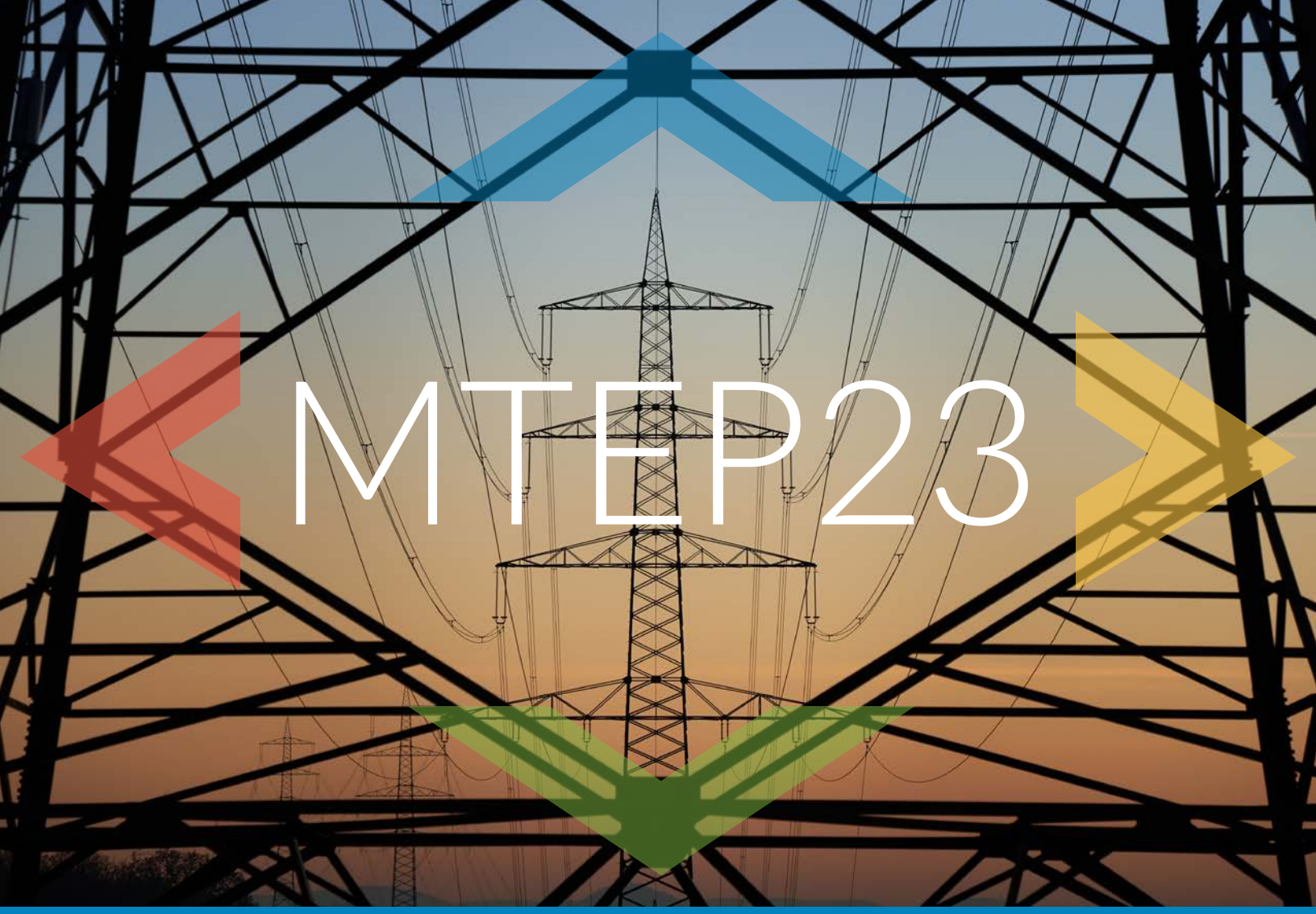


**In the 2023 MISO Transmission Expansion Plan, staff recommends $9 billion of new transmission enhancement projects for Board of Directors' approval.**

## Highlights

- 572 new projects for inclusion in Appendix A to address reliability and load growth
- $34 billion in projects constructed in the MISO region since 2003
- Grid evolution drove record investment in MTEP23

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# Contents

# MTEP23 Executive Summary

The MISO Transmission Expansion Plan (MTEP) is the culmination of a comprehensive planning process which evaluates transmission solutions to build and maintain a reliable and economic electric infrastructure for the MISO region. Since MTEP's inception in 2003, over $58 billion in projects have been approved by MISO's Board of Directors. In total, with approximately $34 billion of MTEP projects now in service, more than 75,000 miles of transmission provide electricity to nearly 45 million people across 15 states and Manitoba, Canada.

MISO's work to ensure reliability for the near-term and future, continues as members begin implementing plans to decarbonize generator resources, while also tackling anticipated load growth and aging infrastructure. Planning efforts for "base business" focus on transmission expansion planning for projects scheduled to go in service over the next three to five years to address local reliability issues, aging equipment, load growth and generator interconnection needs, and to ensure compliance with NERC standards. As such, this report highlights the results of the 2023 study process (MTEP23), which includes 572 projects and nearly $9 billion of investment to address local needs of the region.

# MISO Planning Rooted in Guiding Principles

MISO's MTEP Guiding Principles were first adopted by its Board of Directors in 2006 to provide overarching guidance to MISO as it fulfills its planning obligations. These principles were designed to communicate MISO's broader pursuit of value for customers and to ensure a cost-effective and reliable system that supports policy requirements and provides an inclusive, transparent process.

Biennially, the System Planning Committee of the Board of Directors reviews the principles to determine if changes are necessary. Most recently, in early 2023, the Committee sought input from MISO stakeholders and state regulatory entities through the Organization of MISO States (or OMS). Feedback generally emphasized MISO's need to conduct a transparent and inclusive planning process, including an appropriate analysis of scenarios, resulting in a cost-efficient transmission system to meet its members' plans. In response to the feedback, MISO integrated recommended changes into the language of the principles and its preamble. MISO will adhere to these updated principles in its transmission planning processes.

## GUIDING PRINCIPLES

| FRAMEWORK | Provide inclusive, open process | Meet reliability, policy and key needs | Ensure cost-effective infrastructure | Enable competitive market | Allow for transmission developer competition |
|---|---|---|---|---|---|

PRINCIPLES

### Market access

Make the benefits of an economically efficient electricity market available to customers by identifying solutions to transmission issues that are informed by near-term and long-range needs and provide reliable access to electricity at the lowest total electric system cost.

### Cost allocation

Provide an appropriate cost allocation mechanism that ensures that costs of transmission projects are allocated in a manner roughly commensurate with the projected benefits of those projects.

### Planning criteria

Develop transmission plans that will ensure a reliable and resilient transmission system that can respond to the operational needs of the MISO region.

### Information exchange

Analyze an appropriate range of system scenarios and make the results available to federal, state, and local energy policy makers and other stakeholders to provide context and to inform choices.

### Policy alignment

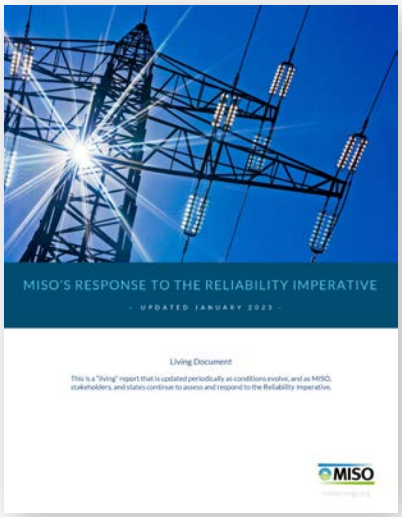
Support federal, state and local energy policy and member plans and goals by planning for access to a changing resource mix.

### Regional coordination

Coordinate planning processes with neighbors and work to eliminate barriers to reliable and efficient operations.

# Planning for the Future

While MISO works to address local needs and maintain a reliable system through MTEP, the scale and pace of grid evolution require prompt attention to develop the most efficient, cost-effective investments that will ensure grid reliability in the future. MISO's broader efforts to address grid evolution continue in parallel through a key initiative of its Reliability Imperative titled Transmission Evolution. Under the Transmission Evolution pillar, MISO assesses the region's future transmission needs and associated cost allocation holistically to identify transmission solutions that support member plans and state goals for existing and future generation resources.




*MISO's 2023 Reliability Imperative Report*

## Market Redefinition

*Aims to ensure that resources with needed capabilities and attributes will be available in the highest risk periods across the year*

## Transmission Evolution

*Assesses future transmission needs holistically, reflecting utility/state plans for new generation; will also consider potential cost allocation changes*


## System Enhancements

*Transforms MISO's legacy platform into a flexible, upgradeable, and secure system that can evolve for years to come; will also integrate advanced technologies to process increasingly complex information*

## Operations of the Future

*Focuses on the skills, processes, and technologies needed to ensure MISO Operations can effectively manage the grid into the future under increased complexity*

Long Range Transmission Planning (LRTP) continues to be an important part of the Transmission Evolution pillar by identifying regional portfolios of least-regret solutions to address the future needs of the footprint. LRTP does not replace annual MTEP efforts, but complements the local reliability, economic and interregional planning studies that are conducted through MISO's transparent and collaborative stakeholder process. To manage workload and complexity, LRTP is developing through four phases or "tranches" of new backbone transmission that will provide a wide range of value to support MISO member plans for the changing fleet. In July 2022, the MISO Board of Directors approved the $10.3 billion Tranche 1 portfolio focused on MISO's Midwest Subregion. Tranche 2 studies, which also focus on the Midwest, are in process with targeted approval in 2024.

To help ensure MISO supports its member utilities and state policy makers as they continuously refine how to serve the 45 million people in the MISO footprint, transmission planning relies on the use of forward-looking planning scenarios – known as Futures - to provide outlooks of the future. Three Futures establish different ranges of economic, policy, and technological possibilities over a twenty-year period. This information is used to model a capacity expansion, which forecasts the fleet mix that meets MISO's planning reserve margin at the lowest cost while adhering to policy objectives. In 2023, MISO updated its Futures to reflect the most current plans of states, utilities and policy makers. The resulting updated series of Futures, referred to as Futures 1A, 2A and 3A, capture the continuing impacts of the energy transition, with significant acceleration expected in thermal retirements, renewable capacity buildout and energy production, and decarbonization.

Ultimately, the LRTP process assesses the effectiveness and efficiency of the transmission plan against the Futures and other appropriate scenarios, and seeks to identify a least-regrets transmission buildout that reliably enables member goals while minimizing the total cost of the fleet transition. It is also intended to improve the system's ability to effectively and efficiently move energy from where it is generated to where it is needed in all hours of the year.

The resource evolution in MISO member plans, which is driving the need for LRTP, is driving transmission investment throughout the region. Projects in MTEP23 and beyond are needed to address local needs that develop as anticipated generation and load are sited, even with the regional transmission backbone identified through the LRTP studies. In addition to resource evolution, resource retirements and reliability needs across the MISO footprint, load growth contributed to unprecedented results in MTEP23.

## SIGNIFICANT MILESTONES OF MTEP23

The **largest portfolio** of Appendix A projects based on project count and overall investment, excluding MTEP cycles with Multi-Value Project portfolios.

The **largest investment** in the South Subregion since its integration in 2013.

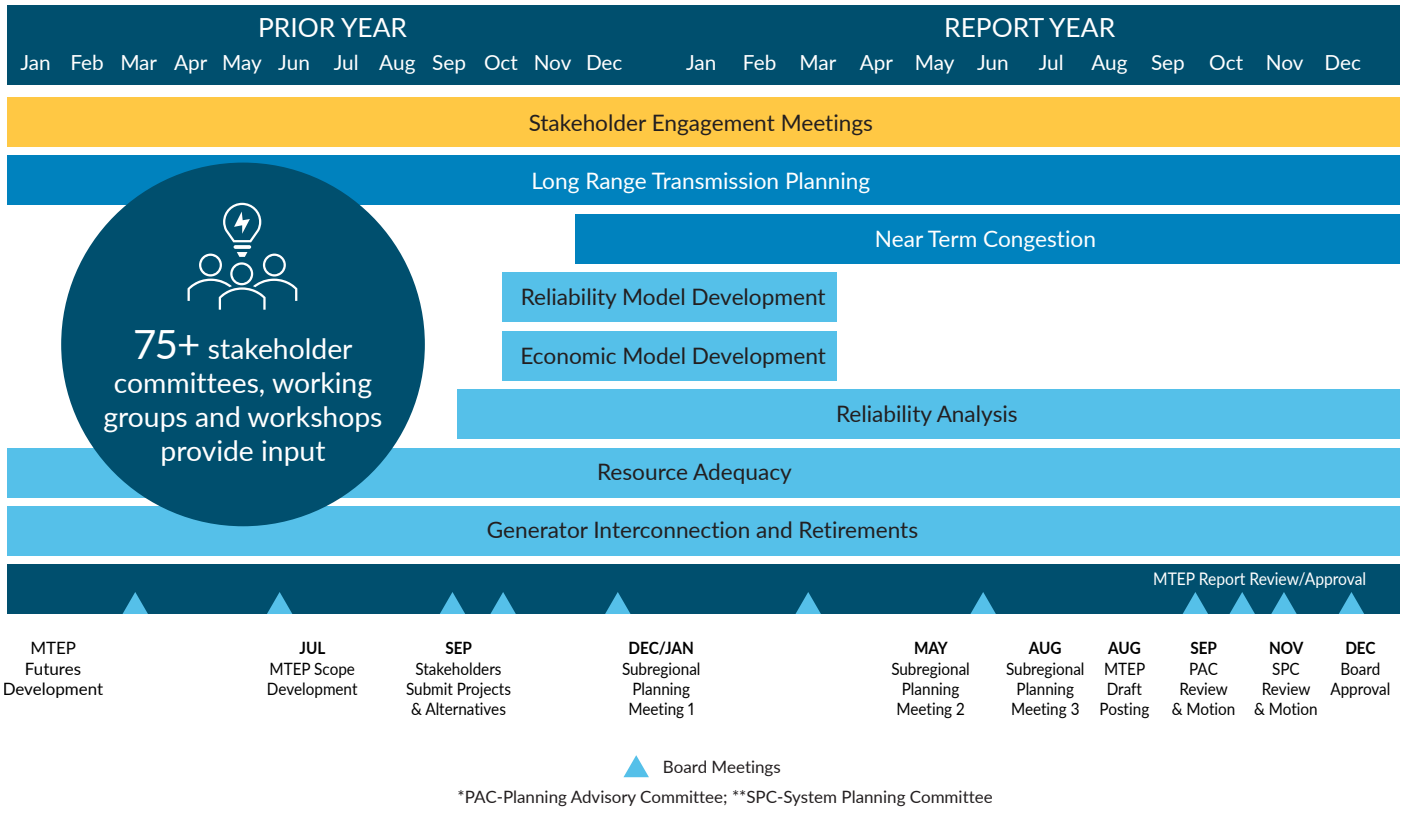
The **greatest number** of Generator Interconnection Queue applications.

A **record number of projects** submitted through Expedited Project Review in response to urgent needs primarily due to load growth.

# MTEP23 Appendix A projects are built on rigorous review and analysis

It's important to determine the best solution for a given need. Given this importance, MTEP23 Appendix A projects were assessed through a comprehensive planning process with substantial stakeholder engagement. As customary, MTEP23 planning efforts have extended through a roughly 18-month period with more than 75 stakeholder meetings to help ensure projects and processes are appropriately vetted. These opportunities for stakeholder input included a series of public Subregional Planning Meetings (SPM) and additional Technical Study Task Force (TSTF) meetings to discuss project details and analysis as required.

## Typical MTEP cycle is developed on overlapping cycles and delivered annually

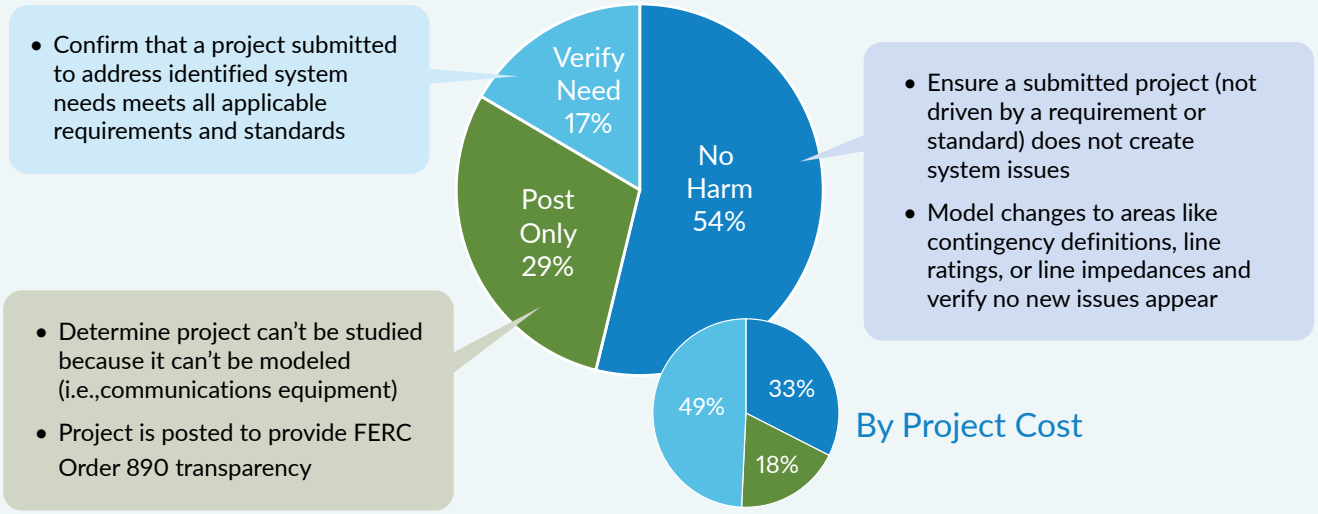



*PAC-Planning Advisory Committee; **SPC-System Planning Committee

The type of analysis MISO performs for projects varies depending on project drivers, system needs and availability of potential alternatives. Some projects have no impact on the transmission system; they are posted for transparency ("Post Only"). Most submitted projects are analyzed to confirm they meet system needs and all applicable requirements and standards ("Verify Need") or to ensure projects not driven by standards or requirements do not create system issues ("No Harm"). Furthermore, for select projects, additional analyses are performed to determine if alternatives may be beneficial. These projects are typically selected by MISO due to their size, opportunities within their area, or from input proposed by stakeholders. MISO's transmission alternatives analysis typically focuses on cost comparisons, construction feasibility, and how reliability needs are resolved. Alternatives considered include like-for-like replacements, regional reliability projects, a combination of multiple local solutions and other options submitted by stakeholders or identified through MISO analysis. Alternative solutions can also be assessed by Transmission Owners prior to project submission.

## Review of MTEP23 Local Projects

(by number of projects)



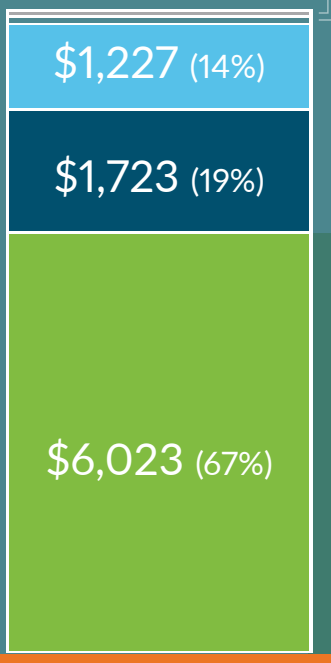

For MTEP23, analysis of twelve key project alternatives, including all projects in the South planning region within the top ten investments, resulted in the re-submission of one project to address a larger set of needs and one lower-cost project in the East planning region; one alternative analysis is still ongoing and may result in a project for approval in 2024. The remaining alternatives were either higher cost or did not resolve the reliability concerns. MISO verified that needs addressed by the largest projects in the South planning region align with projected generation retirements and load growth. Because of the large impact and cost of these projects, MISO also evaluated the economic benefits and confirmed the main driver is local reliability.

# Proposed MTEP23 Appendix A projects meet system needs

The approximately $9 billion in total MTEP23 Appendix A projects proposed for approval by the MISO Board of Directors includes 572 projects. As typical, "Other" projects make up the majority of proposed projects, with reliability cited as the driver for more than half of those projects, followed by age and condition (25%), load growth (16%) and other needs (3%.) The single Multi-Value Project is a like-for-like replacement of communication equipment for an MTEP11 Multi-Value Project. Over seventy percent of all projects are projected to go into service within the next three years.

## MTEP23 Appendix A Project Investment Summary

(Data as of September 29, 2023; $M, % of total investment dollars)



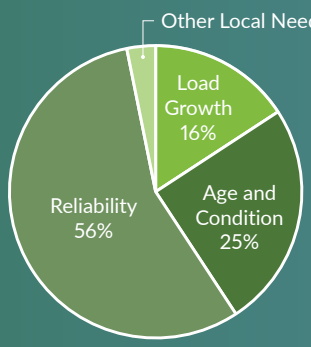

**Market Participant Funded Projects (MPFP)**
$1 - 2 Projects

**Multi-Value Project (MVP)**
$4 - 1 Project

**Generator Interconnection Projects (GIP)**
142 Projects

**Baseline Reliability Projects (BRP)**
45 Projects

**Other**
382 Projects




**DRIVERS OF 'OTHER' PROJECTS**
(% of total investment dollars)

**$8,979** TOTAL INVESTMENT

**572** TOTAL PROJECTS

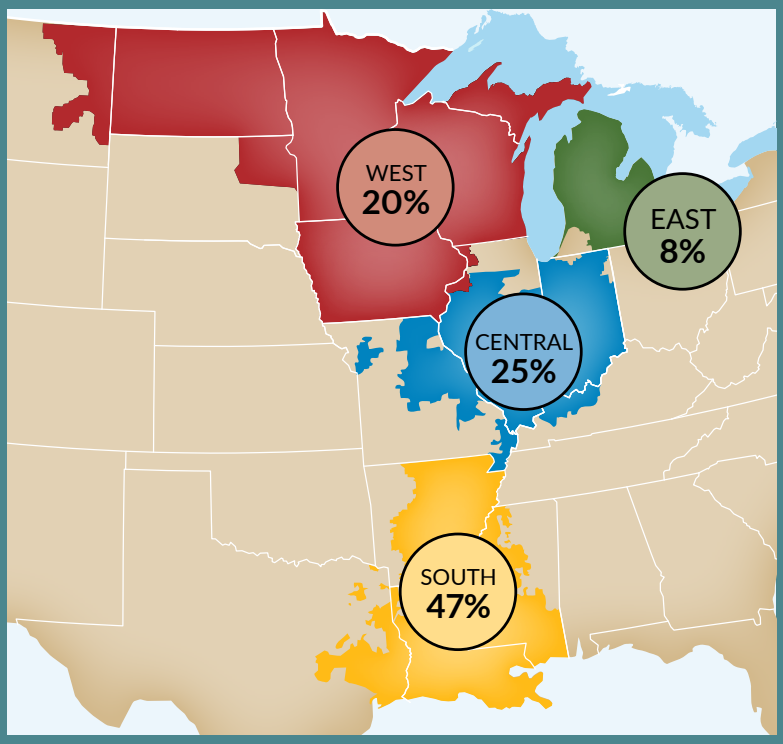
## MTEP23 Appendix A Project Investment Summary

(Data as of September 29, 2023; $M, and number of projects)

| Planning Region | Baseline Reliability Projects (BRP) | Generator Interconnection Projects (GIP) | Market Participant Funded Projects (MPFP) | Multi-Value Project (MVP) | Other Projects | Total | # of Projects |
|---|---|---|---|---|---|---|---|
| Central | $178 | $374 | - | - | $1,714 | $2,266 | 153 |
| East | $60 | $307 | - | - | $371 | $739 | 97 |
| South | $1,335 | $351 | - | - | $2,483 | $4,168 | 78 |
| West | $150 | $195 | $1 | $4 | $1,455 | $1,806 | 244 |
| TOTAL | $1,723 | $1,227 | $1 | $4 | $6,023 | $8,979 | 572 |

## INVESTMENT PLANNING REGIONS

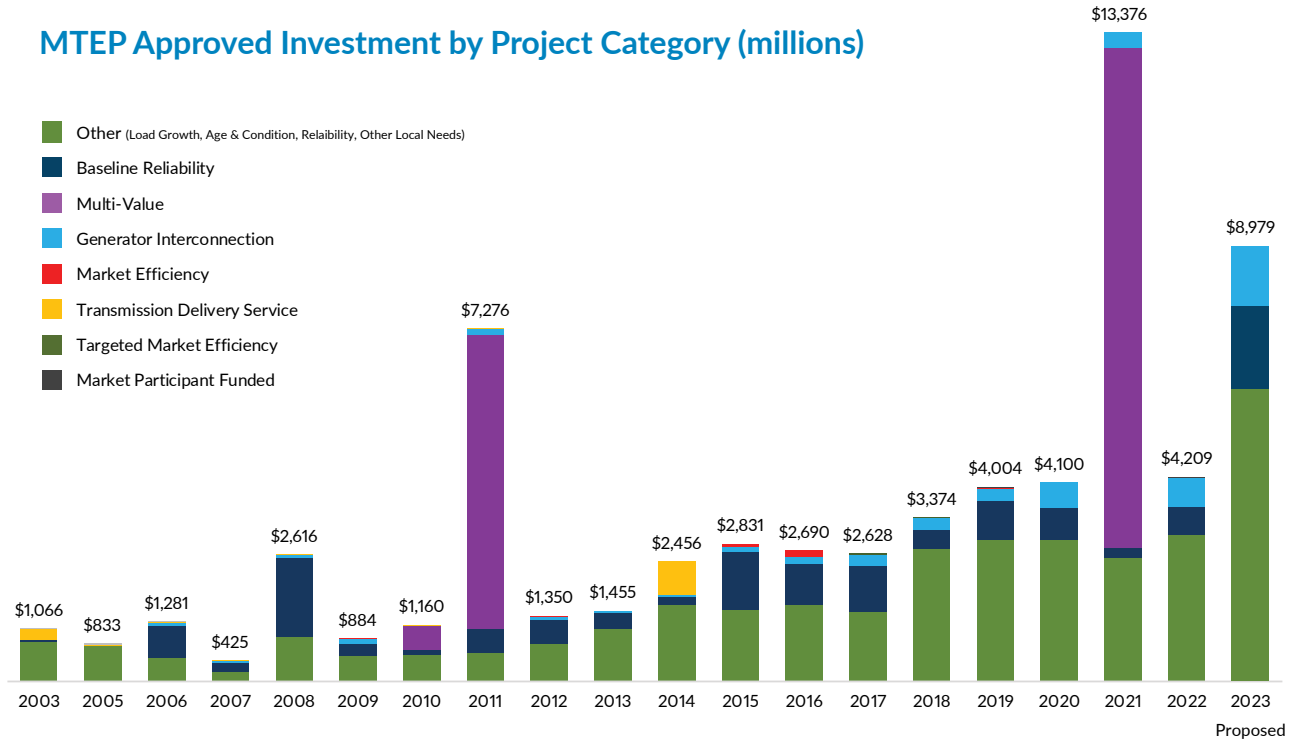
(% of total investment dollars)




Except for the larger than usual 47% share of total investment dedicated to projects in the South planning region, the distribution of investment across MISO's footprint is generally consistent with recent MTEP cycles — 25% of the total for Central planning region projects, 20% for the West and 8% for the East.

# Project categories

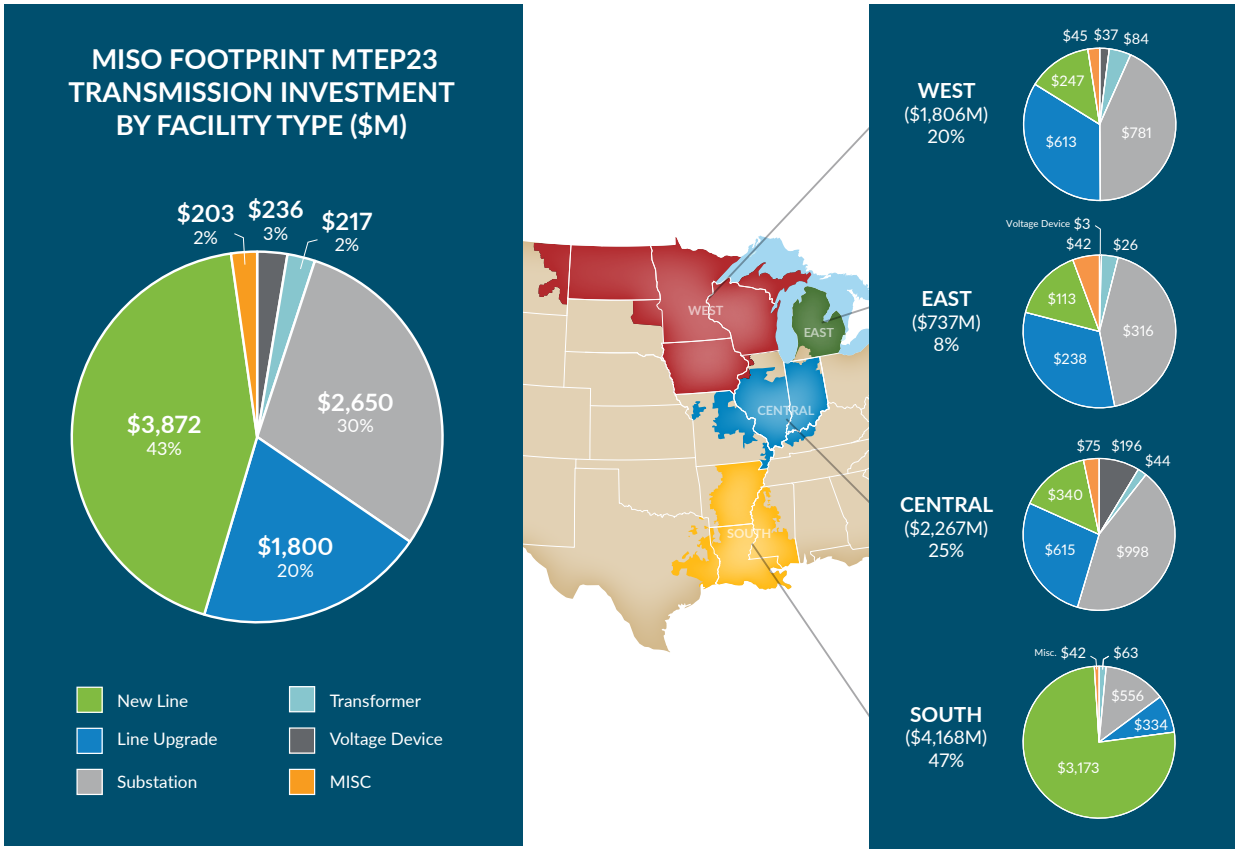
Of the 572 proposed Appendix A projects, 382 are classified as "Other" projects, 142 as Generator Interconnection Projects, 45 as Baseline Reliability Projects, two as Market Participant Funded Projects, and one Multi-Value Project. Since MTEP's inception in 2003, nearly $60 billion in projects have been approved by MISO's Board of Directors - of which approximately $34 billion of MTEP projects are in service.




# Project facilities

Each MTEP project is composed of one or more facilities. Forty-three percent of MTEP23 facility investment is dedicated to new lines on new right-of-way in the MISO region, while 30% will go toward the construction or maintenance of substations or switching stations. This includes completely new substations as well as terminal equipment work, circuit breaker additions and replacements. Line upgrades, which include rebuilds, conversions and relocations, make up 20% of facility investment. The remaining 7% of facility costs are dedicated to voltage devices such as static synchronous compensator (STATCOMs) and capacitor banks, transformers and miscellaneous categories.

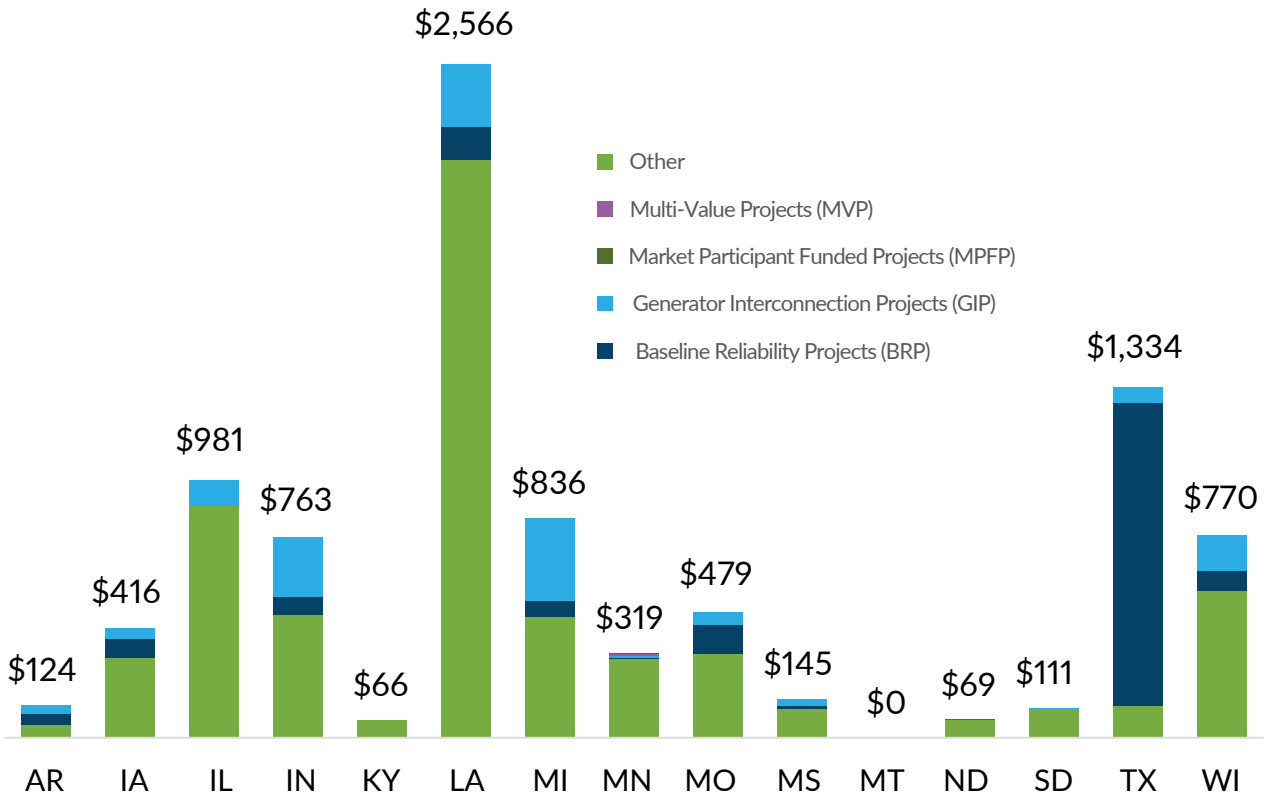
## MTEP23 Transmission Investment by Facility Type (millions)



# Investment by state

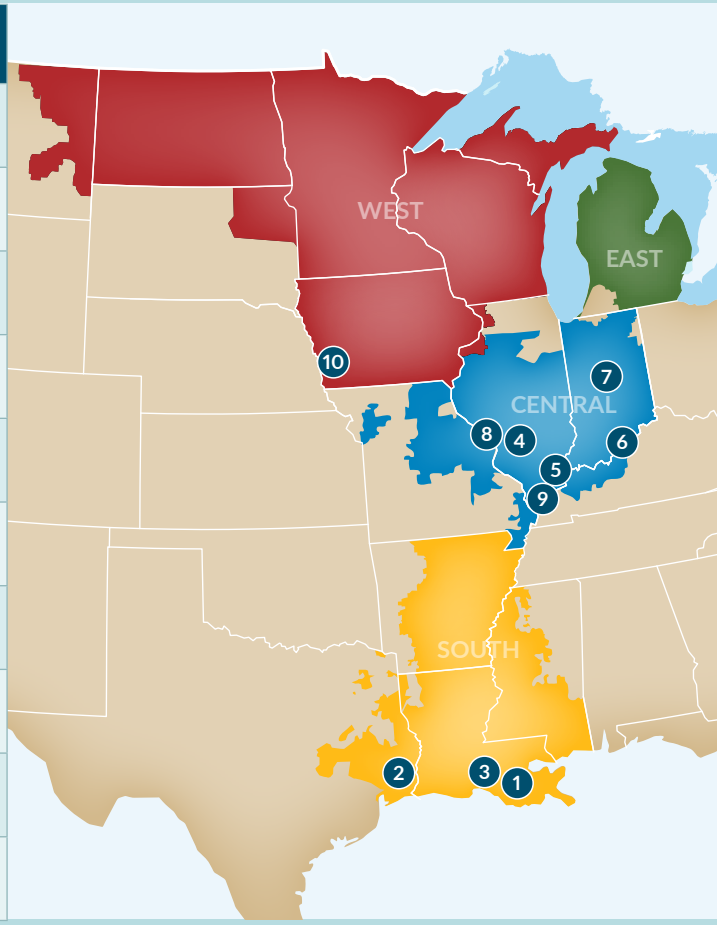
Appendix A projects are spread across MISO's footprint. Geographic investment trends vary greatly from year to year due to the varied age of infrastructure or as new load or generation additions require new transmission build. This year, however, with the activity in the South planning region, $3.9 billion in new investment is planned within Louisiana and Texas.

## MTEP23 Transmission Investment by State (millions)



# TOP 10 PROJECTS IN MTEP23 APPENDIX A

| Rank | Project Name | Project Driver | Cost *(millions)* |
|---|---|---|---|
| 1 | Amite South Reliability Project - Phase 1 - Alternative | Other – Reliability | $1,700 |
| 2 | Southeast Texas Area Reliability Project | Baseline Reliability | $1,111 |
| 3 | Amite South Reliability Project - Phase 2 | Other – Reliability | $290 |
| 4 | New Baldwin Area Reactive Support | Other – Reliability | $170 |
| 5 | New South Central Illinois Transmission Expansion | Other – Reliability | $168 |
| 6 | New Slugger 138 kV Load | Other – Load Growth | $124 |
| 7 | New Kokomo Fusion Phase 1 – 230/69 kV Substation | Other – Load Growth | $92 |
| 8 | Rebuild Sioux-Meppen North-Hull 138 kV Line | Other – Age and Condition | $78 |
| 9 | New Seminary – Wittenberg – Grand Tower 138 kV | Baseline Reliability | $68 |
| 10 | Southland Expansion and Upgrades | Other – Load Growth | $58 |




**The top ten projects** based on investment represent roughly **43% or $3.9 billion of MTEP23.**

## Adapting Tools and Processes

Evolving our planning tools and processes is an important part of the Reliability Imperative's Transmission Evolution pillar. In 2023, this includes enhancements to how MISO collects, stores and reports MTEP project data submitted by MISO staff and stakeholders. A new MTEP software platform launching in the third quarter of 2023 will provide stakeholders better support for submitting, updating, tracking and managing MTEP projects. MISO staff will gain efficiencies in planning, which are critical as complexity increases. With improved sharing of data and information, both MISO and stakeholders will be able to experience an improved planning process that enables further transparency.

## Looking Forward

While efforts surrounding Transmission Evolution continue to occur, in parallel, MTEP activities continue to meet the base business needs of ensuring reliable and efficient system needs on the grid. MISO looks forward to working with stakeholders on both routine MTEP planning activities, as well as activities that position the grid to best serve the broader regional needs identified in the future resource plans of MISO members and state policies.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