# 2016 Top Markets Report Smart Grid Country Case Study

## India

**India's Smart Grid Top Market rankings are bolstered by a fast-growing economy and electricity sector. Ambitious government policies for energy access, renewable resources deployment and development of "smart cities" send positive signals for the smart grid market. Challenges remain, especially in relation to access to financing.**

| Smart Grid ICT | T&D Equipment | Overall Rank |
|---|---|---|
| 15 | 3 | 8 |

U.S. T&D Equipment sales to India were valued at $12.8 million in 2015 and reflect only a 2 percent CAGR over the last five years. Despite market challenges, the Indian market remains attractive as U.S. exporters look to tap into an electricity sector that is expected to grow at one of the fastest global rates among all major economies.

**Market Overview**

For the administration of Indian Prime Minister Narendra Modi, the largest and most perplexing challenge is arguably addressing India's significant need for power. India currently is home to 18 percent of the global population, but only accounted for 5.7 percent of the global energy demand in 2013. India runs at an average energy deficit of 5 percent with values as high as 25 percent in some regions, leading to daily rolling brownouts, hampering economic growth and limiting foreign investment in the country. The July 2012 blackout that affected 620 million people was, for example, seen as a global embarrassment and remains a politically contentious topic to this day. [1]

As a result, the administration's flagship power sector initiative has been the pledge to ensure continuous, 24 hours a day/seven days a week (24/7), power for all Indians. This will require bringing electricity to the over 300 million people who currently lack any access and substantially improving electricity access to the additional 250 million people whose intermittent electricity access may be limited to only three to four hours a day.[2] Bloomberg New Energy Finance estimates that to realize its electricity access targets, generation capacity will need to increase fourfold, and $750 billion in new investment will be required by 2030.

Electricity theft continues to run rampant, and hurdles to rural and urban Indians paying for power remain, thus affecting availability of capital by Indian transmission, distribution and generation providers to invest in grid modernization and expansion.

T&D remains dominated by the government, with the overall private sector role limited to 1 percent in transmission and 5 percent in distribution. One of the biggest challenges facing these entities is T&D losses, which on average are very high – 8 percent at transmission level and 26 percent at distribution level, nationally. Several large states even report more than 40 percent distribution losses.

**Overview of ITA's Analysis: INDIA**

**Strengths**

- Growing electricity consumption
- Ambitious government policies to increase access and reliability of electricity

**Key Trends**

- Smart cities initiatives providing potential local project opportunities
- Distribution companies are cash poor

**Risks**

- Access to financing is a challenge

The Power Grid Corporation is the owner, operator (under its subsidiary the Power System Operator Corporation Limited) and developer of the national interstate power transmission grid. In 2009, the National Load Dispatch Center began supervising regional load dispatch centers, scheduling and dispatching electricity, and monitoring operations of the national grid. In 2013, five regional grids were ultimately united into one synchronous national system, but interconnections are largely thought to remain inadequate with control technologies still out of date. Power Grid Corporation has stated that it anticipates spending $18 billion in the next five years to extend and upgrade the Indian power grid to include smart technology. This, however, is only a small fraction of the $50 billion that the Ministry of Power has indicated is necessary over the next decade to modernize the grid.

The power distribution companies (DISCOMs) handle electricity sales and retail to commercial and residential customers, but industrial customers also have the opportunity to buy directly from the generators and wholesale market. The distribution, sales, and retail markets are largely handled by the regional governments in Delhi and Odisha states and the City of Mumbai, with Kolkata, Ahmedabad, and Surat municipalities having private companies engaged in electricity distribution. India's DISCOMs are largely not profitable. The government continues to direct cash to the DISCOMs to bail them out of debt, while still exploring policy and regulatory reforms to find permanent solutions to the problem. ITA expects the solution will likely need to include increasing regional competition to drive sector innovation and reduce overall losses. As seen in other global markets, ITA expects new smart grid export opportunities for U.S. firms to increase if sectoral competition also increases, as DISCOMs seek new innovations to capture and/or retain market share.

ITA notes this will also spur smart grid investments to effectively integrate the resource, including technologies to improve load shedding when the sun goes down. India announced a renewable energy deployment target of 175 GW of renewable resources by 2022. Solar is expected to play the largest role in India's power mix going forward with goals of increasing capacity to 100 GW by 2022. While ITA does not expect India to meet these targets, the ambitious nature of its announcement sends a positive signal to the market of India's willingness to use its policy tools to drive development of the generation source.

ITA expects India to raise capital to fund new major infrastructure projects while keeping energy prices affordable. A balanced budget will remain an ongoing challenge for India. The July 2014 budget proposed by the Modi administration included a doubling of the tax on coal, which will fund several important clean energy subsidies under the umbrella of the National Clean Environment Fund (NCEF).[3] This includes helping to finance the estimated $6 billion Green Energy Corridor that will deploy high voltage transmission lines and other infrastructure (e.g., substations) to facilitate the transfer of electricity generated from renewable energy in rural locations to load centers throughout the country.[4] In 2014 to 2015, India reported that $2.7 billion was raised, and the NCEF used this to fund 46 clean energy projects. The effectiveness of the NCEF in directing funds to *new* projects, rather than paying off debt from previous clean technology infrastructure projects, has come under question.

Following the budget declaration, India's finance minister announced that Indian banks would be allowed to raise long-term funds for lending to the infrastructure sector through the easing of constraints on liquidity, cash reserves and priority lending.[5] This should support additional investment in the grid infrastructure needed to move renewable electricity

produced in rural areas to load centers around the country.

The Asian Development Bank has announced plans to lend $1 billion to Power Grid Corporation for the Green Energy Corridor. India further emphasized in its Intended Nationally Determined Contribution to the U.N. climate change negotiations that it will seek low cost international financing for climate change mitigation efforts from institutions such as the Green Climate Fund. ITA anticipates that the ability to secure project financing will continue to be an important key to success for U.S. exporters.

**Policy and Regulatory Environment**

India's energy policy is overseen by its Ministry of Power (MOP), and tariffs are regulated by the Central Electricity Regulatory Commission (CERC) and its state-level counterparts.

In 2014, MOP initiated the Integrated Power Development Scheme to guide the development of transmission and distribution systems updates and fill gaps in funding for sub-transmission, distribution and metering to support a more efficient grid.
Focused on efficient and reliable distribution, MOP issued a Smart Grid Vision and Roadmap for India with the vision of a nationwide smart grid. In order to achieve the targets envisioned in the smart grid roadmap, a National Smart Grid Mission (NSGM) was proposed, which was approved by the government with an outlay of approximately $155 million in the 12th Five Year Plan, including $72 million in allocated funds in 2015. The NSGM serves as an institutional mechanism for planning, monitoring and implementing policies and programs related to the smart grid. MOP announced that grants up to 30 percent of the project cost will be available from the NSGM budget, and for selected components, such as training and capacity building, and consumer engagement, grants of 100 percent of costs will be available.

The NSGM is also charged with overseeing state-specific policy efforts, where some regions have already begun to implement smart grid enabling policies on their own. Net metering policies have been adopted in locations such as Andhra Pradesh, Maharashtra and Punjab. Tata Power Delhi has begun to bundle other services and institute a series of social programs that are targeted to finding a business model that drives customers to pay for power instead of stealing it.

Additionally, the National Telecom Machine-to-Machine (M2M) Roadmap, a reference document for deployment of devices at the intersection of physical and digital worlds, incorporates efforts related to the smart grids ICT sub-sector. This is the world's first national strategy for the "internet of things" (IoT). It further highlights the Smart Grid Pilot Program to prove the application of the IoT that will provide $60 million for 14 pilot projects, each with at least 20,000 customers. Largely the projects are focused on deploying smart meters and increasing meter readings to address theft issues, support reliability, support dynamic tariff structures and renewable resources integration. Four of the projects are underway, and six are in the contracting phase.

These efforts are informed by the India Smart Grid Forum (ISGF), the public-private partnership initiative of MOP. ISGF performs research, organizes conferences, develops standards, performs training and provides recommendations to policymakers and regulators.

Policy efforts related to so-called "smart cities" offer another mechanism for smart grid policy and regulation development. India's cities account for approximately 60 percent of the country's gross domestic product (GDP). By 2030, that share is expected to reach 75 percent, and the urban labor force is expected to increase by nearly 200 million workers. The new government has proposed a dramatic nationwide program to build 100 smart cities with 20 cities annually being selected to receive financing to kick-start development. Additionally, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) was launched with the smart cities project and is focused on providing basic services, such as electricity, to households in 500 cities.

**Market Analysis**

India continues to be a difficult market for U.S. exporters. However, bolstered by growing electricity consumption, ambitious government policies, and a growing economy, India saw significant increases to its Smart Grid Top Markets rankings in 2016.
Interestingly, despite concerns over the difficulty of doing business in India, which ranks 130 of 189 by the

World Bank,[6] it had the highest Key Economic and Energy Sector Investment Indicator value (Category 3). On the other hand, India's GTAP score remains one of the lowest among evaluated countries. U.S. firms have had some success to date in India through broader partnership efforts, but securing project financing is a primary challenge.

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

Opportunities

- Growing electricity demand and an emphasis on smart technologies
- U.S. companies are advised to monitor multinational development bank postings and publications for international soft loan and grant funded project announcements. These projects offer significant front-end consulting opportunities and the possibility to supply power generation equipment during the project implementation phase.

Challenges

- Exporters must engage with a slow, often overly bureaucratic, regulatory system that includes highly regulated electricity prices and inefficient state-owned distribution companies.
- U.S. firms looking to pursue opportunities in India are likely to need to bring their own financing options, thus providing an additional layer of difficulty to doing business in country.

**Know Your Buyer**

The primary buyers of smart grid technologies in India are the transmission and distribution companies. An emerging buyer community, however, is large commercial and industrial energy consumers. Due to rolling brownouts, these consumers are installing their own distributed energy resources and microgrid infrastructure to enable off-grid capabilities to maintain their operations.

Central and local government authorities continue to be active players in securing deals in-country as the electricity sector is not completely privatized. Similar to other large markets, exporters and policy-makers are well-served to consider distinct regions or states as different opportunities. Exporters to India should be prepared to face varied political and economic conditions across India's 29 states and seven union territories.

**Summary of Resources**

- U.S. Department of Commerce India Country Commercial Guide: http://www.export.gov/ccg/india090814.asp
- Indian Ministry of Power: www.powermin.gov.in
- Indian Ministry of New and Renewable Energy: www.mnre.gov.in
- Central Electricity Authority: http://www.cea.nic.in/
- Indian Renewable Energy Development Agency - www.ireda.gov.in
- India Smart Grid Task Forum: http://indiasmartgrid.org
- Confederation of Indian Industry: http://www.cii.in/
- Federation of Indian Chambers of Commerce and Industry: http://www.ficci.com/

[1] Ernst & Young, Renewable energy country attractiveness indices, Issue 35, November 2012, pp. 29.
[2] Massachusetts Institute of Technology, http://www.technologyreview.com/featuredstory/542091/indias-energy-crisis/
[3] Bloomberg New Energy Finance, *H2 2014 India Market Outlook*, 8 August 2014
[4] Government of India, *India's Intended National Determined Contribution,* October 2015 (http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf)
[5] Bloomberg New Energy Finance, *H2 2014 India Market Outlook*, 8 August 2014
[6] World Bank, *Doing Business Rankings*, http://www.doingbusiness.org/rankings