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New Transmission Planning Framework

Harvard Electricity Policy Group
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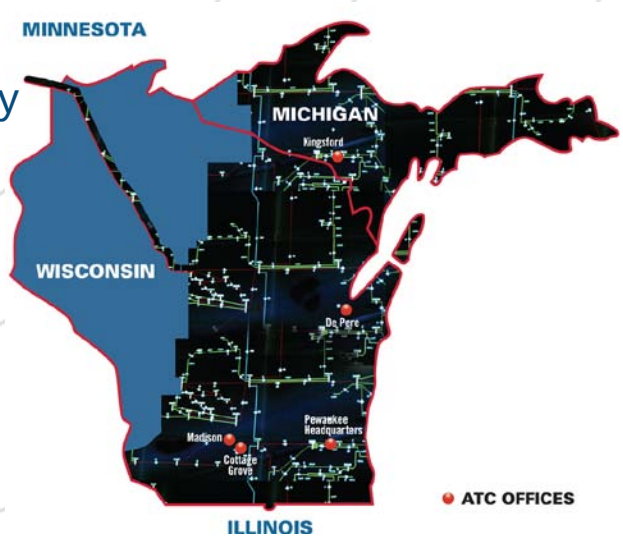
Outline

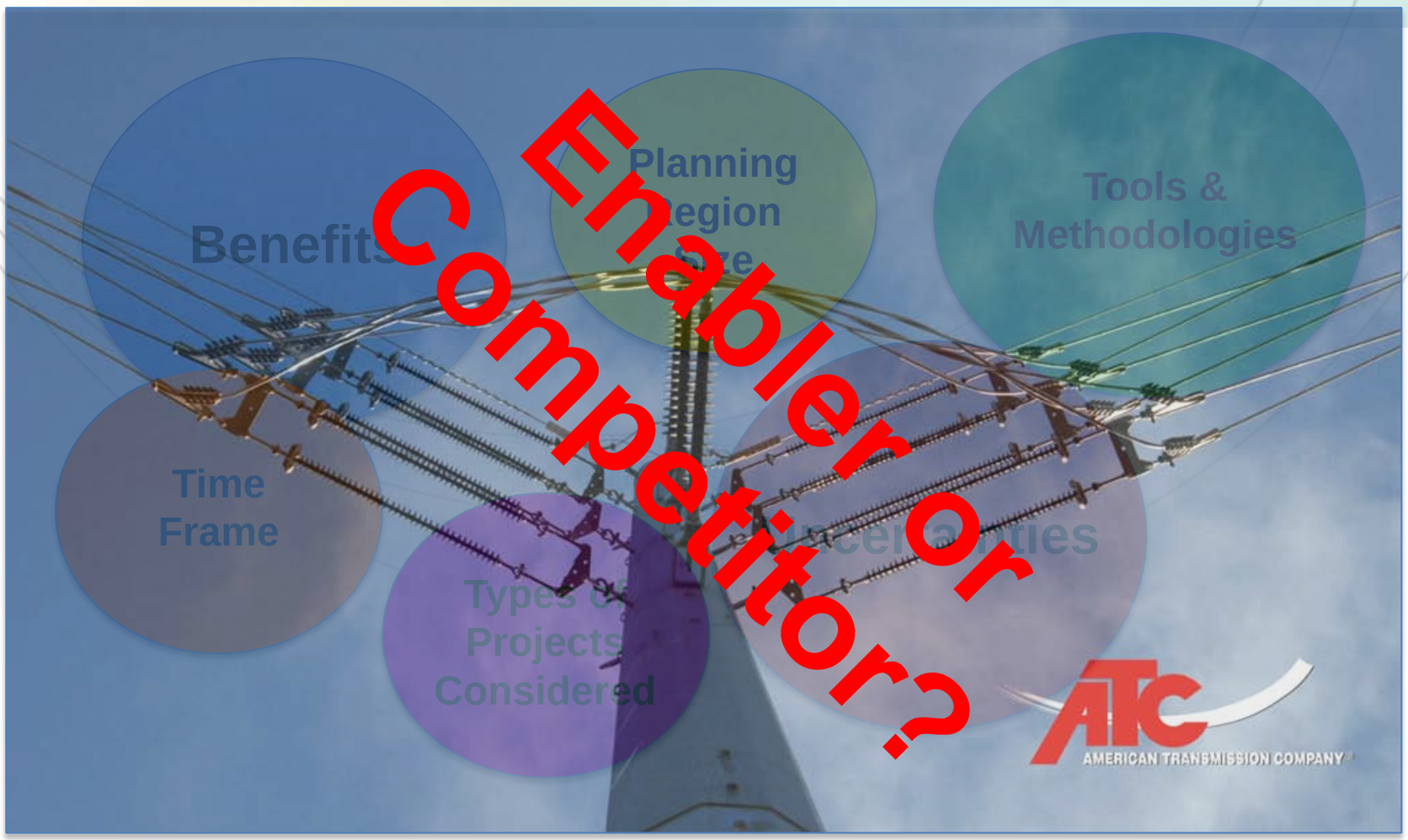
- ATC Introduction
- Elements and Central Question of Transmission Planning Framework
- Current Transmission Planning Framework
- Do We Need a New Transmission Planning Framework?
- What Would New Transmission Planning Framework Look Like?
- Clarifying Questions

Introducing ATC

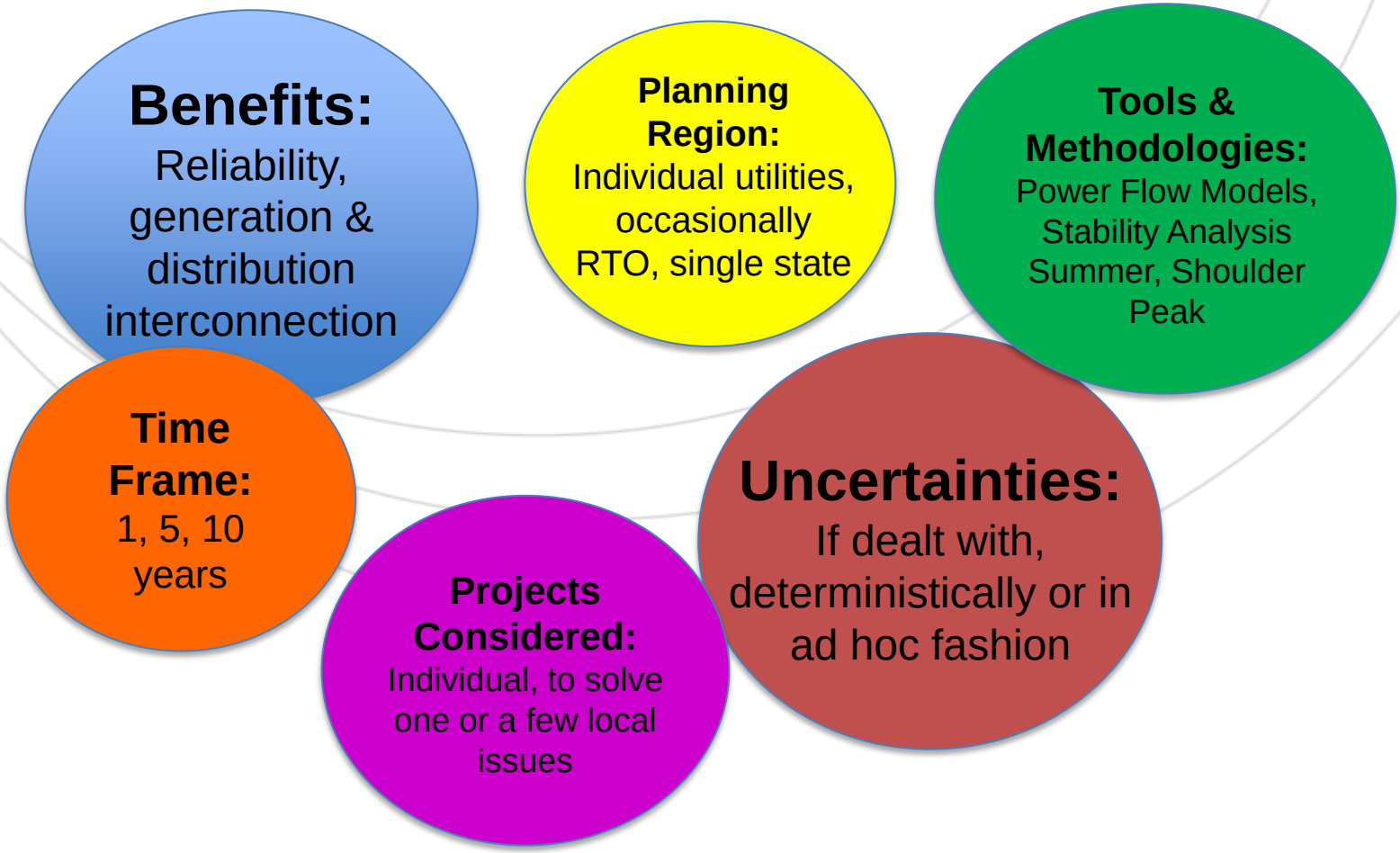
- Began operations in 2001 as first multi-state, transmission-only utility in U.S.
- Headquartered in Pewaukee, Wis.
- Grew from $550 million in assets in 2001 to $3.3 billion today
- Projecting $3.0-$3.6 billion investment over next 10 years
- Operating 9,480 miles of lines and 529 substations in
- Wisconsin, Michigan, Minnesota, Illinois
- Built first economic project in MISO; 35-mile line between Wisconsin and Illinois
- Instrumental in developing Multi-Value Projects in MISO
  - Built first MVP project in MISO; Pleasant Prairie-Zion connection between Wisconsin and Illinois
  - Developing two more MVP projects totaling $1 billion
- Joint venture with Duke – DATC
  - Own Path 15 and rights to Zephyr 3,000MW HVDC line from Wyoming to California



Elements and Central Question of Transmission Planning Framework

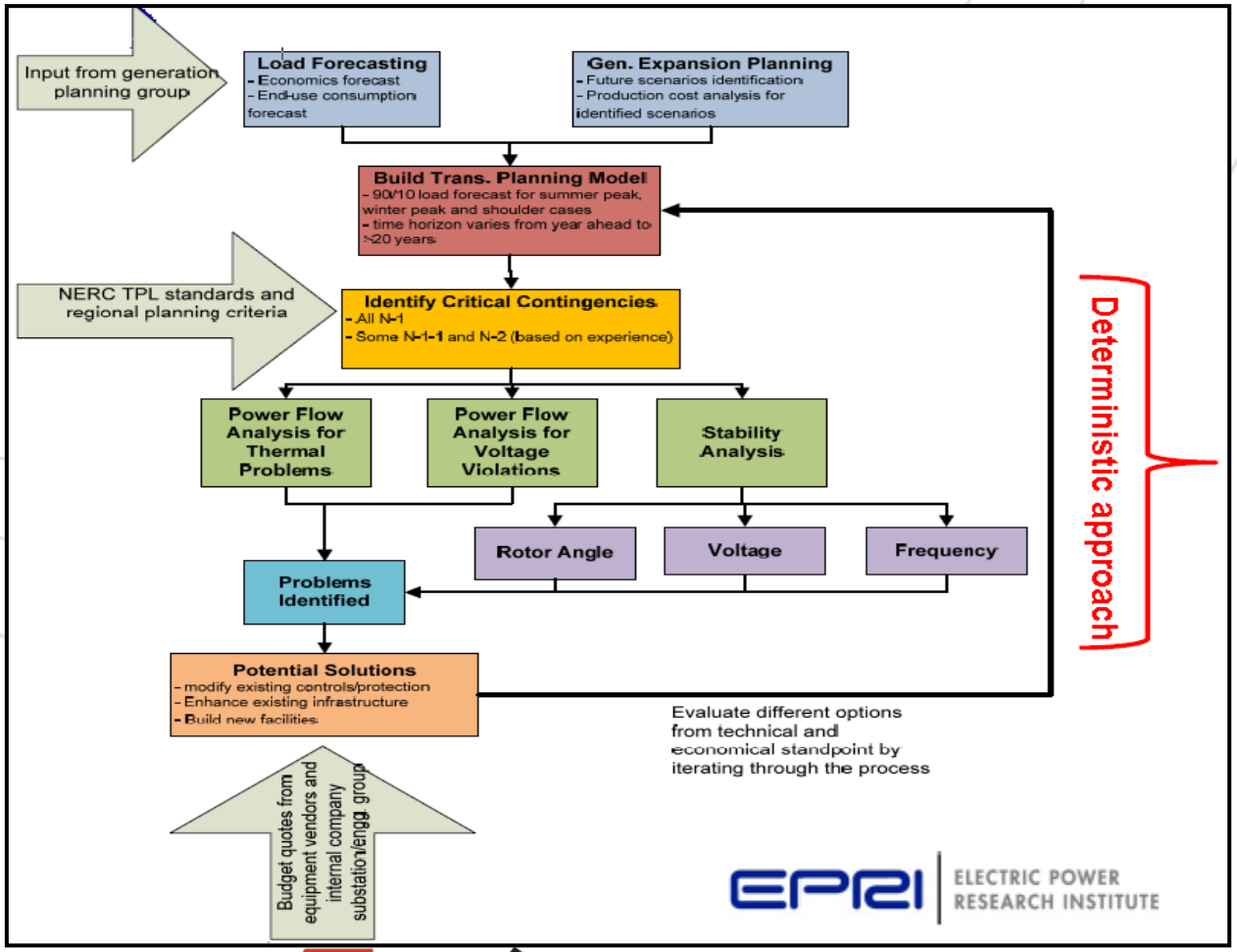


Current Transmission Planning Framework



Traditional Planning Process: EPRI

- Only consequences are considered (not probabilities), with both the single contingencies and higher order contingencies



Do We Need a New Transmission Planning Framework?

- What has changed? Benefits:
  - Markets have enabled monetization of congestion costs, ancillary services, “insurance costs”, etc.
  - With markets, the benefits are much more wide-spread
  - Order 890 and Order 1000: must perform economic analysis, i.e., calculate benefits and consider public policy
  - Cost allocation must be “commensurate with” benefits
- Renewable integration, “Renewable Investment Benefits”
- Need for greater resiliency
- Need for greater flexibility
- Computing power and algorithms enable calculation of many more benefits than previously

Do We Need a New Transmission Planning Framework?

- What has changed? Uncertainties:
  - Markets, moving power in different directions
  - Renewable, intermittent generation (wind and solar)
  - Renewables built at resource, not near loads
  - EPA regulations creating uncertainty in generation mix
  - Shale gas, natural gas prices changing dispatch and generation mix
  - Unexpected retirements due to market conditions
  - Demand side resources, SmartGrid
  - Distributed generation
  - Electric vehicles
  - Storage

Typical Quotes

- Transmission Hub – January 31, 2014*
  - "The ERCOT transmission grid is in a state of flux and transmission developers can no longer conduct transmission planning as they have done historically, panelists at TransForum Texas said on Jan. 29."
  - "Due in part to the increasing penetration of renewable generation and energy storage, the panelists concurred that transmission planning of the future must take a global, rather than a local, view."
- Utility Dive – February 11, 2014^
  - "[Jim] Rogers believes "the Internet of everything will transform the use of electricity in the United States…The simple fact that Google acquired Nest tells you where it's going."
  - Ron Binz: "…two key features…the grid will be low carbon…connected in much the same way that the Internet is"
  - Mike Chesser: "…the power grid's ongoing transformation 'from a one-way system to a two-way integrated network'"

*Source: http://transmissionhub.com/2014/01/31/greater-collaboration-among-ercot-generators-neede

^Source: http://www.utilitydive.com/news/three-perspectives-on-the-future-of-electric-utilities/225505/

New Transmission Planning Framework - Benefits

Challenge: Wide-spread Benefits

Wide-spread nature of transmission benefits creates both planning and cost allocation challenges

▪ Broad in scope	• Increased reliability and operational flexibility • Reduced congestion, dispatch costs, and losses • Lower capacity needs and generation costs • Increased competition and market liquidity • Renewables integration and environmental benefits • Insurance and risk mitigation benefits • Fuel diversification and fuel market benefits • Economic development from G&T investments
▪ Wide-spread geographically	• Multiple transmission service areas • **Multiple states** or regions
▪ Diverse in their effects on market participants	• **Customers**, **generators**, **transmission owners** in regulated and/or deregulated markets • Individual market participants may capture one set of benefits but not others
▪ Occur and change over long periods of time	• Several decades • Changing with system conditions and future generation and transmission additions • Individual market participants may capture different types of benefits at different times

11 *The Brattle Group*

- Currently planning focused on reliability projects, few "economic" or "congestion relief" projects
  - Often attempts to achieve specific goals at lowest costs as opposed to looking for the best value
- Only starting to learn how to plan for "public policy" projects

New Transmission Planning Framework

- Tools and methodologies:
  - Production cost analysis is good start but falls very short of assessing all the benefits
  - Deterministic planning for reliability is not as reliable as it once was
- Planning region size: Individual utility service territories or states not sufficient – benefits are wide spread
- Time frame: Need to look beyond 10 years – benefits are long lasting
- Projects considered: Looking at individual projects to meet specific needs will miss benefits that are larger and more uniformly distributed for portfolios or regional plans
- Uncertainties: Unprecedented increase in uncertainty in electric sector; planners need tools and methodologies to address the uncertainties, whether they are planning for reliability, economic and/or public policy (or all of the above)

New Transmission Planning Framework

Elements	Strategic	Keep the Lights On
Tools & Methodologies	Production cost; economic analysis tools	Probabilistic planning models
Planning Region Size	Regional and inter-regional	Local utility, regional
Projects Considered	Portfolio of Projects	Single Projects
Time Frame	10-20 years	1, 5, 10 years
Benefits Calculated	Calculate full range of benefits and beneficiaries	Reliability, lowest cost alternative, also considering more strategic solution
Uncertainties	Considered with range of plausible futures	Considered with probabilistic planning

Summary

- Many future uncertainties that impact Transmission Planning, both short term and long term
- Traditional transmission planning may be masking real risks and creating suboptimal plans
  - Value of recognizing uncertainty and risks can no longer be ignored
- Reliability must be priority one, but there are many other benefits that must be considered in planning
- Considering all the benefits for portfolios of projects is very resource intensive but needed to make appropriate investment decisions
- New transmission planning framework is needed to build a grid that will capture more of the value of transmission and be more resilient

CLARIFYING QUESTIONS