Transmission Planning for the Grid of the Future

Presented by
Nicolas Koehler
American Electric Power
Director, Transmission Planning East

September 13, 2021

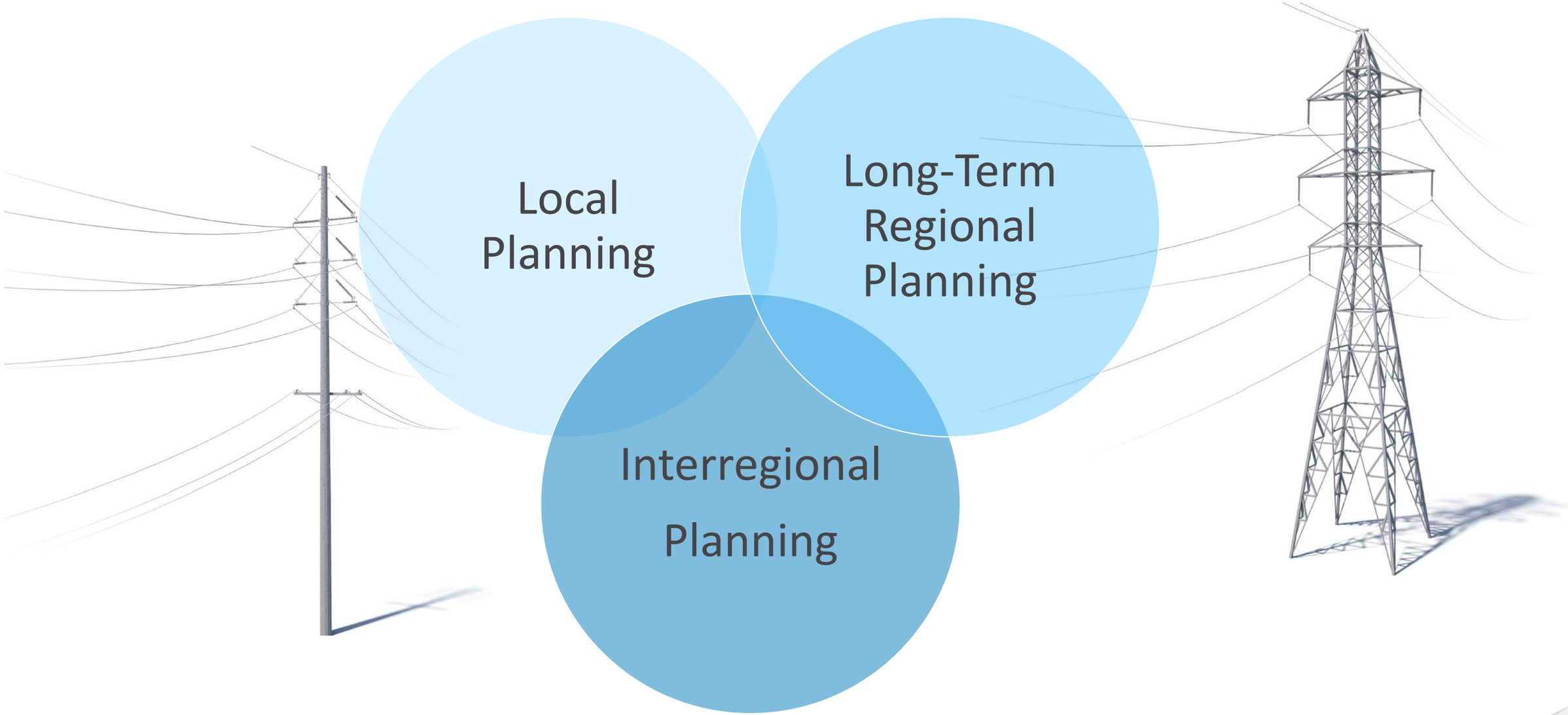
AMERICAN ELECTRIC POWER®

BOUNDLESS ENERGY

Transforming the Grid

- **AEP supports exploring policy reform of current transmission planning processes to envision and build a transmission grid that addresses future needs by:**
  - Enabling the massive transition toward renewables
  - Preparing for existing generation retirements
  - Proactively planning for electrification and shifting load patterns
  - Strengthening the system, protecting customers and the country from increasing number of extreme weather events as well as physical and cyber threats

Visionary Transmission Planning

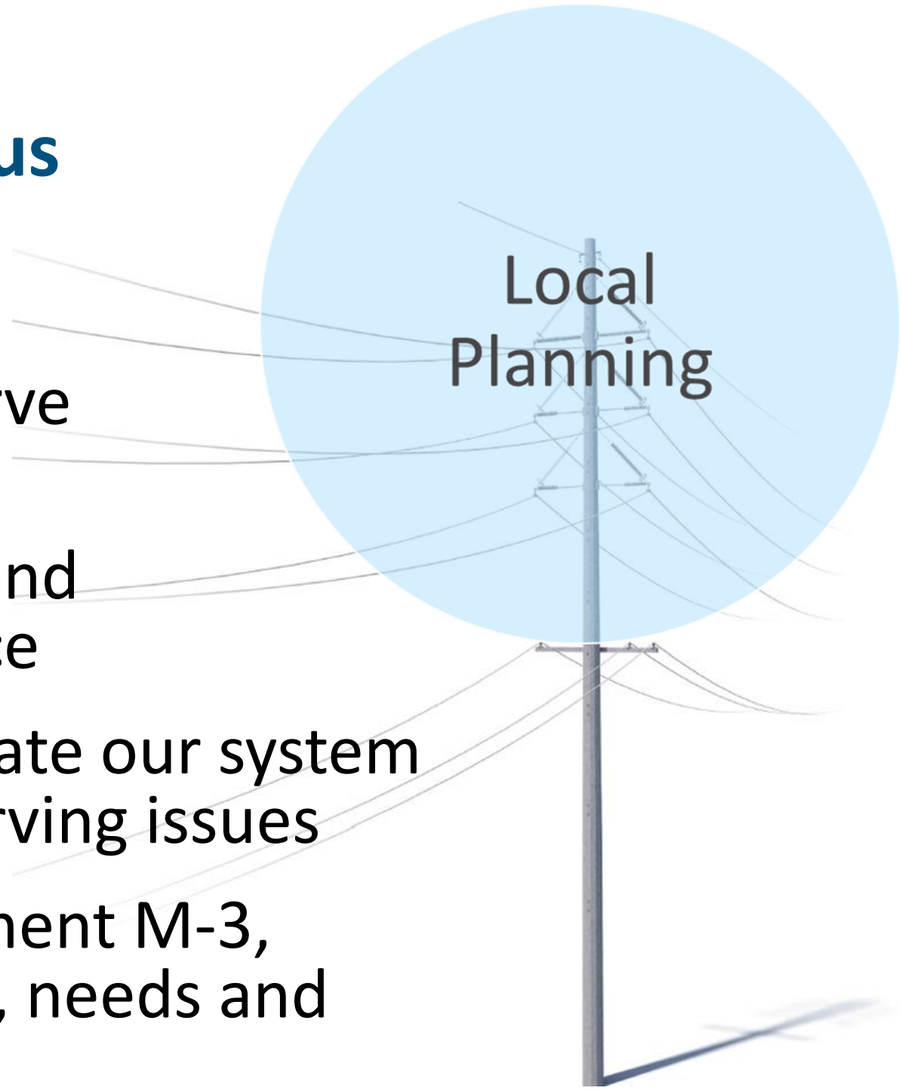


Connects three distinct, yet highly-intertwined, planning functions to transform today's grid

Local Planning

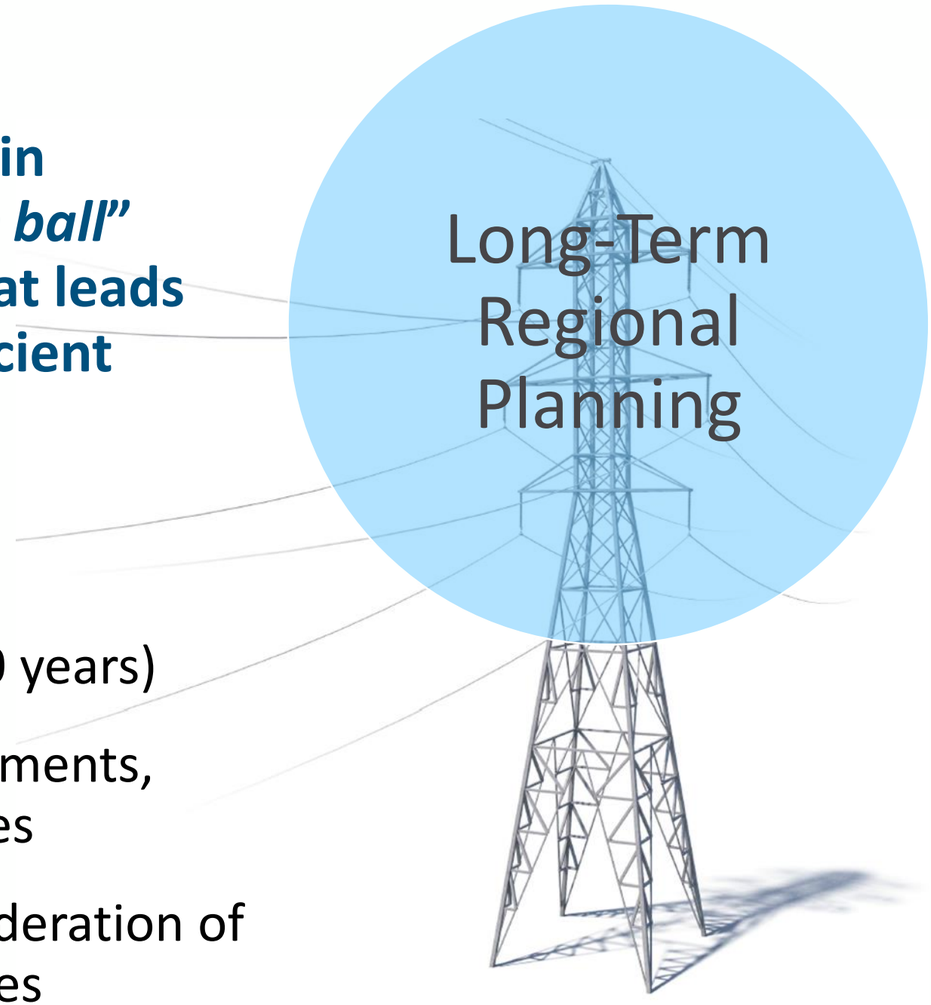
- **Transmission Owners Maintain Needed Focus on the Local System.**

  - Transmission Owners have the obligation to serve their customers
  - Local planning focuses on identifying efficient and cost-effective projects to provide reliable service
  - As a transmission owner we monitor and evaluate our system and must be permitted to resolve local load-serving issues
  - Current stakeholder processes, such as Attachment M-3, provides transparency and platform for criteria, needs and solutions review



Enhanced Long-Term Regional Planning

- **PJM is currently delivering on all the elements of the tariff in regard to regional planning. We now need to "*advance the ball*" and develop a more holistic regional planning approach that leads to the construction of the most cost-effective and cost-efficient projects and shapes the grid of the future.**



- **Recommendation for Reform:**
  - Determine an appropriate long-term planning horizon (i.e. 30 years)
  - Implement proactive scenario planning (i.e. generation retirements, electrification, extreme weather) including objective measures
  - Integrate methods to build project portfolios, including consideration of non-transmission alternatives and grid-enhancing technologies
  - Refine and broaden the view of benefits of regional projects
  - Make the long-term processes actionable and result in Board-approved projects

Examples of Solutions to Guide Future Regional Planning

Construction of CREZ 345 kV

3,600 Miles of Transmission Lines

18,500 MW Wind Generation

Supportive policies and transmission-development efforts include:

MISO Multi-Value Projects (MVP) and ongoing Long Range Transmission Plan (LRTP): The MVP achieved regional consensus for a $6 billion portfolio within MISO-north footprint benefit-cost ratio of 2.6-3.9; but yielded only one set of projects in 2011. The current LRTP is essential to ensure continued reliability given the resource portfolio shift contemplated by members and stakeholders within MISO.

ERCOT (CREZ) and CAISO (Tehachapi): successful HVAC transmission overlay to access low cost-cost wind and solar resources

New York: Public Policy Planning Process considering wide range of benefits (and using competitive solicitations to find innovative solutions at lower costs)

SPP Value of Transmission: planning process uses advanced approach to estimating multiple benefits of transmission investments; retrospective analysis shows $3.4 billion in transmission investments provide $12 billion in savings.

Other on-going efforts:

California's "RETI 2.0": Second round of Renewable Energy Transmission Initiative to identify zones for transmission to connect high levels of renewable energy resources

NREL-SPP Interconnection Seams Study on expanding HVDC interties between Western and Eastern U.S. grids

Interregional Planning

- **Interregional transmission (between separately-operated regions of the grid) can provide large cost savings and reliability benefits.**
  - Numerous studies have shown that interregional transmission:
    (1) reduces costs
    (2) lowers electricity costs to customers
    (3) reduces the risk of high-cost outcomes and power outages
    (4) captures the value of resource and load diversity
    (5) mitigates risk and creates options valuable to proactively address future uncertainties and
    (6) helps to address regional economic and public policy needs

- **Recommendation for Reform:**
  - AEP sees a need for a federally-driven process to clearly establish the system needs and a common set of assumptions for high-voltage interregional transmission projects to meet aggressive clean energy goals
  - A promising approach would be to explore minimum bulk power transfer requirements or standards between the regions for consideration in regional or interregional processes, then identify needed projects to strengthen interconnections