

Reducing Energy Waste from Transformers While Ensuring Robust Supply

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Most new distribution transformers—a familiar sight on utility poles—still use outdated technology that wastes energy, while often using foreign-produced steel with unreliable supply. In December, the U.S. Department of Energy (DOE) proposed updated energy efficiency standard for these transformers that would cut greenhouse gas emissions and costs for households and businesses—while helping shift the market to products with a more reliable domestic supply chain.

DISTRIBUTION TRANSFORMERS ARE CRITICAL FOR ELECTRICAL SERVICE. TODAY'S MODELS AND THEIR SUPPLY CHAIN AREN'T ADEQUATE.

Nearly all generated electricity flows through one or more transformers, so even small amounts of energy waste by each one can cause major needless climate pollution and additional costs incurred by homes and businesses through higher utility bills.



Proposed transformer efficiency standards would:

- Save up to \$15 billion from reduced electricity waste from units produced over the next three decades, savings that should be largely passed on to electric customers
- Cut CO₂ emissions by 340 million metric tons, an amount equal to a year's worth of emissions from 90 coal-fired power plants
- Improve the domestic supply chain for transformers, which will improve the long-term security and reliability of the electric grid

Most new transformers today use conventional grain-oriented electrical steel (GOES) in their cores. However, the supply of GOES for these types of transformers is not reliable. With only a single domestic supplier, about half of the GOES used in the United States is imported, a share that is expected to continue rising, according to the [Department of Commerce](#). Conventional electrical steel producers are increasingly focused on serving the rapidly growing electric vehicle (EV) market (both EV motors and chargers use electrical steel), resulting in significant current and future materials supply challenges for distribution transformers.

TRANSFORMERS THAT WASTE LESS ENERGY ARE AVAILABLE

More efficient transformers are available for widespread use. These models use amorphous metal in their cores and **cut energy waste by about one-third to one-half** compared to conventional models utilizing GOES.

Amorphous transformers are proven and reliable; they have been in use since the late 1980s and an [estimated](#) three million are in service worldwide. About 90% of liquid-immersed transformers [purchased in Canada](#) use amorphous metal.

Metglas, which produces amorphous metal in South Carolina today, has [stated](#) it could add production capacity to meet the majority of U.S. transformer steel demand in 18–24 months. The product is not proprietary and is also made today in several other countries.

THE PROPOSED STANDARDS WOULD IMPROVE TRANSFORMERS AND ENSURE ROBUST SUPPLY

DOE's [proposed](#) updated energy efficiency performance standards would likely necessitate use of amorphous metal in most new units, including both liquid-immersed transformers (typically installed outdoors and owned by utilities) and dry-type transformers (typically used in or near buildings and owned by building owners).

These more efficient transformers would significantly reduce energy waste (and associated costs) as more are installed throughout the electrical system. By 2050, the annual electricity savings from the proposed standards, about 24.6 terawatt hours, would be equivalent to the current annual consumption of all the households in Oklahoma. Cutting needless electricity waste from distribution transformers will reduce electricity generation requirements, making the goal of a net-zero grid both more attainable and affordable.

The updated standards would take effect in 2027 or later, which would provide ample time for domestic amorphous production capacity to increase to meet future demand. And because amorphous metal is not used in EVs (while conventional electrical steel is), using it in the production of transformers should ensure a more stable supply of transformers, a crucial piece of equipment for the electrical grid.

By law, DOE was required to propose updated transformer standards by 2017 and finalize them in 2019. In a settlement agreement last year, the department [committed](#) to finalize them by June 30, 2024.