

## **Workshop Description and Goals for**

### **NIST/DOE Workshop on High-Megawatt Direct-Drive Motors and Front-End Power Electronics**

**(September 4, 2014)**

The goal of the workshop is to discuss recently identified approaches that have the potential to substantially improve the energy efficiency, performance and cost of megawatt to high-megawatt scale variable speed drive (VSD) motors used in a wide range of applications.

A previous workshop was convened at NIST on April 16-17 to identify applications and approaches where advanced HMW machine technologies, front end power electronics, and their integration might provide substantial benefit. A significant reduction of energy consumed world-wide could be achieved by transitioning large-power motor applications to VSD motors. Approximately 14% of the total electricity consumed in the United States flows through large-power electric motors (1-50 MW) that are widely used in the COG (Chemical, Oil, and Gas) industry for example. Many of these motors drive 10,000 to 20,000 RPM mechanical loads through a large gearbox and use mechanical throttles rather than power-electronics based VSDs. The approaches identified that would provide substantial benefit include:

- High-Electrical-Speed Direct-Drive Motors (high-speed VSD and machine would eliminate need for large gear box and mechanical throttles)
- “Transformer-less” Medium-Voltage Drives (small, high frequency transformer integrated within the VSD would replace large 60 Hz grid-step-down transformer)
- Integrated Motor-Drive System (grid-to-load system delivered as one unit would reduce size, weight, and cost)

The complete set of presentations and a proceedings document from the April 16-17 Workshop can be viewed or downloaded at the NIST High Megawatt (HMW) Workshop site at: [http://www.nist.gov/pml/high\\_megawatt/april-2014\\_workshop.cfm](http://www.nist.gov/pml/high_megawatt/april-2014_workshop.cfm).

The September 4<sup>th</sup> Workshop will focus on defining a roadmap scoping the machine designs/concepts, power conditioning system (PCS) architectures, and advanced technologies needed to implement the most promising approaches identified in the April Workshop. It is anticipated that the results will be used to guide future activities including future investment by DOE in direct-drive motors, front end power electronics, and their integration.