


MISO Update

Missouri Public Service Commission

November 2, 2016

MISO Vision – The most reliable, value-creating RTO

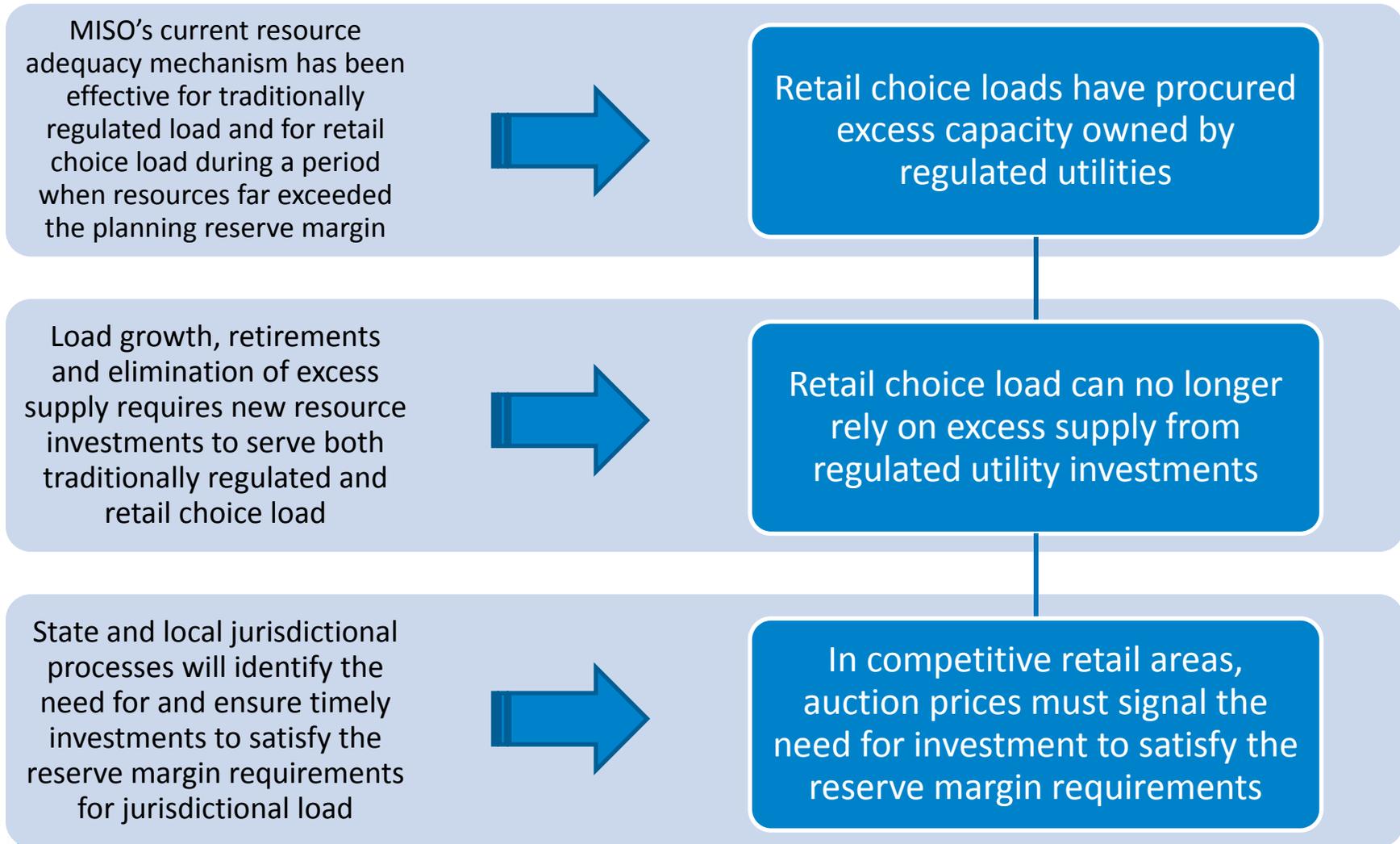
MISO Mission – Work collaboratively and transparently with our stakeholders to enable reliable delivery of low-cost energy through efficient, innovative operations and planning



A large, light gray, stylized sunburst or fan-like graphic is positioned on the left side of the slide. It consists of numerous triangular segments radiating from a central point, creating a semi-circular shape. The segments are arranged in a way that they appear to be part of a larger circular pattern, though only the left half is visible.

Competitive Retail Solution

Changes to MISO's Resource Adequacy processes are needed as reserves approach the minimum reliability target (Reserve Margin)



The Competitive Retail Solution (CRS) ensures future reliability consistent with design criteria

 <p>Preserves Existing Construct</p>	<ul style="list-style-type: none">• Planning Resource Auction remains unchanged
 <p>Fair Treatment of All Consumers and Suppliers</p>	<ul style="list-style-type: none">• All supply resources inside and outside of MISO may sell capacity in the proposed auction• Maintains fungible capacity product throughout MISO – does not differentiate between merchant or non-merchant resources
 <p>Builds on Existing Market Designs</p>	<ul style="list-style-type: none">• Foundational design components are consistent with FERC precedent and have been adopted by other RTOs• Process familiar to Michigan and Illinois, which already utilize forward procurement in other portions of their jurisdiction• All supply and demand receive the same clearing price for a given auction differentiated only by their location (Local Resource Zone)
 <p>Improves Reliability and Decreases Price Volatility</p>	<ul style="list-style-type: none">• According to the analysis by The Brattle Group, the CRS proposal achieves greater reliability and lower price volatility than the status quo or Hybrid System-Wide Prompt proposal

CRS and State Jurisdictional Authority

Four design elements that respect States' jurisdictional authority

Long-Term RA Planning Process

A jurisdictional authority that establishes a planning process may elect to opt Competitive Retail Demand out of the CRS

Prevailing State Compensation Mechanism (PSCM)

Demand subject to a PSCM is excluded from consideration in the Forward Resource Auction (FRA); Resource Adequacy is demonstrated through a Fixed Resource Plan (FRAP) in the Planning Resource Auction

Materiality Threshold

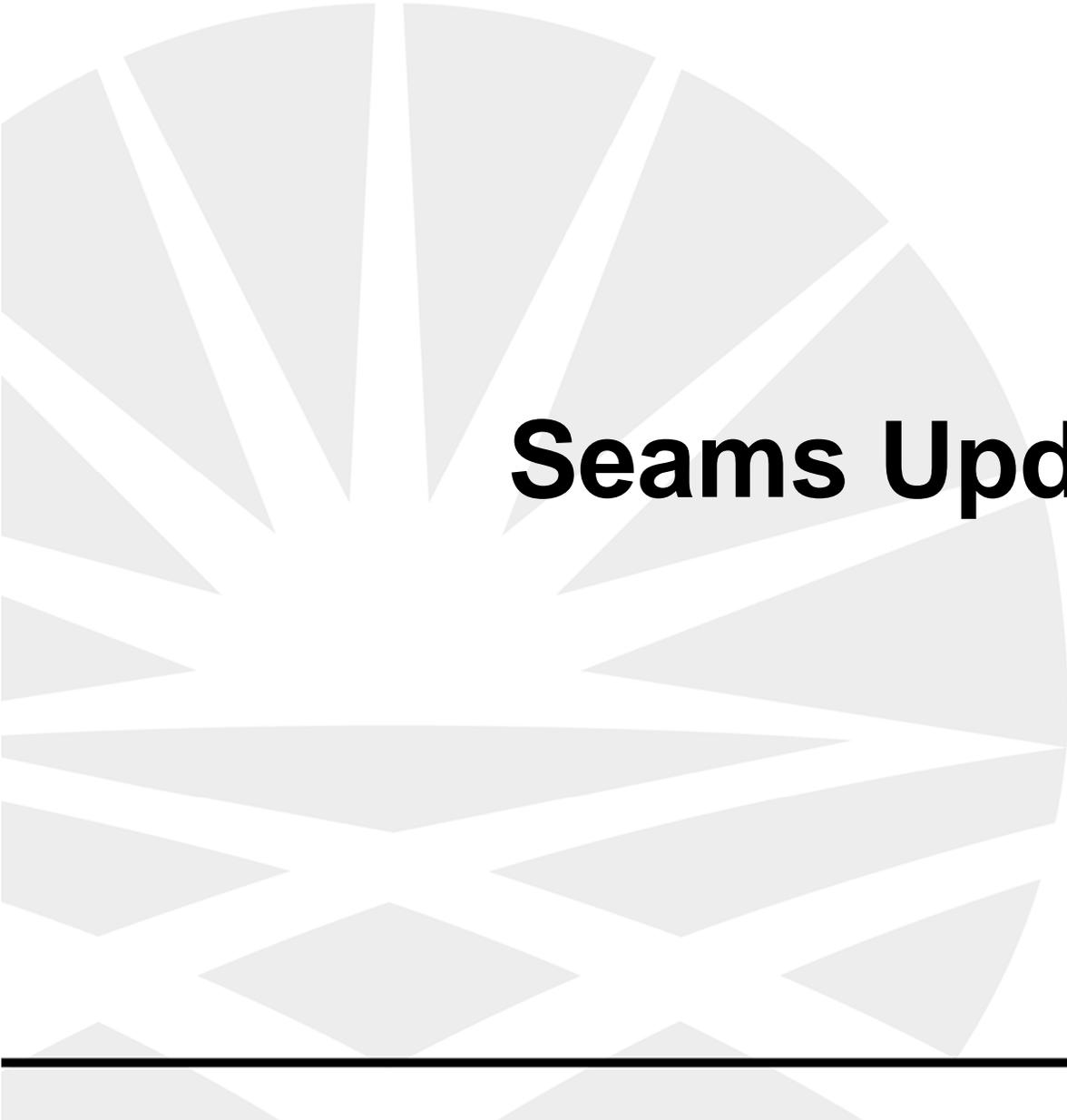
A state cannot override the materiality threshold, bringing another state into the CRS

Forward FRAP

Through submission of a Forward FRAP, and subsequent exclusion of Forward FRAP'd demand from the FRA

Key Design Elements of the Competitive Retail Solution

Key Design Element	Description
Demand Participation	Applicable to retail choice demand based on a bright line test
Options to Demonstrate Resource Adequacy	Forward Resource Auction (FRA), Forward Fixed Resource Adequacy Plan (FFRAP), long-term planning process, and Prevailing State Compensation Mechanism (PSCM)
Forward Resource Auction Structure	Distinct three year forward auction for retail choice demand; does not change existing Planning Resource Auction (PRA) for non-choice demand
Forward Resource Auction Demand Curve	Sloped demand curve formulated using independent analysis performed by The Brattle Group
Forward Resource Auction Supply Participation	All internal resources (generation and demand response) and imports may elect to participate



Seams Update

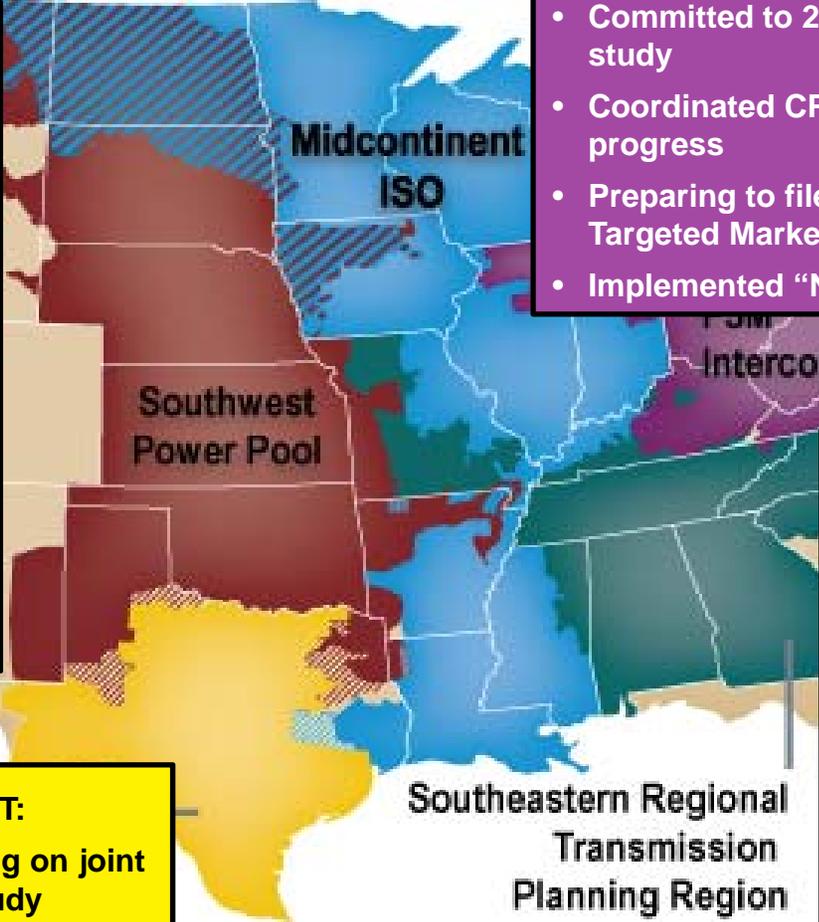
MISO continues to make progress with our seams neighbors

- PJM:**
- Reached agreement on interface pricing solution
 - Implementing Coordinated Transaction Scheduling
 - Eliminated \$20 million project cost threshold for market efficiency projects
 - Committed to 2016-17 Coordinated targeted study
 - Coordinated CPP impact assessment in progress
 - Preparing to file tariff changes to create new Targeted Market Efficiency Project Type
 - Implemented "NIPSCO" Order

- SPP:**
- Implemented settlement agreement with SPP and Joint Parties on transmission capacity sharing.
 - Implemented Market to Market on 03/01/2015
 - Completed 2014-2015 coordinated transmission study
 - Performing a targeted study in 2016/2017
 - Developing scope for a coordinated overlay study to address the changing resource mix in 2017 through 2019

- ERCOT:**
- Collaborating on joint planning study

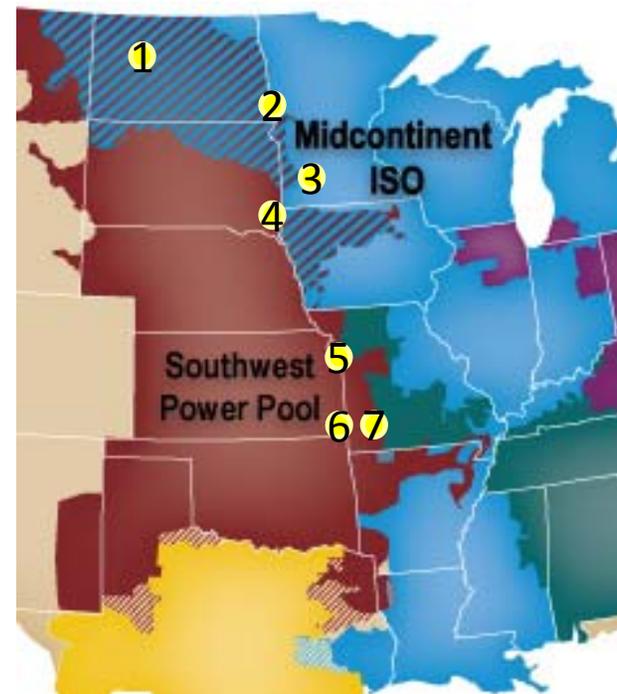
- Southeast Seam:**
- Implementing Order 1000 interregional coordination processes
 - Implemented settlement agreement with SPP and Joint Parties on transmission capacity sharing.
 - Reviewed regional planning processes in April 2016



2016 MISO-SPP Targeted Study

- The 2016 Coordinated Targeted Study will serve as a foundational study for a longer-term, broader study effort
- MISO and SPP will study 7 total needs for the 2016 study
- MISO and SPP have begun discussions on an MISO-SPP overlay scope, which will include a quantification of benefits and coordination of modeling assumptions.

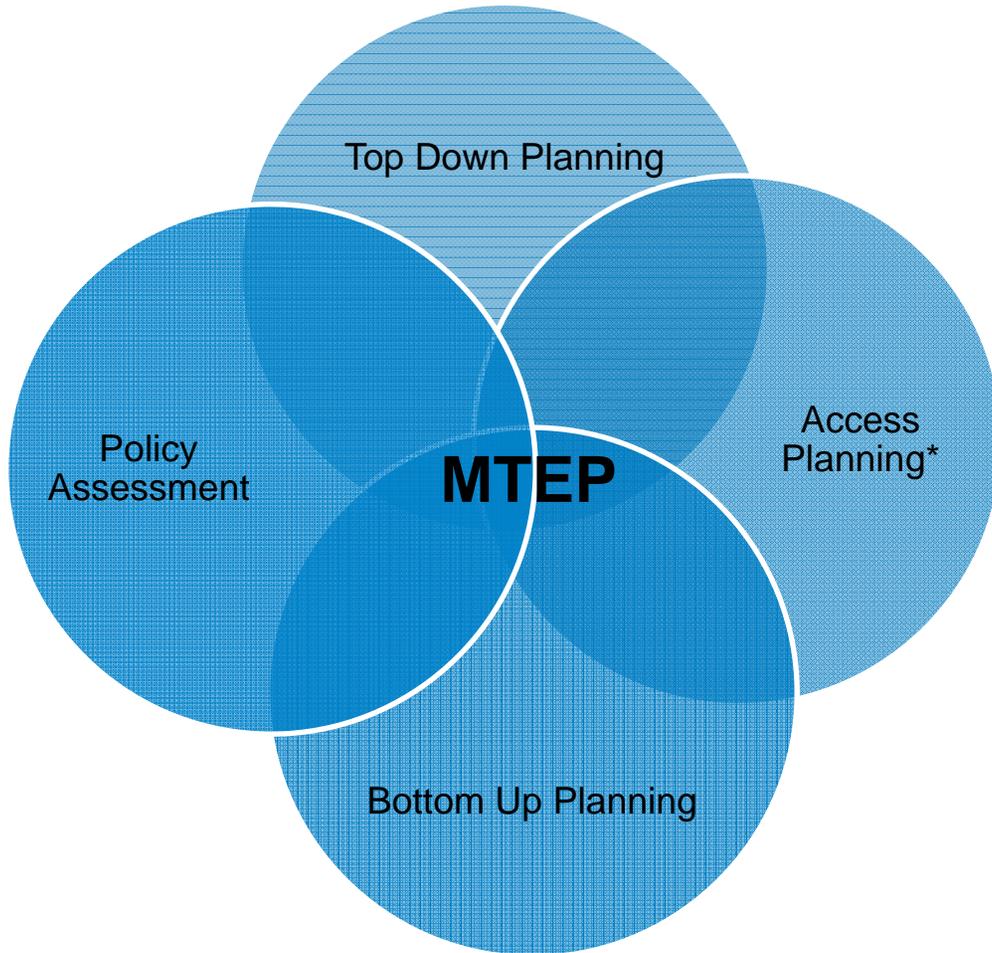
NEED ID	CONSTRAINT
1	Rugby WAUE-Rugby OTP Tie
2	Hankinson - Wahpeton 230kV FLO Jamestown - Buffalo 345kV
3	Sub3 - Granite Falls 115kV Ckt1 FLO Lyon Co. 345kV Ckt1
4	Sioux Falls - Lawrence 115kV FLO Sioux Falls - Split Rock 230kV
5	Northeast - Charlotte 161kV FLO Northeast - Grand Ave West 161kV
6	Neosho - Riverton 161kV FLO Neosho - Blackberry 345kV
7	Brookline 345/161kV Ckt 1 Transformer FLO Brookline 345/161kV Ckt 2 Transformer





Regional Transmission Projects/Studies

MISO Transmission Expansion Plan (MTEP)



- The MTEP is the culmination of all planning efforts performed by MISO during a given planning cycle
- Establishes the recommended regional plan that integrates expansion based on reliability, transmission access, market efficiency, public policy and other value drivers across all planning horizons
- An annual report is produced, with most projects being approved in December

*Access Planning includes both the long term Transmission Service Queue and the Generator Interconnection Queue

Missouri MTEP15 Projects

Campbell 138 kV Substation

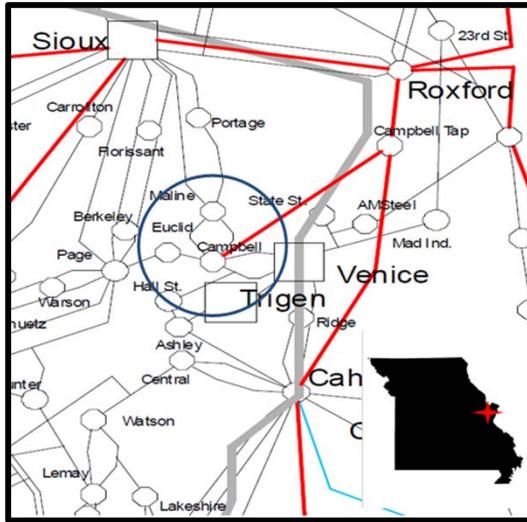


Figure P-1: Geographic map of project area. Ameren Missouri

Project Description: Replace 138 kV, 3000 A, 40 kA capacitor bank breaker at position H8 with a 1200 A minimum breaker capable of interrupting 50 kA (63 kA preferred).
Cost: \$410,000
In Service Date: 12/1/2015
Project Type: Reliability

Hitt 161/34 kV Substation

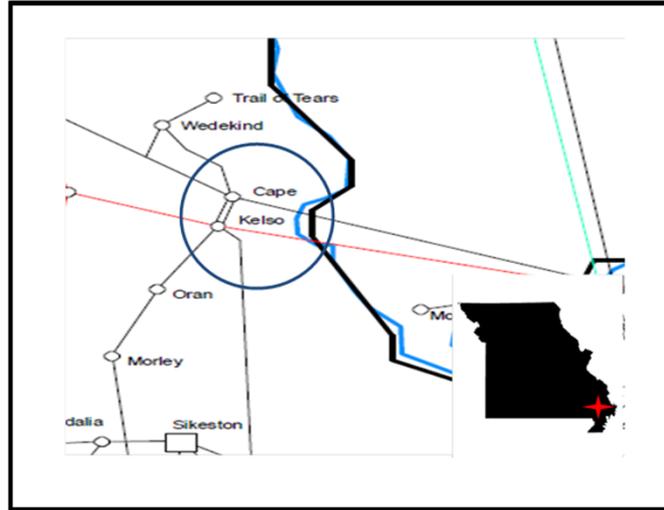


Figure P-2: Geographic map of project area. Ameren Missouri

Project Description: Install 161 kV breaker and extend 161 kV line 0.2 miles. Relocate 40 Mvar, 161 kV capacitor bank from Wedekind to Heritage Substation. Install 2-161 kV bus-tie breakers at Heritage, 3-161 kV breakers at Wedekind, and 1-161 kV breaker at Cape.
Cost: \$10,174,000
In Service Date: 06/1/2016
Project Type: Reliability

New Mill Creek 161 kV Substation

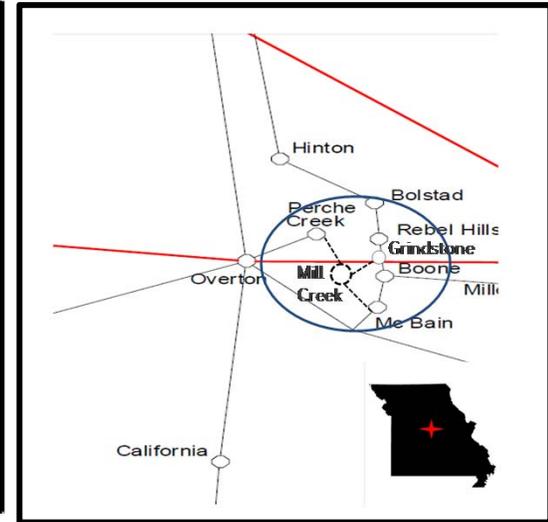


Figure P-3: Geographical Area Map. City of Columbia, Missouri

Project Description: Construct new Mill Creek 161 kV substation
Cost: \$32,000,000
In Service Date: 06/1/2017
Project Type: Reliability

Missouri MTEP16 Projects

McBaine Line Terminal Upgrades

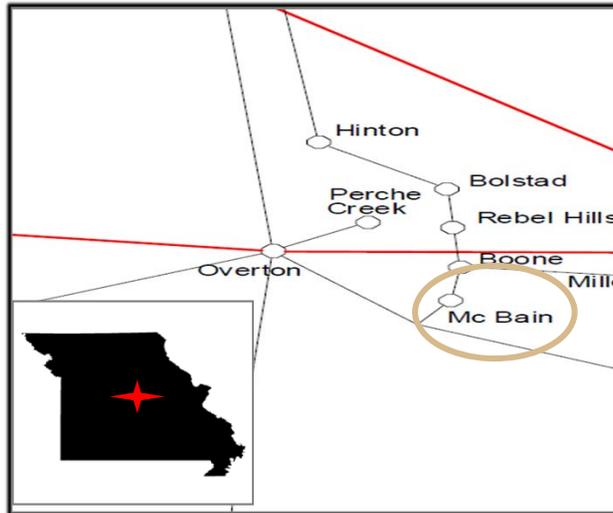


Figure P-1: Geographic map of project area. City of Columbia, Missouri (CWLD)

Project Description: Upgrade McBaine-McBaine Tap line to 249 MVA (300501 bus). Replace a switch (from 600 A to 1200 A) and a wave trap (from 600 A to 2000 A).
Cost: \$50,000
In Service Date: 03/1/2016
Project Type: Reliability

Cape-Kelso-2 and Kelso-Miner-2

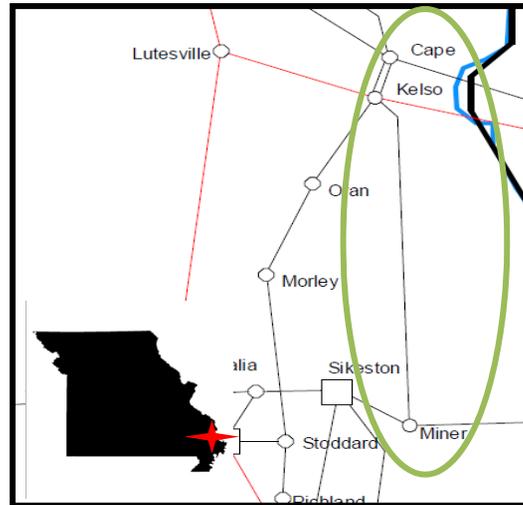


Figure P-2: Geographic map of project area. Ameren Missouri

Project Description: Increase ground clearance to and perform line hardware verification to permit operation at 120 degrees C. Upgrade terminal equipment at Cape, Kelso, and Miner Substations.
Cost: \$ 5,586,082
In Service Date: 12/1/2016
Project Type: Other -Condition

Page-Sioux-4 Reconductoring

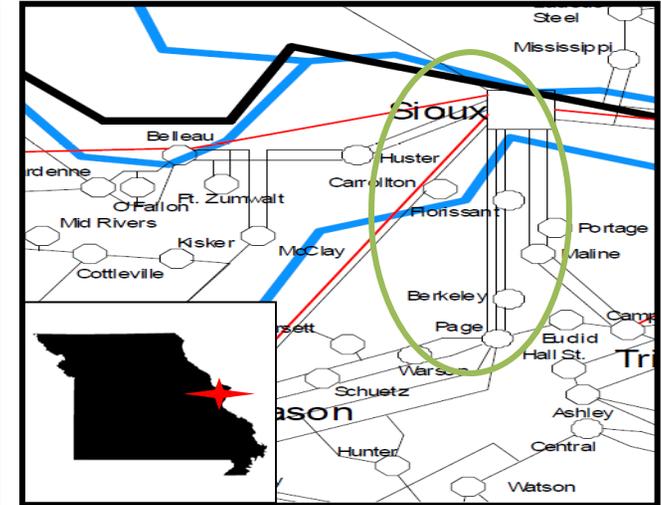


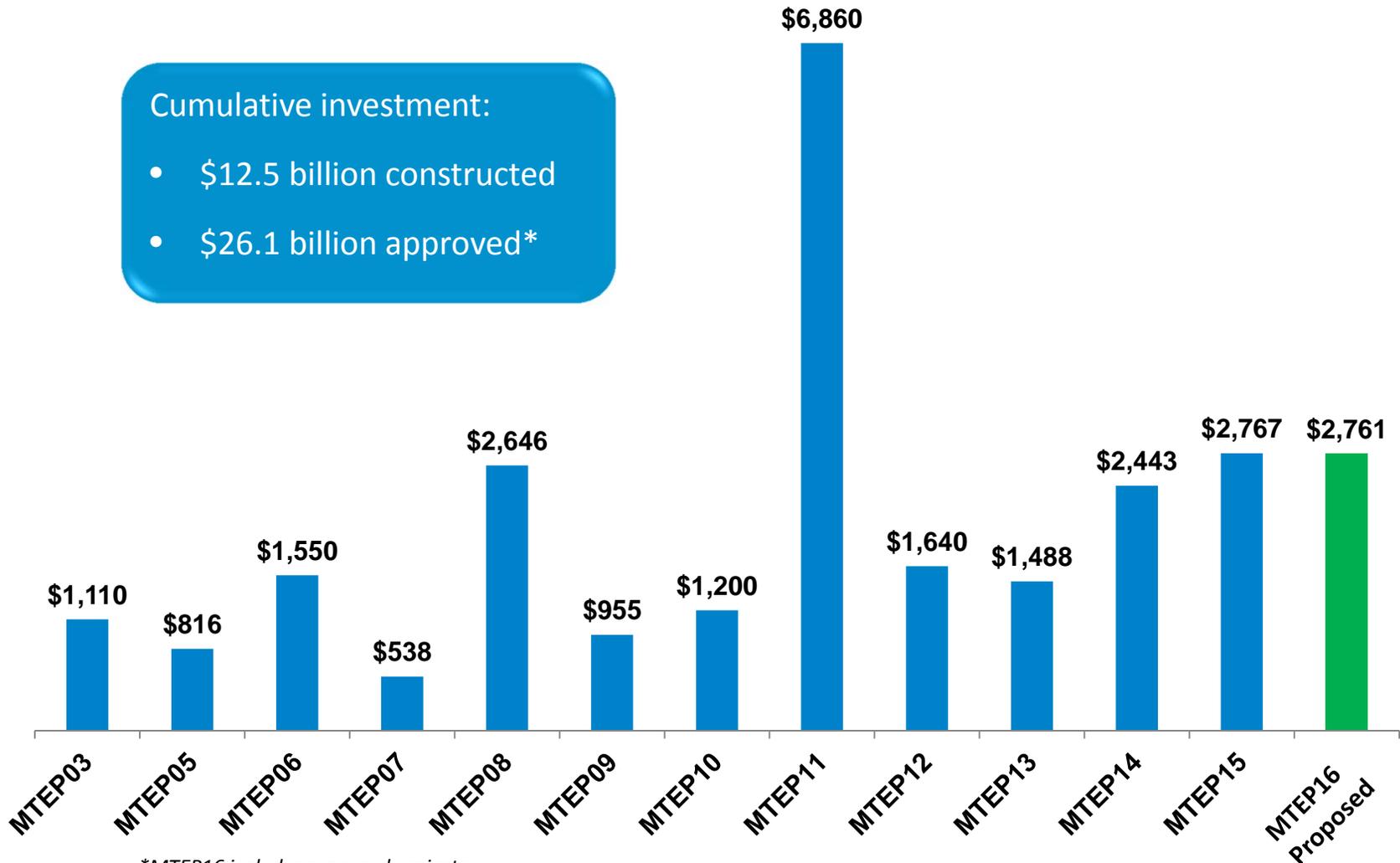
Figure P-3: Geographical Area Map. Ameren Missouri

Project Description: Replace 14.28 miles of 2-300 kcmil Copper conductor with conductor matching or exceeding the capability of the rest of the line (954 kcmil ACSR conductor)
Cost: -
In Service Date: 12/1/2016
Project Type: Other -Condition

MTEP 2016 level of investment is consistent with prior years

Cumulative investment:

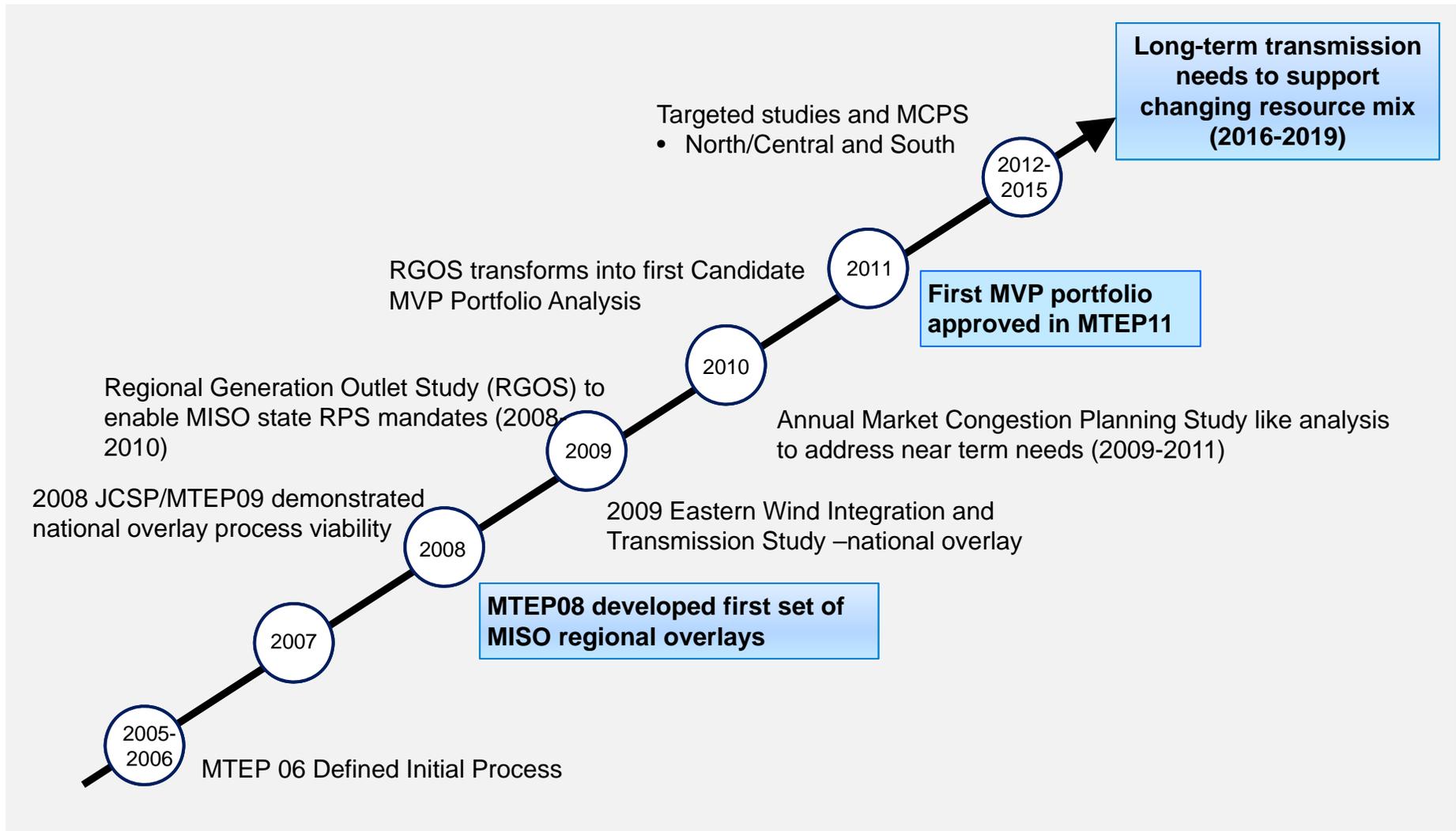
- \$12.5 billion constructed
- \$26.1 billion approved*



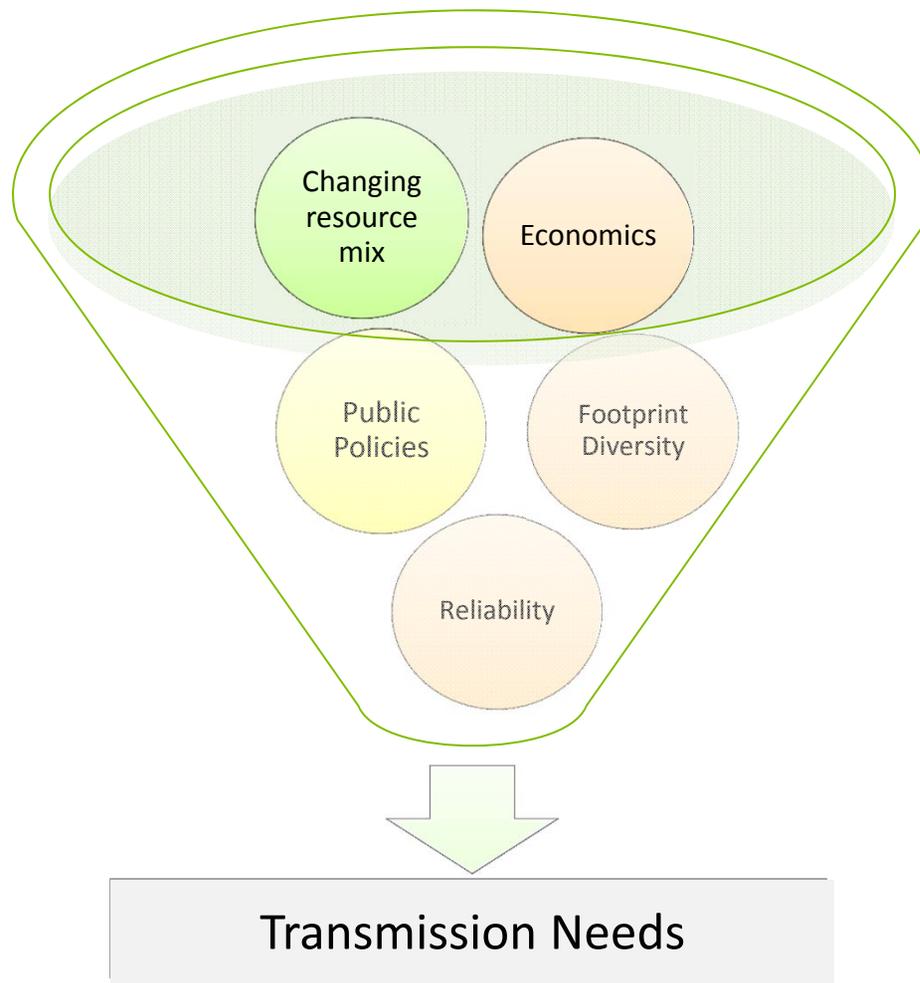
*MTEP16 includes proposed projects

**Amounts are shown in millions

Looking forward, changing resource mix will drive the needs for robust transmission system



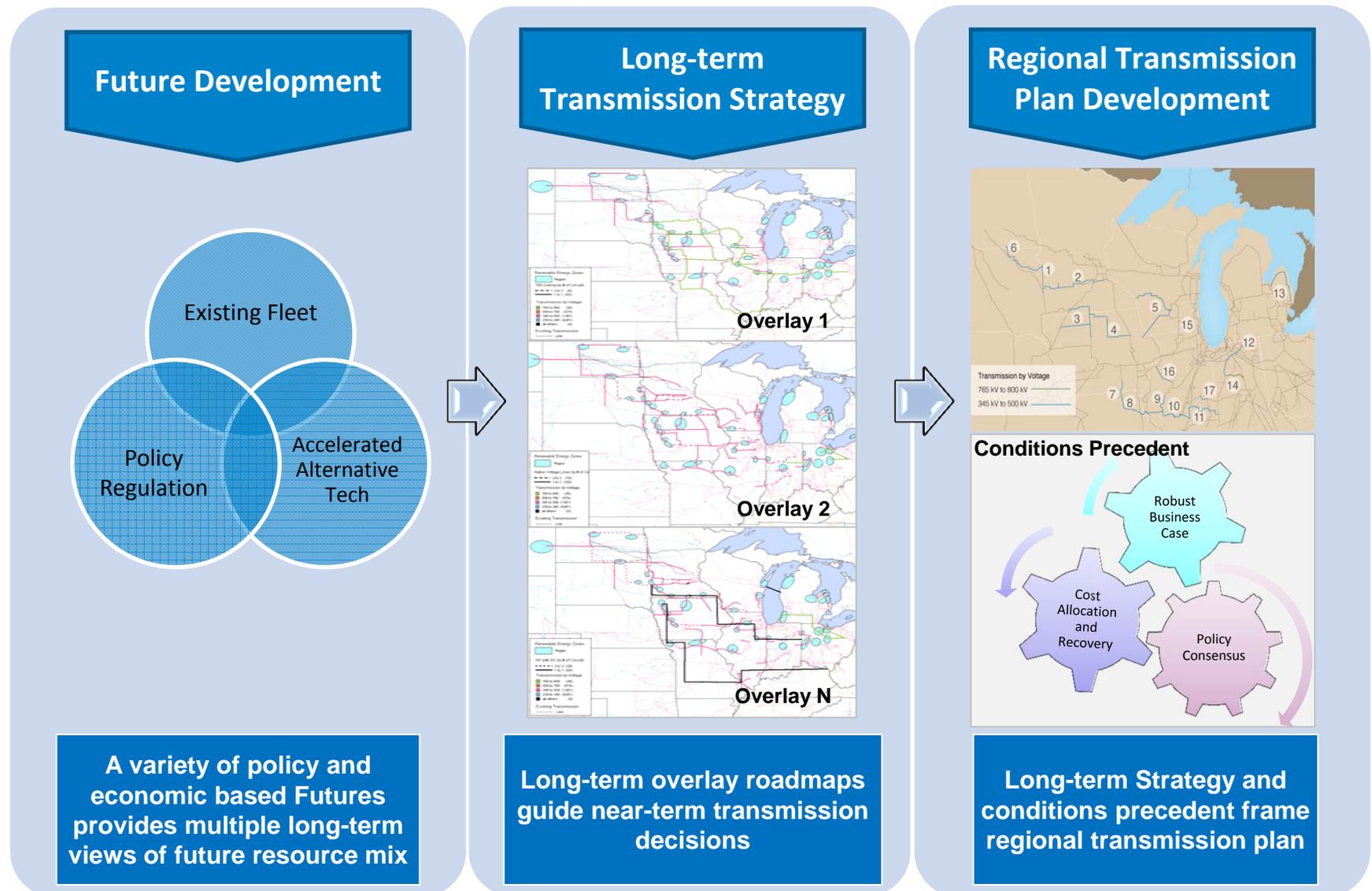
Multiple Drivers for Future Transmission Needs



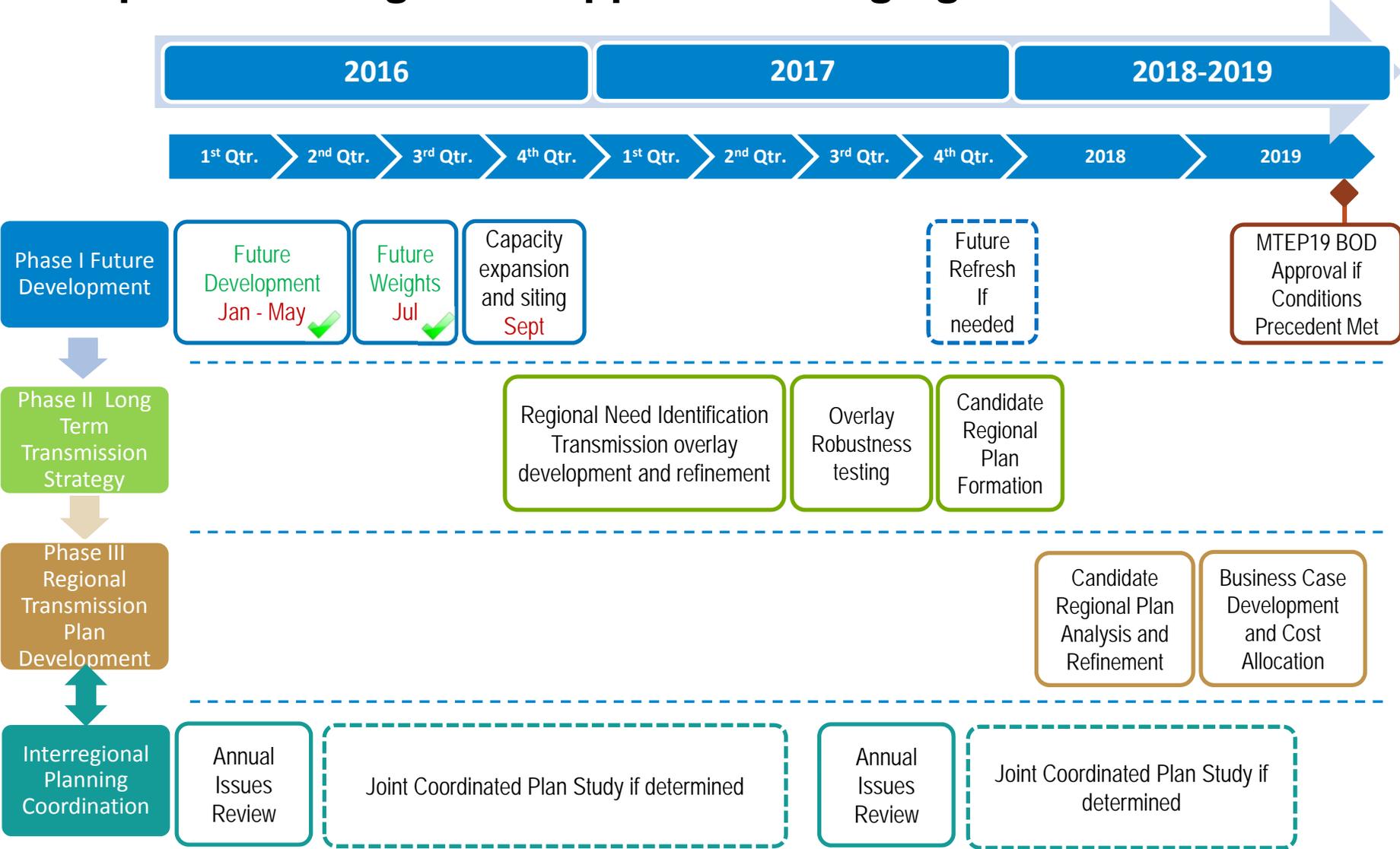
Objective is to take a holistic look at multiple drivers to maximize the value of regional transmission

- Changes in resource mix
- North/Central and South footprint diversity
- Reliability to address generation retirements driven by age or policy
- Low cost energy delivery across footprint
- Federal and state energy policy compliance planning

Regional Transmission Overlay Study develops the most robust plan under a variety of policy and economic future scenarios



Regional Transmission Overlay Study is a multi-year process to position the grid in support of changing resource mix



For Additional Questions:

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