Modeling Transmission Benefits Under FERC Order 1920

Methods, Tools, and Tradeoffs

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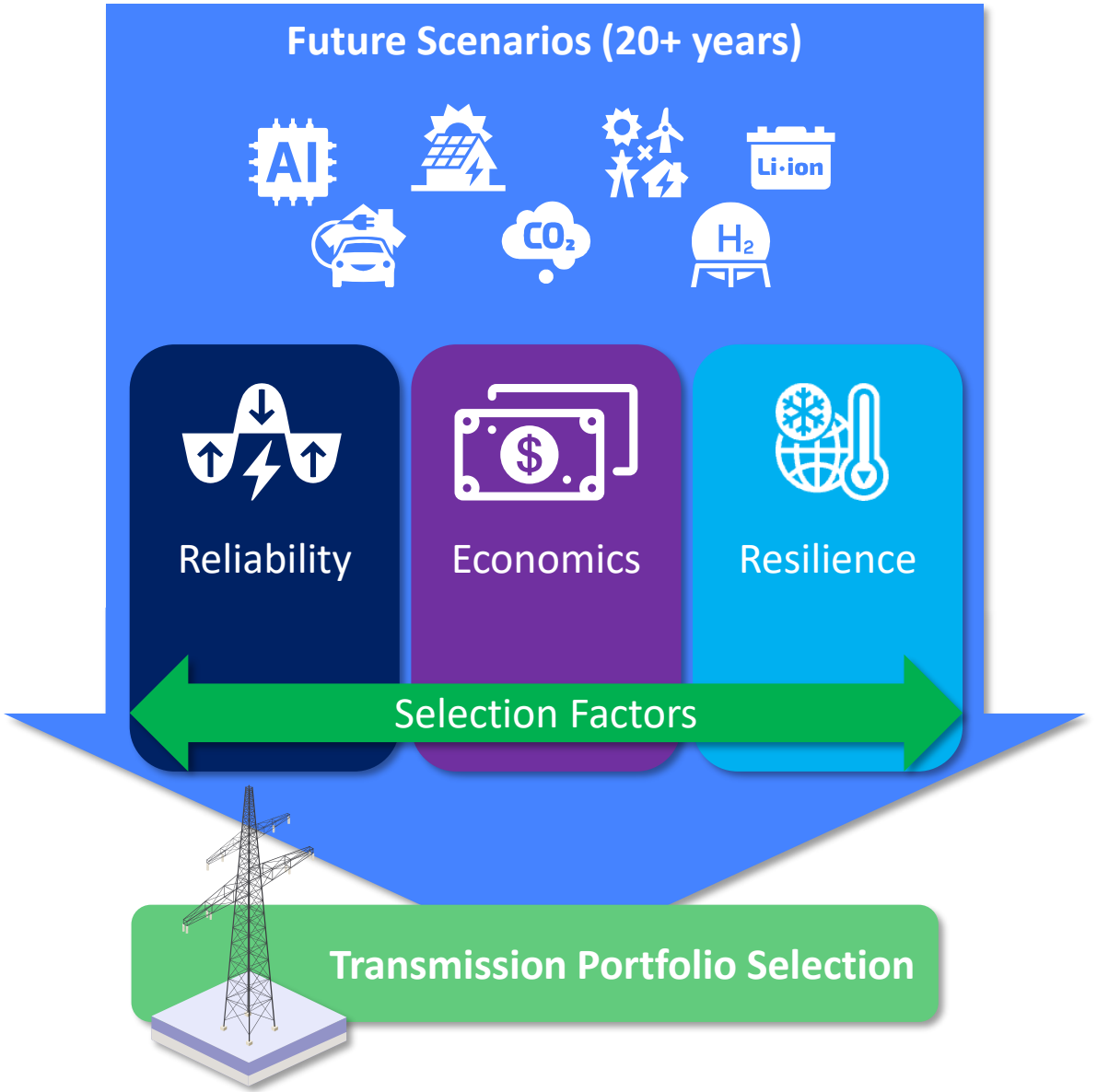
O1920 Necessitates a Shift in Modeling Approaches

- Moves planning from reliability focused assessments to multi-value economic, reliability, and resilience evaluations over longer planning horizons
- Need to capture value clearly across the defined benefits to avoid double-counting and over valuation of portfolios
- Benefit magnitudes are highly sensitive to modeling structure, transmission representation, and scenario design



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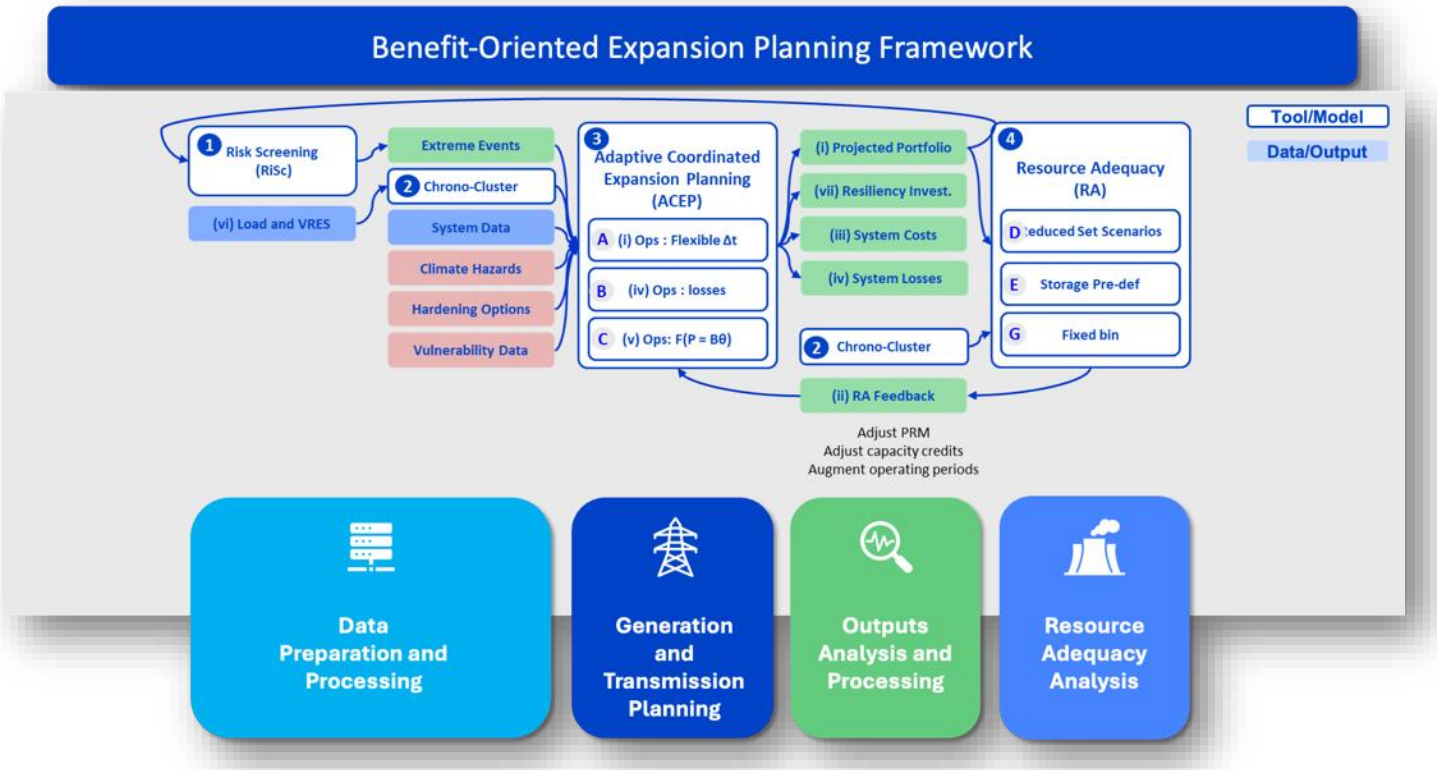
Integrated Modeling as an Evolving Need

- No single model can calculate all required benefits; O1920 requires a coordinated modeling stack
- Long-term resource planning needs to be aligned with the transmission planning process
- Model fidelity and granularity is critical to accurately capture performance metrics

Example EPRI Approach:



Alignment of assumptions across models is essential to ensure internally consistent and defensible results.

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Impacts of Modeling Choices

Three modeling choices will have large impacts on the results and the ability to represent them in commercial and research grade software

01
Model Fidelity

Zonal vs. nodal transmission representation significantly affects congestion, loss, and production cost benefits. Temporal fidelity will

02
Capturing Uncertainty

Accurate representation of stochastic impacts (weather driven variability, extremes, outages etc.) will determine magnitude of unserved energy and resilience benefits

03
Analysis Accuracy & Tractability

How we balance the increased computational burden with the accuracy of the results will become increasingly important. Developing simplified or representative methods while maintain accuracy of the results will be important areas of research

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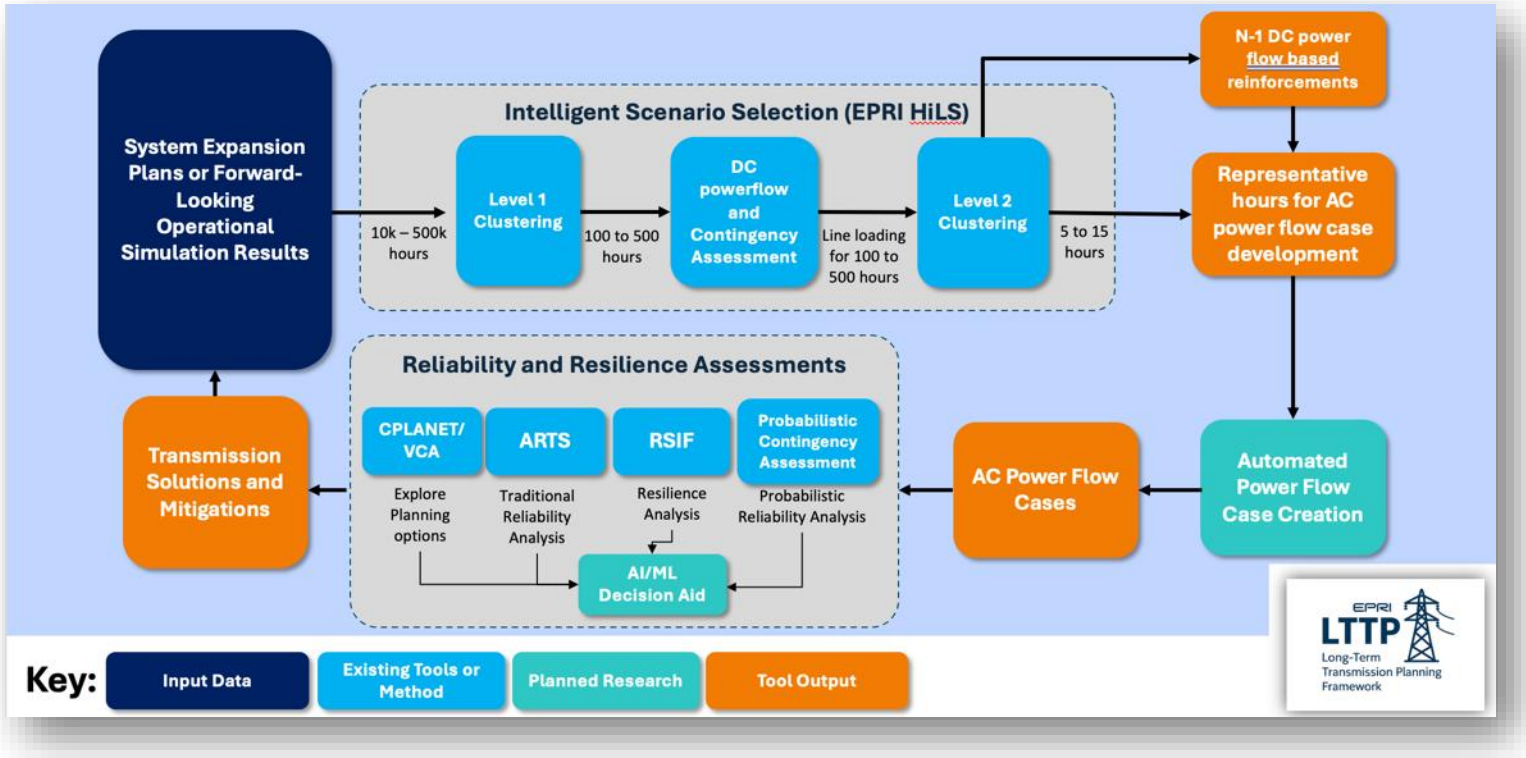
Pre-Proposed Transmission vs. Optimized System Design



System-level optimization and iterative feedback better reflects long-term structural benefits but increases complexity and computational burden

- Incremental "base vs. change case" approach evaluates predefined projects and captures marginal benefits
  - Resource plans may change after the introduction of new transmission pathways
- Scenario design that explicitly co-optimizes generation and transmission can capture impacts on resource siting, reserve margins, losses, and congestion
- Incremental analysis is more transparent and governance-friendly but not cost effectively develop systems

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Current Commercial Modeling Tools & Needed Evolutions

- Existing commercial tools for capacity expansion, production cost modeling, and probabilistic resource adequacy are fundamentally capable of supporting O1920 benefit calculations
  - Increased model detail (transmission representation) presents a trade off in computation time that needs to balanced

Leveraging capabilities of existing tools will require intelligent structuring of data inputs and problem setups to effectively capture results

Linking multiple tools to leverage timescales and spatial assessments using iterative processes

Gradual evolution of the tools to support benefit-based design optimization

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