



U.S.-AFRICA CLEAN ENERGY STANDARDS PROGRAM

Public Market Report: Energy Storage Standards, Conformance and Technology

Phase II Workshop No. 5 USTDA Activity No. (2015-11008A) and Contract No. (CO201511061)

Produced through cooperation between
the **American National Standards Institute (ANSI)** and **Power Africa**
under sponsorship of the **United States Trade and Development Agency (USTDA)**

February 2019

PUBLIC

All rights reserved

PUBLIC

This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government. The opinions, findings, conclusions, or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report.



The U.S. Trade and Development Agency

The U.S. Trade and Development Agency helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies. USTDA links U.S. businesses to export opportunities by funding project planning activities, pilot projects, and reverse trade missions while creating sustainable infrastructure and economic growth in partner countries.

PUBLIC MARKET REPORT

U.S. – South Africa Workshop: Energy Storage Standards, Conformance and Technology

February 21, 2019

08:30 AM – 5:15 PM

Hilton Sandton Hotel

Johannesburg, South Africa

BACKGROUND

Energy storage systems are emerging as central features of electrical infrastructure as global economies transition away from fossil fuels and toward renewable energy systems. Storage systems are an essential tool for decentralized energy systems of all sizes. They play a critical role when integrated in a system-relevant and cost-effective manner. These benefits have the potential to substantially improve both on- and off-grid efficiency and reliability.

While ongoing initiatives, such as the Renewable Energy Independent Power Procurement Programme (REIPPPP), have increased the amount of renewable energy generation and available energy capacity in South Africa, the variable nature of renewables leaves a variety of challenges for system operators. Energy storage technologies, when supported by international standards, create space for renewable energy diversification by ensuring more consistent energy flows and helping distributors balance renewable energy inputs in the national grid. This is particularly important for South Africa, where investment in renewable energy reached \$4.5 billion in 2015 alone.

In 2012, Eskom began a series of actions to enhance South Africa's energy infrastructure, including the Clean Technology Fund (CTF) and Eskom's Renewable Energy Independent Power Procurement Programme (REIPPPP). These initiatives have helped augment the available renewable energy capacity in South Africa. As renewables have increased in the national energy mix, energy storage has become increasingly important as a means for Eskom to improve dispatchability and consistency of variable renewable energy (VRE). With this recognition, Eskom has embarked on an initiative to increase available storage capacity and complement existing renewable generation called the Battery Storage Program.

The Battery Storage Program will add 360MW/1440MWh of battery energy storage to Eskom's energy infrastructure between 2019 and 2021. The program includes implementation of distributed battery storage in two phases beginning with development and implementation of 200MW/800MWh battery energy storage systems (BESS) at 47 of Eskom's distributed substation sites and followed by the procurement and implementation of 160MW/640MWh of BESS at Eskom substations across all nine provinces of South Africa by December 2021.

Despite rapid investments, South Africa has been unable to meet its growing electricity demands. However, energy storage systems, specifically BESS, present an opportunity to augment electricity supplies by increasing the viability and affordability of renewable energies as storage devices, including batteries, help to level out power supply to prevent overloads and blackouts. These systems will help South Africa utilize renewables as a supplement to the main grid as well as in stand-alone off-grid sites.

As South Africa seeks to expand available energy storage capacity over the next three years, installation codes, standards, and conformity assessment will form an essential foundation for safe and reliable

PUBLIC

energy systems. As Eskom deploys BESS, relevant authorities must have the necessary understanding to evaluate these technologies to ensure safety and promote reliability. For this reason, standards are a foundational component to build out South African electrical infrastructure and support successful proliferation of BESS across South Africa and the world.

WORKSHOP SUMMARY

On February 21, 2019, the U.S. Trade and Development Agency (USTDA) hosted the "Energy Storage Standards, Conformance and Technology" workshop in Johannesburg, South Africa. The workshop was organized by the American National Standards Institute (ANSI) under the USTDA-funded U.S.-Africa Clean Energy Standards Program (CESP).

Energy storage systems are an increasingly viable solution for providing remote populations with affordable and reliable electricity access. This workshop featured presentations by U.S. experts, as well as South African experts from both the public and private sectors to address quality assurance, system planning, energy storage systems, data management, metering, and other important aspects of energy storage systems. The event complemented Eskom's Battery Storage Program, which will support the addition of 360MW/1440MWh of battery energy storage to the South Africa national grid by 2022. Presentations focused on standards and technical aspects of energy storage systems that form a critical foundation for safety and a prerequisite for the successful proliferation of energy storage systems across South Africa and the world.

The workshop attracted more than 90 participants, including attendees from multiple African countries. The event provided a thorough background on South Africa's policy landscape for energy storage systems as well as detailed information on standards-related and technical solutions to support the viability and management of existing and future of energy storage systems across South Africa.

The workshop featured 20 expert speakers from the U.S. and South Africa. Expert speakers included 13 representatives from nine U.S.-based organizations including Alpha Technologies, California Public Utilities Commission (CPUC), Eaton, Jabil, National Electric Manufacturers Association (NEMA), Pacific Northwest National Laboratory (PNNL), Southern Africa Energy Program (SAEP), Tesla, and UniEnergy Technologies (UET).

Presentations and photos from the workshop are available on the CESP website: www.standardsportal.org/us-africacesp.

MARKET OPPORTUNITY

The government of South Africa is pursuing an aggressive agenda to increase available renewable energy generation capacity on the national grid. In the 2018 update to the National Development Plan (NDP) 2030, the government of South Africa has indicated its intention to increase the share of PV solar and wind from 7.2% of installed generating capacity to 25.6% by 2030.

Paralleling these goals, Eskom has lead a series of actions to enhance South Africa's energy infrastructure, including the Clean Technology Fund (CTF) and Eskom's Renewable Energy Independent Power Procurement Programme (REIPPPP). These initiatives have helped augment the available renewable energy capacity in South Africa. As renewables have increased in the national energy mix, energy storage has become increasingly important as a means for Eskom to improve dispatchability and consistency of variable renewable energy (VRE). With this recognition, Eskom has embarked on an initiative to increase available storage capacity and complement existing renewable generation called the Battery Storage Program.

PUBLIC

The Battery Storage Program will add 360MW/1440MWh of battery energy storage to Eskom's energy infrastructure between 2019 and 2021. The program includes implementation of distributed battery storage in two phases. Beginning with development and implementation of 200MW/800MWh battery energy storage systems (BESS) at 47 of Eskom's distributed substation sites by December 2019 and followed by the procurement and implementation of 160MW/640MWh of BESS at Eskom substations across all nine provinces of South Africa by December 2021.

As South Africa seeks to expand available energy storage capacity over the next three years, installation codes, standards, and conformity assessment will form an essential foundation for safe and reliable energy systems. As Eskom deploys BESS, relevant authorities must have the necessary understanding to evaluate these technologies to ensure safety and promote reliability. For this reason, standards are a foundational component to build out South African electrical systems, including distributed generation.

In total, the Battery Storage Program has received more than ZAR 15.3 billion (\$1.1 billion USD) in funding to support system procurement, installation, and implementation across various loans including loans from the African Development Bank and World Bank.² Further, according to South Africa's National Development Plan (NDP) 2030, the nation plans to procure at least 20,000MW of renewable energy by 2030 to decommission 11,000MW in coal-fired plants, and to increase investment in energy efficiency. To meet the ambitious goals of the NDP, the government of South Africa intends to invest ZAR 948 billion (\$68.6 billion USD) in energy infrastructure from 2018 to 2020.³

As these projects continue to develop, standards and conformity assessment will form the foundation of safe and interoperable electrical systems. As Eskom, IIPs, and residential property owners consider deployment of energy storage systems, relevant authorities must have the necessary understanding to evaluate these technologies to ensure safety and promote reliability. For this reason, standards are a foundational component to build out South African electrical systems, including distributed generation. When considering the size of South Africa's economy and current energy initiatives, one can estimate the addressable market in South Africa to be at least \$1.2 billion.

² African Development Bank. (November 2018). South Africa: Eskom Distributed Battery Storage Program Appraisal Report.

³ Department of Trade and Industry. (May 2017). Industrial Policy Action Plan 2017–2020
