Overview and Key Findings

Introduction

As U.S. Government agencies implement the Renewable Energy and Energy Efficiency Export Initiative (RE4I), policymakers face the complicated challenge of helping U.S. exporters compete abroad while managing considerable uncertainty and restraint in budgeting. Under the RE4I, the U.S. Department of Commerce’s International Trade Administration (ITA) is committed to developing a tool to prioritize U.S. Government export promotion efforts that help target limited resources toward the markets and sectors that are most likely to result in U.S. exports. The following study elaborates on this commitment for the smart grid sector – it is meant to inform decision makers and managers of key trends, areas of opportunity, and important challenges facing U.S. smart grid exporters.

Beginning in 2009, the United States has made unprecedented investments in the modernization of its electricity grid, and has since become a world leader in the development and deployment of smart grid technologies. U.S. companies large and small provide innovative technology solutions to some of the most pressing challenges facing the electricity industry, and investments by utilities and governments around the world are now driving consistent growth in smart grid exports.

Supporting export growth and addressing trade barriers for the U.S. smart grid industry has been a priority for the ITA since the beginning of the President’s National Export Initiative. Among ITA’s major contributions to this effort has been the delivery of research and analysis to U.S. government partners, and valuable market intelligence to the U.S. smart grid industry.

ITA’s 2016 Smart Grid Top Markets Report ranks 34 international markets in terms of U.S. smart grid industry for its export growth and presents analysis that will help prioritize U.S. Government export promotion efforts to target resources toward these markets. The report integrates data and analysis on global markets and trade, including the critical contributions of commercial specialists from U.S. Foreign Commercial Service posts. The results are combined using a weighted scorecard methodology to produce relative rankings of the 34 subject markets.

Figure 1: Smart Grid Export Market Projections, 2016

| 5. Australia | 14. Malaysia | 23. Israel |
| 6. United Kingdom | 15. Spain | 24. Denmark |
| 8. India | 17. Philippines | 26. Indonesia |
| 9. Vietnam | 18. Germany | 27. Italy |
| 28. Thailand | 29. South Africa |
| 30. Colombia | 31. Poland |
| 32. Brazil | 33. Portugal |
| 34. Russia |
Each subset of the smart grid sector faces different competitiveness challenges, and each market possesses a set of characteristics that require nuanced and tailored export promotion and policy approaches. This report is designed to identify where U.S. Government activities can be most effective, helping policymakers utilize limited resources more efficiently and strategically.

The rankings highlight the common strengths and weaknesses of the various smart grid export markets. The sub-sector rankings of Smart Grid ICT and Transmission & Distribution equipment (T&D) are the result of re-weighting the Smart Grid Top Markets scorecard system. The reweighted version focuses on differentiated opportunities for exporters of equipment and services across the smart grid technologies continuum, which is described in detail in the Report.

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<td>• Top U.S. export market</td>
<td>Canada (1)</td>
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<td>• Geographic and/or cultural proximity</td>
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<td>Netherlands (16)</td>
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<td>• Low income, high growth, including in electricity demand</td>
<td>Vietnam (9)</td>
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<td>India (8)</td>
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<td>Nigeria (21)</td>
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<td>Portugal (33)</td>
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<td>• Smart grid investment growth with major risks</td>
<td>Poland (31)</td>
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<td>• Established incumbent suppliers</td>
<td>Italy (27)</td>
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<tr>
<td></td>
<td>• Poor economic health and/or business environment</td>
<td>Russia (32)</td>
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Figure 1 summarizes the overall rankings. Figure 2 analyzes the rankings into export market clusters. These export clusters describe the common characteristics among top ranking markets.

The 2016 Smart Grid Top Markets Report is an update of the 2015 report. Since the publication of the 2015 report, there have been a number of key developments that affect the smart grid sector, reflected in the new 2016 rankings and described in detail in later sections of this report. Three specific global developments, however, are worth highlighting at this juncture: (1) economic downturn, (2) sustained low global oil prices and (3) the December 2015 agreement reached in Paris under the U.N. Framework Convention on Climate Change.

Economic Downturn

Many economic sectors, including smart grid goods and services, felt the effects as global economic growth slowed in 2015. Decreasing commodity prices, weaker export demand from emerging economies and slowing global trade flows have been reported. Effects of this downturn were the strongest in transitioning and developing economies with the notable exception of India.

Oil Prices

ITA assesses that although the effects of fuel switching as a result of low oil prices are not perfect, fluctuations in oil prices has impacted the broader electricity market and investment landscape as well, and is a factor contributing to the changes in rankings of key U.S. smart grid export markets. Since mid-2014, oil prices dropped more than 70 percent and the industry is now preparing itself for a “longer for lower” outlook on the price of crude oil. ITA assesses that lower operating costs for major oil exporting countries have affected the outlook for available resources for large capital projects – including electricity grid projects. Additionally, a number of nations have leveraged the drop in oil prices to reduce their fossil fuel subsidies. This affects not only the levelized cost of crude oil feedstocks for electricity generation, but also the cost comparison between electricity generation resources.

Climate Change Agreement

Smart grid technologies play an important role in the effective implementation of policies to reduce greenhouse gas emissions, and as such, ITA assesses that strong climate change policies and regulations enhance the global smart grid outlook. In coming years, ITA expects to see an uptick in new policies directed at fleshing out how nations plan to implement the broad greenhouse gas (GHG) reduction targets and renewable energy deployment targets put forward, and where the financing of said projects will come. During the December 2015 United Nations Framework Convention on Climate Change (UNFCCC) in Paris, nearly 200 countries agreed to a framework for setting country-level targets for GHG emissions that include the submission of so-called “intended nationally determined contributions,” or INDCs. Although not all the INDCs reflected new policy commitments since the last Top Markets publication, inclusion in this agreement strengthens the likelihood of following through on commitments, sending a long term market signal to investors. The International Energy Agency (IEA) predicts that the full implementation of these pledges will require $13.5 trillion in clean energy and energy efficiency technology deployment investments over the next 15 years. Deploying smart grid technologies, especially leveraging ICT software and analytical capabilities in ways to use electricity most efficiently, and better integrating renewable energy sources will be critical in meeting INDC targets. The Paris Agreement also includes a collective goal of keeping the increase of global temperature to well below 2 degrees Celsius – something that cannot be met by even following the initial INDC pledges. As such, under the Paris Agreement, countries will submit new nationally determined contributions at regular, five-year intervals to take stock of progress, and set newer, stronger climate change and adaptation goals. Given these factors, and increased transparency requirements for both developed and developing countries to help make sure each country lives up to its commitments, ITA assesses that this agreement likely will be a strong driver for global smart grid deployment.

Other developments during 2015 are described in the subsequent pages and include examinations of wider trends affecting the development of smart grid technologies; factors in investment, policy, and regulatory factors driving market development, as does the competitiveness of U.S. exporters across the
Key Findings: Top Markets and Methodology

The Smart Grid Top Markets Report estimates the relative potential for growth in U.S. smart grid exports in 34 key international markets by integrating analyses of data and information across four categories:

1. **Smart Grid Market Growth Potential**: Industry data and information on policies, regulations, and other local drivers of the smart grid technologies and services market.

2. **Trade Factors and U.S. Competitiveness**: Trade data and other information on exports of U.S. smart grid products and services in a given market.

3. **Key Economic and Energy Sector Investment Indicators**: Broader economic data and power sector trends that impact investment in electricity infrastructure, and the development and growth of the smart grid in a given market.

4. **Strength of Domestic Industry**: Trade data and other information on the extent to which demand for smart grid technology and services will be met by the domestic industry – as opposed to international trade – in a given market.

There are a variety of challenges to obtaining comprehensive and quantifiable information for each of these categories. The smart grid is an energy sector that experts struggle to define, and in an era of technological convergence, many smart grid technologies are multi-use and purchased outside of the electric utility sector. The challenge is acute when it comes to smart grid trade data. As a result, this assessment draws on both qualitative and quantitative data that may inherently narrow the scope of any one of the four categories and serve as a proxy for wider trends.

This is most significant for category 2 – Trade Factors and U.S. competitiveness – where existing global trade data only captures accurate and relevant export revenues for a subset of T&D equipment rather than the entire smart grid market.

The existing Harmonized Tariff System (HTS) includes product codes for the “Transmission & Distribution Equipment”. For the most part, however, HTS product codes for the wide range of hardware, software and networking technology are either non-existent or too broad to discern smart grid applications for these technologies, as opposed to broadband Internet applications, for example. Furthermore, data on international trade in smart grid services, such as consulting, information technology (IT) system integration, and consumer energy efficiency programs, is not collected by government or international institutions.

In order to quantify the global smart grid opportunity, this report utilizes the available U.S. Census trade data for T&D equipment along with smart grid market and investment data – both public and proprietary – to develop a system for comparative market sizing and quantifying opportunities for exporters of smart grid ICT and services.

This report deploys a weighted scorecard system and subsector rankings to better assess industry trends. The weighted scorecard methodology provides a platform for analysis of different technology sub-sectors depending on the weight assigned to the above four factors. Thus, in addition to the overall rankings, the Top Markets analysis also ranks markets for the potential growth of U.S. exports in the T&D Equipment and the Smart Grid ICT sub-sectors. Essentially, these sub-sectors are representative of technologies from the left side and the right side, respectively, of the Smart Grid Technology Continuum, (Figure 4) as presented in detail in the next section.

A detailed explanation of the methodology and key supporting data sets for each of the four categories can be found in Appendix A. This also includes detailed information on the minor modifications to the methodology deployed in the 2016 Smart Grid Top Markets Report relative to the 2015 report.

Figure 2 shows the overall sector rankings for all 34 markets. This builds on an assessment presented in 2015. A full comparison of rankings from 2015 to 2016 is shown in Appendix B, Figure B1.

In 2016, ITA assessments expanded to include two additional markets – Israel and New Zealand – as complete data sets were available for these markets.
From the 2015 to 2016 iterations of this report, most markets remained relatively stable among respective overall rankings. Significant increases in rankings were seen for Mexico (+9), India (+13) and Spain (+16), while Singapore (-14), Brazil (-13) and Colombia (-10) saw the largest drops in rankings year-to-year.

Understanding these movements in rankings is best grasped by understanding the market signals as they relate to four of the score areas.

**Smart Grid Market Growth Potential (Category 1)**

The development and deployment of smart grid technologies are affected by a significant number of enabling policy, regulatory, investment and industrial drivers. The experiences of U.S. officials in diplomatic, technical and commercial settings with additional market research are used to quantify the competitiveness of the U.S. smart grid industry in global markets.

Drawing on developments over the last year, a handful of markets saw significant movement in their scores for Category 1. Spain, Italy, China and Mexico underwent shifts in their respective markets to increase their scores from 2015. Russia, Portugal and the Philippines underwent the largest drops. Much of these shifts can be explained by macroeconomic trends that inform the local commercial setting as explained in Category 3, and affect U.S. interest and competitiveness in the market. Additionally, the 2016 report takes into account new climate change policy announcements and other policies affecting competitiveness.

For example, major reforms proposed to power sectors in China, Mexico and Japan are being implemented to increase competitiveness and limit the vertical integration of utilities. As competition is expected to be

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**Figure 3: BMI Power Sector Risk/Reward Index, Category 3**

![BMI Power Sector Risk/Reward Index](image-url)

- **High Risk, High Reward**
  - Vietnam
  - Indonesia
  - China
  - India
  - Saudi Arabia
  - Malaysia
  - Korea

- **Low Risk, High Reward**
  - Australia
  - Spain
  - Canada

- **High Risk, Low Reward**
  - Nigeria
  - Turkey
  - Philippines
  - Mexico
  - Korea
  - Thailand
  - Colombia
  - South Africa

- **Low Risk, Low Reward**
  - Brazil
  - Israel
  - Poland
  - Netherlands
  - Singapore
  - Austria
  - Norway
  - Denmark
  - New Zealand
  - Chile
  - France
  - Germany
  - United Kingdom
  - Sweden
  - Norway
  - Canada

This case study is part of a larger Top Markets Report. For additional content, please visit [www.trade.gov/topmarkets](http://www.trade.gov/topmarkets).
introduced, the ITA assesses that the potential for innovative U.S. firms to supply services – especially ICT and advanced metering infrastructure – will increase as local utilities look to gain a competitive advantage and secure (or retain) market share under a reformed system.

Given the significant weight of this category to the smart grid ICT sub-sector ranking, greater detail on 2016 trends and developments can be found in the sub-sector snapshot.

**Trade Factors and U.S. Competitiveness (Category 2)**

As described above, available trade data for all technologies and services in the smart grid sector limits the scope of Category 2 data. Three data sets form the foundation for scores in this category: U.S. exports of T&D Equipment, trend of U.S. exports over the last two years, and projected electricity consumption growth over the next five years.

Trending for this category is described in detail in Appendix A and the T&D Equipment Sub-Sector Snapshot. Canada and Mexico continued to account for almost half of all U.S. T&D equipment global exports. Year-to-year trends show that Canada, Sweden, Brazil, Russia, Japan and Singapore experienced the biggest absolute drops in T&D equipment exports since 2013, while U.S. exports to Mexico, Korea and Italy increased most significantly over the same period.

Projected increases in electricity consumption over the next five years have been scaled back for Colombia, China and Singapore. Emerging markets such as Vietnam, Nigeria, Indonesia and India are anticipated to see electricity consumption grow most rapidly – including increased relative growth projections from 2015 among top markets.

**Key Economic and Energy Sector Investment Indicators (Category 3)**

Macroeconomic market signals in the global economy and energy sector are most apparent in category #3 – Key Economic and Energy Sector Investment Indicators. As outlined in Appendix A and highlighted in Figure 4, data in this category informs of the relative risk to reward ratio for investing in the power sector. For example, emerging countries such as India and China have high reward potential, but also relatively high risk.

On the other hand, high-income Nordic countries such as Denmark and Sweden have low risk and low reward potential.

In 2016, China, Russia, Brazil and Singapore saw the most substantial decreases to their economic and energy sector investment indicator scores, while India and European markets such as Spain and the Netherlands saw the most significant year-to-year increases. The following regional economic market signals also contribute to score changes captured in categories 1 and 2.

- **Brazil**: Brazil is undergoing a deep economic recession, and there are expectations of record government budget cuts. Recently unfolding scandals have affected the government and state-owned companies, increasing uncertainty and creating a drag on economic growth and infrastructure projects. As a result, stricter compliance rules that could benefit U.S. companies interested in Brazil are being implemented.

- **Colombia**: Sustained low oil prices have decreased demand from Colombia’s trading partners, and have led to a loss of domestic tax revenues. The Colombian peso’s value dropped significantly in 2015.

- **East Asia**: Although still growing, China’s economic growth has begun to slow, reducing investment expectations in domestic infrastructure projects and growth trends in electricity consumption. These effects are being felt regionally as Singapore, Japan, Korea and Thailand all saw reductions in investment power scores. For example, the Singapore Dollar prospects hit a low in 2015 not seen since 1998.

- **Europe**: Economic recessions that plagued parts of Europe – such as Spain and Italy – have been countered by policy reforms in recent years that have begun to make these markets more attractive for investment. This is especially relevant as the continent looks to transition its energy sector to address the changing utility business model and for energy security purposes.

- **India**: India is expected to remain largely sheltered from the economic slowdowns plaguing other large emerging economies, and will benefit from lower commodity prices resulting from low oil prices. Coupled with ambitious policy and regulatory plans, India’s energy sector is expected to be a pillar of the Modi Government’s near-term agenda.
• **Russia**: Recent events in Ukraine have changed the landscape of the bilateral trade and investment relationship between the United States and Russia. For example, the United States has suspended government-to-government economic cooperation with Russia on many fronts, including the bilateral trade and investment working group that sought to expand economic and commercial ties.

**Strength of Domestic Industry (Category 4)**

Data for this category remained consistent between 2015 and 2016, as the data set used for this category is updated on a five-year basis.

**Industry Overview & Competitiveness**

The smart grid is a modernized electricity transmission and distribution network that includes two-way communication systems and enables the integration of technologies that will further improve grid efficiency, reliability and security. Depending on the market, a wide range of equipment and technology will be required to modernize the grid.

Modernization includes the build-out and upgrade of transmission and distribution (T&D) networks that extend electricity services to new populations and also improve the grid’s efficiency in delivering those services. In many markets, modernization goes beyond these initial T&D investments to include a range of digital technologies and platforms, including the deployment and integration of Internet Protocol (IP) based communications, infrastructure ICT systems to better manage increasingly-complex utility networks and data, and online applications and consumer services that enable energy efficiency programs at the “user-end” of the grid.

This report considers a wide range of utility investments in T&D, communications, data networking, IT infrastructure and energy efficiency services to be part of the worldwide smart grid opportunity for U.S. exporters. The analyses and rankings that are included consider the near-term growth potential for U.S. exporters of the products and services detailed in Figure 5 and discussed in greater technical detail in the T&D Equipment and Smart Grid ICT sub-sector snapshots.

Additionally, U.S. exporters of related energy technologies – including microgrid systems, distributed energy resource technologies, home building management technologies and software, and a wide range of electric utility services – may find this report to be an effective guide to international market growth and potential export gains.

New in 2016, ITA has included a sub-sector snapshot of the energy storage industry to better capture this emerging sub-sector and detail expected applications for electrical grid ancillary services and maintenance deferral globally.

The available data for market-sizing and measuring trade flows varies across the spectrum of technologies detailed in Figure 5. The emergent smart grid industry...
includes evolving networking and information technologies that are driving the convergence between communication and electricity networks. Defining the industry and identifying data points that capture and distinguish smart grid investment are significant challenges to market analysis, particularly those in emerging and less developed international markets.

Global spending on grid modernization and smart grid technologies has emerged as a major growth segment in the infrastructure sector, and is expected to continue to grow. Various energy market research groups have pegged market values to range from $15 to $500 billion annually, depending on specific technologies that are incorporated into the calculation. Regardless of the absolute estimated market size, the sector has been on a strong growth trajectory over the last decade and will continue to grow.

According to Bloomberg New Energy Finance, worldwide annual smart grid spending grew by 12 percent in 2015, reflecting a five-year CAGR just under 13 percent. Other energy market research groups, including GTM Research, Navigant and Transparent Market Research, predict that annual spending on smart grid sub-sectors will grow anywhere from 5-18 percent annually over the next decade. Predictions vary dramatically across sub-categories, but spending in all areas is expected to increase in both established and emerging markets.

The ITA assesses that the current market for all U.S. smart grid exports — including T&D equipment, smart grid ICT goods and services, and energy storage technologies — is valued at $30 billion annually. These exports leverage U.S. investments to upgrade the domestic electric grid and capitalize on the growing global market.

Energy, environmental and security needs for the 21st century have accelerated both public and private sector investments in grid modernization and smart grid technologies across the United States. The Energy Independence and Security Act of 2007 (EISA) made it “the policy of the United States to support the modernization” of the electrical grid. Federal and state governments and private sector stakeholders have since made major investments in the development and deployment of smart grid technologies and programs that are making the electric grid more efficient, reliable, resilient and secure.

The American Recovery and Reinvestment Act of 2009 (ARRA) provided by far the most significant subsidy and stimulus to smart grid spending over the last five years, making the United States the largest smart grid market in the world from 2009 to 2012. The ARRA smart grid investments included $4.5 billion in government funding for electricity delivery and energy reliability activities to modernize the electric grid, with an additional $5.5 billion in matching, and additional funds from private sector stakeholders. Approximately $7.5 billion was invested in smart grid deployments and related utility projects as a result of the ARRA programs.

As outlined in the 2015 release of the Quadrennial Energy Review’s first installment, U.S. transmission and distribution systems are gaining a renewed focus on investment. Reasons for increased investment include reliability enhancement, renewable resources connections, demand shifts, cost increases and market reforms that create more options for independent generators and require new connections to transmission systems. U.S. utilities have a strong interest to address the potential effects of distributed energy resources and understand how utility business models may change as a result of decreased revenues.

Policy and regulatory drivers at the Federal and state levels for demand response, energy storage, net-metering and cybersecurity have also created domestic drivers for innovation in energy efficiency programs, analytical tools, two-way communication systems and consumer engagements that provide a U.S. competitive advantage.

As these smart grid solutions have advanced in the United States, the domestic industry has developed steadily, and a wide range of U.S. technology and service companies now lead the global market for smart grid solutions. Pilot projects and programs by U.S. utilities with U.S. suppliers form the foundational use-case examples to inform U.S. suppliers looking to export. On the other hand, pilot projects abroad with U.S. suppliers offer the potential to also inform deployments in the regulated U.S. market. The ITA assesses that although there is regional variation to priority drivers for grid modernization and smart grid deployment, there is also a pervasive expectation that the global industry is in the middle of a transformation and the door is open to innovative firms to capture market share. With international investment growth...
Global Industry Landscape

Although the U.S. is amid an active, robust and innovative electricity modernization effort, the global market is also actively engaged. In 2013, China surpassed the United States, becoming the world’s largest market for smart grid spending. Drivers for the deployment and development of grid modernization equipment, technology, and services vary by region and sub-sector. A consistent theme across the world, however, is that utilities are concerned with revenue losses resulting from reduced loads driven by efficiency, increased distributed energy, and/or theft. Global investment decisions are now focused on how to do more with less. This includes looking for ways to increase supply and demand side energy management efficiencies.

For emerging economies in Southeast Asia, India, Africa and South America, the focus is on reducing theft and T&D losses while building new infrastructure to meet increasing demand, and bringing electricity to the 1.2 billion people – 17 percent of the global population – who currently lack access.

Europe, North America, East Asia, Australia and New Zealand have increased focus on deploying advanced metering infrastructure and big data analytics to better leverage the capabilities resulting from cloud computing advancements. Utilities in these countries are looking to improve systems management as revenues continue to decrease. According to Bloomberg New Energy Finance, many European utilities have lost over 50 percent of their market value since 2010 from deployment of distributed energy resources and other efficiency gains that led to load loss.

The U.S. is globally competitive for the supply of goods and services to these markets as well as serving as a key test bed for new progressive utilities to experiment with new business models. The U.S. is the third-largest exporter of T&D equipment, behind China and Germany. While limited HTS trade data cannot accurately capture global competitiveness in the smart grid ICT sub-sector, U.S. information technology, networking technology, software and technology service firms are widely viewed as ICT industry leaders. European firms serve as the biggest source of competition.

Overall, the growth of the U.S. domestic smart grid over the last five years and increased spending in international markets are now combining to provide expanded opportunities for U.S. innovators in international markets.

Challenges and Barriers

Over the last decade, investment in the smart grid has grown in every major economy; increased export opportunities are anticipated for the wide range of U.S. suppliers and service providers marketing smart grid solutions to electric utilities around the world. However, the development of the smart grid will be unique across – and often within – export markets, and opportunities will vary depending on a nation’s stage of smart grid development and specific market demands for various technology and services. Additionally, there are a number of key issues that could affect smart grid development, challenge the pace of deployment, or hinder U.S. competitiveness in a given export market.

This report considers common regulatory, policy, business, and technical challenges to smart grid development, and provides an analysis of their impact on specific markets. These challenges include:

- **Developing Standards and Achieving Interoperability**: The identification and adoption of international standards for smart grid technologies and the need to ensure their interoperability in order to help drive technology development, deployment and operations.
- **Getting the Regulatory Model Right**: The need for energy sector reforms and the development of a regulatory framework that will sustain smart grid investment and enable sufficient economic returns for the electricity industry.
- **Driving Innovation in the Electricity Industry**: The need for sustainable business models and a coordinated industry approach that ensures investment in new technologies that help achieve the benefits of the smart grid.
- **Enabling the Consumer**: The need for successful consumer protection and engagement in order to
help drive demand for smart grid technologies and ensure value for the consumer.

Evolving technologies and policies are driving investments in the smart grid that could translate into export returns for the United States. The rest of this report will examine country-level trends and present an analysis of the top prospective markets for U.S. T&D equipment and smart grid ICT export growth.

Opportunities

In addition to country and sub-sector specific market opportunities highlighted in this report, the following offers a few key opportunities for the smart grid industry to engage in cross-sectorial initiatives and global trends.

**Climate Change:** ITA assesses that the 2015 Paris Agreement under the U.N. Framework Convention on Climate Change likely will be a strong driver for smart grid deployment globally, and that firms positioned to enable nations to deliver on their nationally determined commitments will be best positioned to compete globally. Smart grid technologies that directly facilitate reductions in greenhouse gas emissions and increase the resilience of critical infrastructure to the effects of climate change are positioned to capitalize on the near-term need of the 195 countries that committed to ambitious actions on climate change in December 2015.

**Smart Cities:** Smart grid is a foundational component of the development of increasing “smartness” of global cities, and informing integrated resource planning at the local level. U.S. suppliers of smart grid technologies will find global opportunities in both greenfield and brownfield city efforts. World urban populations are expected to double by 2050; 80 percent of global goods and services are produced in cities, according to the World Bank.13

**Internet of Things (IoT):** Similar to the “smart cities” theme, smart grid technologies are included in the suite of technologies included in the IoT. The IoT reflects the digitalization of process and services that leverage cloud computing, data analytics, and other ICT advancements.

**Cybersecurity:** Smart grid firms with a focus on cybersecurity will find interest in export opportunities among both developed and developing nations. As the grid becomes increasingly data driven, the privatization of consumer data and protection of critical infrastructure will be of central importance to policymakers and utilities.

**Regional U.S. Government Initiatives:** Near-term opportunities to deploy smart grid goods and services for U.S. suppliers are not limited to the markets outlined in this report. ITA notes that U.S. suppliers may find success in smaller, less-developed markets, especially in those that are still developing their electricity system. Initiatives such as Power Africa and the Clean Energy Finance Facility for the Caribbean and Central America highlight commercial opportunities supported by development objectives and finance mechanisms provided by multilateral government institutions of lower income nations. These initiatives represent a new approach to development that prioritizes unlocking and accelerating transactions in the energy and infrastructure sector, and building a more investment-friendly enabling environment.

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12 United Nations Trade Data via the Trade Policy Information System of the U.S. Department of Commerce: International Trade Administration