



## **U.S.-AFRICA CLEAN ENERGY STANDARDS PROGRAM**

### **Public Market Report: Electrical Safety for Clean Energy Systems Workshop**

The U.S.-Africa Clean Energy Standards Program is sponsored by the U.S. Trade and Development Agency and coordinated by the American National Standards Institute in partnership with Power Africa.

**June 2016**

**\*PUBLIC\***

All rights reserved

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

## Electrical Safety for Clean Energy Systems Workshop

May 16, 2016

8:30 AM – 12:30 PM

Westin Hotel

Cape Town, South Africa

### WORKSHOP SUMMARY

On May 16, 2016, the American National Standards Institute (ANSI), through the support of the U.S. Trade and Development Agency (USTDA) initiative the U.S.-Africa Clean Energy Standards Program (CESP), held the “Electrical Safety for Clean Energy Systems” workshop in Cape Town, South Africa. As the first workshop under the CESP, the focus was on the fundamental issue of electrical safety. Increased access to reliable electricity sources is among the top priorities of many sub-Saharan African countries, but safety has emerged as a key concern. In this context, ANSI worked together with the National Electrical Manufacturers Association (NEMA) as its primary technical expert, as well as members of the IEEE National Electrical Safety Code (NESC) committee and Power Africa to organize relevant content and messages.

The workshop emphasized the importance of a robust quality infrastructure to ensuring the safe generation, distribution, transmission, management and use of electricity across the continent. Speakers also emphasized that, over the last 50 years, the United States has led the way in developing a globally relevant, interlocking system of electrical safety installation codes, product standards, testing and verification processes that are available for African countries to adopt and use without having to go through the same trial and error process. U.S.-Africa cooperation on these standards will also provide opportunities for U.S. providers of electrical products and services to enter or expand in the African market, where the export opportunity was valued at approximately USD 119 million in 2015.

Electrical safety depends on two key parts: technical and safe practices. From a technical standpoint, a safe electrical system requires a rigorous installation code, products that are designed and manufactured to world-class standards, testing and certification system to assure the user that the products in fact meet the standards to which they are manufactured, and overall system inspection from knowledgeable experts. Regarding safe practices, users of electricity need to be aware that their own actions can impact their own safety, in nearly all environments including industrial and commercial workplaces as well as the residential community. These safe practices have been developed over years of experience by users worldwide, and have been collected and organized to present them to users in all communities, from children to adults.

The electrical infrastructure of the electrical utilities in the United States follows the *National Electrical Safety Code*, an American National Standard developed and published by the Institute of Electric and Electronic Engineers. This code is updated and published on a five-year cycle; the latest edition is scheduled to be published in September of this year. This was the basis for the initial presentation that targeted the electrical utilities and their regulators.

The electrical infrastructure of users of electricity in the United States is based on the *National Electrical Code*<sup>®</sup>, an American National Standard published by the National Fire Protection Association. The code

is updated and published on a three-year cycle, the next edition of which will be published in September of this year.

Electrical products used in installations are designed and manufactured to standards developed and published by several different standards development organizations in the United States, all of whom are accredited by ANSI. Additionally, these products are tested and certified by independent third parties to ensure that the products conform to the required standards.

Inspection and verification has been shown to be necessary to complete the loop to ensure a safe electrical system. This step is conducted by technical experts who are licensed on a state-by-state basis, and includes review and approval of installation planning documents as well as an on-site inspection of the installation prior to issuance of an occupancy permit by the local government authority.

Electric installation codes used by suppliers (utilities) and their customers are now starting to include requirements that address the unique features of clean energy systems, such as wind power and solar photo-voltaic (PV), energy storage, and distributed energy systems such as microgrids.

Across all the presentations several themes consistently emerged:

- Codes and standards are developed by accredited organizations via documented voluntary consensus processes.
- Safety codes and standards are intended to provide practical methods of safeguarding persons and property and are based on many years of practical experience.
- Safety codes and standards are adopted by various regulatory and governmental agencies.
- Development is ongoing and revisions are made on regular cycles to ensure that the codes are relevant and up-to-date. A good example is the inclusion of clean energy components that are increasingly being added to installation codes, as well as the development of new product standards as needed.
- Participation in the development of codes and standards is open to all stakeholders on a global basis. Indeed, it is encouraged by the respective technical committees.
- Codes and standards developed by U.S.-based organizations, including the National Electrical Safety Code, can be adopted, or more likely adapted, to meet the needs of other countries. In 2015, IEEE worked with Pakistan Engineering Council, through the support of USAID, to develop the Pakistan Electrical and Telecommunication Safety Code, based in part on the NESC.
- Information is available to all stakeholders in a transparent manner primarily via the internet at little or no cost.
- There are no shortcuts to achieving safe electrical systems by bypassing the necessary component parts.

Links to a flyer, photos, the final agenda and presentations from the workshop are available for on the U.S.-Africa CESP web site: [www.StandardsPortal.org/us-africacesp](http://www.StandardsPortal.org/us-africacesp)

## MARKET OPPORTUNITY

- Based on the trade data included below, South Africa, Angola, Nigeria, Ghana and Cameroon are top 5 export destinations for U.S. electrical products.
- Key challenges for related U.S. companies looking to enter or expand in these markets include finding and working with reputable product distributors, freight forwarders, project contractors and local utilities, many of whom are government-owned.
- A number of resources exist to learn more about the markets and related opportunities, including [Notify U.S.](#), which offers U.S. entities an opportunity to review and comment on proposed foreign technical regulations that can affect their businesses and their access to

international markets. Various U.S. government agencies, including USTDA, USAID, the U.S. Commercial Service, and initiatives such as Power Africa, also have valuable market intelligence and engagement vehicles for U.S. companies to take advantage of.

With the adoption of internationally-accepted codes and standards, markets in Africa will expand significantly to U.S. manufacturers and service providers. For these U.S. companies, the primary customers should be electrical generation, transmission, and distribution utilities located across Africa. As those utilities and national governments continue to plan and deploy electrical systems, including to transmit electricity across borders and to connect millions of households and businesses to sources of electricity, safety is paramount. Additional customers include firms involved in engineering, procurement and construction of electric power facility infrastructure in the region. As described below, the export of relevant U.S. products to African countries eligible under the African Growth and Opportunity Act (AGOA) were valued at USD 119 million in 2015.

The range of electrical products needed for safe and reliable transmission, distribution and use of electrical energy is extensive. Years of experience has shown that at the least the following list of products is included:

***HTS number    Product description***

7306.30	Non-insulated metallic conduit
7326.9085	Rods for electrical grounding
8501.61	AC generators (alternators): Of an output not exceeding 75 kVA
8501.62	AC generators (alternators): Of an output exceeding 75 kVA but not exceeding 375 kVA
8501.63	AC generators (alternators): Of an output exceeding 375 kVA but not exceeding 750 kVA
8501.64	AC generators (alternators): Of an output exceeding 750 kVA
8503.00	Commutators: Stators and rotors for motors and generators
8504.21	Liquid dielectric transformers: Having a power handling capacity not exceeding 650 kVA
8504.22	Liquid dielectric transformers: Having a power handling capacity exceeding 650 kVA but not exceeding 10,000 kVA
8504.23	Liquid dielectric transformers: Having a power handling capacity exceeding 10,000 kVA
8504.31	Other transformers: Having a power handling capacity not exceeding 1kVA
8504.32	Other transformers: Having a power handling capacity exceeding 1 kVA but not exceeding 16 kVA
8504.33	Other transformers: Having a power handling capacity exceeding 16 kVA but not exceeding 500 kVA
8504.34	Other transformers: Having a power handling capacity exceeding 500 kVA
8504.40	Static converters
8504.50	Other inductors
8504.90	Parts
8532.10	Fixed capacitors used in 50/60 Hz circuits, w/reactive power capacity of not < .5 kvar
8535.10	Electrical apparatus for switching or protecting electrical circuits, voltage > 1,000 V: Fuses for a voltage > 1,000 V
8535.21	Automatic circuit breakers for a voltage > 1kV but < 72.5 kV
8535.29	Other circuit breakers for a voltage > 72.5 kV
8535.30	Isolating switches and make-and-break switches
8535.40	Lightning arresters, voltage limiters and surge suppressors
8535.90	Other electrical apparatus for switching or protecting electrical circuits above 1000 V

8536.10	Fuses
8536.20	Automatic circuit breakers
8536.30	Other apparatus for protecting electrical circuits
8536.41	Relays, for a voltage not > 60 v
8536.49	Relays, 60 to 1000 V
8536.50	Switches
8536.61	Lamp holders
8536.69	Electrical connectors
8536.90	Boxes, raceway, terminals and others
8537.10	Panel boards, voltage not > 1,000 V
8537.20	Switchgear and assemblies for a voltage > 1,000 V
8538.10	Boards, Panels, consoles, desks, etc. for goods of 8537 w/out their apparatus
8538.90	Molded and other parts for 8536 and 8537
8544.41	Electric conductors, fitted with connectors for voltage not > 80 V
8544.49	Electric conductors, fitted with connectors for voltage not > 80 V: Other, without connectors
8544.51	Electric conductors, fitted with connectors, voltage > 80 V but < 1,000 V
8544.59	Electric conductors, fitted with connectors, voltage > 80 V but < 1,000 V: Other, without connectors, of copper Other, not of copper
8544.60	Electric conductors, fitted with connectors, voltage > 1,000 V Not fitted with connectors and of copper Not fitted with connectors and not of copper
8544.70	Optical fiber cables
8546.10	Electrical insulators of glass
8546.20	Electrical insulators of ceramics
8546.90	Electrical insulators of other material
8547.90	Insulated metallic conduit
9028.30	Electricity meters
9028.90	Parts and accessories

The U.S. International Trade Commission Interactive Tariff and Trade DataWeb provides direct access to trade data and allows users to create customized reports from queries created under "advanced searching" from a defined list of products. Using the list above a query was developed to determine the export of these products to countries in sub-Saharan Africa using the AGOA 2016 defined list of countries. The table below shows the result of exports over the past three years to the top 25 AGOA eligible countries. These data represent all of the products from the list above aggregated. It is possible to disaggregate the data into specific tariff lines if necessary for further analysis.

## U.S. Exports of Electrical Products to AGOA Countries

Annual + Year-To-Date Data from Jan - Apr

Country	2014	2015	2015 YTD	2016 YTD	Percent Change YTD2015 - YTD2016
	<i>In 1,000 Dollars</i>				
South Africa	103,722	95,818	30,711	33,190	8.10%
Nigeria	75,961	60,027	22,836	18,174	-20.40%
Angola	95,477	44,790	17,699	25,123	41.90%
Ghana	14,734	33,981	13,660	16,775	22.80%
Cameroon	22,430	22,437	11,023	2,904	-73.70%
Congo (ROC)	19,590	9,644	3,720	1,206	-67.60%
Gabon	13,692	8,869	3,767	1,561	-58.60%
Djibouti	4,532	7,803	2,319	908	-60.80%
Chad	5,948	6,949	1,796	527	-70.60%
Cote d'Ivoire	2,579	6,013	2,125	364	-82.90%
Liberia	2,111	5,125	129	2,593	1909.80%
Mauritania	4,368	4,216	1,465	1,542	5.30%
Kenya	3,149	3,660	801	3,137	291.60%
Ethiopia	17,893	3,562	1,447	1,781	23.10%
Senegal	5,679	3,076	931	382	-58.90%
Mozambique	1,998	2,595	1,064	532	-50.00%
Namibia	3,364	1,752	1,213	362	-70.20%
Niger	663	1,418	896	29	-96.70%
Tanzania	8,001	1,173	390	523	34.10%
Botswana	484	1,045	138	205	47.80%
Mali	406	851	152	1,514	897.90%
Uganda	879	835	247	428	73.40%
Zambia	3,059	669	176	150	-14.90%
Guinea	275	442	117	32	-72.90%
Sierra Leone	756	322	30	65	119.00%
<b>Subtotal : top 25</b>	<b>411,749</b>	<b>327,071</b>	<b>118,852</b>	<b>114,008</b>	<b>-4.10%</b>
<b>All Other countries:</b>	<b>3,317</b>	<b>1,121</b>	<b>477</b>	<b>3,539</b>	<b>642.50%</b>
<b>Total</b>	<b>415,066</b>	<b>328,192</b>	<b>119,329</b>	<b>117,547</b>	<b>-1.50%</b>

Sources: Data on this site have been compiled from tariff and trade data from the U.S. Department of Commerce and the U.S. International Trade Commission.

