

DOE's Proposed Regulation on Electricity Distribution Transformers

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The U.S. Department of Energy (DOE) regulates the energy efficiency of electricity distribution transformers using authority under the Energy Policy and Conservation Act (P.L. 94-163), as amended. DOE issued a [proposed rule](#) on January 11, 2023, that, if finalized, would raise the minimum efficiency standards for certain types of distribution transformers manufactured and sold into commerce. DOE has stated this may require switching to a new type of steel for one part of the transformer. Certain [electric power trade groups](#) have cited supply chain challenges that may impact the availability of this type of steel. DOE [has stated that](#) the supply is expected to meet the increased demand.

Regulations for Distribution Transformers

Congress first required DOE to set legally-binding energy conservation standards for distribution transformers in the Energy Policy Act of 1992 (P.L. 102-486), provided that such standards “would be technologically feasible and economically justified, and would result in significant energy savings.” [42 U.S.C. §6317\(a\)\(1\)](#). DOE first [published standards](#) for two types of transformers in October 2007, with a compliance date in January 2010. Congress set standards for a third type of transformer in the Energy Policy Act of 2005 (P.L. 109-58). [10 C.F.R. §431.196](#).

DOE Rulemakings and Types of Steel

Transformers change the input voltage of power being transported via the electric grid, stepping it up or down as necessary, to synchronize different components and stabilize the grid. (For more discussion of transformers, see [CRS Insight IN12048](#) or [CRS In Focus IF12253](#).) The parts of a transformer include a steel core, wrapped by insulated electrical wires. Grain-oriented electrical steel (GOES) has been the dominant material used in distribution transformer cores; amorphous steel is another category used for the cores. DOE previously [had found that](#) “amorphous [steel] is the lowest-loss grade and a practical necessity to reach the very highest efficiency levels.” The very thin nature of the amorphous steel ribbons can reduce energy loss phenomena. The 2023 proposed rule, however, does not dictate the choice of steel.

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Whether there is sufficient domestic manufacturing capacity for transformer steel has been the subject of debate. For example, in a June 2019 [notice](#), DOE explained that several years earlier more stringent standards were not adopted owing to the “risks associated with limitations in the available supply” of the amorphous steel. At the time, DOE [noted](#) amorphous steel was “available in significant volume from one supplier whose annual production capacity is below the amount that would be required to meet the demand.” A 2022 DOE [report](#) found that domestic GOES manufacturing could not meet domestic demand for the highest quality steel at prices comparable to imported GOES.

More recently, DOE has reconsidered the supply risk of amorphous steel and any impacts of new standards. In the January 11, 2023, proposed rule, DOE noted that “[a]morphous manufacturers response to earlier standards demonstrates that amorphous capacity can be added quickly” and further that “[s]takeholders have expressed willingness to increase supply to match any potential demand created by an amended efficiency standard.” In contrast, Eaton, a manufacturer of transformers, submitted a public comment to the rule to the proposed rule [stating](#): “Technology and process development to accommodate amorphous steel will exacerbate existing labor and material supply issues.”

Supply of Electrical Steel

Types of Electrical Steel Discussed in the DOE Rulemaking

According to DOE’s [analysis document](#) (p. 3A-4) accompanying the January 2023 proposed rule, the only current domestic makers of GOES and amorphous steel are [Cleveland-Cliffs Inc.](#) and Japanese-owned [Metglas](#) (a subsidiary of Hitachi), respectively. Metglas [asserts](#) that it can install additional domestic capacity quickly. DOE noted other sources of GOES exist in Russia, China, and the European Union. An [industry report](#) listed the major producers of amorphous steel as being in Japan, China, and the European Union.

Status of Supply of Electrical Steel

The National Rural Electrical Cooperative Association [asserted](#) that, due to various factors, “orders for distribution transformers that previously were filled in two to four months now take between 22 to 33 months to complete.” DOE [has joined with industry CEOs](#) and “formed a Supply Chain Tiger Team to identify the challenges facing the energy sector and what solutions could help to address this issue.” DOE’s May 2023 [critical materials assessment](#) identified electrical steel as a “near-critical material.”

In June 2022, [President Biden authorized DOE to use the Defense Production Act \(DPA\)](#) [50 U.S.C. §§4501 et seq.] to address domestic production of critical energy components including transformers. A recent draft bill, the “[Clean Electricity and Transmission Acceleration Act of 2023](#),” would authorize additional funding under the DPA for GOES. [CRS Report R43767](#) discusses the DPA in detail.

Other Programs on Transformers

The Infrastructure Investment and Jobs Act (IIJA, P.L. 117-58) appropriated \$10 million in rebates for transformers, a program authorized in Section 1006 of the Energy Act of 2020 (Division Z of the Consolidated Appropriations Act of 2020, P.L. 116-260). The categories eligible for rebates include two of the three transformer categories DOE regulates.

Congressional Interest

A group of 47 Senators wrote a [letter](#) to Energy Secretary Granholm on June 1, 2023, urging DOE to “finalize a rule that does not exacerbate the shortage in distribution transformers.” At an April 20, 2023, [hearing](#) of the [Senate Committee on Energy and Natural Resources](#), Senator Hyde-Smith asked Secretary Granholm about the impact of the proposed standard, asking whether users of the transformers might expect “long lead times, up to 2 to 4 years and more” owing to “more expensive and limited types of steel” needed to comply with the standard. Secretary Granholm stated that DOE “would like the Defense Production Act to supply more funding to be able to incentivize manufacturers to open up more manufacturing” and noted that while the Department allocated [\\$75 million for DPA activities in FY2024](#), of the \$500 million appropriated in the [Inflation Reduction Act](#) that amount likely would not be enough. Congress could request a plan from DOE for use of authorities in Title III of the DPA to enhance domestic transformer steel production.

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