

December 4, 2018

Chairman Asim Z. Haque  
Public Utilities Commission of Ohio  
180 E Broad Street  
Columbus, OH 43215

Via Email RE: Case No. 18-1596-EL-GRD

The Copper Development Association Inc. (CDA) hereby wishes to submit the following comments in the above captioned case in which the Public Utilities Commission of Ohio solicits comments in the matter of the PowerForward Distribution System Planning Workgroup. CDA supports the Commission's goal to revitalize and modernize the electrical grid and create a more efficient energy system in Ohio, through the increased development of distributed energy resources, like solar, energy efficiency, and battery storage, along with a more modernized grid infrastructure system supporting EDUs. Copper plays a vital role in sustainable electric energy, increasing the efficiency and reliability of wind and solar installations, energy storage applications, and their related power transmission systems.

Copper plays a critical role in clean energy systems, from generators and transformers to cabling and protective devices. The generation of electricity from renewable sources, including solar and wind, has copper usage intensity typically four to six times higher than for fossil fuels. Copper usage intensity for renewables is high because solar panels that require the installation of copper grounding cable and copper-concentric-neutral aluminum-conductor power cable. Copper high conductivity compared to other commercial metals (e.g., Cu is 65 percent more conductive than Al) makes it the ideal material to ensure efficient, reliable, and safe transmission and distribution of electricity. Renewable energy sources, such as solar, wind and geothermal, are crucial in meeting the power demand required to support economic growth and improve living standards. Adding 1 kg of copper to electrical or thermal systems saves between 100 and 7,500 kg of CO<sub>2</sub> emissions and 500 to 50,000 kWh of primary energy use over a system's lifetime. This can save anywhere from \$78 to \$7,800 in energy costs over the product's lifetime while minimizing CO<sub>2</sub> emissions. The more copper your electrical equipment windings and cabling contain the less costly energy you'll lose as heat.

Copper also contributes to magnet wire for generators and transformers, DLO cables, control and communication cables, and bus bar for switchgear. Since copper is not consumed like a fuel, it performs its functions for many years and is ultimately recyclable. The presence of copper in transport systems utilizing electric motors and other components reduces energy losses, thereby improving equipment performance and reducing CO<sub>2</sub> emissions to the environment. These devices and their copper components work to reduce CO<sub>2</sub> emissions in

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a highly efficient manner. Copper upsizing also minimizes costly operations problems, particularly downtime due to overheated or failed equipment. Reliability and service life of electrical equipment are substantially increased. And there can be significant savings in the cost of air handling and cooling no longer needed.

Copper can be easily and effectively recycled over and over again without degradation of its properties. Copper's electric and thermal properties decrease load loss and keep the power grid working at full capacity. Copper's high-quality, long-life, and proven performance ensure long-term reliability of energy systems and equipment. Copper's electrical conductivity is unmatched by any other engineering metal. Copper's conductivity, plus its ability to create high-quality, low-resistant connections is the basis for highly-efficient electrical equipment and lower energy losses.

Thank you for your review and consideration of our comments, We look forward to providing the Commission with any additional information as needed as the PowerForward Collaborative and its working groups continue to develop grid modernization solutions.

Sincerely,



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Summary: Public Comment Public Comments of Copper Development Association electronically filed by Mr. William Devine on behalf of Copper Development Association and Strong, Zolaikha Ms.