



# Coreless Axial Flux Motor

## Technology Overview

Electric motors consume about half of the world's electricity.<sup>1</sup> The coreless axial flux motor replaces the copper wire and laminated iron core found in conventional electric motors with a printed circuit board stator, making the motor smaller, lighter, and more efficient. The coreless motor is combined with a programmable variable-frequency drive (VFD) and a controller that provides real-time monitoring and cloud-based connectivity. A modular form factor enables flexibility in meeting design specifications. Motors and stators can be incrementally added or removed to meet changing capacity requirements.

## Why is GSA Interested?

In response to CDC guidelines to increase outdoor air ventilation and run HVAC systems longer, the energy spend for heating and cooling GSA buildings is likely to increase. Coreless axial flux motors are both more efficient and less expensive than a premium-efficient motor combined with a VFD, so they have the potential to provide GSA with significant cost savings. They are up to 10% more efficient at their rated full speeds—and up to 30% more efficient at part loads/speed. The coreless motors use fewer natural resources to manufacture, they are 50% smaller and lighter than conventional induction motors, and they're about half as expensive to purchase as a premium motor combined with a VFD. Integrated sensing and reporting, as well as quieter performance, promise additional O&M benefits for GSA.

## How Will Success Be Measured?

The testbed design will assess three key manufacturer claims: 10% energy savings when compared to a premium-efficient motor with the same horsepower; a retrofit payback of less than 5 years; and an immediate payback for end-of-life replacement.

Additional criteria to be evaluated include O&M impact; added value for built-in reporting and monitoring; ease of installation; acoustics and vibration.

## Deployment Potential

This technology is currently available for motors between 5 and 15 horsepower (HP) in size. In 2022, motor sizes of up to 25 HP will become available. If this technology proves out, it promises to be a cost-effective retrofit for the majority of GSA HVAC plants, with an opportunity to save up to \$8 million annually, if fully deployed.

<sup>1</sup>International Energy Agency, Paul Waide and Conrad U. Brunner, *Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems*, 2011.

*Green Proving Ground (GPG), in association with a Department of Energy national laboratory, is evaluating the real-world performance of Coreless Axial Flux Motors in federally owned buildings within GSA's inventory. The technology will be provided by Infinitem (Round Rock, TX) and coordinated with other ongoing evaluations of this technology.*