NorthernGrid

Enrolled Parties and States
Technical Workshop 1
March 12, 2021

Welcome and Introduction

Dave Angell, NWPP

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Graham Retzlaff, PacifiCorp

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Learning Objectives

- Working knowledge of the regional power system to support policy discussions
- Opportunity to build relationships
- Understanding of planning techniques
- Understand current state of power system and impact of policy decisions on future operations

Regional Transmission Planning Process

Chelsea Loomis, Northwestern Energy

Jared Ellsworth, Idaho Power Company

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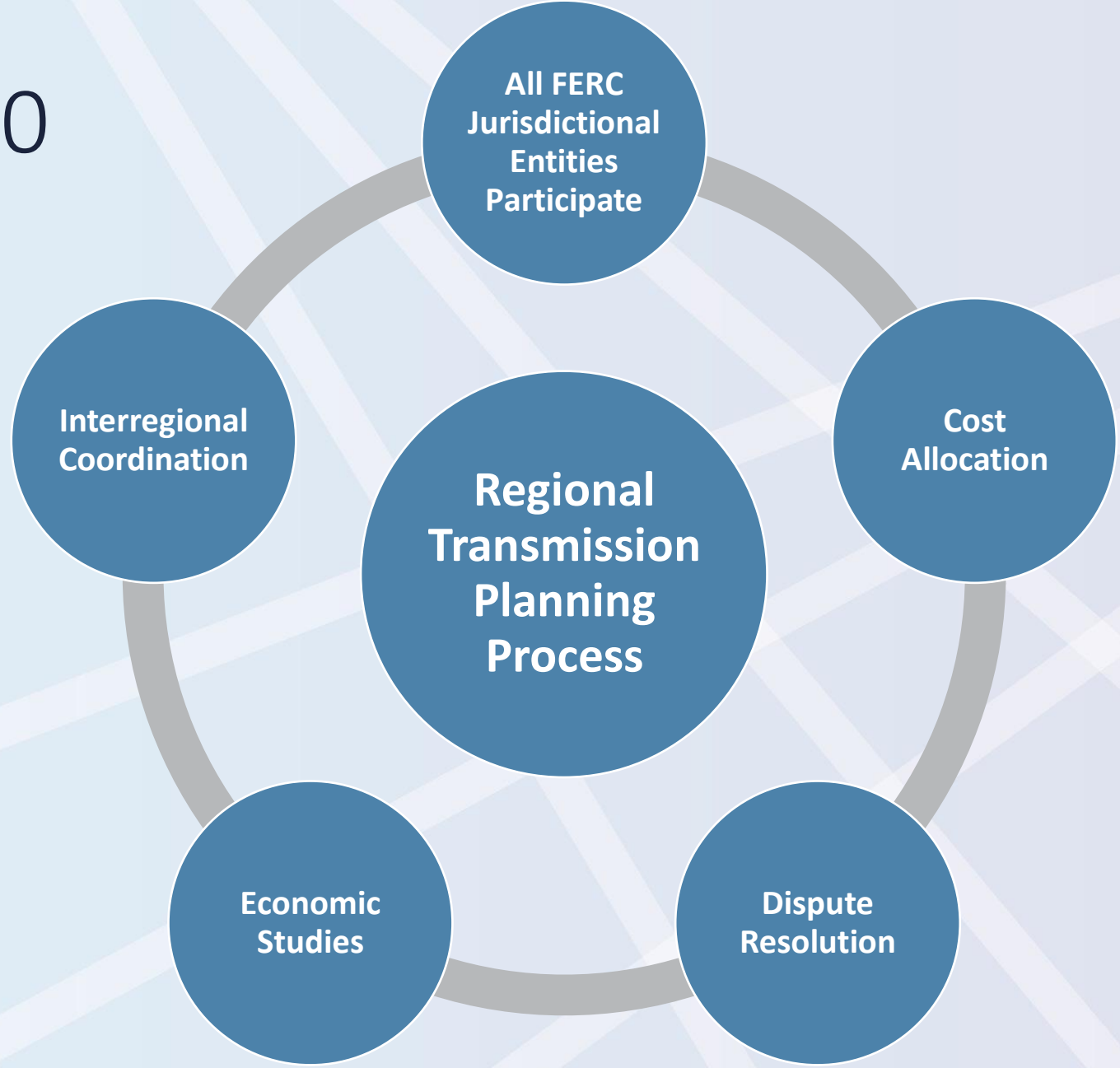
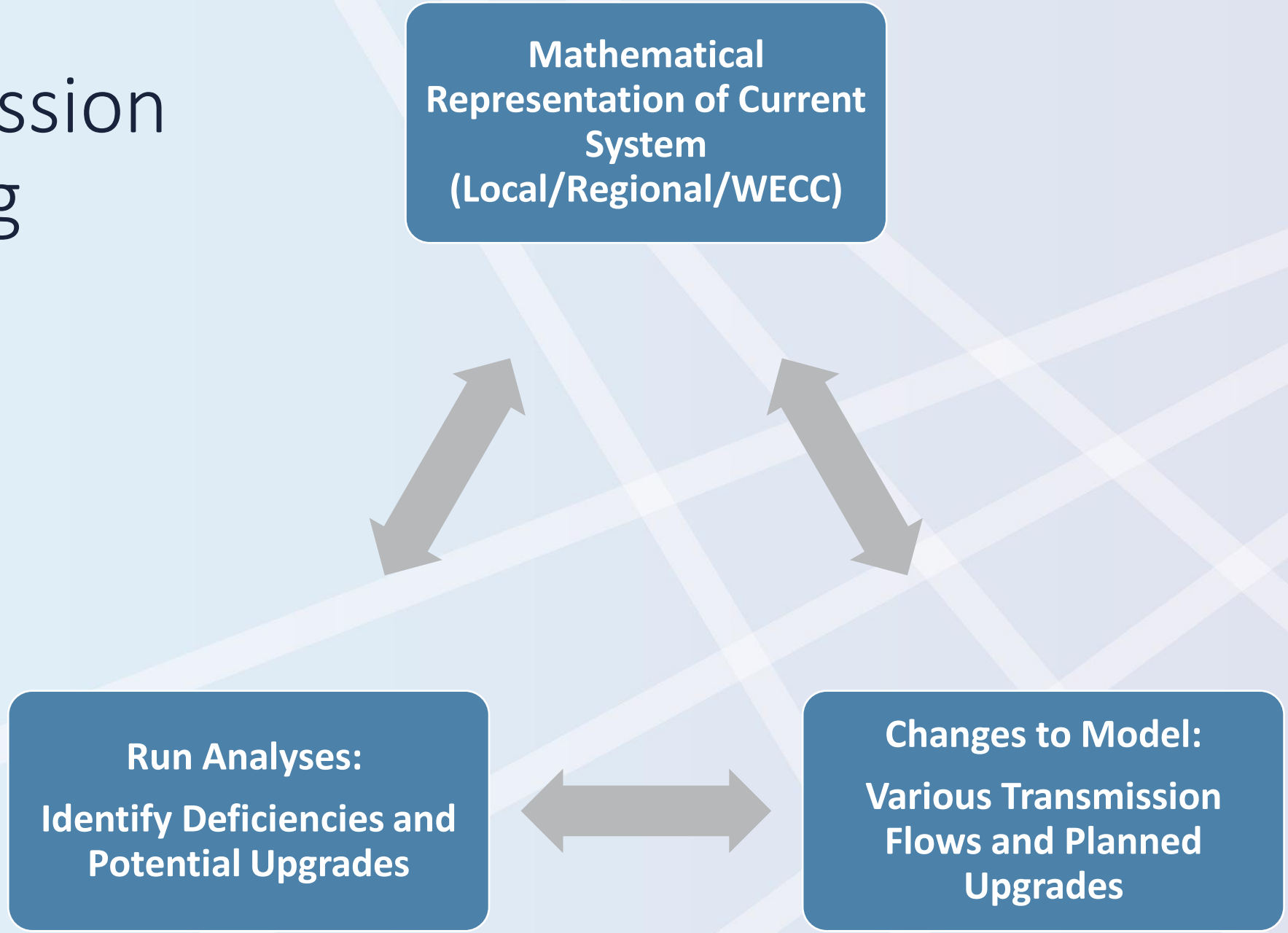
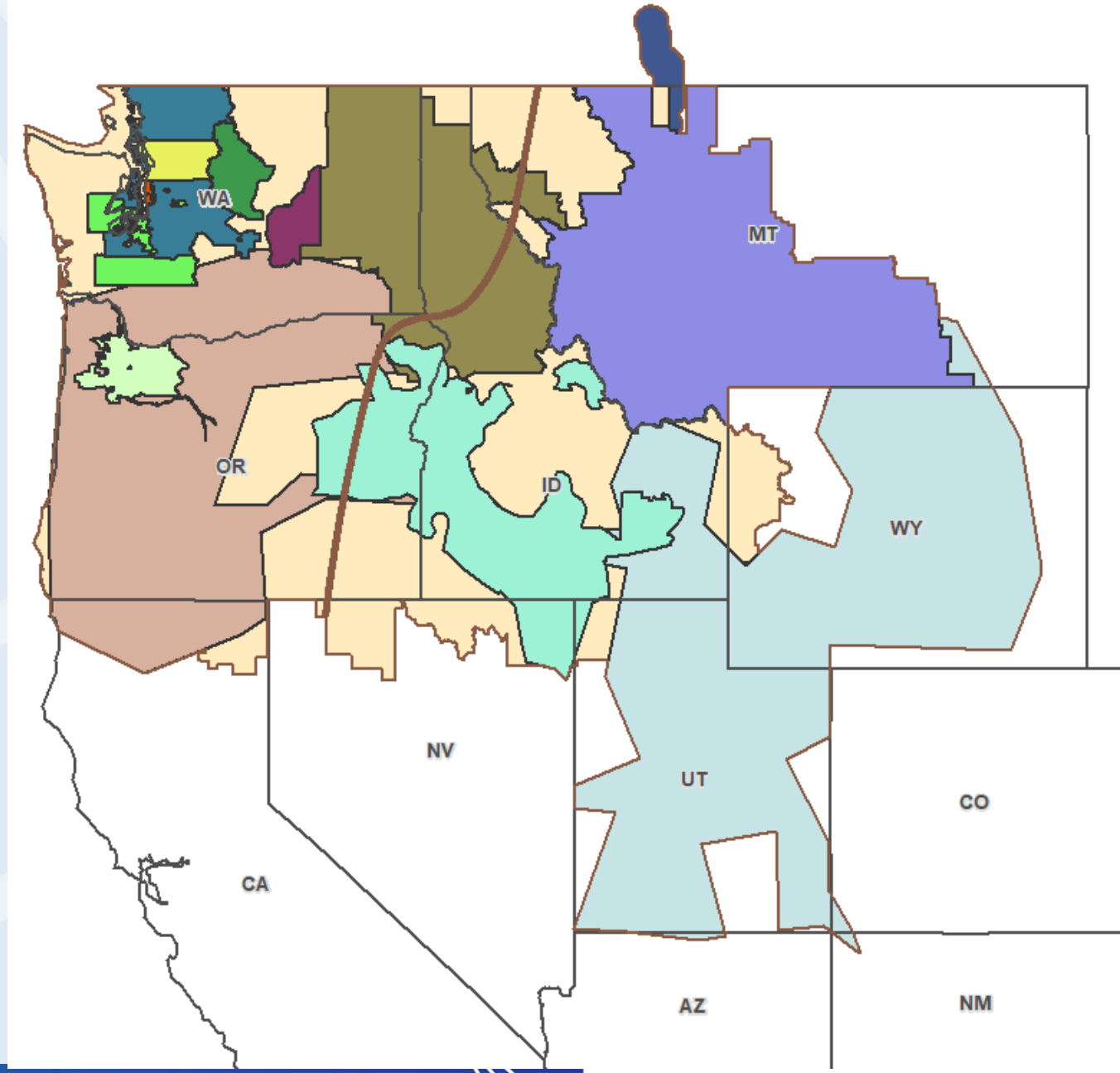
FERC Order 1000 Tenets



Transmission Planning



Association of Members



Jared

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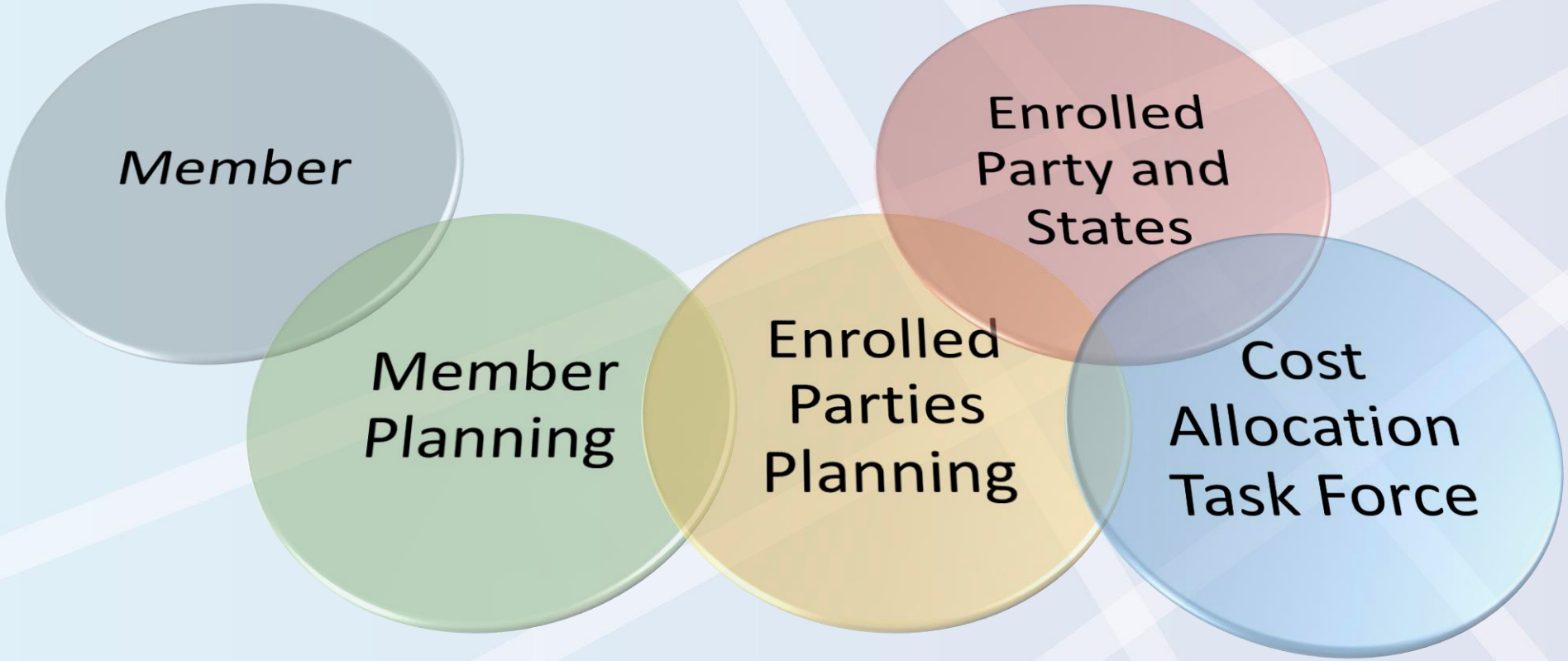
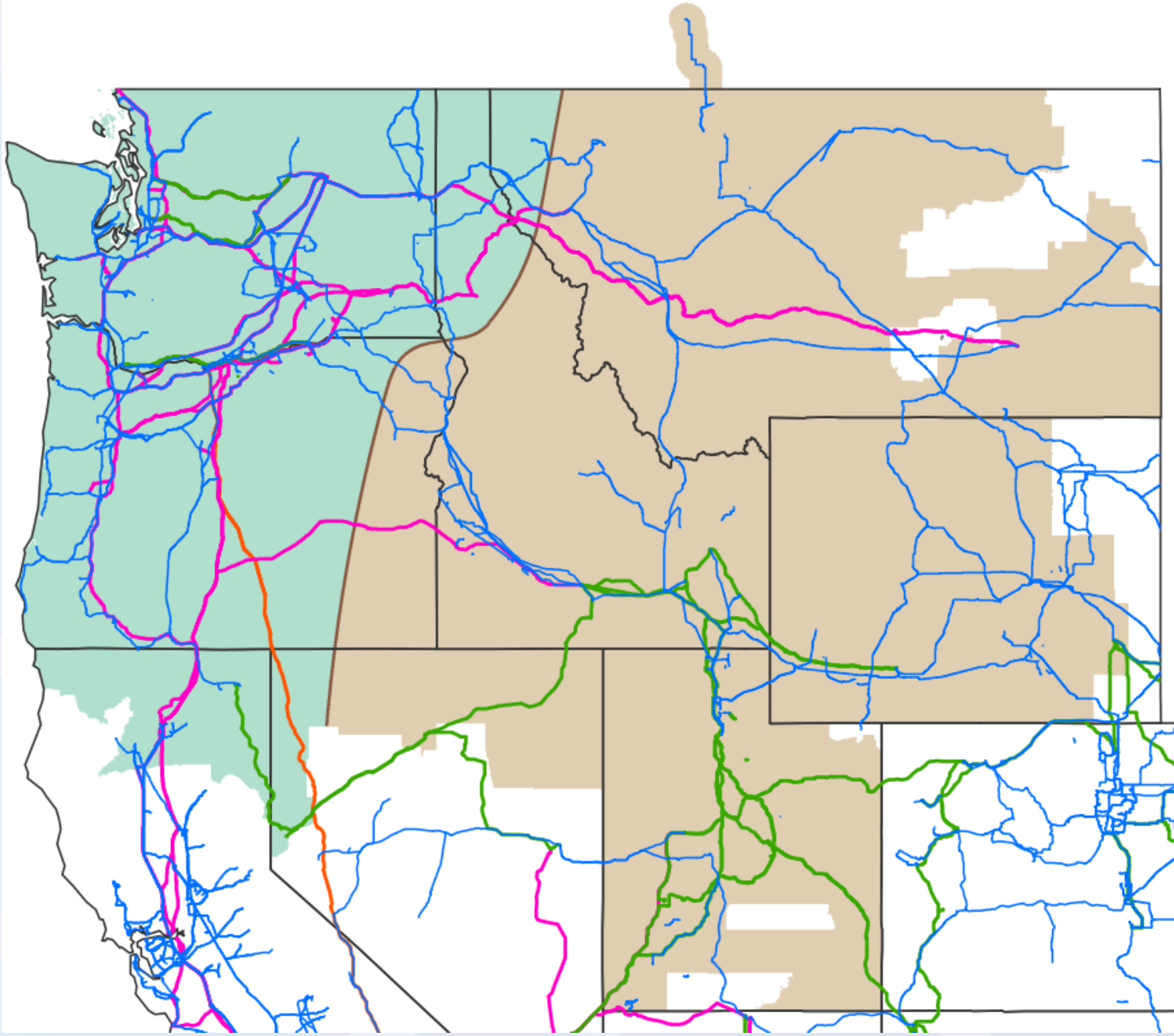
Committees


Member
Member Planning
Enrolled Party and States
Enrolled Parties Planning
Cost Allocation Task Force

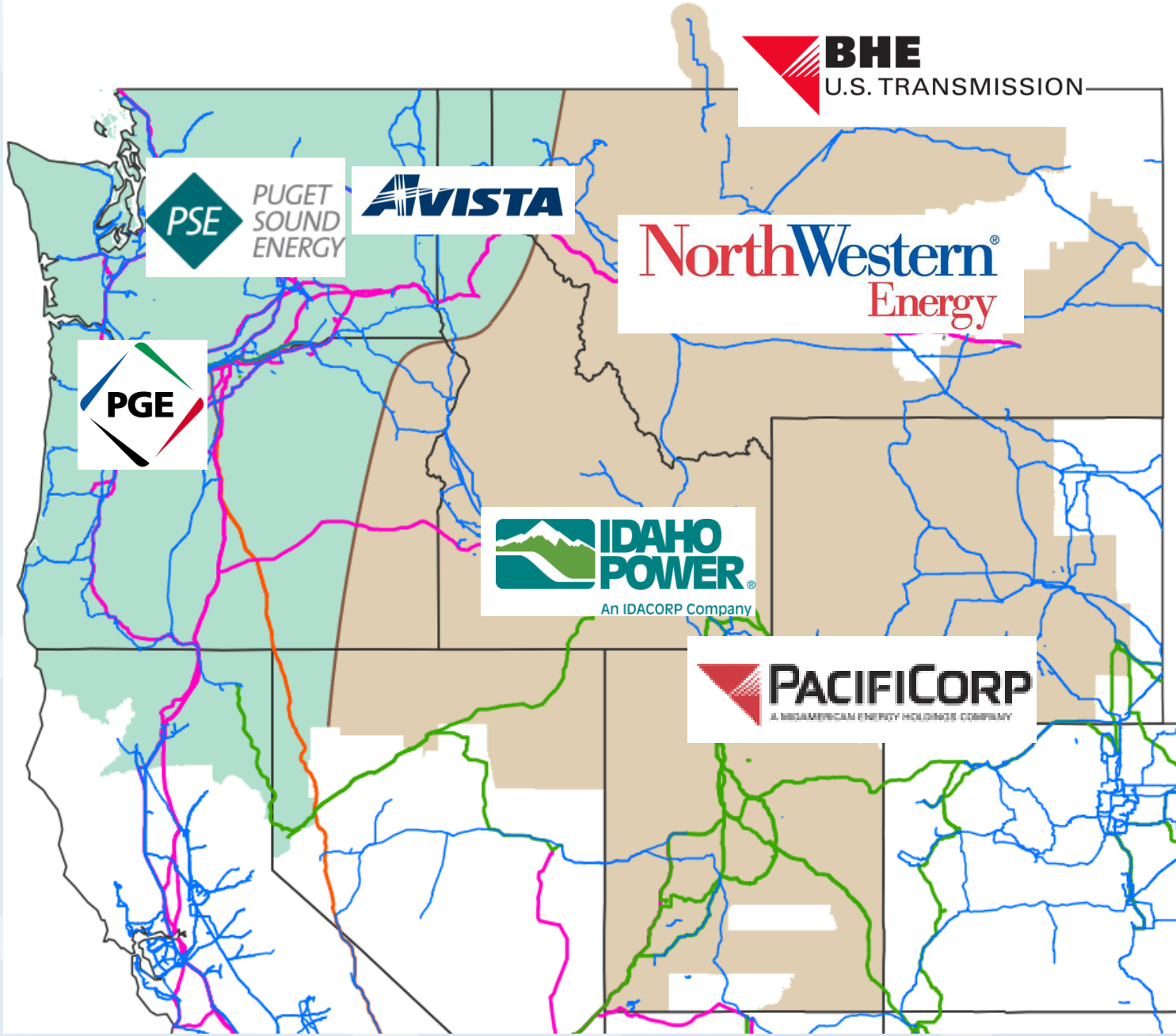
Benefits

- Collaborative Pacific Northwest and Intermountain region planning
- Common data & assumptions
- Single stakeholder forum
- Reduced cost
- Facilitates FERC transmission planning compliance
  - including economic studies and cost allocation

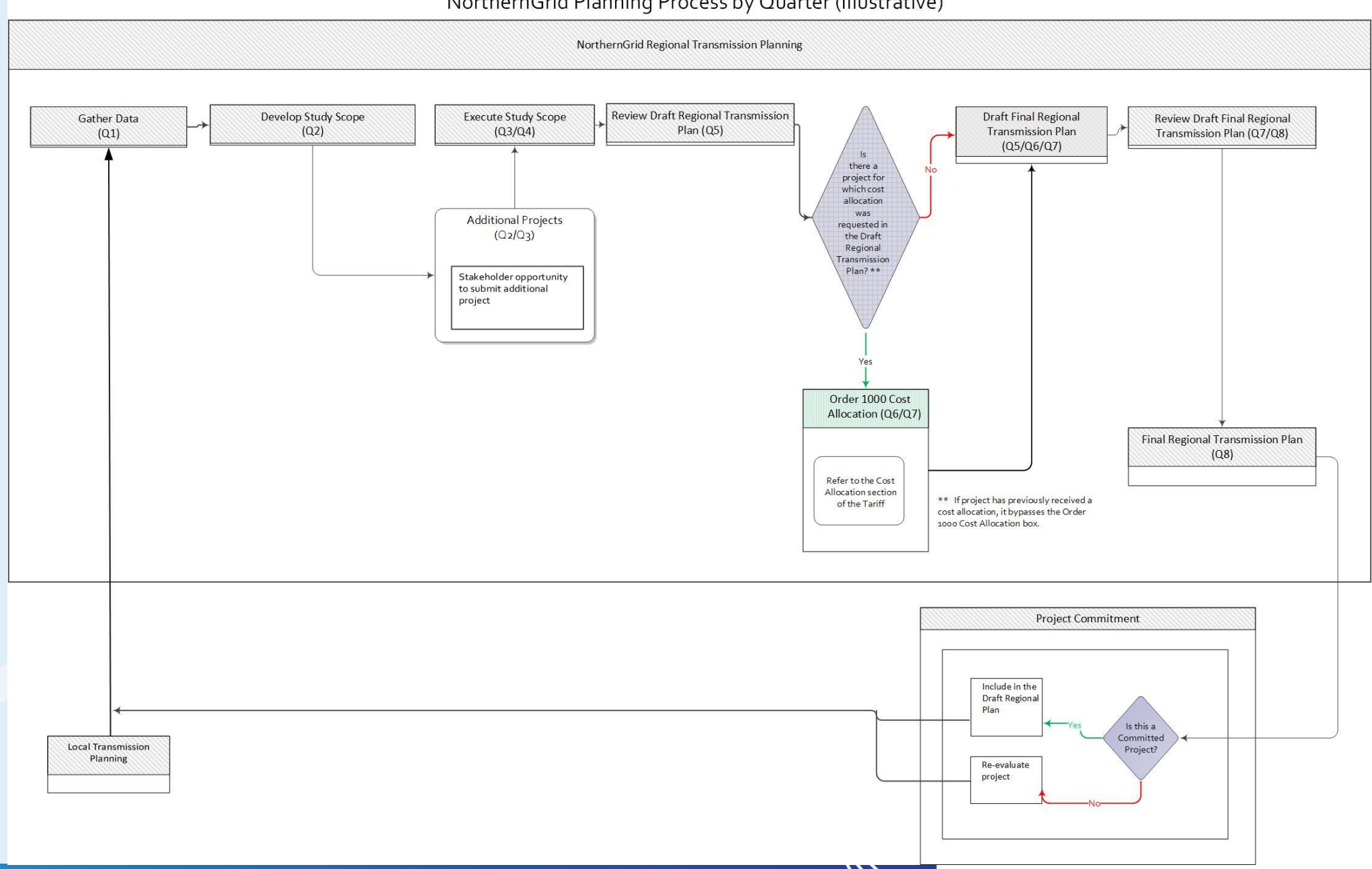


Enrolled Parties

- Members who file a Regional Transmission Planning Tariff with FERC



Planning Process



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Regional Transmission Process

- Work together to create a Regional Plan that “exceeds” a simple rollup of all the Local Area Plans

Study Scope

- **Gather Data**
- **Develop Study Plan**
- **Economic Study requests submittal**
- **Cost Allocation submittal**
- **Interregional coordination**

Analysis

- **Perform Analysis**
- **Updated data in Q5**
- **Economic Study submittal/analysis**
- **Cost Allocation analysis**
- **Interregional coordination**

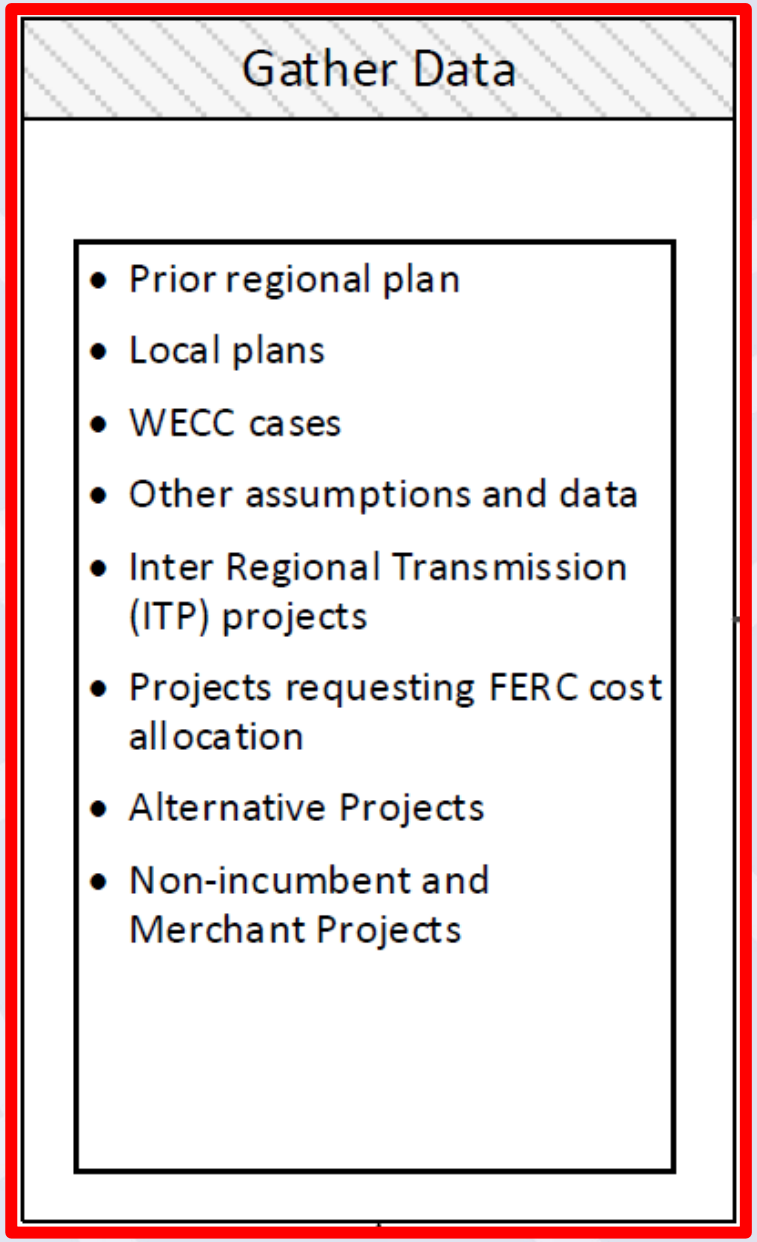
Report

- **Finalize Report**
- **Finalize Cost Allocation**

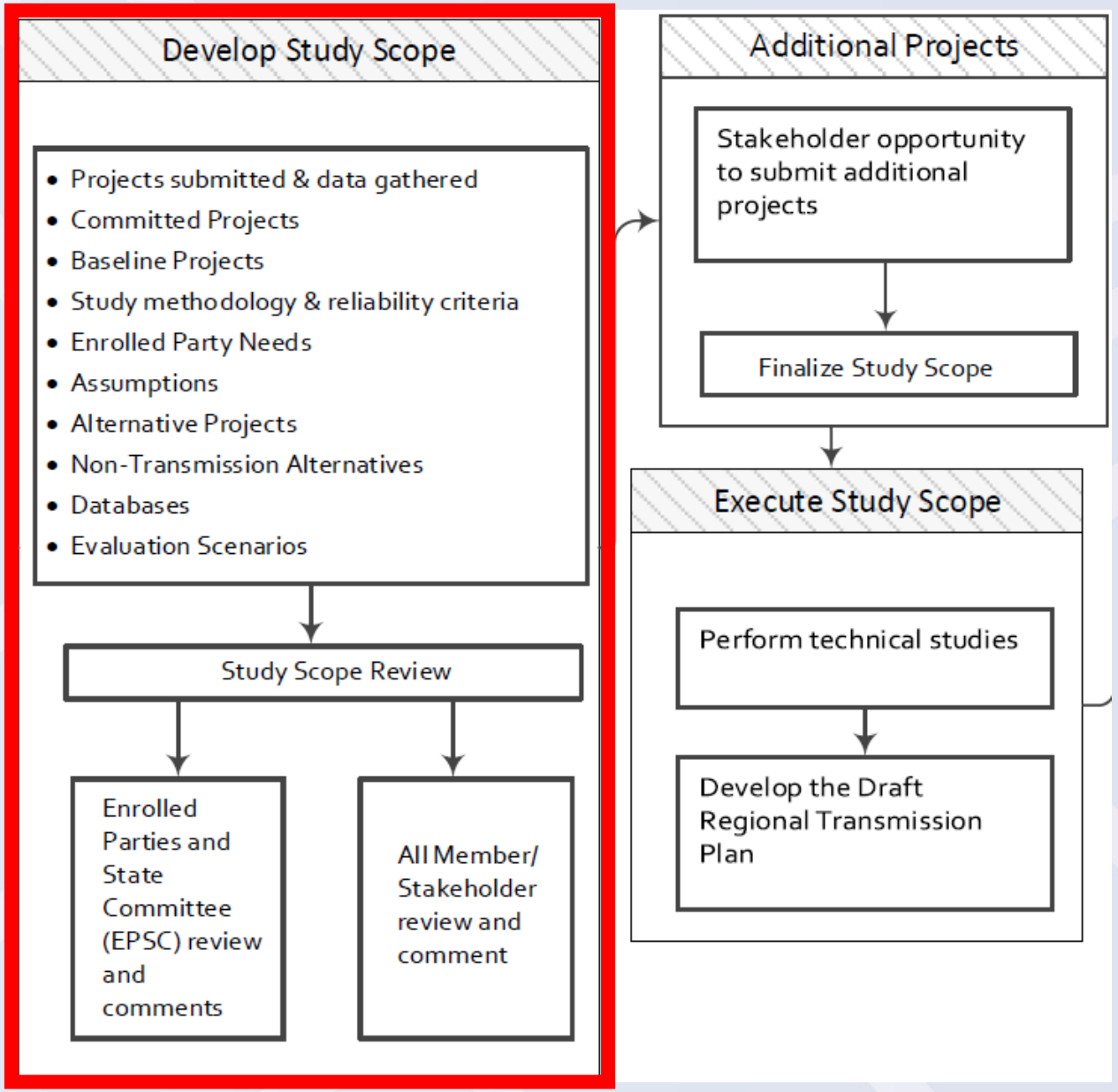
A Regional Transmission Plan is <u>not</u> a Construction Plan

Data Submission Process

- NorthernGrid Utility Data
  - Local Plans
  - Load Forecast
  - Resource Forecasts
  - Public Policy Requirements
- Non-Incumbent and Merchant Project Data
  - Associated Resources



Develop Study Scope



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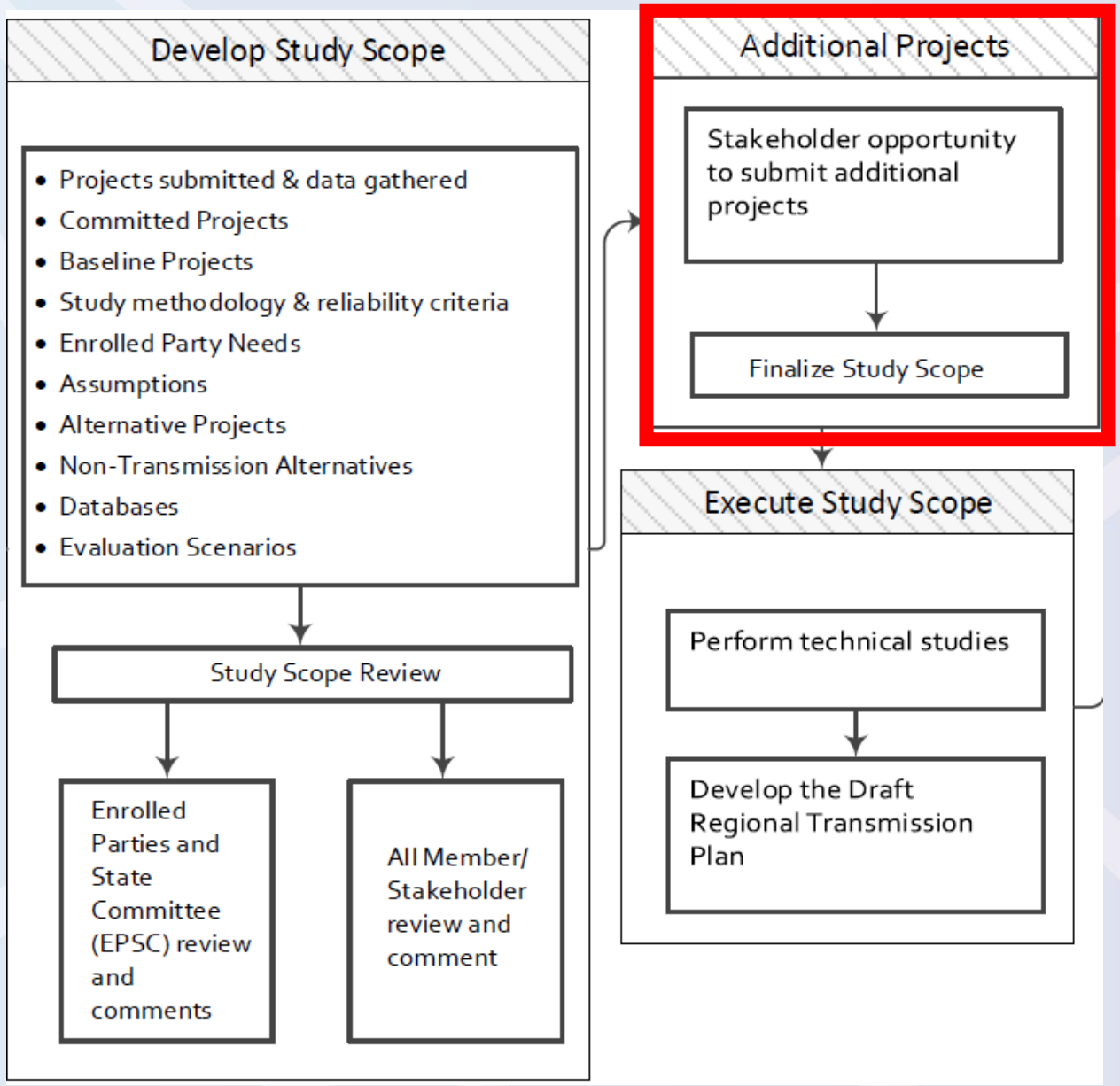
FERC Filing Lessons Learned



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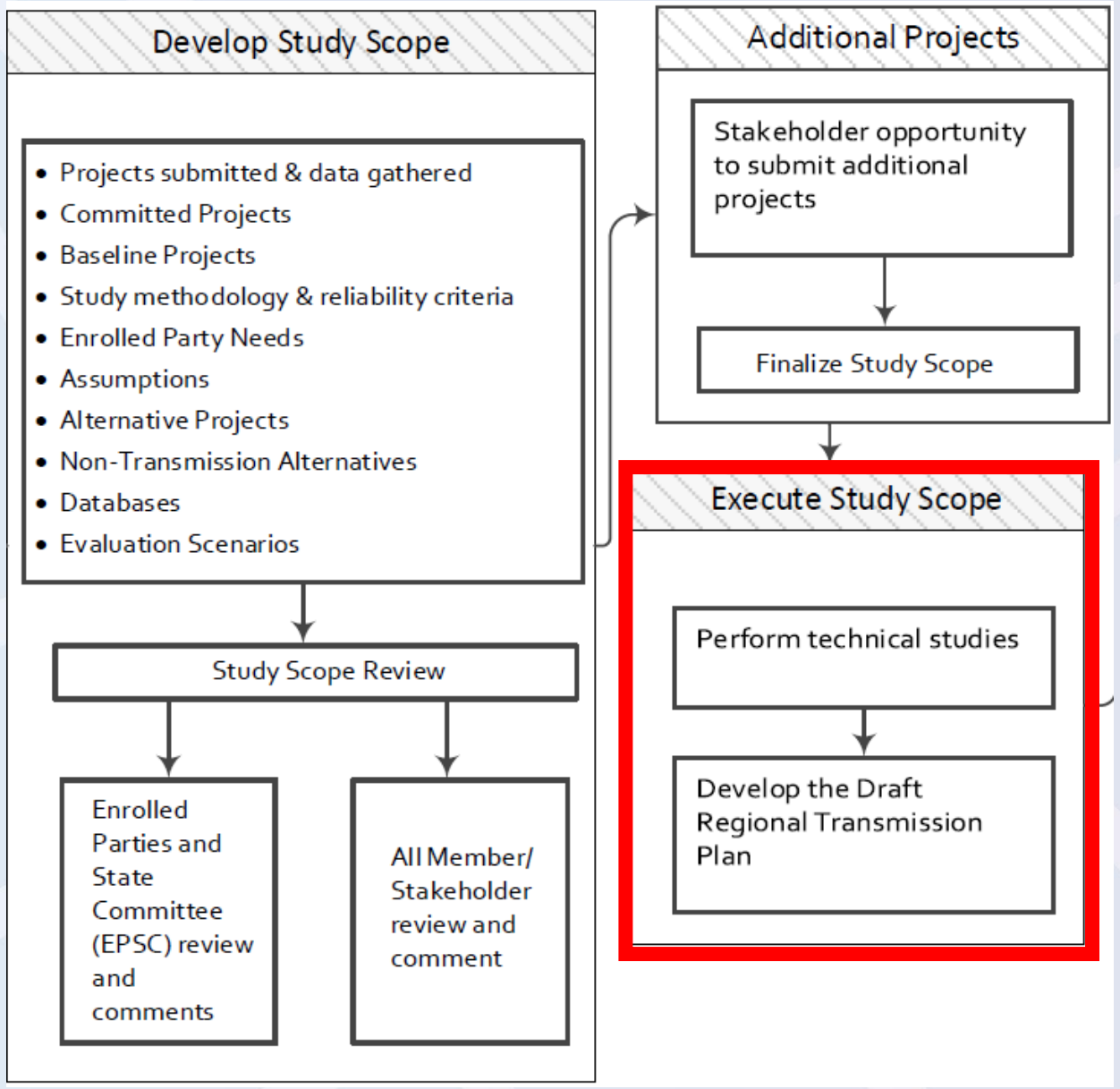
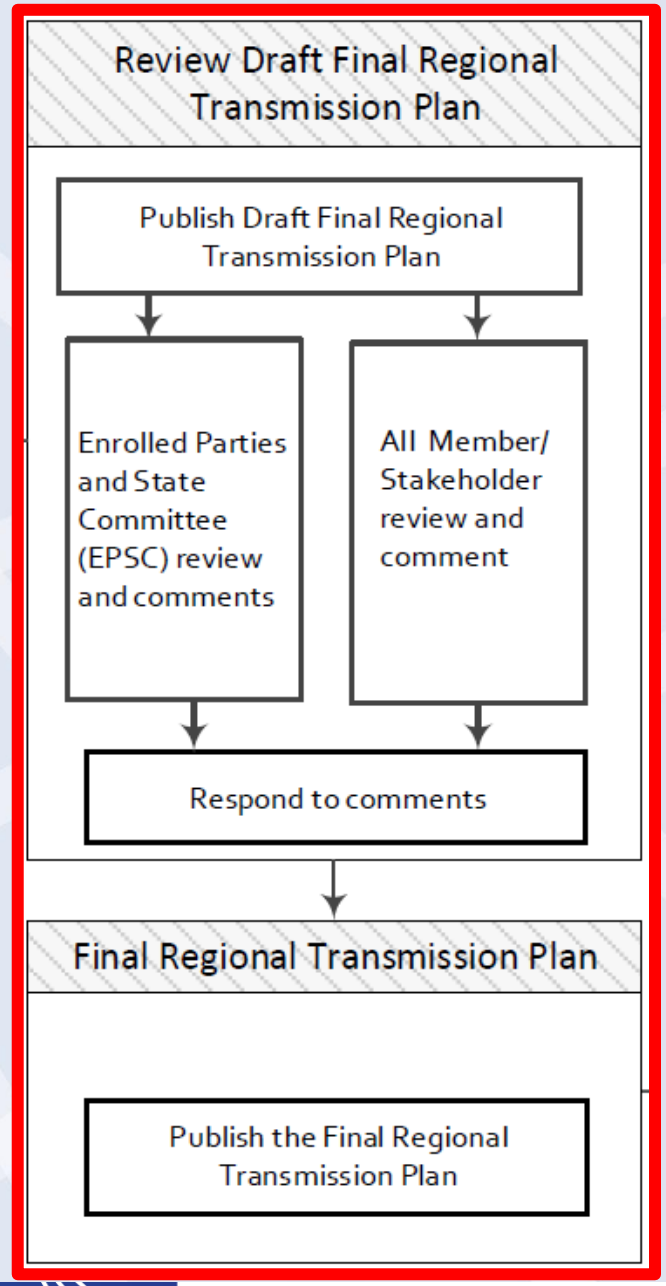
Execute the Study Scope



Process Output

- Final NorthernGrid Regional Transmission Plan
  - Incorporating stakeholder feedback
  - Includes any potential Cost Allocation



NorthernGrid Schedule of Deliverables

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Q & A Break

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Local Versus Regional Planning

Panel Discussion with Berhanu Tesema, Bonneville Power Administration; Chelsea Loomis, Northwestern Energy; James Gall, Avista; Scott Beyer, PacifiCorp; Erik Olson, PSE and Jared Ellsworth, Idaho Power Company

Moderator: Graham Retzlaff, PacifiCorp

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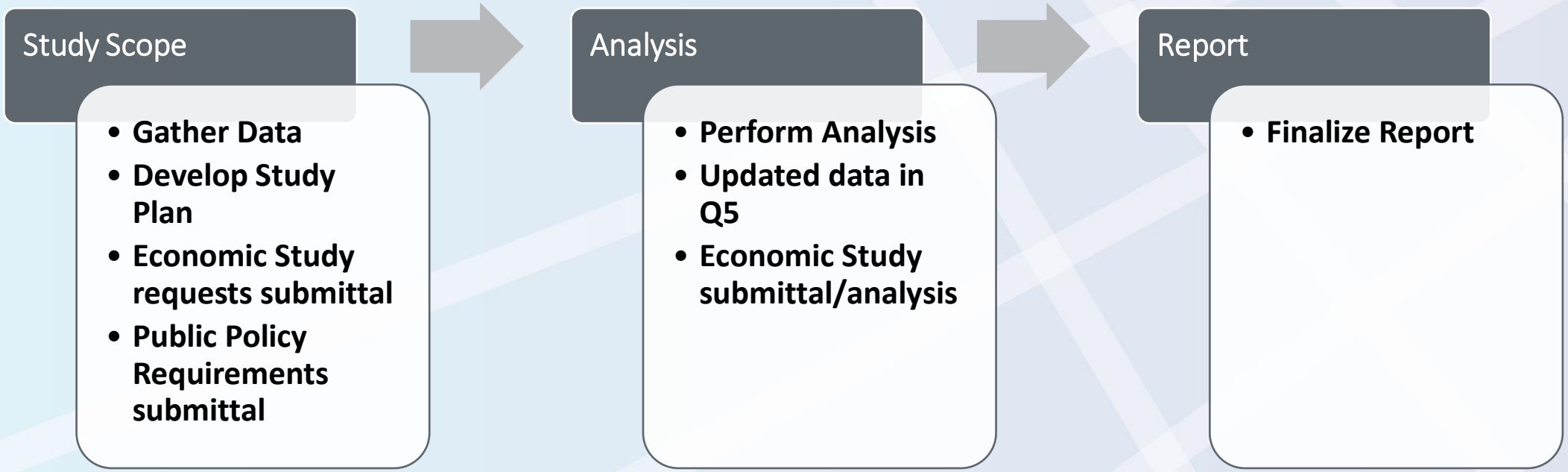
FERC Order 890 Principles

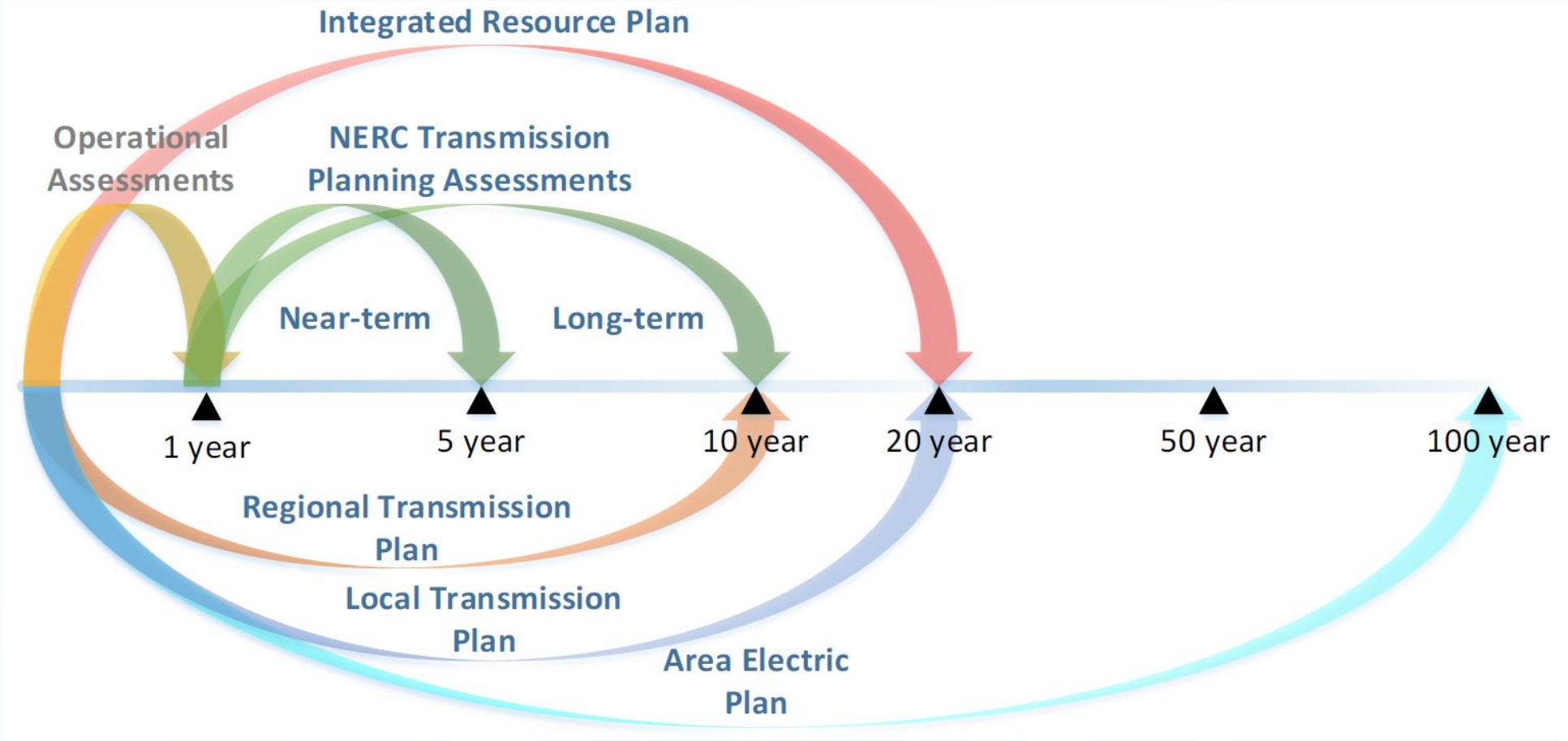
890 Attachment K and Planning Process



Local and Regional Transmission Planning

	Local	Regional
Requirement	NERC Reliability Standard	FERC Order 1000
Coordination of projects and assumptions	Adjacent Transmission Owners	Adjacent Regions
Analysis	Power Flow and Stability	Power Flow and Production Cost Model

Planning Process Overview



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NERC Reliability Standards

- The planning and operating rules that electric utilities follow to ensure the security and reliability of the bulk electric system
  - NERC Standards Committee managed
  - Developed by the industry through an inclusive process with representation from many electric industry sectors
- NERC delegated compliance monitoring and enforcement authority to WECC for the Western Region of the United States

NERC Reliability Standards with Planning Requirements

Standards Group	Areas of Focus
Cyber and Physical Security	Identifying and mitigating risk to critical facilities
Power System Modeling	Models, underlying assumptions and model validation
Transmission Planning	steady-state, short circuit, stability and geomagnetic disturbance performance analysis

Transmission Planning - Steady-State and Stability Analysis (TPL-001-4)

- NERC defined event categories are based on severity of impact, not event probability
- Prevent system performance issues that could potentially lead to widespread outages across an interconnection
  - Thermal overload
  - Over and under voltage
  - Voltage deviation
  - Voltage stability
  - System stability

Planning Study Coordination

- Base case assumptions, planned projects and timelines are coordinated between adjacent Planning Coordinators (PC) Transmission Planners (TP) at the initiation of the study.
- Contingency lists for both steady-state and stability are provided to adjacent PCs and TPs for review and feedback.

Contingency:

The unexpected failure or outage of a system component, such as a generator, transmission line, circuit breaker, switch or other electrical element.

TPL-001-4 Assessment Results

- Deficiencies require mitigation through Corrective Action Plans
- Occasionally interim operating procedures or remedial action schemes are implemented while a transmission system reinforcement project is developed
  - These procedures may result in additional local customer outage risk to mitigate system reliability concerns

Example Corrective Action Plans
Operating Procedures
Automatic Protection Schemes
System Normal Reconfiguration
Transmission System Reinforcement

TPL-001-4 Results Coordination

- Corrective Action Plans may involve projects or other mitigation affecting multiple Transmission Owners
- These projects are coordinated between the owners and reported in each entity's individual system assessment reports
- System assessment reports are distributed to adjacent owners

Planning Objectives

- Plan a Reliable Transmission System for
  - Reliable load service
  - Maintain transfer capabilities
  - New generator and line/load interconnections
- Meet NERC Compliance
  - Projected customer demand over the Planning Horizon
  - Projected firm transmission services over the Planning Horizon
  - Total Transfer Capabilities (TTC) in the Planning Horizon
- NERC Compliance requires Annual System Assessment

Key Assumptions

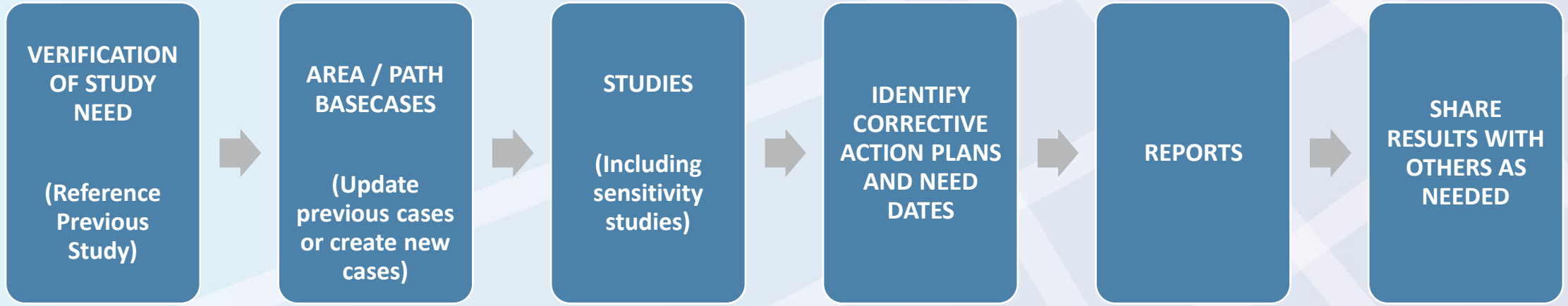
- Required to analyze both Winter and Summer seasons
- Required base cases
  - 1-2 year peak load
  - Off peak load for one of the 5 years
  - 5 year peak load
  - 10 year peak load
- Must meet NERC Standards, WECC Criteria, and BPA Criteria

Required Events

- Contingencies required to plan for
  - Single contingency (N-1)
  - Double contingency (N-1-1)
  - Breaker failures
  - Bus outages
  - Extreme events
- Facilities within applicable thermal ratings
- Voltages within acceptable ranges
- Voltage stable
- System transiently stable within acceptable voltage and frequency performance

Transmission Planning Annual Assessment Process

If Study is Needed



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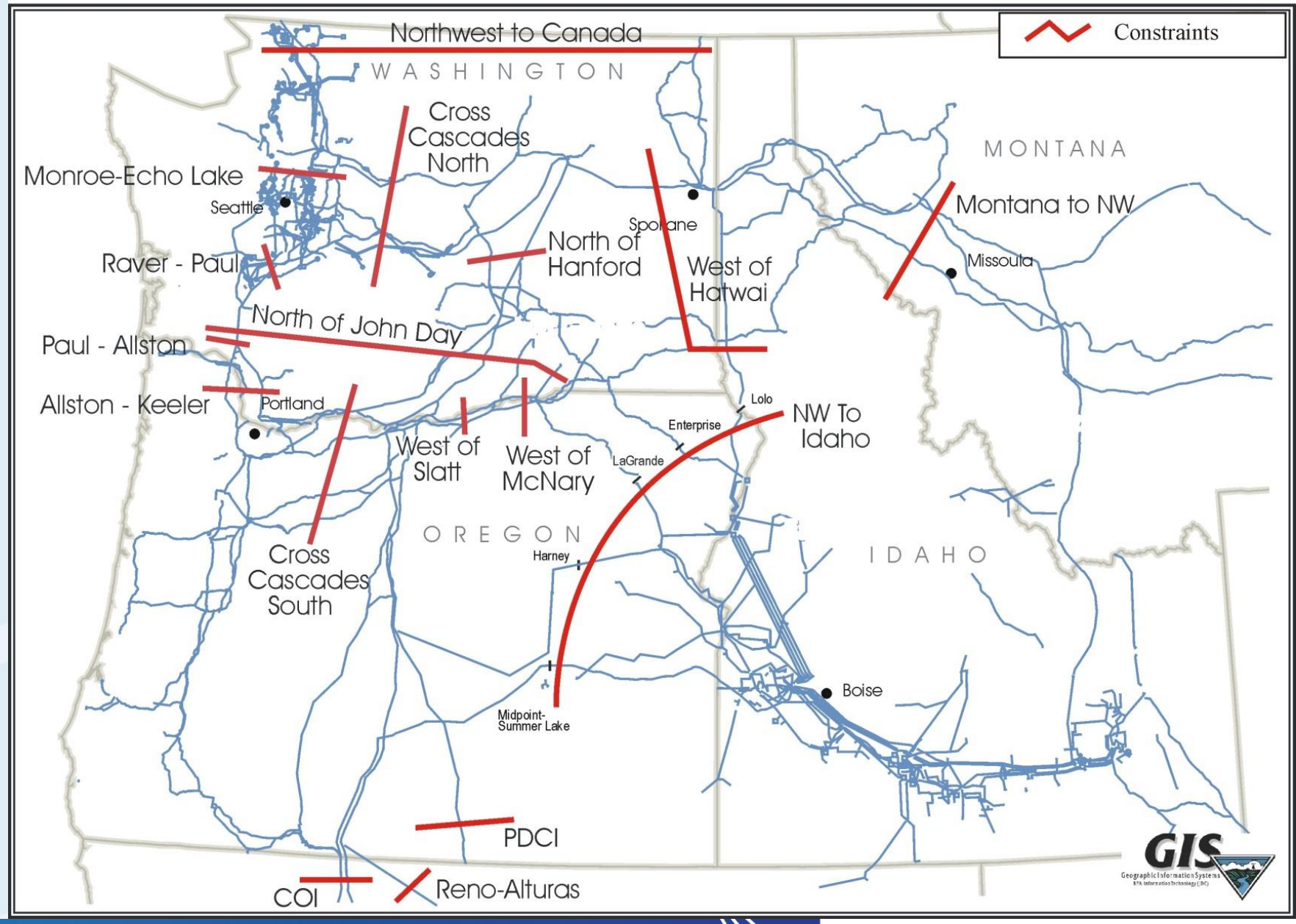
Transmission Planning Inputs

- Starts with WECC developed base cases
  - Loads provided by utilities directly to WECC
    - BPA Agency Load Forecasting provides for all public customers - Includes total connected retail load
    - IOU's, Large generating public customers
  - Resources provided by utilities directly to WECC
    - BPA provides existing federal resources among others
    - BPA provides future resources interconnected to BPA
    - IOU's, Large generating public customers
    - Dispatched to meet stress objectives defined by WECC
  - Topology and new projects expected in the Planning Horizon

Transmission Planning Inputs

- Planning base cases start with WECC base cases
  - Topology updated based on latest information for new projects
  - Loads updated with latest information
    - Outreach to Agency (customer) Load Forecasting to capture updates and intelligence
    - Outreach to other utilities for updates to individual loads/forecasts
  - Resources updated with latest information
    - Any additional future resources
    - Dispatched to simulate expected stress on the load area or transfer path being studied
    - Federal resources based on coordination with power services (expected outages, forecasted water availability, etc)

BPA System Transmission Paths



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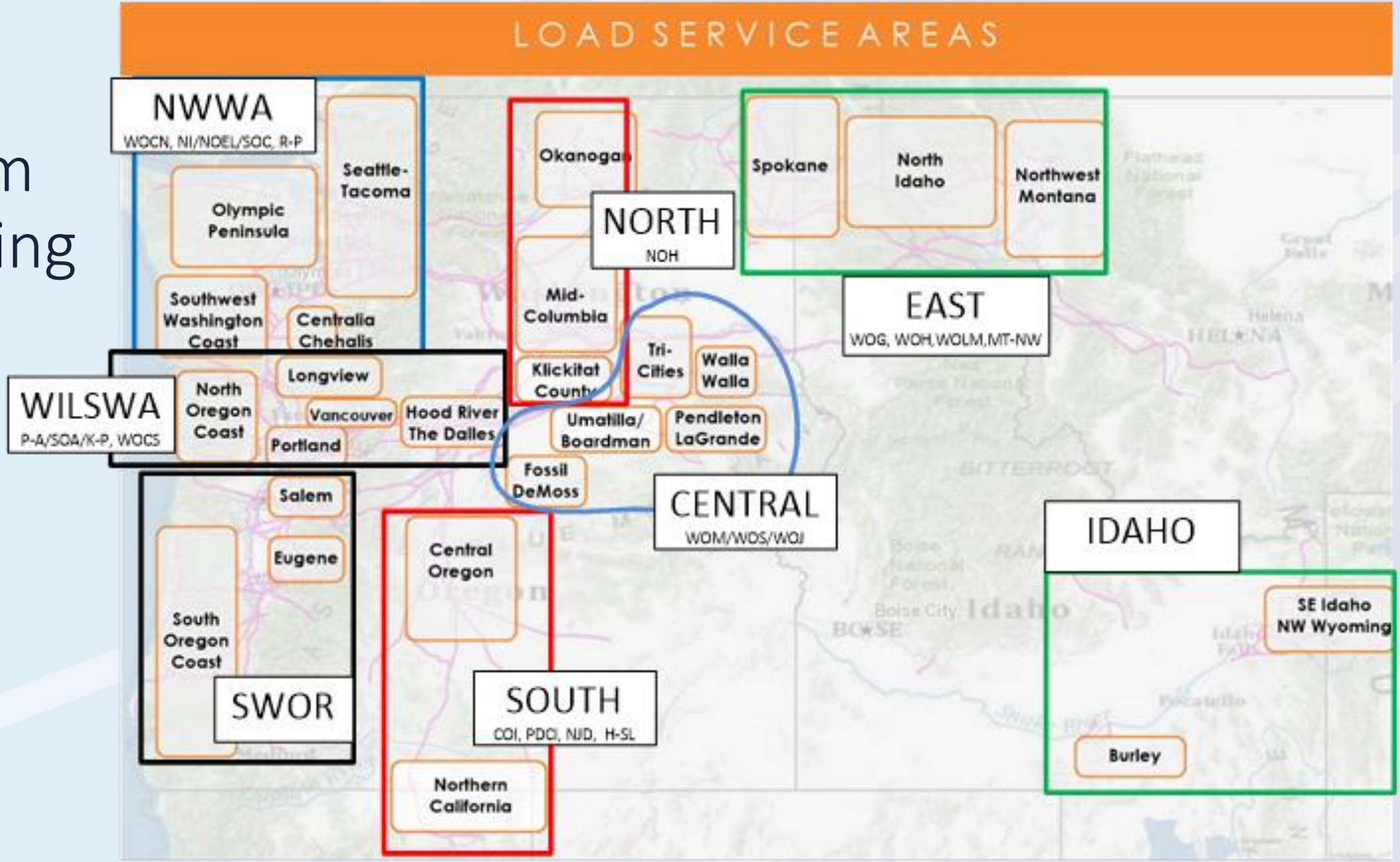
BPA System Planning Areas



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Planning Analysis Timeline

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Transmission Planning Projects

- Studies define reliability deficiencies
- Corrective action plans developed to correct deficiencies
- Projects types include:
  - Non-wires solutions
  - New substation
  - New line
  - Breaker addition
  - Transformer addition
  - Line upgrade – re-sag, reconductor, rebuild
  - Replacements – under-rated switches
  - Re-terminations within existing substation
  - Shunt capacitor/reactor additions
  - Remedial action schemes

Transmission Planning Outputs

- System Assessment Summary Report
  - Detailed studies and reports for the eight planning areas that includes all load service areas
  - Corrective action plans identified for the planning horizon
  - Assessment Summary Report prepared for Compliance
  - Non-Wires summary report
- Other Internal Study Reports as needed
- Project submittals into the Capital Project approval process

Coordination with Others

- Within BPA
  - Power Services
  - System Operations
  - Regions / Districts
  - Cost Estimating
- Outside of BPA
  - IOU's, Public Utilities, Municipalities, Cooperatives
  - Regional Planning Organizations, NorthernGrid, WECC

Study Case Overview

Planning	TPL-001-4	Starting Case	Study Cases

Local	Standard defined full system assessment	WECC Planning Cases	• Heavy Summer & Winter
			  • Year 1, year 5, and year 10 cases
			• Light Loading Case
			  • Year 1 or 2; season varies by study year
			• Sensitivity cases
			  • Further Stress the system to address potential local areas of concern

Regional	Not a complete system assessment	WECC Anchor Data Set (ADS)	• Year 10 timeframe
			  • Heavy Summer
			  • Heavy Winter
			  • Region Paths Stressed

Study Inputs

Planning	Load	Dispatch	Topology
Local	• Distributed Energy Resources • Block Loads • Wheeling Load	Adjust dispatch based off sensitivity case being studied.	Incorporate all projects in the TP's 10-year plan • Based on energization date

Regional	• Peak Winter & Summer Loads from L&R Report
	• Transmission Service Obligations
		• High Generation
		  • Wyoming wind
		  • Hydroelectric
		• High Transmission flows on 5 regional paths
			• Regional or Interregional
			• Projects submitted by members - deemed to have regional impacts
			• Non-incumbent and merchant transmission developers may submit projects for analysis

Study Contingency Analysis

Planning	Power Flow	Short Circuit & Transient
Local	• Include Contingencies internal to BAA and coordinated contingencies with adjacent Planners • Depending on the size of the BA, hundreds or thousands of contingencies may be analyzed	• Voltage and Transient stability contingencies analyzed • Short Circuit Analysis to ensure facility interrupting ratings are adequate
Regional	• Contingency Analysis: Study focus mainly on single contingency outages 230 kV and above • Multiple contingencies can be included with majority MPC approval	• Voltage and Transient stability contingencies analyzed after power flow analysis if needed • Short Circuit Analysis not performed

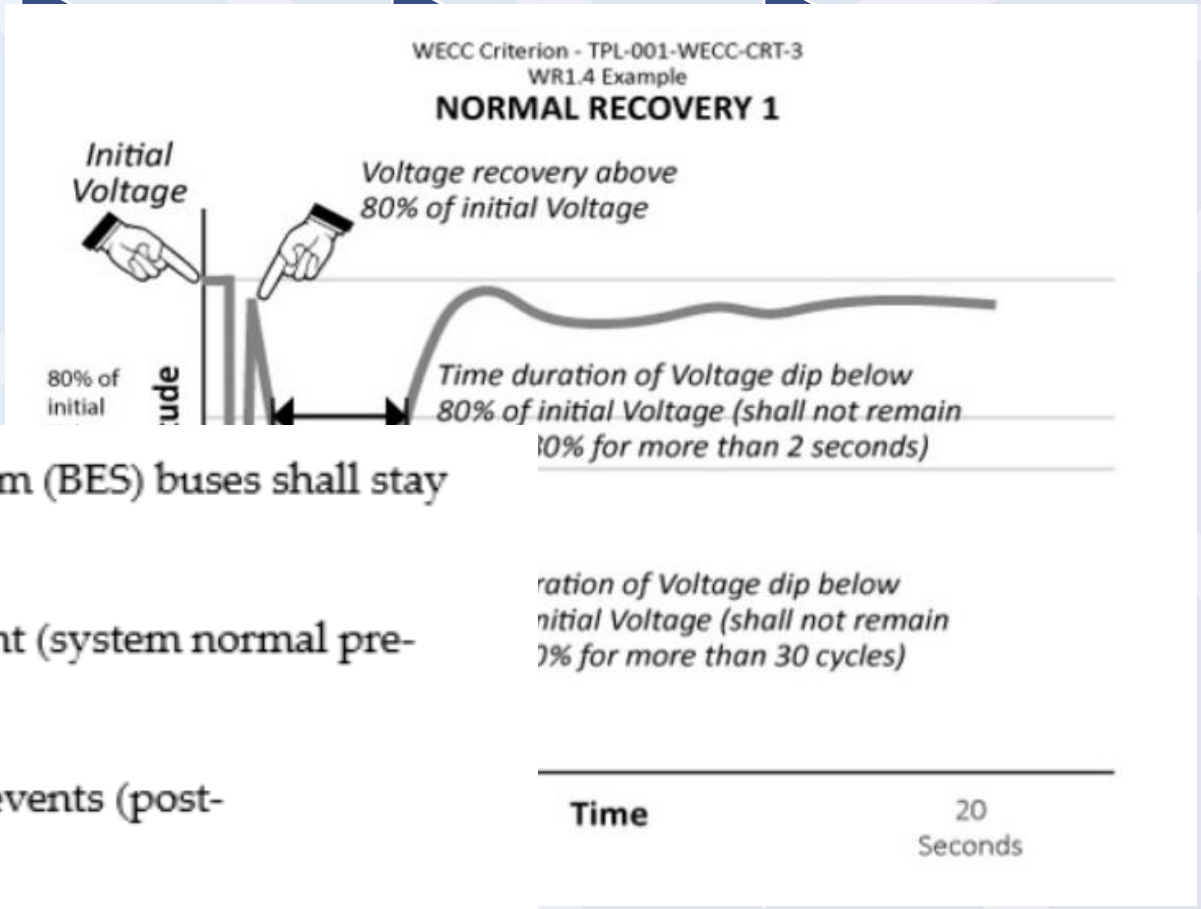
Study Outputs

Local Study

Analyze contingency performance based on entities stated performance criteria

Must meet WECC Criterion TPL-001-WECC-CRT-3.2-*Transmission System Planning Performance*

Regional Study



1.1. Steady-state voltages at all applicable Bulk-Electric System (BES) buses shall stay within each of the following limits:

1.1.1. 95 percent to 105 percent of nominal for P0[1] event (system normal pre-contingency event powerflow);

1.1.2. 90 percent to 110 percent of nominal for P1-P7[2] events (post-contingency event powerflow).

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Q&A Break

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Integrated Resource Planning Cycles

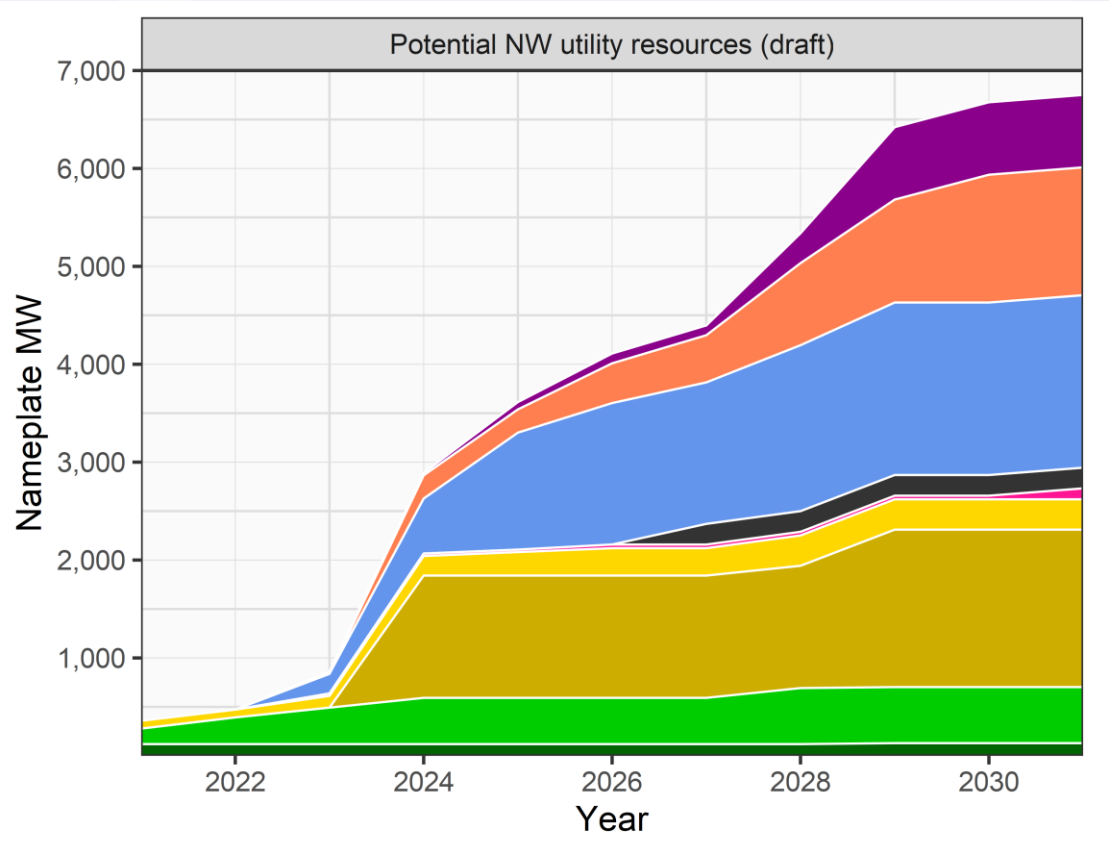
- Role of an Integrated Resource Plan (IRP)
  - Understand resource needs
  - Determine resource alternatives and benefits
  - Select likely resources
    - Resources are not always generation; energy efficiency and demand response have significant roles
    - DER planning is being pushed for inclusion and preference
- Most IRP's are completed every two years
  - Washington: filed on January 1 of odd years
  - Idaho: every two years with no specific year timing
  - Oregon: two years of from acknowledgement date and an update one year after
  - Montana: next due in 2022, now every three years thereafter, but may change back to every two years

Common Misperceptions about IRPs

- Not how resources are acquired (that is an RFP)
- IRP (generic capacity, generic specific resources)
- Utilities aren't the only entities building resources

Resource Plan Outcomes

- Integrated Resource Plans may not be helpful to transmission planners.
- Plans select generic resources or no “real” resource at all.
- Plans don’t consider existing resources opportunities.
- Request for proposal (RFPs) generally determine resource selection.
  - In a perfect world an IRP would include only resources from an RFP and resources a utility could build for near term acquisitions.



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Timing & Data Consistency

- Difference between IRP and regional transmission planning
- NorthernGrid Data Window – First quarter of even years
- What IRP resources to submit?
  - Options:
  - No resources – wait for RFP to decide
  - Placeholder resources
    - May not be located correctly
    - May not be the correct fuel type resource
  - Unit retirements?