify as sound agency decision-making.<sup>46</sup>

In addition to the lack of AM in the bulk quantities necessary to make the proposed efficiency standards technologically feasible, the currently available designs of distribution transformer cores using AM are not even suitable for their proposed use. At the public meeting DOE convened on February 16, 2023, several participants in the U.S. energy market raised concerns that AM cores cannot be efficiently loaded as much as traditional steel cores.<sup>47</sup> And this is despite companies' efforts to use AM for smaller kilovolt-ampere designs and custom designs.<sup>48</sup> Moreover, current designs of transformer cores using AM will likely lead to more catastrophic failures of the transformers, particularly as loads increase.<sup>49</sup>

Compounding this failure is the fact that DOE also did not account for the added amounts of AM that will be required in order to limit the anticipated impacts of increased load requirements. This is an issue both from a supply standpoint as well as from a technological feasibility standpoint. In order to reduce load losses resulting from a switch to AM, manufacturers will need to increase the coil size, and, as well as the core size. Specifically, affected stakeholders predict that a 30 to 60 percent increase in core steel will be required in

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<sup>43</sup> NPRM Meeting at 15.

<sup>44</sup> NPRM Meeting at 13; *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722, 1755 (Jan. 11, 2023).

<sup>45</sup> NPRM Meeting at 79-80.

<sup>46</sup> See, e.g., *Alpharma, Inc. v. Leavitt*, 460 F.3d 1, 6 (D.C. Cir. 2006) (agency must "examine the relevant data and articulate a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made'" (quoting *State Farm*, 463 U.S. at 43)).

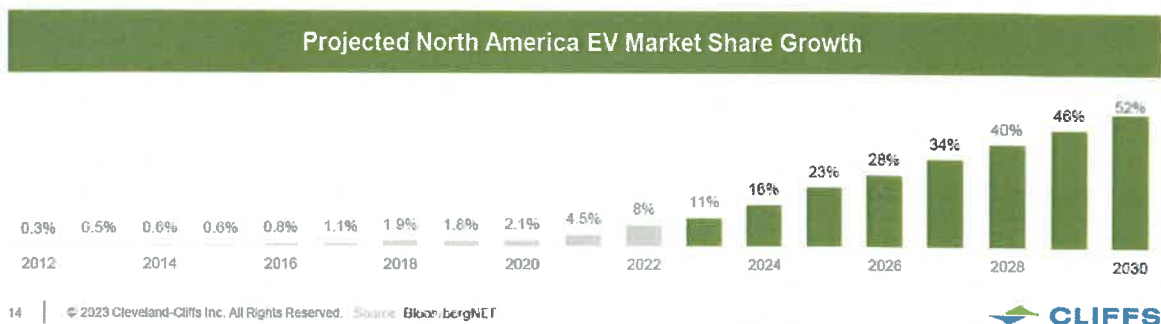
<sup>47</sup> See, e.g., NPRM Meeting at 12.

<sup>48</sup> *Id.* at 15.

<sup>49</sup> *Id.* at 12-13.

order to meet DOE’s proposed standards.<sup>50</sup> However, as discussed above, AM is not available in the volumes necessary to meet market needs based on existing product specifications, much less the added volume needed to support increased core sizes.<sup>51</sup> Moreover, the increase in core size will result in an estimated 25 percent increase in weight, which significantly affects the blueprint of the installation of distribution transformers.<sup>52</sup> The increased weight is particularly important as it pertains to pole-mounted distribution transformers. The increased stress placed on the pole may render existing infrastructure incapable of supporting the new AM transformers, requiring their replacement before the end of their useful life. DOE’s evaluation of technological feasibility fails to account for this new infrastructure that will need to be built to support a switch to AM infrastructure that is not available in adequate volumes to meet these needs.

DOE’s NPRM is also not technologically feasible because it establishes an unrealistic implementation timeline. The timeline proposed by DOE for implementation of these new rules is entirely too short, as was confirmed by several industry participants at the meeting DOE convened in February.<sup>53</sup> Moreover, the NPRM does not account for the fact that market demand for electricity will significantly increase in the coming years, particularly as EVs gain a greater foothold in the marketplace, as demonstrated in the table below.



Indeed, as depicted in the following table below, electricity usage is expected to increase significantly in the next 20 years.<sup>54</sup> Among other reasons, these changes can be attributed to the continuing trend away from gas-powered heating to electric heating and increasing use of EVs as

<sup>50</sup> *Id.* at 11.

<sup>51</sup> *Id.* at 15.

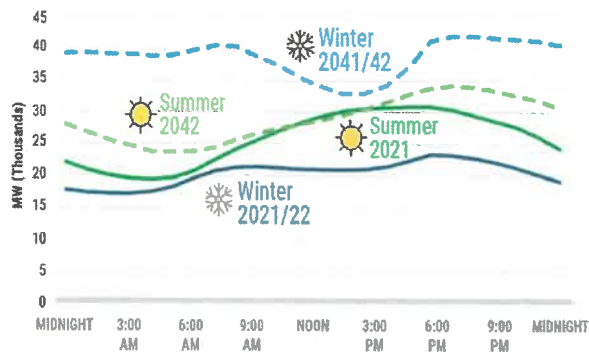
<sup>52</sup> *Id.* at 16, 24–25.

<sup>53</sup> *Id.* at 9–10, 15, 24.

<sup>54</sup> See “Power Trends 2022 – The Path to a Reliable, Greener Grid for New York,” New York ISO, *available at* <https://www.nyiso.com/documents/20142/2223020/2022-Power-Trends-Report.pdf/d1f9eca5-b278-c445-2f3f-edd959611903>.

demonstrated above.<sup>55</sup> These cumulative market changes in how Americans meet their energy needs, as supported by DOE itself, are projected to result in considerably higher peak loads, where AM transformers will be much less efficient than GOES transformers.<sup>56</sup>

Figure 3: 2021 New York Control Area (NYCA) Bulk Electric System 2021 Actual and 2042 Forecasted Winter/Summer Load Shapes



But these developments relating to energy transition, including their anticipated impact on the markets for transformers, are ignored entirely by DOE in the NPRM. These considerations are very important because AM loses much of its efficiency quality at the higher load levels projected to result from increased demand for electricity. Moreover, as noted above, the NPRM gives no consideration to whether supply chains for AM are capable of meeting these increased power needs, nor any thought to the potential economic and national security consequences of transformer and transformer input shortages caused by a misguided efficiency standard.

### III. *The NPRM Is Not Economically Justified, as Required by Law*

DOE's NPRM also exceeds the agency's authority under the EPCA because the amended efficiency standards are not economically justified. In determining whether an energy

<sup>55</sup> See "Annual Energy Outlook 2023" (Mar. 2023), U.S. Energy Information Administration, *available at* [https://www.eia.gov/outlooks/aeo/pdf/AEO2023\\_Narrative.pdf](https://www.eia.gov/outlooks/aeo/pdf/AEO2023_Narrative.pdf) at 5 ("Not only is the U.S. electric power sector's composition changing, but we see increased electrification in the end-use sectors. We project more heat pumps and electric vehicles, as well as electric arc furnaces increasingly deployed in the iron and steel industry. In the residential and commercial sectors, higher equipment efficiencies and stricter building codes extend ongoing declines in energy intensity.").

<sup>56</sup> See Projected Efficiency of GOES- and AM-based Transformers, which is attached as **Exhibit 1**; see also NPRM Meeting at 42-43.

conservation standard is economically justified, DOE must fully assess several statutory factors, including:

(I) the economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard;

...

(IV) any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard; [and]

(V) the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard.<sup>57</sup>

Here, however, DOE appears to have used flawed modeling assumptions in assessing these factors and failed entirely to assess certain other factors.

*First*, DOE has failed to account for the real-world costs associated with switching to AM cores.<sup>58</sup> There is no dispute that effectively mandating the use of AM rather than GOES will significantly increase the cost of transformers and power generation and distribution in the near-term. But even the substantial cost increases estimated in the NPRM are far below the reasonably foreseeable economic impact on manufacturers and on consumers. DOE cites an estimate of \$271 million in upfront costs associated with capital improvements attributable to the NPRM.<sup>59</sup> But this figure does not appear to account for the 30-60 percent increase in transformer core weight that would result from the proposed efficiency standards.<sup>60</sup> This affects the entire supply chain, which has required significant investments to support current manufacturing processes.<sup>61</sup> Moreover, the capital equipment estimates used by DOE are based on manufacturer interviews conducted in 2019. The prevailing market dynamics and inflationary forces have changed substantially since then. Long lead times and pronounced inflation have caused significant disruptions to the marketplace since the second half of 2020, resulting in at least a 50 percent increase in the cost of industrial equipment. Furthermore, DOE predicts a required increase of about 600-700 workers, requiring offshoring of certain production processes, to support implementation of these new standards. However, these figures significantly underestimate the labor force of highly skilled workers needed to work in the AM

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<sup>57</sup> 42 U.S.C. § 6295(o)(2)(B)(i)(I), (IV), (V).

<sup>58</sup> See 42 U.S.C. § 6295(o)(2)(B)(i)(I); *contra Herrington*, 768 F.2d at 1420–22 (requiring DOE to explain its assumption that businesses would use debt to finance increased investment required by its new standards, because that assumption appeared not to “correspond[] to the real world”).

<sup>59</sup> *Energy Conservation Program: Energy Conservation Standards for Distribution Transformers*, 88 Fed. Reg. 1722 (Jan. 11, 2023).

<sup>60</sup> NPRM Meeting at 11.

<sup>61</sup> *Id.* at 151.

industry. Informed estimates suggest an additional 1,000-2,000 workers will be needed for just a *single manufacturer*.<sup>62</sup> Notably, the limited domestic supply of AM for core production, coupled with additional constraints in the domestic supply chain and labor market, would invariably lead to many of these needed jobs being filled overseas, if at all.

DOE's failure to account for the supply chain constraints associated with ramping up AM production, as well as the tremendous increased demands linked to greater market penetration of EVs and other decarbonization efforts, makes the NPRM's cost projections woefully inadequate.<sup>63</sup> Simply put, the increased costs from mandating universal application of AM, which currently constitutes about three percent of the market for distribution transformers, will be massive and stretch the limits of existing supply chains—particularly those in the United States—beyond their breaking point.

The NPRM also undermines the reasonable expectations that supported critical investments in the domestic transformer industry, including as it relates to GOES. Market actors made these investments in reliance on the U.S. policy of building and supporting the domestic GOES industry, only to be blindsided by this proposed rulemaking that does the exact opposite. Cleveland-Cliffs alone has dedicated approximately \$40 million over the last three years to maximize existing electrical steel production capabilities, including nearly \$10 million in expanded operations at its Butler Works facility and \$30 million to develop 70,000 tons of EV-grade NOES production capacity. And these are not one-time investments. Cleveland-Cliffs aims to invest more in the near future to keep up with market demand.<sup>64</sup> Those investments are now at risk, as domestic manufacturers of transformers estimate that changes required to comply with the proposed standards would require new investments of between \$30 and \$50 million for each *individual manufacturer* to retool existing factories.<sup>65</sup> Based on industry's own estimates, shared with DOE during the recent meeting on the NPRM, the transformer manufacturing industry faces a 50 percent increase in costs,<sup>66</sup> and approximately \$500 to 800 million in new costs associated with converting transformer building operations to AM.<sup>67</sup>

**Second**, on top of these costs, the anticompetitive effect of giving one AM manufacturer complete control over the domestic supply of a critical input to distribution transformers will harm electric utilities, the end-users of distribution transformers. This is exacerbated by the fact

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<sup>62</sup> *Id.* at 80 and 152.

<sup>63</sup> *See Gas Appliances Mfrs. Ass'n v. Dept. of Energy*, 998 F.2d 1041, 1047 (D.C. Cir. 1993) ("DOE cannot accurately estimate the costs and benefits of compliance without some notion of how industry will achieve the loss reduction.").

<sup>64</sup> NPRM Meeting at 19.

<sup>65</sup> *Id.* at 24.

<sup>66</sup> *Id.* at 25.

<sup>67</sup> *Id.* at 80.

that this single manufacturer – the original holder of patents related to the production of amorphous steel – has the advantage of having the technical know-how with respect to AM-based technology. Indeed, during the NPRM meeting in February, the company suggested it would need to license the core-making technology in order for others to benefit from and deploy its technical know-how.<sup>68</sup> In considering whether an efficiency standard is economically justified, DOE must consider not only quantifiable economic factors but also the harm to competition likely to result from the adoption of the standard.<sup>69</sup> Because the NPRM effectively gives a single manufacturer a monopoly in AM production, core material costs and, by extension, transformer prices will increase. These anticompetitive effects would also harm the public, to whom the electric utilities would be likely to pass on the increased costs resulting from the consolidation of market power.

*Third*, DOE has failed to demonstrate in a meaningful way that the estimated savings in operating costs throughout the estimated average life of distribution transformers using AM cores outweighs the huge increase in the price and maintenance costs associated with implementation of the new requirements.<sup>70</sup> DOE’s purported analysis showing net benefits from this mandated change to AM is severely flawed. As noted above, the feasibility of making this change, and the substantial costs required even if possible from a technical and supply chain standpoint, are not properly accounted for by DOE.

Moreover, the projected benefits – the energy savings that the NPRM projects as resulting from the proposed efficiency standard – are substantially overstated.<sup>71</sup> Among other things, the NPRM fails to account for the fact that at heavier loads, GOES-based transformers are more efficient than AM-based transformers.<sup>72</sup> Indeed, as demonstrated in the attached **Exhibit 1**, when load levels are at 50% or higher, GOES transformers outperform AM-based transformers.<sup>73</sup> DOE ignores these effects altogether, instead calculating inflated estimates of the anticipated energy savings based on flawed modeling assumptions that AM transformers will

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<sup>68</sup> *Id.* at 36.

<sup>69</sup> 42 U.S.C. § 6295(o)(2)(B)(i)(V); *see Herrington*, 768 F.2d at 1400, 1415 (recognizing that DOE must consider “[f]actors bearing on economic justification” that are not “precisely quantifiable”).

<sup>70</sup> *See* 42 U.S.C. § 6295(o)(2)(B)(i)(II).

<sup>71</sup> *Contra Am. Public Gas Ass’n v. U.S. Dep’t of Energy*, 22 F.4th 1018, 1027 (D.C. Cir. 2022) (“DOE inflated the economic value of a more stringent standard by attributing to a new regulation economic benefits that would be realized even without a new regulation”).

<sup>72</sup> NPRM Meeting at 42-43 (“The losses on the amorphous core transformers are 50-percent higher than they are on the silicon iron transformers across the board ... amorphous core transformers at the higher loads are going to be less efficient than the silicon iron transformers.”).

<sup>73</sup> *See* Exhibit 1.



outperform GOES transformers under all circumstances.<sup>74</sup> The increasing demands on power capacity will, in turn, strain electrical grids, meaning that they will be more frequently operating at loads of 50% or higher. Not only do GOES transformers outperform AM transformers at higher load levels, but stakeholders have also raised concerns that AM cores cannot be overloaded as much as traditional steel cores.<sup>75</sup> This is critical to cost considerations, as more catastrophic failures to AM transformers are expected as loads increase. This equates to increased costs to maintain and replace those transformers.<sup>76</sup> Therefore, the energy savings from switching to AM transformers are far less significant – and, as the load on the grid increases, non-existent – compared to what DOE has projected in the NPRM.

*Finally*, among the economic factors DOE should consider is the inevitability that the costs resulting from implementation of DOE’s NPRM will be passed down to consumers.<sup>77</sup> This result will be particularly burdensome on vulnerable and low-income communities ill-equipped to absorb these significant cost increases.

#### IV. Conclusion

The NPRM was not the product of a transparent process that included the input of all relevant stakeholders. Indeed, if DOE had given any indication to Cleveland-Cliffs, or our customers, suppliers, or employees, that it was considering such a drastic policy change, we are confident that the agency would have received significant and vocal feedback about all of the flaws with this approach. Indeed, stakeholders from many different industries participated in DOE’s February 16, 2023, online meeting and expressed deep misgivings with the proposed efficiency standard.

DOE should heed these concerns as it proceeds with the rulemaking process. Rather than hastily adopting a standard that is not supported by well-founded evidence and that would jeopardize the domestic supply chain for transformers and their critical components, we urge the agency to take a more thoughtful approach going forward that accounts for the views of all affected stakeholders.

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<sup>74</sup> *Contra Appalachian Power Co. v. EPA*, 249 F.3d 1032, 1053 (D.C. Cir. 2001) (“model assumptions must have a ‘rational relationship’ to the real world.” (citing *Chemical Mfrs. Ass’n v. EPA*, 28 F.3d 1259, 1265 (D.C. Cir. 1994))); *Gas Appliances Mfrs.*, 998 F.2d at 1047 (DOE did not “manifest reasoned decisionmaking” when using an “arbitrary multiplier for projecting costs” from residential to commercial markets).

<sup>75</sup> NPRM Meeting at 12, 132.

<sup>76</sup> *Id.* at 12–13, 132.

<sup>77</sup> 42 U.S.C. § 6295(o)(2)(B)(i)(VII).

We believe that the proper course is for DOE to withdraw this proposed rule and to meet with stakeholders to gather more information about alternative approaches that are technologically feasible and economically justified, and can better achieve the increased energy efficiency goals that the agency desires. For example, higher-efficiency grades of GOES could be produced in increased volumes, subject to lead time to develop and manufacture these products. We encourage the agency to pursue these more sensible solutions that better align with U.S. economic and national security interests.

Sincerely,

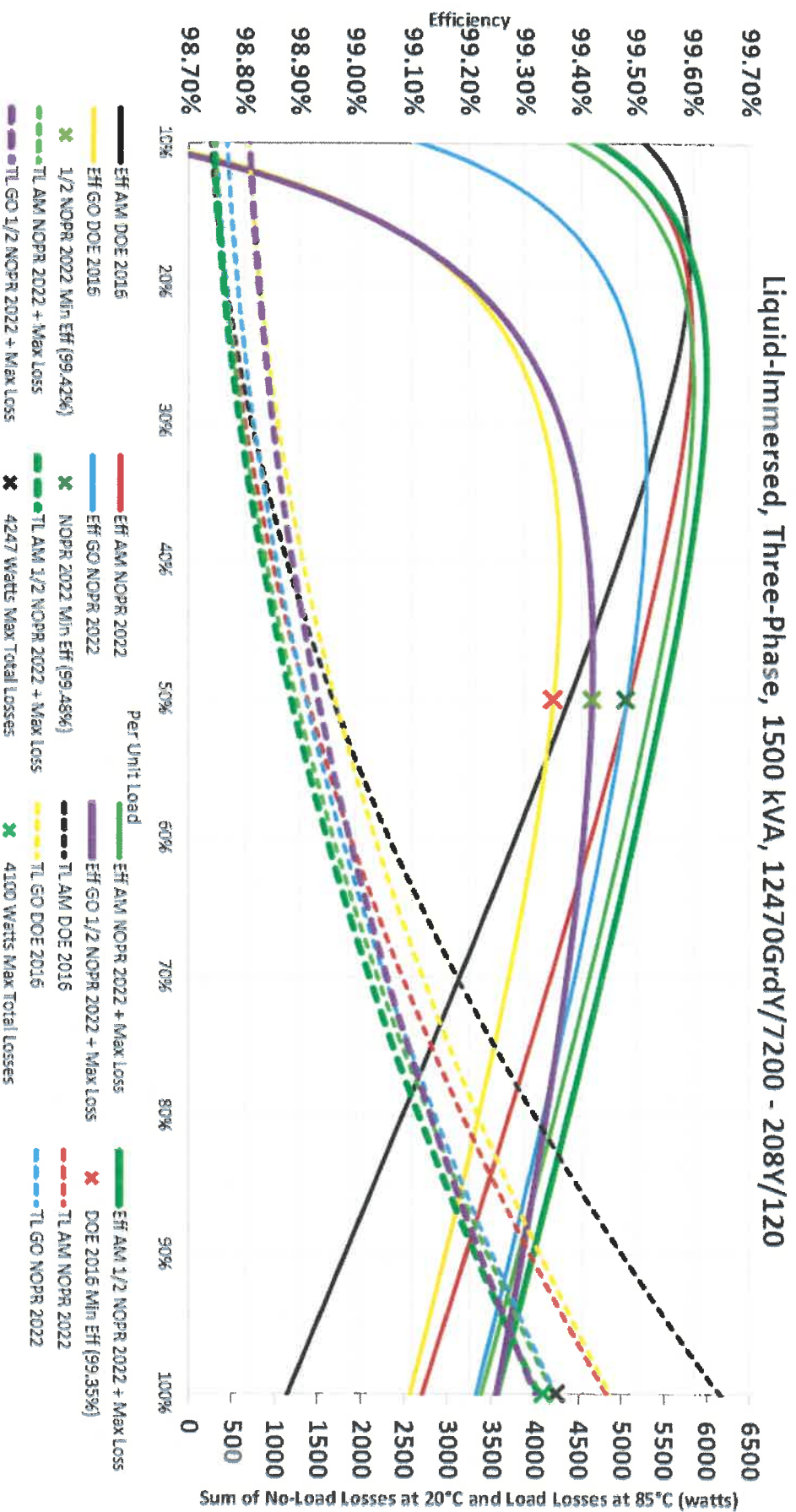
A handwritten signature in black ink, appearing to read 'Wendell L. Carter', with a stylized flourish at the end.

Wendell L. Carter  
Executive Vice President, Technology

# Exhibit 1

1

# Liquid filled designs at 1500 kVA



# Liquid filled designs at 2000 kVA

Liquid-Immersed, Three-Phase, 2000 kVA, 12470GrdY/7200 - 480Y/277

