AMERICAN TRANSMISSION COMPANY®

Helping to keep the lights on, businesses running and communities strong®

2019 10-Year Assessment Preliminary Study Design

October 25, 2018

Stakeholder and Customer Webcast

Jeremy Voigt, System Planning

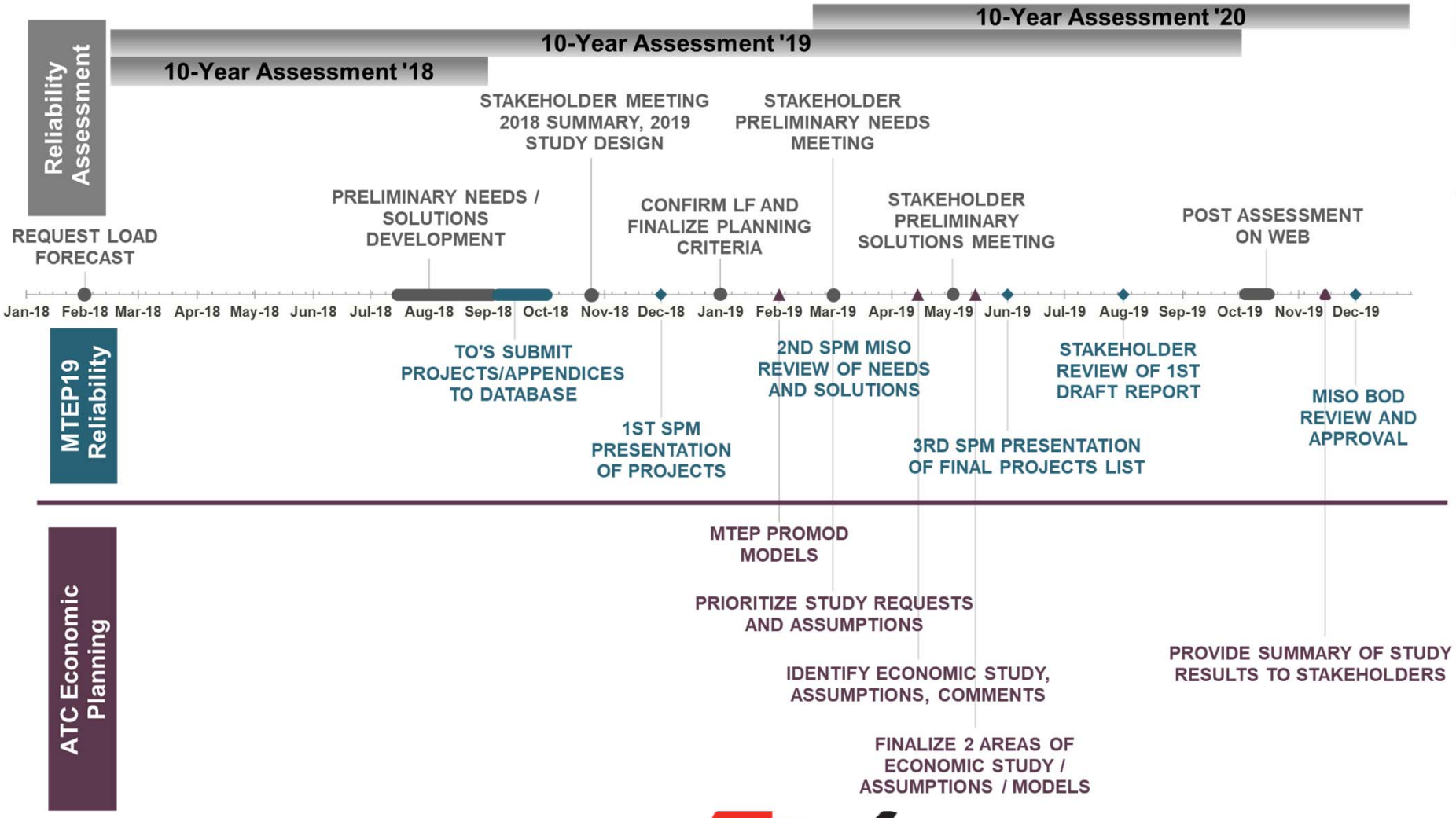
Purpose

- Summarize ATC's project development processes
- Solicit input for the 2019 Assessment Study Design
- Solicit input on Public Policy Requirements

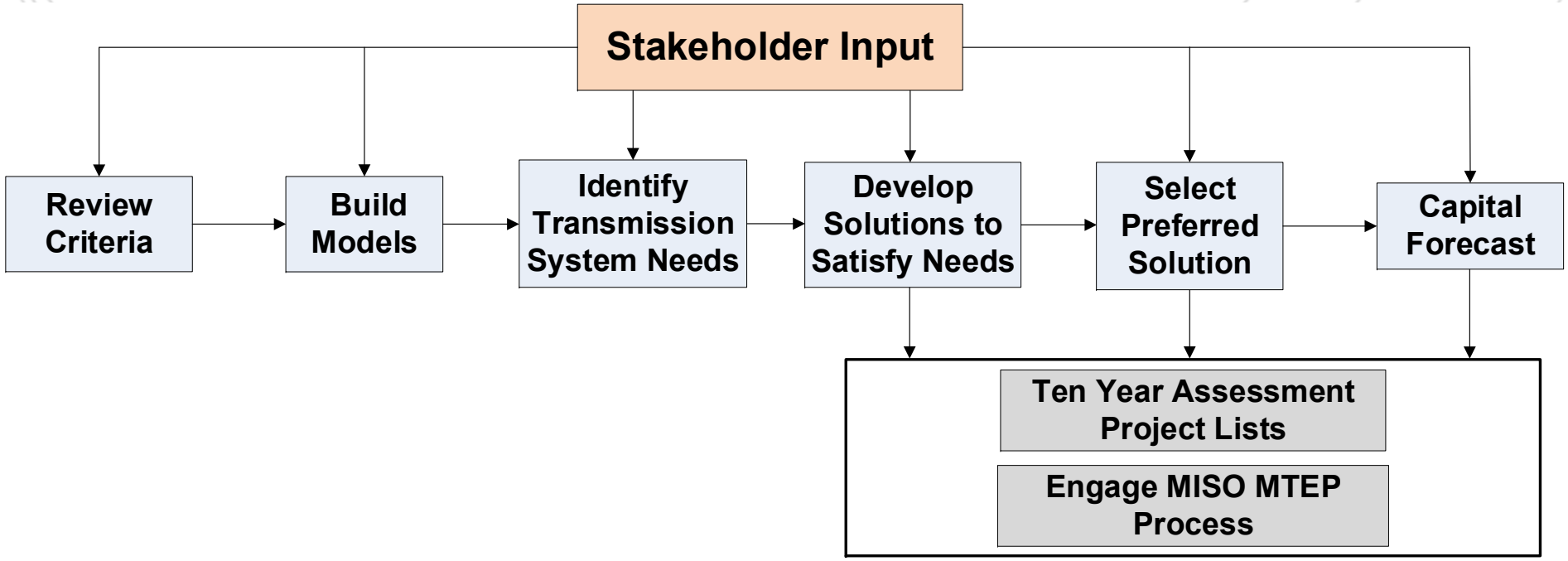
ATC's Project Development Processes

- Local Transmission Planning
  - Asset Renewal
  - Interconnections
  - Network
    - Planning Reliability Criteria
    - Sectionalizing Guidelines
    - Economic Benefits Considerations
- Other Solution Considerations (non-transmission alternatives)
- Regional Planning
- Public Policy Requirements

Timeline


Reliability Assessment
10-Year Assessment '20
10-Year Assessment '19
10-Year Assessment '18
STAKEHOLDER MEETING 2018 SUMMARY, 2019 STUDY DESIGN
STAKEHOLDER PRELIMINARY NEEDS MEETING
PRELIMINARY NEEDS / SOLUTIONS DEVELOPMENT
CONFIRM LF AND FINALIZE PLANNING CRITERIA
STAKEHOLDER PRELIMINARY SOLUTIONS MEETING
POST ASSESSMENT ON WEB
REQUEST LOAD FORECAST
Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18 Jul-18 Aug-18 Sep-18 Oct-18 Nov-18 Dec-18 Jan-19 Feb-19 Mar-19 Apr-19 May-19 Jun-19 Jul-19 Aug-19 Sep-19 Oct-19 Nov-19 Dec-19
MTEP19 Reliability
TO'S SUBMIT PROJECTS/APPENDICES TO DATABASE
2ND SPM MISO REVIEW OF NEEDS AND SOLUTIONS
STAKEHOLDER REVIEW OF 1ST DRAFT REPORT
MISO BOD REVIEW AND APPROVAL
1ST SPM PRESENTATION OF PROJECTS
3RD SPM PRESENTATION OF FINAL PROJECTS LIST
ATC Economic Planning
MTEP PROMOD MODELS
PRIORITIZE STUDY REQUESTS AND ASSUMPTIONS
IDENTIFY ECONOMIC STUDY, ASSUMPTIONS, COMMENTS
PROVIDE SUMMARY OF STUDY RESULTS TO STAKEHOLDERS
FINALIZE 2 AREAS OF ECONOMIC STUDY / ASSUMPTIONS / MODELS

ATC Project Identification Process



ATC Project Status Definitions

Strategic

Provisional

Proposed

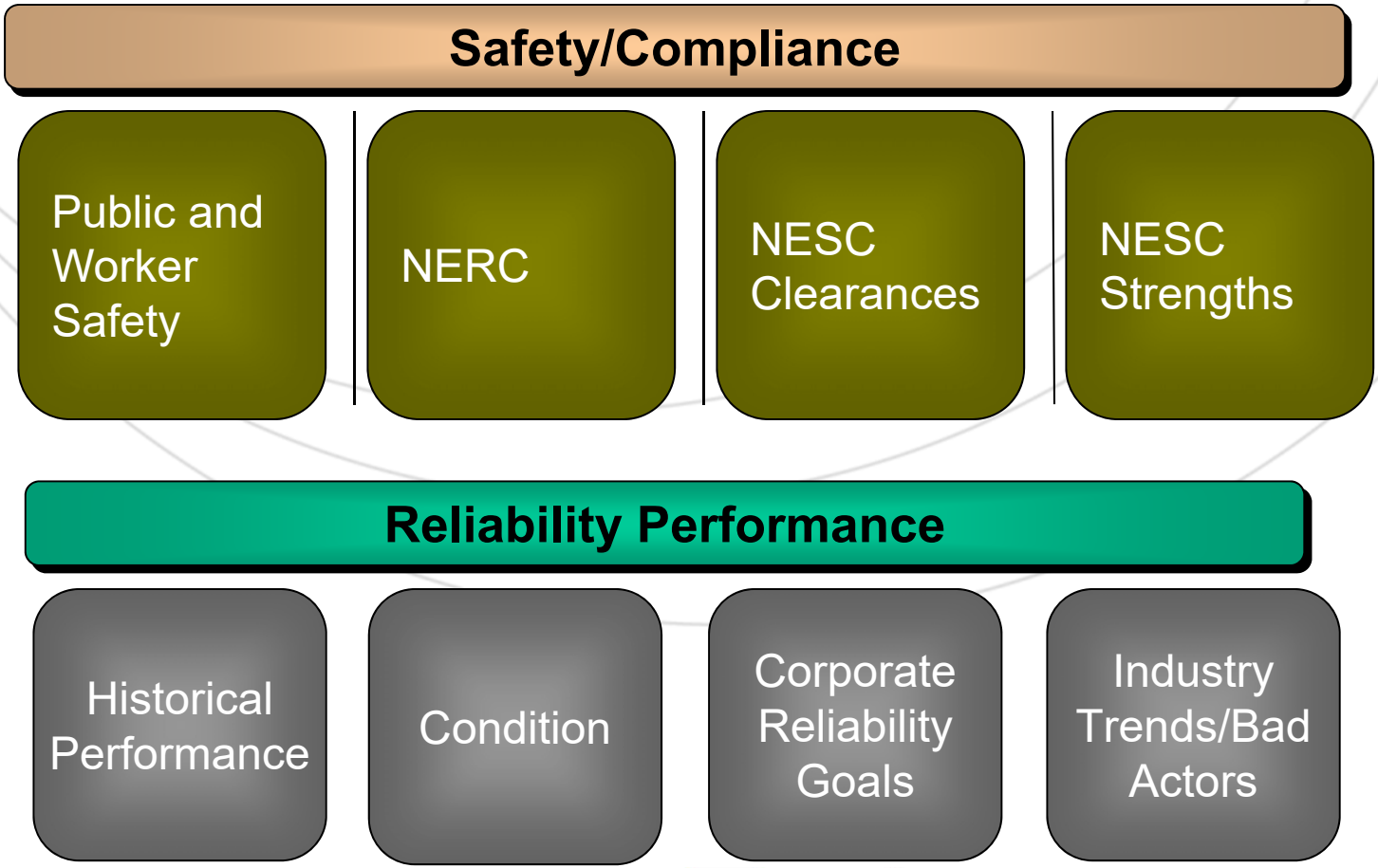
Planned

In-Service

Asset Renewal Program Objectives

- Safety – Public and worker
- Minimize total life cycle cost
- Compliance
- Manage risk of aging infrastructure
- Reliability performance improvements
- Environmental performance improvements

Asset Renewal Criteria



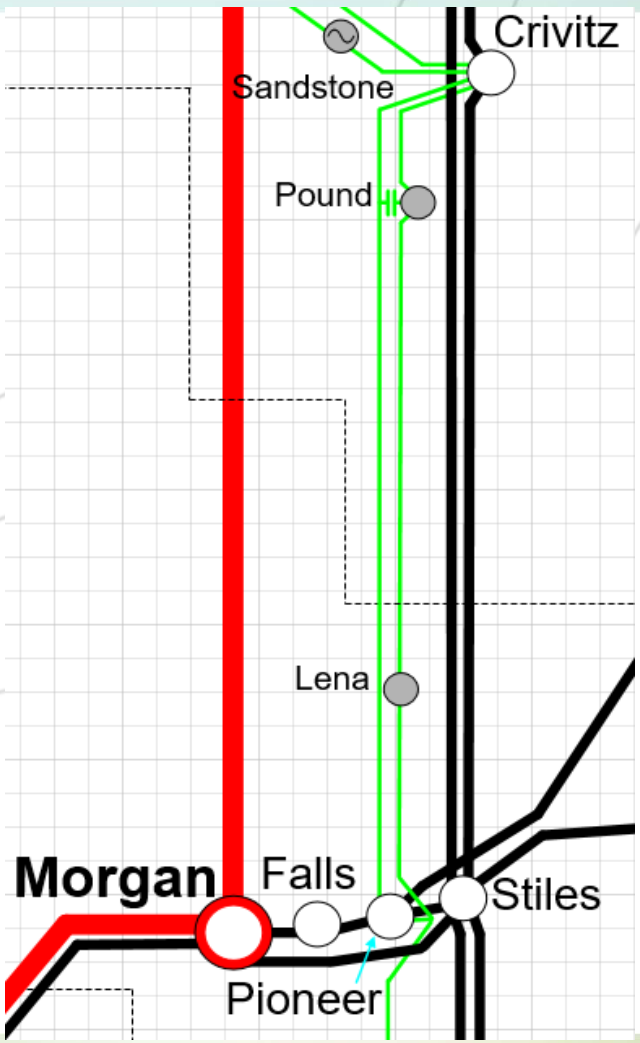
Asset Renewal Considerations

- Is the asset still needed?
  - Assess area needs
  - Obtain cross-functional and distribution provider input
  - Consider removal of lines (full/partial retirement)
- What ratings are needed?
- Investing prudently using defensible criteria

Asset Renewal Considerations – E-83/B-2 (Past Example)

- ATC team and affected distribution provider assessed area needs

- Found potential for full or partial retirement
  - Preferred alternative: move substations nearby existing 138 kV lines
  - Existing 69 kV lines fully retired



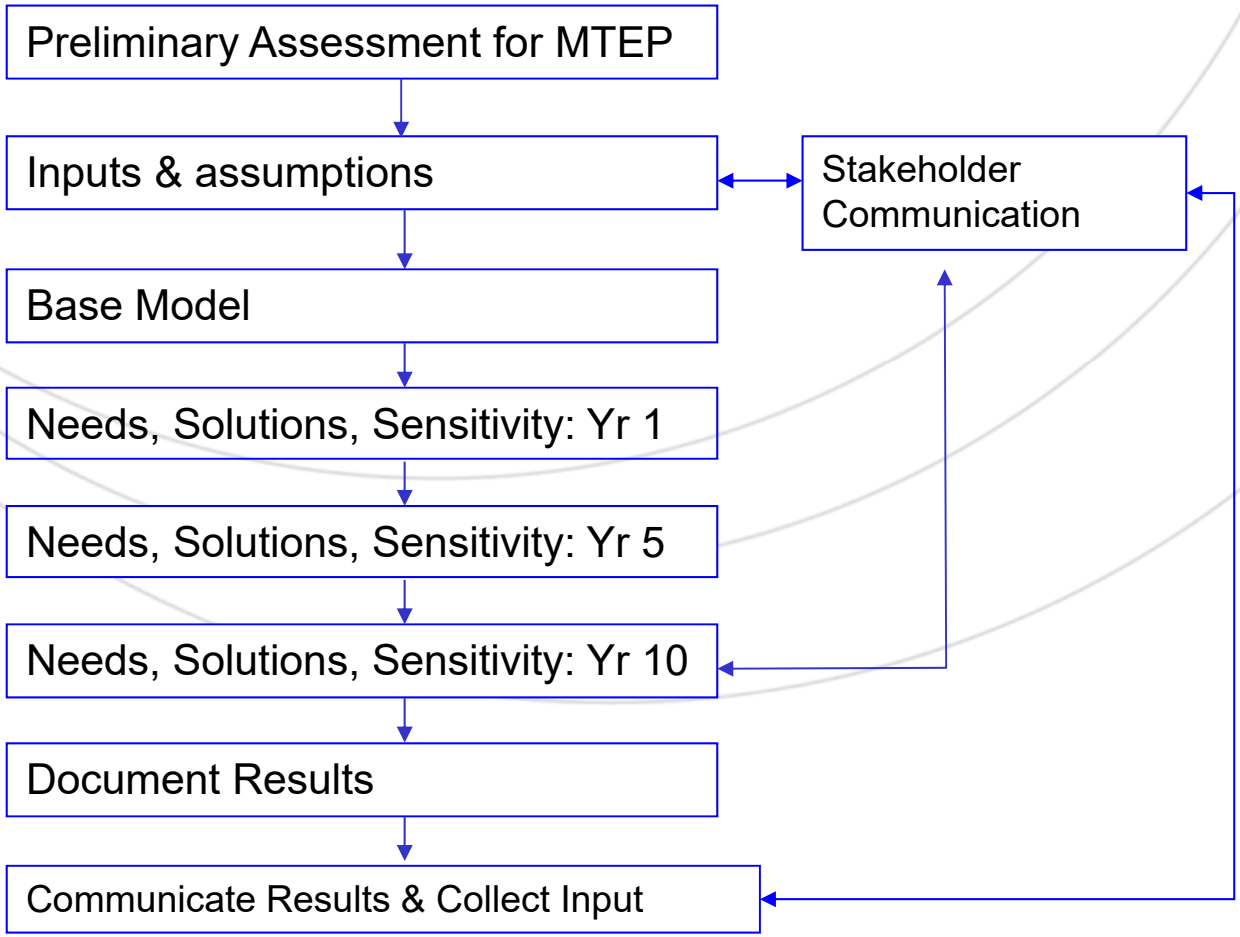
Interconnections

- G-T
  - Support MISO Attachment X and Y Processes
- D-T
  - Collaboration with distribution providers through Load Interconnection Request Form (LIRF) and BVP process
- T-T
  - Collaboration with other Transmission Owners

Network Planning Objectives

- Compliance with NERC regional and local criteria
- Best Value Plan (BVP)
- Customer involvement
- Address Public Policy requirements
- Maintain or improve the adequacy and reliability of the electric transmission system

Network Planning Assessment Process



Planning Criteria & Assessment Practices

- NERC Standards, particularly TPL-001, version 4

- ATC Planning Criteria/Assessment Practices
  - http://www.atc10yearplan.com (About tab)
  - Updates to Planning Criteria v19.1 & Planning Assessment Practices v7

- Sectionalizing Guidelines
  - Developed with distribution providers early in ATC's history
  - http://www.atcllc.com/wp-content/uploads/2017/12/Load-Interconnection-Guide-Rev-7-121517-Pub.pdf (Sections 3.6.1-3.6.2)

Planning Criteria & Assessment Practices Updates

- Planning Criteria v19.1
  - Added a footnote in Section 1.1 to clarify how ATC addresses appropriate ratings for loading and voltage limitations
  - Added ATC's interpretation of NERC Cascading in Section 1.1.2

- Planning Assessment Practices v7
  - Modified sections 13.1 Types of Analysis and 13.2 Compliance with Applicable Requirements
  - Now include depending on some MISO MTEP analysis

2019 Studies and Assumptions

- Preliminary 2018 Load Forecast Confirmation and MTEP19 Support Studies
- Modeling Assumptions
  - Model Years
  - Load
  - Generation
  - No Load Loss Allowed Contingency Analysis
- Additional Studies

Preliminary Load Forecast and MTEP19 Support Studies

- Initial screening (reduced generator reactive capability)
  - Summer peak (5 and 10 year models)
  - 2018 load forecast
  - 2018 TYA outside world (2017 MMWG cases)

- To confirm 2018 Load Forecast and support MTEP19 database development
  - No load loss allowed contingencies
  - Completed July 2018

Projects Submitted to MTEP19

- MTEP19 Active Project List

2019 TYA Model Years

- 2019 (As-planned)
- 2020
- 2024
- 2029

- All models will likely be completed by the Spring of 2019

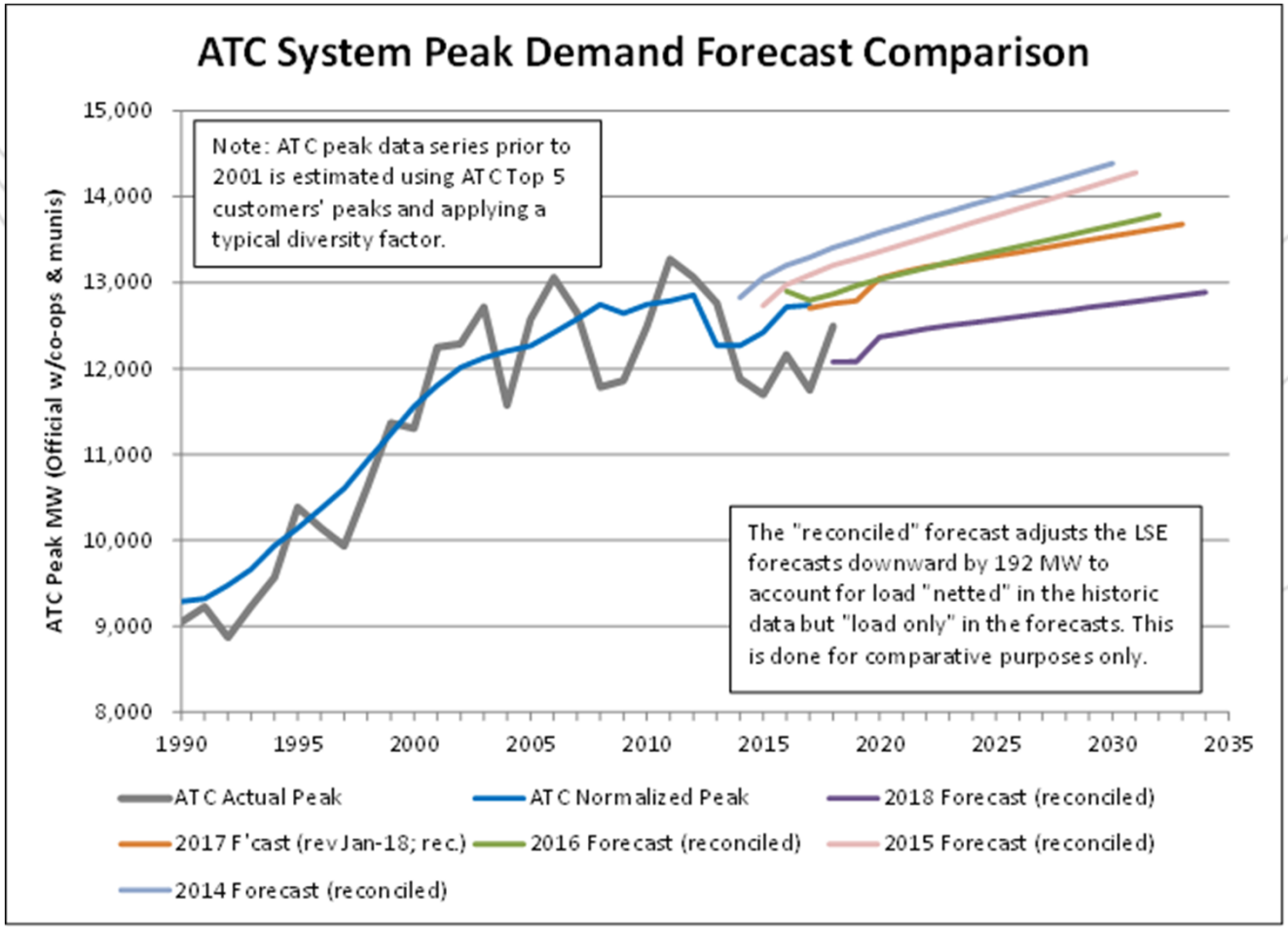
Load - Historical

- Requested September 28, 2018
  - Summer peak
  - Winter peak
  - Light load
  - Shoulder load
- Receive November 1, 2018
- Add to databases

Load – Expected Forecast

- Requested LDC forecasts February 2018
  - 11 years
  - Consistent with resource planning forecast
  - Considered expected (50/50 probability)
- Received in Quarter 2 of 2018
- ATC compiles
  - Comparisons to previous forecasts
  - Differences confirmed with LDCs
  - Finalized copy to LDCs – August 2018
  - Forecasts used to plan the system

Load Forecast Trends



Forecast Year	10-Year Average Growth Rate
2018	0.50%
2017	0.53%
2016	0.52%
2015	0.66%
2014	0.68%

Load Forecast Trends, Continued

Model	ATC Load (MW)		
	2017 Assessment	2018 Assessment	2019 Assessment
Year 1 Summer Peak	13,000	13,000	12,300
Year 5 Summer Peak	+300	+400	+400
Year 10 Summer Peak	+600	+600	+600
Year 5 Shoulder	9,400	9,400	8,900
Year 10 Shoulder	+200	+100	+100

Generation Modeling

- Existing generator data
  - Annual updates requested from GOs in Q3 of each year
- Generation additions
  - Only add generators with signed interconnection agreements
  - Additions modeled at MISO Facility study location
- Generation retirements
  - Generators with a completed MISO Attachment Y are modeled as retired, unless there is an SSR agreement
- Intact system and outage conditions
  - Maintain voltage criteria for
    - 90% maximum generator reactive power output
    - 90% minimum generator reactive power consumption

Generation Dispatch

- Local Balancing Area merit order dispatch:
  - Used for Assessment summer peak and shoulder models. Local Balancing Area dispatch from merit order provided by LBA
- ATC-wide merit order dispatch:
  - Minimum load models
  - ATC-wide merit order dispatch determined with PROMOD
- Generators without scheduled transactions:
  - If signed IA, generation included in the host Local Balancing Area.

No Load Loss Allowed Contingency Analysis

- Peak
  - 1, 5, and 10 year out models
- Shoulder (firm)
  - 5 and 10 year out models
  - 70% load except for Zone 2 (90% load) and northern Zone 4 (80% load)
  - Shoulder rating methodology
- Minimum load
  - 1 and 5 year out model
  - 40% load, may be adjusted based on analysis of historical loads

Additional Network Planning Studies

- Load Loss Allowed
- Existing Generator Stability Reviews
- Annual Fault Study
- Proposed – Next Limiting Element Study
  - Identify next few limiters
  - Just informational
- Proposed – Load Loss Allowed Manual Mitigation (2-year study)
- Proposed – Getting back to Rate A (2-year study)

Non-transmission Alternative Considerations

- Preliminary process developing with our stakeholders
- Two ways process can be initiated
  - Need initiated by local distribution provider
    - Identify T or D related reliability/service concerns
    - Develop needs and solutions
    - Communicate with ATC to promote collaboration
      - Use existing D-T or G-T processes
  - Need initiated by ATC
    - 10-Year Assessment screening – develop Needs/Limitations lists
    - Customers/stakeholders engage ATC with ideas
    - Collaborate to identify possible DER options from customers
    - Open project development discussions
    - Use modified BVP practices to balance comparison of appropriate alternatives

Network Limitations Potential NTA Information Example

Model	Planning Zone	Monitored Facility	Category
(Year) Peak	1,2,3,4,5	Substation1 – Substation2 69, 115, 138, 230, 345 kV (Name) Line	P1#, P3#

% of Facility Rating	% of Nominal Bus Voltage	Normal Rating (MVA)	Emergency Rating (MVA)	Possible Mitigation	MTEP PRJiD	MTEP Cost or Cost Range ($)
##%	##%	##	##	Project1	####	## or ##-##

Asset Renewal Needs Potential NTA Information Example

Continuing Asset Renewal Condition Need	2018 Projected Need Year	2019 Projected Need Year	Project Status
Substation1 – Substation2 69, 115, 138, 230, 345 kV line (Name) Partial Rebuild or Rebuild	####	####	Provisional, Proposed, Planned

Planning Zone	Need Category	MISO MTEP19 Appendix Status	MTEP PRJiD	MTEP Cost or Cost Range (M$)	Length (Miles)	Connected Load (MW)	Network Type
1,2,3,4,5	Description of need	A, B, --	####	## or ##-##	TBD/##	##-##	Network, Radial

Regional Planning

- MTEP
  - Preliminary screening helps ATC to better prepare for upcoming MTEP cycle
- MISO Coordinated Seasonal Assessments
- RF Seasonal Assessments

Public Policy Requirements

- Following MISO Tariff (Attachment FF) Processes

- Previously identified requirements
  - State Renewable Portfolio Standard (RPS) mandates
  - EPA regulations
  - State mandates and goals for energy efficiency (EE) and demand side management (DSM) programs

- Any public policy requirements not identified in ATC or MISO processes?

Schedule

- Expected Load Forecast – Review complete August 16, 2018
- Criteria and Methodology Review – Comments by November 30, 2018
- Preliminary MTEP19 Support Study – Done
- Post 2019 TYA Preliminary Study Design – Done
- Stakeholder Study Design Meeting – October 25, 2018
- Stakeholder Design Comments Due – November 30, 2018
- Study Design Completion – December 2018
- Model Development Completion – March 2019
- Preliminary Needs Meeting – February 28, 2019
- Preliminary Solutions Meeting – May 2, 2019
- Document and Publish – September 2019

Thank you for Participating

To provide solicited comments or for more information, please contact

Jeremy Voigt
Phone: 262-832-8742
Email: jvoigt@atcllc.com

By November 30, 2018