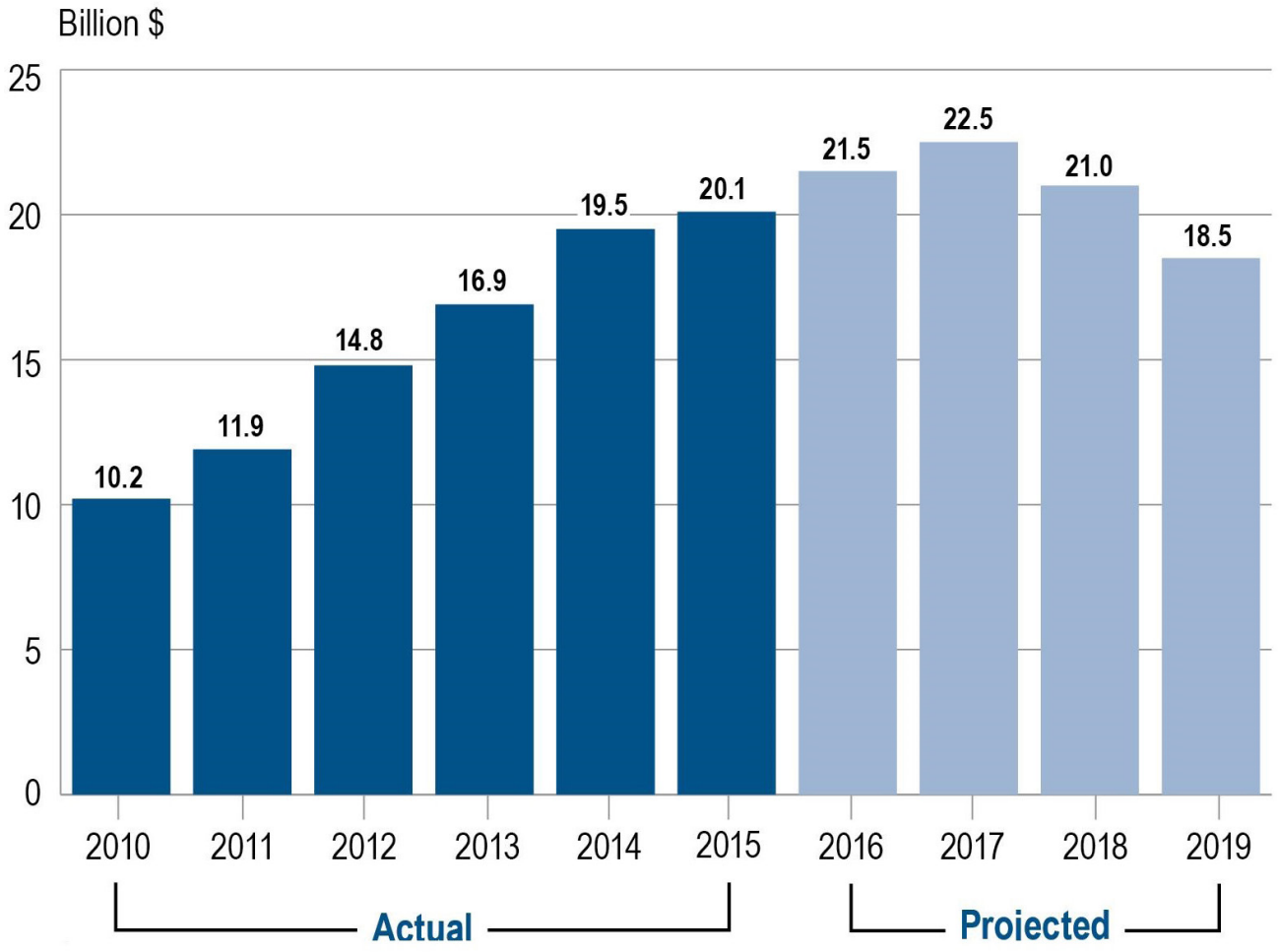
Introduction

Investment in Transmission

While the electric industry and general economic climate have changed since the first *Transmission Projects: At A Glance* publication in 2007, EEI members remain firmly dedicated to prudent investment in needed and beneficial transmission infrastructure. In 2015, EEI members' total transmission investments reached approximately $20.1 billion (nominal $). As shown in the chart,[3] year-over-year total transmission investment is projected to increase through 2017, when EEI estimates a peak at approximately $22.5 billion. [4]

Historical and Projected Transmission Investment (Nominal Dollars)



[3] Investment of investor-owned electric utilities and stand-alone transmission companies. Actual Investment figures were obtained from the EEI Property & Plant Capital Investment Survey supplemented with FERC Form 1 data. Projected investment figures were obtained from the EEI Transmission Capital Budget & Forecast Survey supplemented with data obtained from company 10-k reports and investor presentations. Source: Edison Electric Institute, Business Information Group. Updated November 2016.

[4] The past several years have demonstrated that actual spending typically surpasses previous projections. Although these figures show a decline in transmission investment after 2017, greater certainty in nearer-term projections demonstrates that future investment continues to be robust and may continue to increase.

Primary factors driving transmission investment between 2015 and 2019 include upgrades and replacement of aging transmission infrastructure, system hardening and resiliency to minimize adverse catastrophic events, fundamental improvements to comply with evolving transmission reliability and security compliance standards, and expansion of the transmission system to integrate renewables and an evolving generation mix. Without question, this level of investment in our nation's transmission infrastructure is significant and will provide numerous benefits for electricity customers.

The Value of Transmission

Investment in transmission enhances the high level of reliable electricity service that customers expect and reduces congestion and system losses, which result in direct cost savings for customers. Transmission investment also facilitates the integration of new generation sources, including renewable resources, by adding robust support to the existing network, or by directly interconnecting resources, even when located far from load centers. Transmission also provides access to other flexible power resources and support services to complement the increasing amounts of distributed energy resources. As transmission assets are designed for long-term use, up to 40 years or more, these facilities can ensure optionality and act as insurance for the unknown future. Often, these assets provide future benefits that were not originally planned for during the project's development.[5]

Because transmission assets are built to be in use for several decades, a large portion of the electric transmission system built in the mid-twentieth century is approaching the end of its useful life and needs to be upgraded or replaced. In addition, new generation sources continue to need access to the grid in order to meet customer demands for cleaner, cost-effective energy. In order to maintain reliability and enhance the flexibility of the grid to meet these demands, EEI members are continuing to invest in new and upgraded facilities. For example, Pepco Holdings is developing the new 138 kV Wattsville – Piney Grove transmission line to eliminate potential reliability risks and voltage issues as well as address the age of existing infrastructure in the Delmarva Peninsula.

Although energy load growth is relatively flat nation-wide, there is continued load growth in specific regions which require new transmission facilities to meet demand and relieve congestion while ensuring access to economical energy. Xcel Energy is addressing such load growth in southeast New Mexico through its new 48-mile, 345 kV Hobbs-Kiowa transmission line while Entergy's $62 million Louisiana Economic Transmission Project is designed to alleviate congestion in southeast Louisiana and provide access to lower cost energy for its consumers.

In addition, transmission investments help to ensure the continued reliability of the grid in the face of power plant retirements as our nation's mix of electric generation resources changes in response to federal, state and local environmental requirements, as well as shifts in the costs of power plant operations. California adopted a Renewable Portfolio Standard ("RPS") requiring all retail electricity providers to procure 33% of its energy from renewable resources by 2030 and recently enacted legislation that accelerated procurement requirements to 50% by 2030. A recent study by the Renew-

[5] See Department of Energy, National Electric Transmission Congestion Study at (September 2015); available at http://energy.gov/sites/prod/files/2015/09/f26/2015%20National%20Electric%20Transmission%20Congestion%20Study_0.pdf
[6] Renewable Energy Transmission Initiative 2.0 - Transmission Technical Input Group, Transmission Capability and Requirements Report (October 24, 2016); available at http://docketpublic.energy.ca.gov/PublicDocuments/15-RETI-02/TN214168_20161025T091645_Transmission_Capability_and_Requirements_Report.pdf

able Energy Transmission Initiative 2.0 Transmission Technical Input Group estimated that up to $5.8 billion in transmission investments would be needed to upgrade the current system capabilities as well as build new transmission in order to interconnect potential generation to meet the 50% renewables goal.[6] To meet these RPS requirements, Southern California Edison is developing new transmission facilities, including the Tehachapi Renewable Transmission Project and the Path 42 project, to interconnect thousands of megawatts of renewable energy to the California transmission grid. In the Northeast, the Northern Pass Transmission Project developed by Eversource, will bring large quantities of hydro-electric power to customers helping New Hampshire achieve its goals in the New Hampshire Climate Action Plan, and assisting New England in meeting its targets under the Regional Greenhouse Gas Initiative.

Smarter Energy Infrastructure

The transmission network is the backbone of the smart energy grid. The industry is making significant investments to enhance the transmission system to make it more dynamic and secure. These investments in new and upgraded infrastructure and new digital and communications technologies help to seamlessly integrate more renewable energy sources while maintaining reliability, promoting resiliency and providing customers with flexible energy solutions. EEI members are dedicated to planning and modernizing the nation's transmission network to meet twenty-first century electric energy demands. Recent extreme weather events as well as a renewed focus on cyber and physical security have highlighted the need for reinforcing and upgrading electric infrastructure. Such investments improve the durability of transmission infrastructure, allowing the system to withstand the impacts of severe weather events and malicious interference with minimal damage. For example, Florida Power & Light ("FPL") has invested more than $2 billion since 2006 to build a stronger, smarter and more storm-resilient energy grid allowing faster restoration than ever before. In the aftermath of Hurricane Matthew in October 2016, FPL was able to quickly restore power to 1.2 million of its impacted customers. Automated switches on FPL's poles and wires prevented approximately 80,000 outages, while hardened feeders performed approximately 1.5 times better than non-hardened feeders. Despite the high winds from Hurricane Matthew, none of the poles along FPL's transmission or distribution network failed. According to FPL, were it not for these improvements, a storm of this magnitude and strength would have resulted in a much longer and more costly restoration. By the end of the second full day after Hurricane Matthew left the service territory, FPL was able to restore power to 98.7% of its customers.

With increasing penetration of distributed energy resources (e.g. private solar, demand response) and an overall interest by customers in clean energy, transmission remains vitally important to maintaining system-wide reliability by providing access to other, flexible power resources in cases when such variable power supply is unavailable. At the same time, large concentrations of distributed energy resources increase the need for the transmission system to detect and react quickly to balance supply and demand when those generation sources go offline, require ramping support, or are unable to meet customer demand. To enable flexible networks that allow for more customer control and choice, it is important that regulatory frameworks, adequate returns and equitable cost allocation are in place for utilities to provide services that meet customer needs.

[7] http://www.eei.org/resourcesandmedia/newsroom/Pages/Press%20Releases/American%20Electric%20Power%20Awarded%20EEI%E2%80%99s%202016%20Edison%20Award.aspx

Meanwhile, EEI members continue to introduce innovative technologies in transmission projects to meet system needs when they provide benefits to customers and improve service. A number of the projects highlighted in this report integrate advanced transmission technologies including fiber optic communication, advanced conductor technology, enhanced power device monitoring and energy storage devices. For example, ITC Midwest is improving transmission system reliability, real-time monitoring capabilities, and event analysis capabilities by implementing smart grid improvements including an advanced, digital network architecture. Southern California Edison is evaluating the capability of utility-scale lithium-ion battery technology to improve grid performance and assist with the integration of variable energy resources through its Tehachapi Wind Energy Storage Project. The AEP Lower Rio Grande Valley Re-Conductoring Project, the 2016 recipient of the EEI Edison Award, utilized advanced technologies to replace 240 miles of transmission line while keeping the facilities in service to save consumers an estimated $43 million.[7]

Policies Supporting Transmission Development

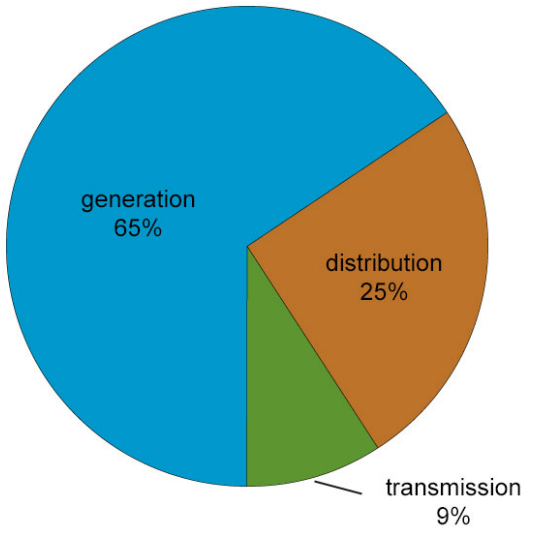
As demonstrated by the sample of transmission projects in this report, investment in our nation's transmission grid continues as EEI's members address the evolving energy needs of the nation. The Energy Policy Act of 2005 ("EPAct 2005") set forth several statutory requirements intended to support transmission investment, and in 2012 the Federal Energy Regulatory Commission ("FERC") reaffirmed its pricing policy providing incentive rate treatments to assist in mitigating the risks associated with developing, constructing, operating, and maintaining transmission infrastructure. In addition, FERC advanced its strategic goal of supporting the development of transmission by enabling regional and interregional coordination processes and supporting allocation of costs for the selected transmission solutions that meet customer and system needs. Since the issuance of these policies, the risks associated with planning, siting and constructing needed transmission have not diminished.

In June 2014, FERC issued its Opinion No. 531 adopting a new two-stage discounted cash flow ("DCF") methodology for calculating return on equity as well as providing guidance on the treatment of rates of return for transmission investment. With this new policy, FERC should continue to foster the construction and modernization of beneficial transmission by balancing the need to promote investment in long-term infrastructure assets with the short-term, cyclical movements in the capital markets and ensuring sufficient access to capital to developers. This is particularly true given the growing competition for capital to invest in our nation's strategic assets and infrastructure and the breadth of investor choice in other sectors. Returns commensurate with the long-term prevailing risks are necessary to continue to attract sufficient capital to achieve the needed transmission investment levels and promote the implementation of advanced technologies.

[8] While the transmission component may vary over time and by region, the DOE recently estimated that transmission comprises nine percent of a customer's bill. See, e.g., Energy Information Agency. http://www.eia.gov/energyexplained/index.cfm?page=electricity_factors_affecting_prices.

Transmission remains the smallest portion of electricity costs, when compared to generation and distribution costs, and while the benefits of transmission projects are realized on the date they are placed into service, utilities recover these investments over the facility's useful life (typically 40 years or more).[8]

Major components of the U.S. average price of electricity, 2014



Source: U.S. Energy Information Administration, *Annual Energy Outlook 2015*, Reference Case, Table 8: Electrical supply, disposition, prices, and emissions

Moreover, in EPAct 2005, Congress required the adoption of transmission incentives for certain qualifying projects in recognition of the benefits of a robust transmission network, the risks of its development, and the challenges of raising adequate capital to invest in transmission given other capital requirements. These transmission incentives were also created to encourage the deployment of advanced transmission technologies.[9] The 2012 FERC Policy Statement reaffirmed that development of transmission still presents risks and challenges that are not present for investment in any other utility plant. In this vein, FERC should recognize that the new two-stage DCF methodology for determining return on equity has narrowed the zone of reasonable returns and has thus resulted in previously granted transmission incentives being capped. This has caused uncertainty for investors and future returns. Thus, FERC should look into adjusting its policies regarding the capping of incentives that exceed the higher end of reasonable returns as determined by the new methodology.

Recognizing the importance of transmission to the nation's economy, security and quality of life, the Obama Administration announced the first "Quadrennial Energy Review" (QER)[10] building off of its *Blueprint for a Secure Energy Future*,[11] instructing the heads of twenty-two executive departments and agencies to collaborate on a year-long review of transmission and distribution infrastructure. EEI members worked extensively with Department of Energy ("DOE") staff to participate in regional meetings and prepare written comments to assist the DOE with completing its 2015 Report[12] and determining whether there are further opportunities to modernize, expand, upgrade, or transform energy infrastructure to accommodate changes in energy supply, integrate new information and security technologies, and meet customers' increasing demands. In response to these findings, and to provide an appropriate consideration of an energy sector undergoing significant technological and regulatory change, the second installment of the QER (QER 1.2) is conducting a comprehensive review of the nation's electricity system, from generation to end use, including a more comprehen-

[9] Section 1223 of EPAct 2005 defines an "advanced transmission technology" as a technology that increases the capacity, efficiency, or reliability of an existing or new transmission facility.
[10] Presidential Memorandum – Establishing a Quadrennial Energy Review (Jan. 9, 2014).
[11] Blueprint for a Secure Energy Future (Mar. 11, 2011), available at http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf.
[12] Department of Energy – Quadrennial Energy Review: Energy Transmission, Storage and Distribution Infrastructure (April 2015), available at http://energy.gov/epsa/downloads/quadrennial-energy-review-first-installment.

sive look at electricity transmission, storage, and distribution infrastructure covered in the 2015 Report. EEI members have participated in this second installment of regional meetings and written comments and look forward to reviewing the DOE's recommendations expected in December 2016.

Meanwhile, the Administration under President Obama directed federal agencies to coordinate transmission siting and permitting on federal lands to bolster infrastructure development to meet current challenges including environmental impacts, national security, reliability, aging facilities and transformations in energy supply. Building upon the efforts of the interagency Rapid Response Team for Transmission, the Administration established a steering committee to identify best-management practices and process improvements for reducing transmission project reviews[13] and required federal agencies to study electric transmission corridors and develop an integrated, interagency pre-application process for significant onshore electric transmission projects requiring Federal approval.[14] In response, the DOE initiated the development of best practices by establishing the Integrated, Interagency Pre-Application Process in order to facilitate a more streamlined and efficient transmission project review process.[15] Congress has appropriately recognized the difficulties in permitting and siting transmission facilities on federal lands and in December 2015 enacted Title 41 of the Fixing America's Surface Transportation Act ("FAST Act"). Title 41 establishes the Federal Permitting Improvement Steering Council which is tasked with creating recommendations for best practices and timetables for environmental review of infrastructure projects, including electric transmission, to bring greater efficiency, transparency, and accountability to agency permitting practices. Such coordination efforts must continue in order to help address a major challenge in the effort to enhance the United States transmission network.

An Evolving Investment Trend

Planned transmission investments are affected by economic conditions and the rate of electricity demand growth. Accordingly, EEI forecasts evolving levels of transmission investment after 2017, which could be attributable to load growth forecast revisions in response to the current economic environment, as well as lower long-term growth rates due to increases in demand side management and energy efficiency. As noted previously, although a general decline in investment is predicted after 2017, greater certainty in nearer-term projections demonstrates that future investment continues to be robust and may continue to increase. In recent years, the industry had significant investments, and continues to invest, in new large-scale, high-voltage facilities. In addition, the industry has also focused on upgrades and replacement of existing facilities to further modernize the transmission grid. As the planning considerations change, EEI members respond by adjusting their system infrastructure needs to meet customer demands. Nevertheless, EEI expects investment by its members during 2016 and 2017 to be significantly higher than in years prior to 2014. One driver that could significantly alter forecasted investment is the continued retirements of traditional baseload coal-fueled and nuclear power plants and a greater reliance on new natural gas-fueled plants due to environmental regulations and low-cost natural gas. Electric transmission will be required to connect new resources and be flexible enough to accommodate drastic changes in flows and dispatch. Another development has been advancements in plug-in electric vehicle and battery technology which has supported wider adoption of electric transportation among customers

[13] Presidential Memorandum - Modernizing Federal Infrastructure Review and Permitting Regulations, Policies, and Procedures (May 17, 2013).
[14] Presidential Memorandum - Transforming our Nation's Electric Grid Through Improved Siting, Permitting, and Review (June 7, 2013).
[15] Department of Energy - Coordination of Federal Authorizations for Electric Transmission Facilities, 81 Fed. Reg. 66500 (Sept. 28, 2016).

and industry. In order to support vehicle charging and the resulting change in demand, the transmission grid will need to be flexible to accommodate new charging infrastructure and increased load on off-peak hours. In the future, the potential for utilities to use vehicle batteries as additional resources during peak demand will necessitate a flexible grid to accommodate such two-way exchanges of electric energy. As such, we may see transmission investment rising to meet those challenges in the coming years.

The projects highlighted in this report provide further evidence of an increased need for a robust and flexible grid as transmission investments increased for 2015 and are projected to remain robust over the next few years. Over 150 projects are highlighted in this report, totaling approximately $41 billion in transmission investments through 2019 (nominal $).

Transmission Planning

Prior to construction, transmission planning processes evaluate the costs and benefits of each project, assess the forecasted changes in regional supply and demand, and consider alternative solutions.[16] During these planning processes, generation options, demand response and energy efficiency alternatives are considered before transmission solutions. Thus, future transmission projects are considered only after all other options have been exhausted, ensuring that investments are prudent. In addition, in some regions, transmission projects are identified as part of state integrated resource planning processes. Once transmission projects are identified, they may be subject to additional evaluations as part of state commission reviews and siting processes. Such checks and balances ensure that cost-effective and efficient transmission projects that meet local and/or regional needs are constructed.

In 2011, FERC sought to enhance existing regional and interregional transmission planning processes with its issuance of Order No. 1000. Each planning region is implementing reforms for: i) planning, including procedures to identify transmission needs driven by public policy requirements; ii) cost allocation methodologies; and iii) non-incumbent transmission developer participation. In 2013, the industry submitted to FERC interregional compliance proposals that provide a cost allocation method for new interregional transmission facilities. These reforms are intended to provide further support for transmission development.

Report Scope

It is against this backdrop that EEI developed this report of member company transmission projects. Contained herein is a broad, though not comprehensive, perspective on the variety of transmission projects being built in the United States to support a number of needs and objectives. While the focus in this report is to present targeted projects within these broad categories, it is important to note that these transmission projects represent only a portion of total planned transmission addressing an array of needs and delivering a number of benefits, regardless of the initial development intention. With that in mind, most projects in this report are multifaceted. That is, they are not developed solely to meet any one specific purpose. Rather, they fall into more than one transmission investment category.

[16] There are also merchant transmission projects that may result from voluntary contracts.

Highlighted Projects Recently Completed (2015)

Project Name	Transmission Planning Region (FERC Order No. 1000)
Brokaw – South Bloomington	MISO
Boulevard 230/115 kV Project	SERTP
Burtonsville – Metzerott – Takoma	PJM
Cane Run Unit 7	SERTP
East Pelham Substation	SERTP
Greene County – Bassett Creek	SERTP
Golden Meadow – Leeville	MISO
Hassayampa – North Gila 500 kV Project	MISO
Iatan – Nashua	SPP
Interstate Reliability Project	ISO-NE
ITC Midwest Smart Grid Program	MISO
Jasper – Pine Grove Primary	SERTP
Kenzig Road	SERTP
Corpus Christi – Lower Rio Grande Valley Energized Line Re-Conductor	ERCOT
Michigan Thumb Loop Transmission Project	MISO
Mickleton – Gloucester – Camden Reinforcement	PJM
Nelson Substation Upgrade	MISO
North Brewton – Alligator Swamp	FRCC
Northeast Louisiana Improvement Projects	MISO
Panama City Area Voltage Improvements	FRCC
Path 42	CAISO
Pinckard – Holmes Creek – Highland City	FRCC
Plant Smith – Laguna Beach – Santa Rosa	FRCC
Potash Junction – Roadrunner	WestConnect
Scott County Substation Expansion	MISO
Susquehanna – Roseland	PJM
Valentine – Clovelly Upgrade	MISO

These projects completed in 2015 represent approximately $3.1 billion in transmission investment.