



ELECTRIC TRANSMISSION 201: Transmission Planning and Benefits of Transmission

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Content

Transmission Investment Trends

Recent Drivers of Transmission Investments

Benefits of Transmission

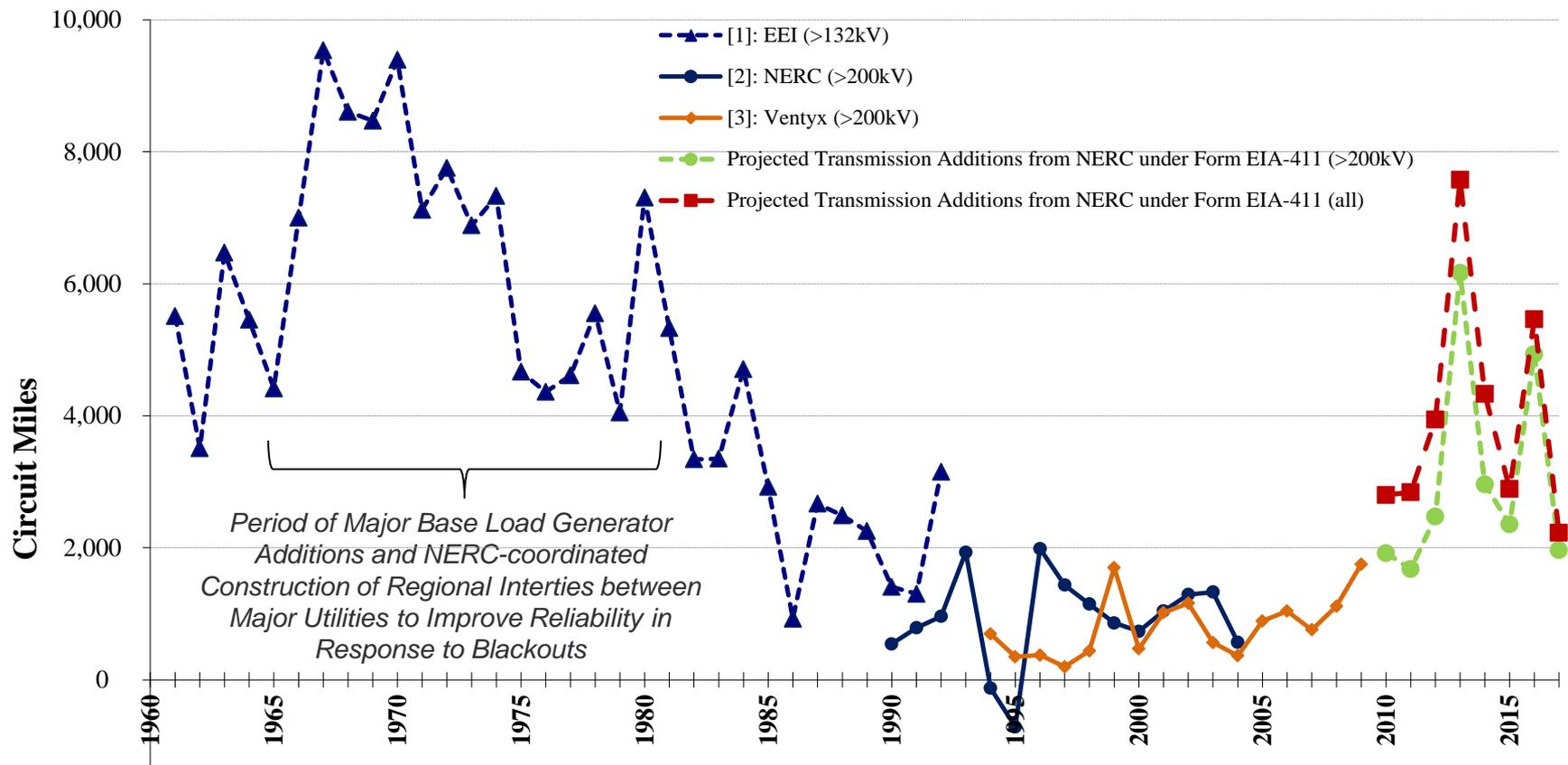
Framework for System Planning

Interregional Planning

Competition in Transmission Business

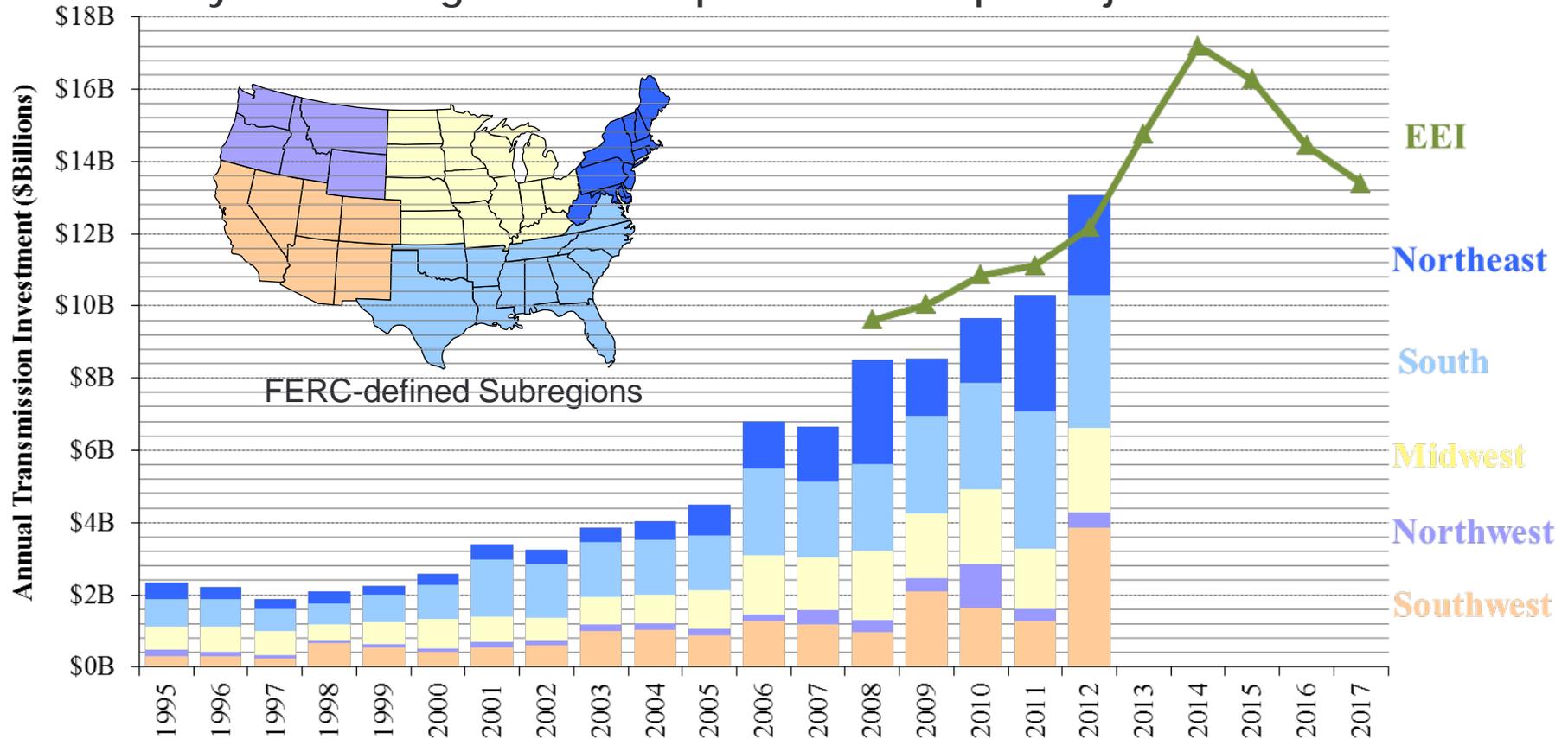
Projected Circuit-Mile Additions Still Below Historical Peak Levels

- 3,000 to 7,000 circuit-miles/year reported for 2013-16 nationwide
- Equivalent to \$7-16 billion (averaging \$12b) per year
- Up from 1985-2005, but still below levels of 1960s to early 1980s



Actual Transmission Investments are Growing, with 2012 Highest of all Historical Years

1995–2017 Annual Investment of FERC-Jurisdictional Transmission Owners by FERC Subregion and compared to EEI CapEx Projections



Sources and Notes: The Brattle Group's analysis of FERC Form 1 data compiled in Ventyx's Velocity Suite.

Based on EIA data available through 2003, FERC-jurisdictional transmission owners estimated to account for 80% of transmission assets in the Eastern Interconnection, and 60% in WECC and ERCOT. Facilities >300kV estimated to account for 60-80% of shown investments.

EEI annual transmission expenditures shown (2008-2017) based on prior year's actual investment through 2012 and planned investment thereafter.

Main Drivers of Transmission Investment

Utility-scale renewables development (Strong driver)

- Level of state/federal RPS standards and voluntary purchases
- Lower load growth reduces RPS need
- Favorable economics: declining capital costs
- Overall, likely drives about 1/3 of identified transmission need; not much change over last several years

Load-serving and reliability needs (Moderate driver)

- Low load growth has reduced customer-side and generation-side transmission needs
- But coal plant retirements require some local and regional upgrades
- Impact of shift from coal to gas generation less clear: gas generation at same location or closer to load reduces overall needs

Main Drivers of Transmission Investment

Replacing/upgrading aging facilities (Strong driver)

- Varying degrees of state regulatory incentives causes uncertainties around how much utilities will replace and upgrade, but the potential is significant
- Increasing as facilities from investment cycle in 1960s to early 1980s are getting to be 50 to 80 years old through 2030

Regulatory drivers (Moderate driver)

- FERC Order 1000 positive for regional/interregional projects
- FERC orders on ROFR elimination favorable, allowing for more competitive transmission than proposed by some RTOs
- Continuing FERC incentives (ROEs, others)
- Varying state policies: positive (e.g., storm hardening, interregional, supporting competitive options) and negative (e.g., state ROFR)
- But uncertainties remain (e.g., Order 1000 implementation; effectiveness of interregional planning efforts)

Main Drivers of Transmission Investment

Interregional buildout (Moderate driver)

- Significant challenges and potential opportunities to address seam between planning regions
- RTOs are only starting to learn how to identify and address needs
- Magnitude of opportunities for inter-regional merchant projects currently still low – but increasing, though uncertain

RTO planning cycles (Strong driver)

- Planning processes yield large “waves” of new project approvals followed by several years of only modest activity
 - MISO \$6.5 billion approvals in 2011 followed and preceded by \$1.5 billion approvals in other years
 - Approval of SPP’s ITP10/20 portfolios followed by only modest additional approvals since
 - Significant fluctuations in PJM and withdrawals of previous approvals
- Order 1000 directives requiring more robust and complete regional and inter-regional planning (public policy, etc.) may increase such waves in planning cycles

Importance of Considering All Benefits

- Not all proposed transmission projects can (or should) be justified economically
- Transmission projects can provide a wide range of benefits—economic, public, and reliability—to a range of market participants and regions
- Narrow or conservative evaluation of transmission benefits risks rejection of valuable projects
 - Transmission benefits in large part are a reduction in system-wide costs
 - Not considering the full economic benefits of transmission investments means not considering all costs and the potentially very-high-cost outcomes that market participants would face without these investments
- Production cost simulations have become a standard tool to assess “economic benefits” of transmission, but only considers short-term dispatch-cost savings under very simplified system conditions (e.g., no transmission outages)
 - Simplified simulations reflect incomplete production cost savings, thus only a smaller portion of the overall economy-wide benefits

“Checklist” of Economic Transmission Benefits

- Compiled a “checklist of economic benefits” from a detailed review of industry practices and our own experience
 - Can be used to help identify the potential benefits of transmission investments
 - Recommend policy makers and planners use this checklist to document, evaluate, and communicate a comprehensive “business case” for transmission projects.
- How to estimate the monetary value of benefits in checklist?
 - Some benefits should be measured routinely with existing tools and metrics (such as “Adjusted Production Cost” savings)
 - Other potentially-significant, but difficult-to-estimate benefits should be analyzed by calculating their likely range and magnitude

Consideration and Evaluation of Transmission Benefits



- **Recommend policy makers and planners use this checklist** to document, evaluate, and communicate a comprehensive “business case” for transmission.
- **Do NOT assign zero value to difficult-to-estimate benefits** because omitting them inherently assumes customers are better off paying for higher cost of delivered power

Transmission Planning Framework

Identify and describe future scenarios to be considered in transmission planning



Identify likely valuable transmission projects under most scenarios and develop a comprehensive list of likely benefits



Estimate the value of the identified benefits without regard to distribution of benefits



Compare estimated economy-wide (“societal”) benefits with project costs



Address cost allocation last to reduce incentives to minimize benefits and avoid premature rejection of valuable projects

Interregional Planning: Planning Across Seams

- **Divergent criteria create barriers** for transmission between RTOs
 - For example, the MISO-PJM cross border tariff for market efficiency projects (CBMEP) is limited to narrowly defined economic drivers in both RTOs.
 - Projects must simultaneously pass three tests to be included in the plan:
 1. MISO's MTEP process and criteria: production cost savings > 1.5 cost
 2. PJM's RTEP process and criteria: production cost savings and savings to load (different calculations as MISO's)
 3. Joint cross border interregional process and criteria: also different from individual RTO test
- **Need to consider the combined benefits** to find transmission projects that benefit across regions
- **Need to avoid this “least common denominator” outcome** by evaluating interregional projects based on benefits.