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INSIGHT

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 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 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 in distribution transformer cores; amorphous steel is another category. 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. 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 debated. For example, in a June 2019 notice, DOE explained that several years earlier more stringent standards were not adopted owing to the "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 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 transformer manufacturer, submitted a public comment 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, respectively. Metglas asserts that it can install additional domestic capacity quickly. DOE noted other GOES sources exist in Russia, China, and the European Union. An industry report listed the major amorphous steel producers 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 "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. The categories eligible for rebates include two of the three transformer categories DOE regulates.

Recent Developments

On December 5, 2023, the House Committee on Energy and Commerce reported H.R. 4167, the "Protecting America's Distribution Transformer Supply Chain Act," that would prevent DOE from

updating the transformer regulations for five years. Senator Barrasso (WY) had introduced a companion bill, S. 2036, on June 15, 2023.

Section 307 of H.R. 4394, the "Energy and Water Development and Related Agencies Appropriations Act, 2024," would prevent DOE from using funds to finalize the proposed rule. Amendment #24 struck Section 307 and would allow the proposed rule to proceed.

Congressional Interest

Forty-seven 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 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 DOE 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.

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