



## 2016 Top Markets Report **Smart Grid** Country Case Study

### China

**As the world’s largest market for electricity infrastructure development and smart grid technologies, China offers great opportunities for U.S. exporters, particularly suppliers and service providers in the areas of high voltage transmission, synchrophasor technology and modernization of transmission operations, and partnerships in Smart City and select smart grid projects.**

Smart Grid ICT	6	Overall Rank	7
T&D Equipment	13		

U.S. T&D equipment export revenues to China exceeded \$54 million in 2015, reflecting a two year decrease and the lowest export levels since 2006. After a period of very high electricity consumption growth, China is shifting its economy, and growth is expected to slow. ITA, however, expects continued investment in electricity infrastructure and opportunities for U.S. suppliers of T&D equipment and an increase in opportunities for smart grid ICT solution providers to increase.

China’s electricity market is dominated by coal, but this has been dropping in share over the last two years, as the government is now primarily interested in improving urban air quality. Investments in renewable resources and nuclear energy have grown and are expected to contribute the most to an expanding electricity supply that will be necessary to meet anticipated average demand growth rates of 4 percent per year over the next five years.

With smart meter procurements underway, the government is showing a commitment to diversifying its energy mix, reducing carbon emissions, and increasing energy efficiency. China leads the world in new investment in the full suite of smart grid technologies. While the bulk of smart grid technologies for China’s distribution network will be provided by local suppliers in the near term, opportunities will grow for firms providing solutions to operational and network efficiency, renewable integration and management, demand side management, and end-user energy efficiency challenges.

China’s government has made significant, recent statements regarding its intent to reduce carbon emissions, including bans on new coal-fired power plants in certain regions and the creation of a national carbon trading system by 2017. Such measures will apply major pressure to the power sector and likely accelerate the market for non-coal-fired generation, as well as for smart grid and energy efficiency technologies and services. Currently, overall growth of China’s power sector is estimated at 2 percent, but the markets for renewable energy development, energy efficiency investment and smart grid technologies grew at approximately 16 percent, 25 percent and 34 percent, respectively, in 2013.

#### Market Overview

## Overview of ITA's Analysis

### Strengths

- China's government is making a push to reduce the carbon intensity and use of coal in its economy, largely through improving energy efficiency
- China is planning to install smart meters in every household by 2017, and then institute country-wide time-of-use electricity pricing

### Key Trends

- Electricity consumption in China is continuing to rise as China's economy continues to expand rapidly, though the nature of economic growth is expected to have more growth in the less-energy-intensive service industry
- China's electricity mix will begin shifting away from coal and towards cleaner energy sources, necessitating the build-out and modernization of grid infrastructure

### Risks

- Chinese firms have substantial market shares in the smart grid sector, supplying most of the smart meters currently produced at prices below U.S. products
- More favorable labor markets give Chinese manufacturers an advantage over U.S. manufacturers in commoditized products, so as these products mature, the U.S. advantage on these technologies will diminish

Investment in the modernization of China's electricity infrastructure and the development of a "unified strong and smart grid" have been a focus for the country's power sector since 2010. China's largest vertically-integrated T&D company, State Grid Corporation of China (SGCC), has largely kept pace with goals outlined in the country's 12<sup>th</sup> Five Year Plan (FYP) for 2011 through 2015 to boost grid investment by 68 percent over the period, particularly in ultra-high-voltage transmission lines. This trend is expected to continue with SGCC tapped to invest \$243.2 billion (CNY 1.6 trillion) as outlined in the 13<sup>th</sup> FYP (2016 through 2020). The challenge of connecting major hydro and wind resources to distant population centers continues to be a major driver of China's growing T&D market.

China also has commitments to massively expand its use of smart meters. Through 2015, tenders for 425.8 million smart meters have been contracted.<sup>1</sup> Annual investment in smart metering was estimated to be \$1.4 billion in 2015 and was predicted to reach \$2.9 billion in 2016.<sup>2</sup> In 2020, China is expected to account for over 24 percent of the global smart grid market at around \$96 billion, according to GTM.

### Policy and Regulatory Environment

The electricity market in China is heavily regulated, with power prices at the both generation and consumption levels being set by the government. Although China has begun liberalizing the generation sector, it is dominated by five state-owned utilities that control almost half of total capacity, and the

transmission and distribution grid is entirely controlled by three state-owned operators.

The National Development and Reform Commission (NDRC) plays a critical role in China's electricity market as the primary price-setter and regulator. It also develops and implements major policies that affect the wider economy and energy sector, where energy policy planning primarily falls to the National Energy Administration, a sub-agency within NDRC. The NDRC currently dictates the pace of privatization and liberalization of China's energy markets, including the involvement of foreign competitors.

As part of China's stated effort to open up the electricity sector, the NDRC allows limited foreign investment in the construction and operation of the power grid. Other market reform objectives for China's energy sector include the unbundling and separation of owners, operators and various business units across the electricity supply chain and the creation of an open wholesale electricity market. Progress has been slow: the separation of some of the power grid operators from generation companies is all that has been achieved to date.

Electricity prices are currently separated into residential, agricultural, and commercial & industrial (C&I) tiers, with additional levels of granularity – including peak and trough pricing – offered to C&I customers. The NDRC determines the profit margins of generators, and can determine prices and incentives according to supply-type.

In order to balance electricity supply and demand, China is increasingly focused on energy efficiency opportunities, including the implementation of demand side management (DSM) programs. Beginning in 2011, NDRC mandated peak load reductions for grid companies of 0.3 percent annually, and has since endorsed Suzhou, Beijing, Foshan and Tangshan as DSM pilot cities. Energy Service Companies (ESCOs) and technology solution providers work with end-users and utilities in these cities to achieve energy savings through Direct Load Control technologies, interruptible tariff programs, smart metering solutions, and time-of-use (ToU) pricing options. ToU pricing is available to roughly 66 percent of commercial and industrial consumers.<sup>3</sup>

As the electricity provider for over 1 billion customers and 88 percent of the Chinese Market, SGCC has an investment portfolio and operating policies that all have a major impact on the power market. Beginning in 2010, the grid operator earmarked over \$40 billion for smart grid technologies. Although SGCC has delayed its deployment goals, combined with China Southern Grid the firms are set to install of another 280 million smart meters is expected over the next five years. Additionally, SGCC has updated its grid connection policies to enable the expanded installation of distributed energy resources. In order to better integrate and manage these resources, the utilities are expected to invest almost \$7 billion in distributed automation technologies over the next five years.<sup>4</sup>

### Top Markets Analysis

Spending on electricity infrastructure and the smart grid in China is expected to far outpace that of any other international market for at least the next five years. Success over the period for foreign suppliers, however, will be limited because of the focus on developing basic infrastructure and larger business issues that constrain exporters' commercial opportunities in China's energy sector.

China's Smart Grid Top Markets ranking remained unchanged in 2016. Though it had a slower economy and lower T&D equipment imports, China countered this with significant overall power sector investments, government policies and a commitment to grid modernization. A reliance on local suppliers, the lack of opportunity for foreign suppliers of advanced smart grid technologies, and a poor competitive

environment for U.S. firms, however, all have negative effects on China's ranking.

### Opportunities and Challenges for U.S. Companies

Despite the huge investments being made in grid modernization and smart metering, the market for U.S. firms in China is significantly limited by the challenge of incumbent local supply chains and technical interoperability issues, particularly in the distribution network. The market for demand DSM technologies that help reduce peak load and overall power consumption by end-users, however, is an area of potential growth for U.S. exporters that have already deployed and proven these technologies at home. China fell short of its goal to reduce energy consumption per unit of GDP, or "energy intensity," by 16 percent from 2010 to 2015 and has since scaled this back to 15 percent with a total energy consumption cap of 5 billion tons of coal equivalent by 2020.

#### Opportunities

- Continued, though declining, opportunities in T&D infrastructure, particularly high voltage transmission.
- Increasing demand for network management technologies and applications following modernization of China's substations.
- Energy efficiency programs and projects with industrial and municipal partners, particularly green data center segment.
- Microgrids, as China accelerates their construction and distribution of other energy resources.

#### Challenges

- The Chinese electricity market is opaque: incumbent suppliers are favored, and government intervention to support local firms and production is common.
- Local partnerships are key to success. A coordinated effort to support U.S. industry involvement in major projects, like smart cities, will be required.

### Know Your Buyer

Chinese purchasers of U.S. smart grid goods and services include generation, transmission and distribution companies. SGCC and China Southern Grid remain the primary purchasers of smart grid technologies.

## Summary of Resources

- U.S. Department of Commerce China Country Commercial Guide: <http://www.export.gov/ccg/china090765.asp>
- People's Republic of China, National Development and Reform Commission: <http://en.ndrc.gov.cn/>

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- <sup>1</sup> Bloomberg New Energy Finance, *Q1 2016 Digital Energy Market Outlook*, 25 February 2016.  
<sup>2</sup> Bloomberg New Energy Finance, *Q1 2016 Digital Energy Market Outlook*, 25 February 2016.  
<sup>3</sup> The Climate Group, *China's Fast Track to Renewable Energy*, April 2015  
<sup>4</sup> Bloomberg New Energy Finance, *Q1 2016 Digital Energy Market Outlook*, 25 February 2016