Transmission & Distribution Infrastructure

A Harris Williams & Co. White Paper

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The North American Electric Transmission & Distribution (“T&D”) industry is characterized by significant committed, announced, and anticipated investment in infrastructure, which is forecasted to exceed $49Bn in 2015. Fueled by the need to improve the reliability and capacity of the North American T&D network and by long-term regulatory requirements and incentives providing an avenue for earnings growth, utilities and developers are making substantial investments to replace, upgrade, and expand new and existing T&D infrastructure. This prolonged investment cycle is in its early stages and will continue its robust growth.

Our mission with this paper is to provide an overview of the U.S. T&D industry with a particular focus on the trends driving growth in T&D infrastructure investment spending.
T&D Infrastructure: Overview

Transmission & Distribution (“T&D”) infrastructure is the backbone of the electric power system as it facilitates the delivery of electricity from power plants to end customers. Energy is produced at electrical generating (power) plants at a relatively low voltage. To prepare this power for transport, its voltage level is increased by transformers to reduce energy loss during transportation along transmission lines. Transmission lines carry electricity between regions to substations, where the voltage level is reduced (or “stepped down”) so that it can be distributed to end users, including residential, commercial, and industrial customers. Prior to end-user delivery, distribution transformers decrease the voltage in order to safely distribute electricity to end users. Distribution lines then deliver electricity through overhead or underground power lines, while metering systems measure and record the locations and amounts of power transmitted.

Exhibit 1
T&D Infrastructure Overview

1 Power plant. Electricity is generated at the power plant.

2 High voltage transformer. Large transformers increase voltage from thousands to hundreds of thousands of volts so power can be sent over long distances.

3 Transmission lines. High voltage transmission lines carry electricity from the power plant to substations.

4 Transmission substation. Connects two or more transmission lines and contains high-voltage switches that allow lines to be connected or isolated for maintenance.

5 Distribution substation. Transformers that reduce voltage to a lower level so power can be sent out on distribution lines to the surrounding community.

6 Distribution system. Includes main or primary lines and lower voltage or secondary lines that deliver electricity through overhead or underground wires to end users.

7 Service connection. Line that connects meter at end-user location.
Market Outlook

The North American T&D network is an immense grid of interconnected generation facilities, high voltage transmission lines, substations, and low voltage distribution lines. This vast infrastructure consists of nearly 450,000 miles of high voltage transmission cables and approximately six million miles of distribution cable serving nearly 300 million customers.

North American utilities are making considerable investments to replace, upgrade, and expand new and existing T&D infrastructure, primarily driven by the need to improve the reliability and capacity of the North American T&D network and by long-term regulatory requirements and incentives. This prolonged investment cycle is in its very early stages and will continue its robust growth as a result of several factors, including:

- Aging and inadequate T&D infrastructure;
- Increasing demand for outsourced service providers;
- Regulatory tailwinds;
- Increasing demand for reliable power delivery;
- Focus on renewable energy production;
- Shift from Coal to Natural Gas Generation; and
- Proliferation of North American oil and gas production.

As a result of these industry trends, utilities and developers are expected to make a significant level of investment to replace, upgrade, and expand T&D infrastructure over the next two decades that is a nearly three-fold increase over the previous two decades. In addition to the nearly $880Bn projected to be spent by utilities in the U.S. over the next 20 years, Canadian utilities are expected to invest nearly $100Bn over the same time period on T&D infrastructure. This trend has already started, with T&D spending increasing over 55% from 2010 to 2013E.
Significant T&D investment across North America

Major U.S. and Canadian utilities are continuing to invest heavily in T&D infrastructure and have recently announced substantial investment over the next seven years. Large transmission and distribution projects typically require several years to complete as contractors construct new infrastructure. Each new, large infrastructure project creates significant demand for T&D equipment and services not only for construction-related purposes, but also for annual, recurring maintenance, repairs, and upgrades. As of Q4 2013, Industrial Info Resources (“IIR”), a leading aggregator of T&D industry data, was tracking 360 U.S. and 33 Canadian announced T&D projects to be completed between 2013 and 2020, representing approximately $71Bn in cumulative project value.

Exhibit 3
Regional Spending Outlook

Exhibit 4
Top Ten Utilities by Announced U.S. Investment
(# of projects and $ in billions)

<table>
<thead>
<tr>
<th>Utility</th>
<th># of Projects</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Grid</td>
<td>5</td>
<td>$10.0</td>
</tr>
<tr>
<td>American Electric Power</td>
<td>14</td>
<td>4.8</td>
</tr>
<tr>
<td>Duke Energy</td>
<td>6</td>
<td>3.9</td>
</tr>
<tr>
<td>Xcel Energy</td>
<td>39</td>
<td>2.2</td>
</tr>
<tr>
<td>Edison International</td>
<td>12</td>
<td>2.0</td>
</tr>
<tr>
<td>Ameren Corporation</td>
<td>9</td>
<td>1.7</td>
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<tr>
<td>PacifiCorp</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Central Maine Power Company</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Northeast Utilities</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Public Services Enterprise Group</td>
<td>7</td>
<td>1.3</td>
</tr>
<tr>
<td>All Other U.S. Projects</td>
<td>258</td>
<td>30.0</td>
</tr>
<tr>
<td>All Canadian Projects</td>
<td>33</td>
<td>10.7</td>
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<tr>
<td><strong>All Projects</strong></td>
<td><strong>393</strong></td>
<td><strong>$71.1</strong></td>
</tr>
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</table>

Source: IIR.
Industry Growth Drivers

Growth in the T&D market is being driven by a number of attractive dynamics, demonstrating that the U.S. is in the very early stages of a prolonged T&D spending cycle.

Exhibit 5
Key Industry Growth Drivers

| Aging and Inadequate T&D Infrastructure | • Aging equipment requires replacement and upgrade of existing infrastructure  
• Unreliable T&D infrastructure poses threat to national security as critical systems have failed during previous outages  
• Approximately 70% of transformers are over 25 years old and 60% of distribution poles are 30 to 50 years old relative to useful lives of 20 years and 50 years, respectively  
• Estimated that 70% of transmission lines are 25 years old or older and approaching the end of their useful life. |
| Increased Demand for Outsourced Service Providers | • The median age of utility workers has steadily increased while the total in-house utility workforce has substantially decreased  
• Estimated that nearly 62% of electric utility workers have the potential to retire or leave for other reasons over the next decade  
• Approximately 75% of utility infrastructure repair, replacement, and installation is currently outsourced and more than 90% of utilities use outsourced contractors in some capacity |
• American Reinvestment and Recovery Act of 2009: Dedicated $108Bn to energy spending and tax credits focused on improving electric delivery and reliability  
• Federal Energy Regulatory Commission (“FERC”) Order 1000: Establishes transmission planning and cost allocation requirements for public utility transmission providers  
• Rapid Response Team for Transmission (“RRTT”): Established to improve the overall quality and timeliness of electric transmission infrastructure |
| Increasing Demand for Reliable Power Delivery | • U.S. electricity demand is expected to increase 24% from 2012 – 2040P  
• Large potential economic loss from power failures  
• Customer intolerance for power outages, including blackouts and brownouts, is a powerful issue for state public utility commissions |
| Focus on Renewable Energy Assets | • Spending on renewable energy projects has grown at a 37% CAGR over the past six years  
• Renewable portfolio standards (“RPS”) require renewable sources to account for nearly 4x the current generation capacity  
• 29 states and the District of Columbia currently require renewable energy to account for up to 40% of a utility’s energy generation portfolio within the next two to twelve years  
• Remotely located sources of renewable power require greater T&D investment to connect to grid |
| Shift from Coal to Natural Gas Generation | • Due to heightened environmental regulations, it is estimated that over 37GW of U.S. coal-fired generation capacity is expected to be shuttered by 2020  
• Nearly 44% of all announced and expected capacity additions from natural gas-fired generation  
• Shift is resulting in significant investment to upgrade and improve transmission infrastructure and ensure grid reliability |
| Proliferation of North American Oil & Gas Production | • Technological advancements have driven a substantial increase in North American unconventional oil and gas production  
• Drilling and production activities require a tremendous amount of power on site, and many of the most prolific resources are often in remote locations with little infrastructure in place |
Aging and Inadequate Infrastructure

The dual trends of long-term underinvestment in T&D infrastructure and increasing demand for the reliable delivery of electricity have increased pressure on the electricity grid. The existing electric power delivery system relies on an aging infrastructure and largely reflects technology developed in the 1950s that struggles to meet today’s growing demand. In a recent survey, 147 investor-owned utilities reported that between 35% and 48% of their T&D assets either currently need or will soon need replacement.

Exhibit 6
Current Infrastructure Age Relative to Useful Life

<table>
<thead>
<tr>
<th>Transmission Infrastructure</th>
<th>Distribution Infrastructure</th>
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<tbody>
<tr>
<td>(as a % of total)</td>
<td>(as a % of total)</td>
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<tr>
<td>At End</td>
<td>At End</td>
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<tr>
<td>5%</td>
<td>4%</td>
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<tr>
<td>Near End Of 25%</td>
<td>Near End Of 41%</td>
</tr>
<tr>
<td>Within 70%</td>
<td>Within 55%</td>
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</tbody>
</table>

Source: EBI.

In order to avoid power outages from component and equipment failures, analysts believe there is significant investment required on both the transmission and distribution fronts due to the aging grid. The U.S. Department of Energy (“DOE”) estimates 70% of transformers are 25 years old or older and 60% of circuit breakers are more than 30 years old compared to useful lives of 25 years and 20 years, respectively. Additionally, of the 450,000 transmission miles in the U.S., it is estimated that 70% are 25 years old or older and approaching the end of their useful life. This critical situation is driven by a lack of investment in transmission infrastructure, which declined 44% from 1980 to 1999, while electricity use simultaneously increased by 58%. 
The story on the distribution side of the grid is much the same. At nearly six million distribution miles in the U.S., the local distribution infrastructure is more than 13 times larger than the high voltage transmission grid. It is estimated that over 60% of distribution poles were installed in the mid-1940s to mid-1970s and are now approaching or have surpassed their useful life of 50 years. As one of the components of the distribution grid most susceptible to the elements, poles will likely require significant investment to maintain system stability. As such, the American Society of Civil Engineers (“ASCE”) estimates annual distribution spending of nearly $20Bn over the next several years, largely driven by recurring investment to maintain, replace, and improve the aged distribution infrastructure.
**Consequences of Inaction**

Without expanded T&D transmission investment, grid congestion is forecasted to increase, resulting in supply shortages and power interruptions. Grid congestion becomes an increasing concern due to the consistently decreasing capacity margin, which is defined as the difference between committed capacity and peak demand expressed as a percentage of capacity resources. As peak demand catches up to available capacity, electricity providers require a more efficient transmission system to deliver power to end users. As the exhibits below from the DOE’s National Electric Transmission Study indicate, reliability and congestion in existing transmission infrastructure is a significant problem and a driver of planned transmission mile additions.

**Exhibit 8**

*System Disturbances and Planned Transmission Mile Additions*

*Congestion Areas in the Eastern Connection*

*Planned Transmission Miles by Driver (as a % of total)*


Power outages due to blackouts, brownouts, grid inefficiencies, and weather events have increased at a CAGR of approximately 7% from 1999 to 2012. These outages are the result of an aging infrastructure that is unable to properly support electricity demand and withstand the effects of weather-related events. The DOE estimates the annual cost of all power outages (including weather and other causes) is approximately $150Bn. The recent California Blackout in June 2013, the Southwest Blackout in September 2011, the Northeast Blackout in August 2003, and the California Energy Crisis in 2000 and 2001 are some of the most notable examples of outages directly related to the outdated and inadequate T&D infrastructure. Moreover, aging T&D infrastructure has made the grid more susceptible to weather events, such as Winter Storm Nemo in February 2013 and Superstorm Sandy in October 2012, reinforcing the need to update and improve the U.S. electric grid.
Notable Widespread U.S. Power Outages

- **Central California Blackout of 2013**
  The most recent blackout in California occurred in June of 2013 due to limitations of existing electric T&D infrastructure, leaving over 145,000 people without power.

- **Southwest Blackout of 2011**
  In September 2011, a system disturbance occurred in the Pacific Southwest, leading to cascading outages and leaving approximately 2.7 million customers without power.

- **Northeast Blackout of 2003**
  The Northeast Blackout in 2003 heightened awareness regarding the limitations of existing electric T&D infrastructure. It resulted in a $6Bn economic loss and temporarily crippled key national security safeguards.

Source: DOE.

Increasing Demand for Outsourced Service Providers

In addition to the need to invest a substantial amount of capital into existing infrastructure, utilities are also contending with an aging workforce. Since 2002, the median age of utility workers has steadily increased while the total in-house utility workforce has substantially decreased. Additionally, according to the Center for Energy Workforce Development (“CEWD”), almost 62% of electric utility workers have the potential to retire or leave for other reasons over the next decade. These trends, coupled with acute shortages at positions such as utility lineman, will drive continued outsourcing of maintenance and new construction services to specialized third-party partners. Furthermore, industry analysts estimate that approximately 75% of utility infrastructure repair, replacement, and installation services are currently outsourced and that more than 90% of utilities use outsourced contractors in some capacity.

Exhibit 10
Utility Workforce Trends

**Potential Retirements**
(as a % of total utility workers)

<table>
<thead>
<tr>
<th>Role</th>
<th>2010 to 2015</th>
<th>2015 to 2020</th>
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<tbody>
<tr>
<td>Lineworkers</td>
<td>32%</td>
<td>39%</td>
</tr>
<tr>
<td>Technicians</td>
<td>15%</td>
<td>19%</td>
</tr>
<tr>
<td>Plant Operators</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Engineers</td>
<td>38%</td>
<td>38%</td>
</tr>
</tbody>
</table>

Source: U.S. Bureau of Labor Statistics and CEWD.
Regulatory Tailwinds

The reliable transmission of electricity to U.S. commercial, industrial, and residential end-users is a critical element of the nation’s economy and national security. Recognizing the deteriorating condition of this critical power infrastructure, the U.S. government has directed significant efforts towards the modernization and improvement of the electric grid to help reduce the economic losses associated with power outages as well as to ensure the continuity of the nation’s security systems.

A White House report issued in August 2013 ("Economic Benefits of Increasing Electric Grid Resilience to Weather Outages") as well as the recent 10 year anniversary of the Northeast Blackout of 2003, highlight the current focus across top levels of the U.S. government and the T&D industry on improving the nation’s aging infrastructure. Moreover, the Department of Homeland Security’s (“DHS”) 2013 annual National Risk Profile noted that the lack of maintenance and investment in the nation’s aging infrastructure “…will continue to result in occasional industrial disasters…” with the rate of these disasters increasing if sufficient funding and resources are not allocated. The DHS report also outlined that the unpredictable repercussions of infrastructure failure will adversely affect other areas of the U.S., most notably the economy and “potentially cause the U.S. to fall behind other countries and regions economically, particularly China and Europe.”

Exhibit 11
T&D Regulatory Overview

<table>
<thead>
<tr>
<th>Energy Policy Act of 2005</th>
<th>Outlined the establishment of mandatory electric grid reliability standards and incentivized T&amp;D investments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eased, and in some cases eliminated, state or local citing practices for new transmission lines</td>
</tr>
<tr>
<td></td>
<td>Allowed ROE on transmission projects 100 to 150 basis points higher than on other investments, spurring utility transmission spending</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FERC Order 1000</th>
<th>Establishes transmission planning and cost allocation requirements for public utility transmission providers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Encourages transmission infrastructure development</td>
</tr>
<tr>
<td></td>
<td>Requires transmission providers to develop regional plans and cost-allocation methods</td>
</tr>
<tr>
<td></td>
<td>Could reduce permitting delays, expediting the development of T&amp;D infrastructure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rapid Response Team for Transmission</th>
<th>Established to improve the overall quality and timeliness of electric transmission infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Focuses on increasing electric reliability, integrating new renewable energy into the grid, and saving consumers money</td>
</tr>
<tr>
<td></td>
<td>Promotes cooperation amongst governing agencies to streamline and improve the review and permitting of transmission projects</td>
</tr>
</tbody>
</table>

The ASCE’s recently released 2013 Report Card for America’s Infrastructure gave the U.S. a D+ and stated that “America relies on an aging electrical grid...” while its accompanying Failure to Act report noted “The needs to maintain and update existing electric energy infrastructure...will impose significant requirements for new energy infrastructure investment.”
Increasing Demand for Reliable Power Delivery

Growth in demand for the reliable delivery of electric power is also driving increased investment in T&D infrastructure. Demand for electricity has grown consistently over the past three decades, increasing by 82% since 1980. The EIA projects continued consistent growth in demand for electricity in each of the commercial, residential, and industrial sectors. This increase in demand is a result of economic growth, the further digitalization of the global economy, including growing electronic data storage and transfer requirements, and other technological developments like electric vehicles. Total electricity use is forecasted to increase across all sectors by approximately 24% from 2012 to 2040P. This demand growth will require significant investment in T&D infrastructure to improve the performance of existing systems, reduce the risk of loss from a power failure, and expand the overall grid.

Exhibit 12
U.S. Electricity Demand by Sector
(kwh in billions)

Source: EIA.
Focus on Renewable Energy

Driven by state-level renewable portfolio standards ("RPS") and new federal policies, utilities are actively diversifying sources of power generation. Capital spending on renewable energy projects grew at a 37% CAGR over the past six years, and is projected by industry analysts to increase 20% in 2013E to $99Bn, with continued growth expected for the foreseeable future. The remote locations of most major renewable power generation projects will require new high voltage transmission systems to deliver the energy to the grid. The National Renewable Energy Laboratory projects investment in transmission infrastructure of up to $9Bn per year to connect remote areas of power generation to the grid.

Under current mandates in 29 states and the District of Columbia, renewable energy is required to account for up to 40% of electricity generation within the next two to twelve years. More specifically, eight states have mandatory or voluntary RPS requirements by 2015, which increases to 20 states in 2020 and 35 states in 2025. Compliance with these standards will require states to generate 55GW of renewable energy by 2015 and 140GW by 2025 compared to the 40GW existing or under construction in the United States. These standards will require increased infrastructure investment as the most cost effective of these renewable resources are located far from load centers and the existing grid.

The remote location of U.S. renewable resources will require significant investment in new transmission lines.

Source: NREL.
Shift from Coal to Natural Gas Generation

The shift from coal-fired generation to natural gas-fired generation will require billions in investment to upgrade the transmission grid. Tightening environmental regulations have effectively ended the development of coal-fired generation plants in the U.S. while the abundance of natural gas in the U.S. has led to significant expected additions to natural gas-fired generation. The emissions control costs imposed by EPA regulations have made it uneconomical for coal-fired plants to continue operating. Doyle Trading Consultants estimates that over 37GW of U.S. coal-fired generation capacity is expected to be shuttered by 2020, with nearly 23GW in the next two years alone. Furthermore, the Mercury and Air Toxics Standards (MATS) are set to commence at the end of 2015 and 130 of the country’s smaller plants lacking emissions control systems are scheduled for closure. Between 2014 and 2020, it is expected that nearly 200 plants will be retired, accounting for approximately 11% of all domestic coal capacity.

On the other hand, an abundance of natural gas supply from shale production and persistent low prices are driving the construction of new natural gas combined-cycle units to act as base load generators. Nearly 44% of all planned (announced) and unplanned (not yet announced but expected by the EIA) capacity additions will ultimately be natural gas by 2040. As a result, a number of Independent System Operators (ISOs) and Regional Transmission Operators (RTOs) have identified and approved billions of investment in smaller and medium sized projects that support the transition away from coal generation through transmission upgrades to ensure grid reliability. For example, PJM has approved over $9 billion in upgrades and improvements related to the shift from coal to gas generation since 2012, while The Electric Reliability Council of Texas (“ERCOT”) has approved over $450 million in similar upgrades. These upgrades will continue to drive investment in transmission infrastructure as the shift becomes more pronounced over the next several years.

Exhibit 14

U.S. Coal Plant Retirements and Natural Gas Capacity Additions

U.S. Coal Plant Retirements

U.S. Natural Gas Capacity Additions

Source: EIA and Equity Research.
Proliferation of North American Oil and Gas Production

Growth in domestic oil and gas production is requiring significant incremental T&D investment to deliver power to often remote production sites.

Due to the rapid development of shale resources, U.S. oil production rose in each of the last four years after more than 20 years of decline. While oil from unconventional resources represented approximately 15% of U.S. production in 2010, the EIA estimates that currently identified unconventional oil plays could add output of nearly three million barrels per day, representing almost 40% of U.S. crude production by 2020. Unconventional resources have also dramatically changed the landscape for domestic natural gas production. Shale gas production, which accounted for 2% of domestic natural gas production in 2000, represented approximately 35% of gas production in 2012 and is expected to increase to more than 50% by 2040, according to the EIA.

The growth in domestic oil and gas production from these unconventional resources is largely driven from remote regions within the U.S., such as the Bakken Shale in North Dakota, the Eagle Ford Shale in south Texas, and the Permian Basin in west Texas. The number of wells drilled in these three formations increased by 220% from 2009 to 2013 and represented over 40% of the total new wells drilled in 2013. The dramatic increases in wells drilled will require significant T&D investment to connect these regions to the electrical grid and accommodate the increasing demand for power throughout the life of the well site. Development activities, such as artificial lift, require a tremendous amount of electrical power to successfully produce oil and natural gas. As a result, there is over $4Bn of announced and planned investment in T&D infrastructure in Texas and North Dakota through 2020, largely driven by the need for electrical infrastructure to power oil and gas development in remote locations.

### Exhibit 15
Estimated T&D Spend and Select Projects

<table>
<thead>
<tr>
<th>T&amp;D Spending ($ in millions)</th>
</tr>
</thead>
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<table>
<thead>
<tr>
<th>Cumulative Investment</th>
<th>$4,160</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013 / 2014</td>
<td>$1,280</td>
</tr>
<tr>
<td>2014+</td>
<td>$2,881</td>
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</tbody>
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<table>
<thead>
<tr>
<th>T&amp;D Investment in North Dakota and Texas</th>
</tr>
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</table>

### Select Regional Projects

<table>
<thead>
<tr>
<th>Utility / Owner</th>
<th>Location</th>
<th>Expected Year Complete</th>
<th>Investment ($MM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnkota Power</td>
<td>Center, ND</td>
<td>2013/2014</td>
<td>$312</td>
</tr>
<tr>
<td>LCRA Transmission</td>
<td>Eldorado, TX</td>
<td>2013/2014</td>
<td>$345</td>
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<td>Oncor</td>
<td>Krum, TX</td>
<td>2014</td>
<td>$250</td>
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<td>AEP</td>
<td>Vernon, TX</td>
<td>2014</td>
<td>$180</td>
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<td>Xcel Energy</td>
<td>Fargo, ND</td>
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<td>Sharyland Utilities</td>
<td>McAllen, TX</td>
<td>2015</td>
<td>$40</td>
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<tr>
<td>Southern Cross</td>
<td>Henderson, TX</td>
<td>2016</td>
<td>$1,000</td>
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<tr>
<td>AEP</td>
<td>Laredo, TX</td>
<td>2016</td>
<td>$300</td>
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Source: IIR. Includes T&D investment in North Dakota and Texas from 2013E – 2020P.
### Exhibit 16
Industry Landscape

<table>
<thead>
<tr>
<th>Company</th>
<th>Transformers</th>
<th>High Voltage</th>
<th>Medium Voltage</th>
<th>Low Voltage</th>
<th>Grid Automation and Control</th>
<th>Metering</th>
<th>Overhead Electric</th>
<th>Underground Electric</th>
<th>Natural Gas T&amp;D</th>
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<tr>
<td>ABB</td>
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<td>Alstom</td>
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Harris Williams & Co. Select Transactions

Infrastructure and Utility Services

- **FOCUS**
  - A portfolio company of KRG Capital
  - Has been acquired by WSP

- **NESCO**
  - A portfolio company of Platinum Equity
  - Has been acquired by Energy Capital

- **IPSO**
  - A portfolio company of The Sterling Group
  - Has been acquired by ZACHRY

- **CO2**
  - A portfolio company of Watermark Capital
  - Has been acquired by BOAR Capital Group

- **OCZ**
  - A portfolio company of Envision
  - Has been acquired by ROAR Capital Group

- **Aquilex**
  - A portfolio company of Riverside
  - Has been acquired by Harvest Partners

- **CBB**
  - A portfolio company of Harvest Partners
  - Has been acquired by Berkshire Partners

- **HydroChem**
  - A portfolio company of Aquilex
  - Has been acquired by Harvest Partners

- **Platinum Equity**
  - Has been acquired by KKR

- **Lyon**
  - A portfolio company of First Reserve
  - Has been acquired by United Water

- **CSI**
  - A portfolio company of Kohlberg Capital Management
  - Has been acquired by TIMKEN

- **Wind River**
  - A portfolio company of Harvest Partners
  - Has been acquired by TIMKEN

- **USG**
  - A portfolio company of OMERS Private Equity
  - Has been acquired by TIMKEN

- **NAPA**
  - A portfolio company of Stonepeak Infrastructure Partners
  - Has been acquired by TIMKEN

- **Lindsey Gold**
  - A portfolio company of The Sterling Group
  - Has been acquired by KBR

- **Recon**
  - A portfolio company of Lindsay Gold
  - Has been acquired by Harvest Partners

- **IUSI**
  - A portfolio company of Harvest Partners
  - Has been acquired by Harvest Partners
Harris Williams & Co. Select Transactions (continued)

Power Products and Technologies

- Power Measurement
  - a portfolio company of
  - has been acquired by
  - Schneider Electric

- UISOL
  - has been acquired by
  - ALSTOM

- Fresco Energy
  - a portfolio company of
  - has been acquired by
  - The Comer Group

- Danaher
  - A division of
  - has been acquired by
  - Thomas & Betts

- LineSoft
  - has been acquired by
  - Itron

- SAES
  - a portfolio company of
  - ACN
  - has been acquired by
  - KEC

- Enscape
  - a portfolio company of
  - DMGI
  - has been acquired by
  - Intech

- Capula
  - a portfolio company of
  - Dunedin
  - has been acquired by
  - Cooper

- Cannon Technologies
  - a portfolio company of
  - DMGI
  - has been acquired by
  - SPX

- Alerion
  - a portfolio company of
  - has been acquired by
  - Emerson

- NRESCO
  - a portfolio company of
  - has been acquired by
  - Carrier

- Johnson Controls
  - has been acquired by
  - energySage

- AFS Energy Services
  - a subsidiary of
  - has been acquired by
  - Ameresco

- E-Mon
  - Energy Monitoring Products
  - a portfolio company of
  - Franklin Capital
  - has been acquired by
  - Honeywell
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