Arizona Corporation Commission

Fifth Biennial Transmission Assessment Commission Decision 70635

Workshop on Transmission to Support Renewable Energy Development

Overall Utility Planning Process
And
Associated Transmission Issues

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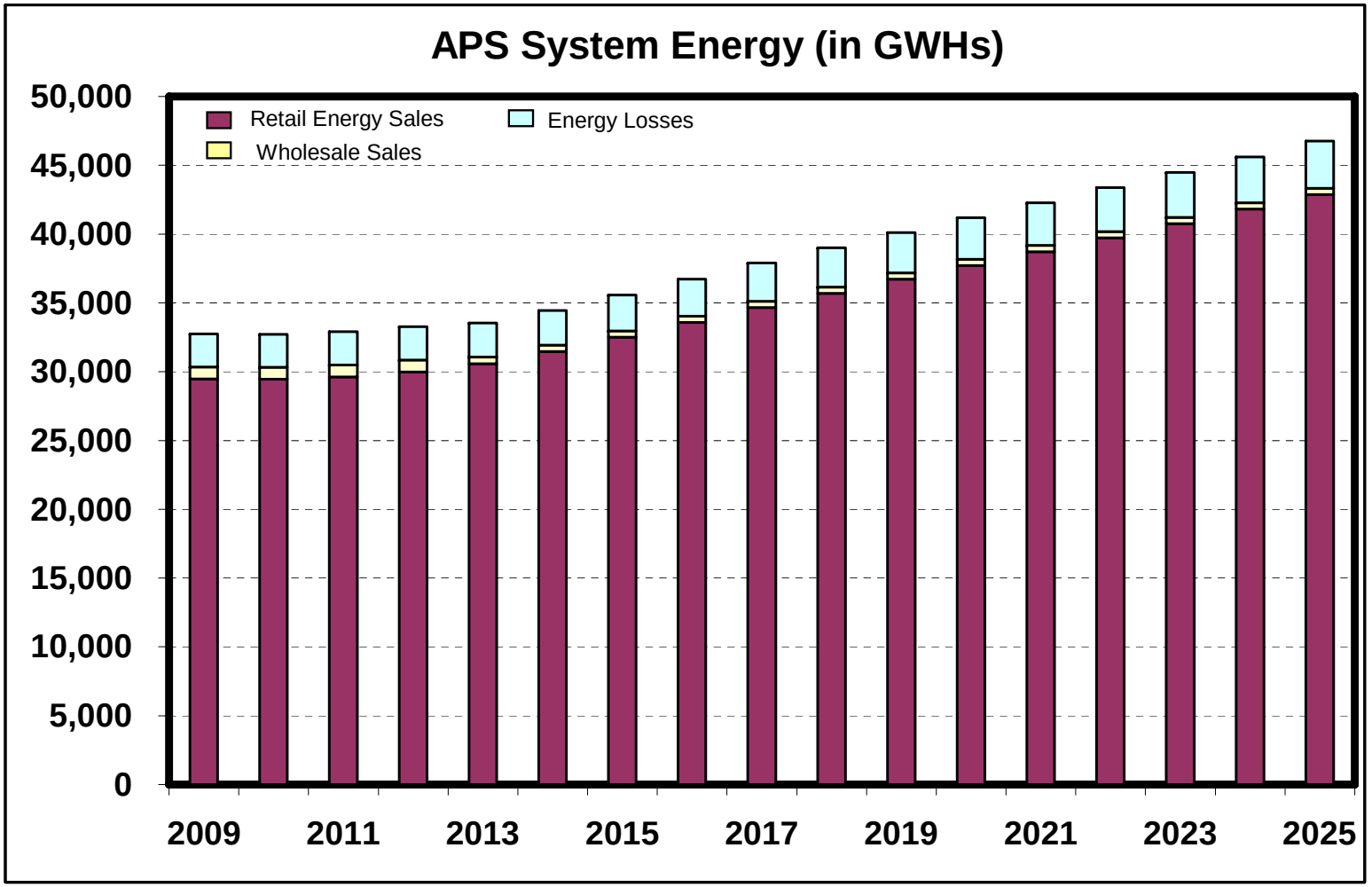
Determining Renewable Energy Need For a Vertically-Integrated Utility

- **Two Components:**
  - Satisfying Mandates:
    - For Arizona jurisdictional utilities, the RES rules specify the minimum amount of renewable energy:
      - 15% of retail energy sales by 2025
      - 30% of the total comes from distributed energy sources
  - Additional Amounts Determined Through Resource Planning Process:
    - Reasons why a utility may elect to include additional renewable energy sources beyond the mandated amount:
      - Energy source diversity
      - Mitigation of key risk factors (climate change, natural gas volatility, etc.)
      - Strategic (advance technologies for long-term benefit)

Amounts Needed to Meet the RES

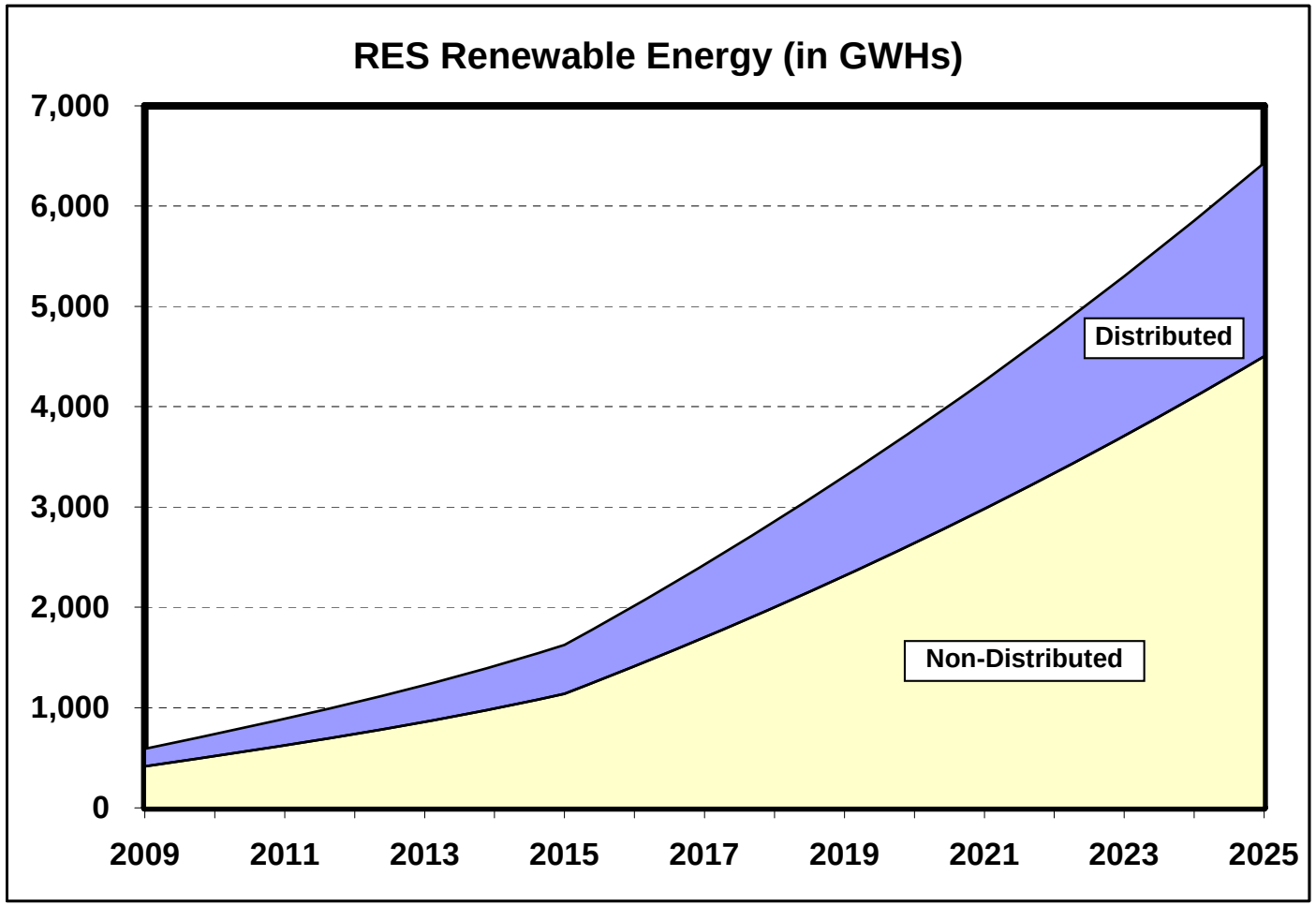
Step #1 – Load Forecast



- Load forecast develops estimate of retail energy sales
- Approx. 43,000 GWHs in 2025 (after considering EE impacts)

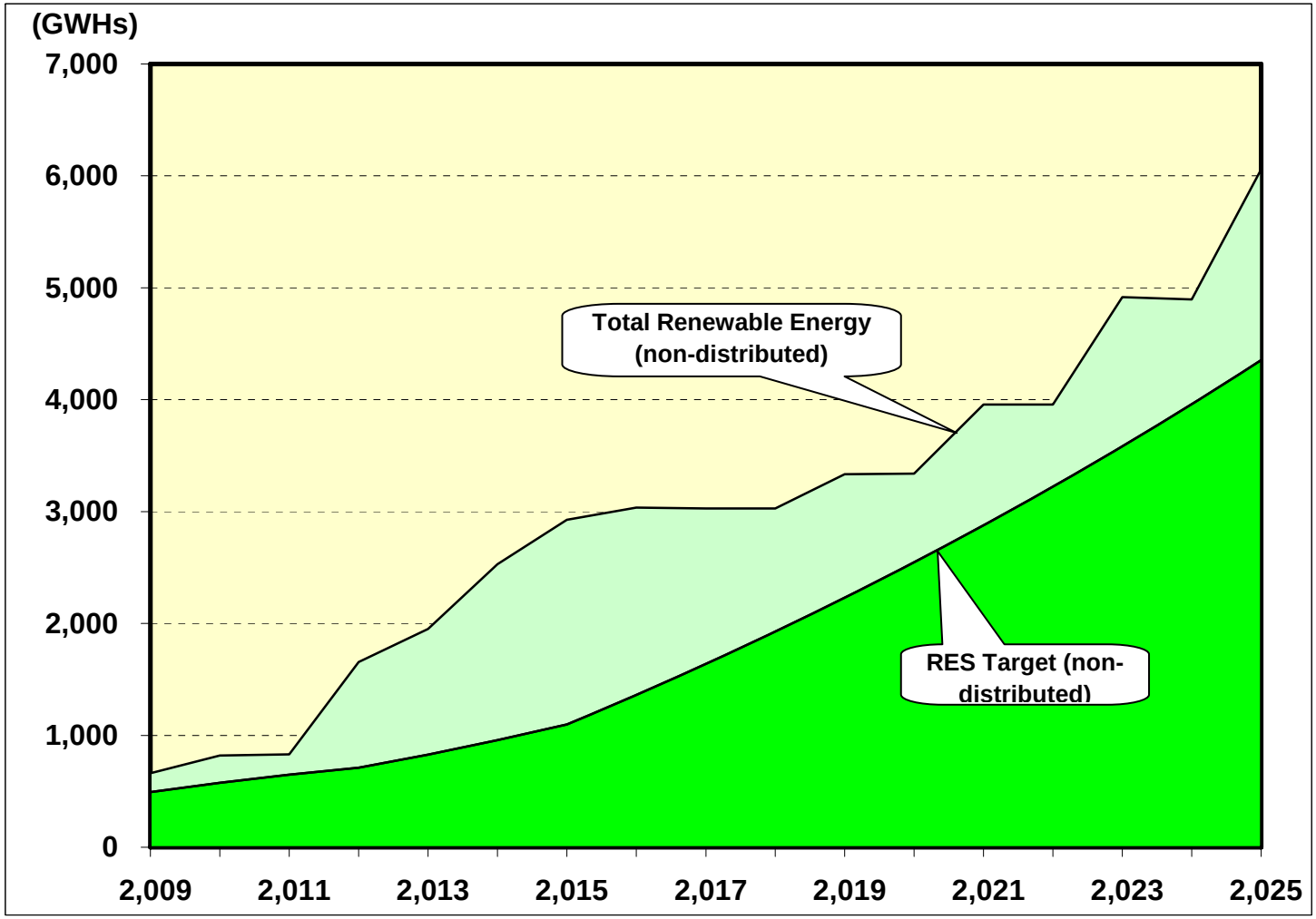
Amounts Needed to Meet the RES

Step #2 – RES Energy Requirements



- **Distributed renewables are at the load center (no transmission needed)**
- **Non-Distributed is about 4,500 GWHs in 2025**

Additional Renewables Per APS Resource Plan



- Approximately 6,000 GWHs specified by plan in 2025
- Graph only includes non-distributed renewable resources
- Figure 5 from APS Resource Plan Filing (Docket No. E-01345A-09-0037)

Making Sense of the Numbers

- **APS Resource Plan Specifies 6,000 GWHs of Non-Distributed Renewable Energy in 2025:**
  - APS Currently Has Approximately 1,650 GWHs of non-distributed renewable energy Either Operating or Under Contract:
    - Solana is approximately 900 GWHs per year
  - Remaining Amount (4,350 GWHs) Could be Met By:
    - Approximately 5 more Solana-type CSP solar plants (1,400 MWs), or
    - Approximately 1,650 MWs of wind energy (assuming 30% annual capacity factor), or
    - Approximately 585 MWs of geothermal energy (assuming 85% annual capacity factor, or
    - Some combination of the above

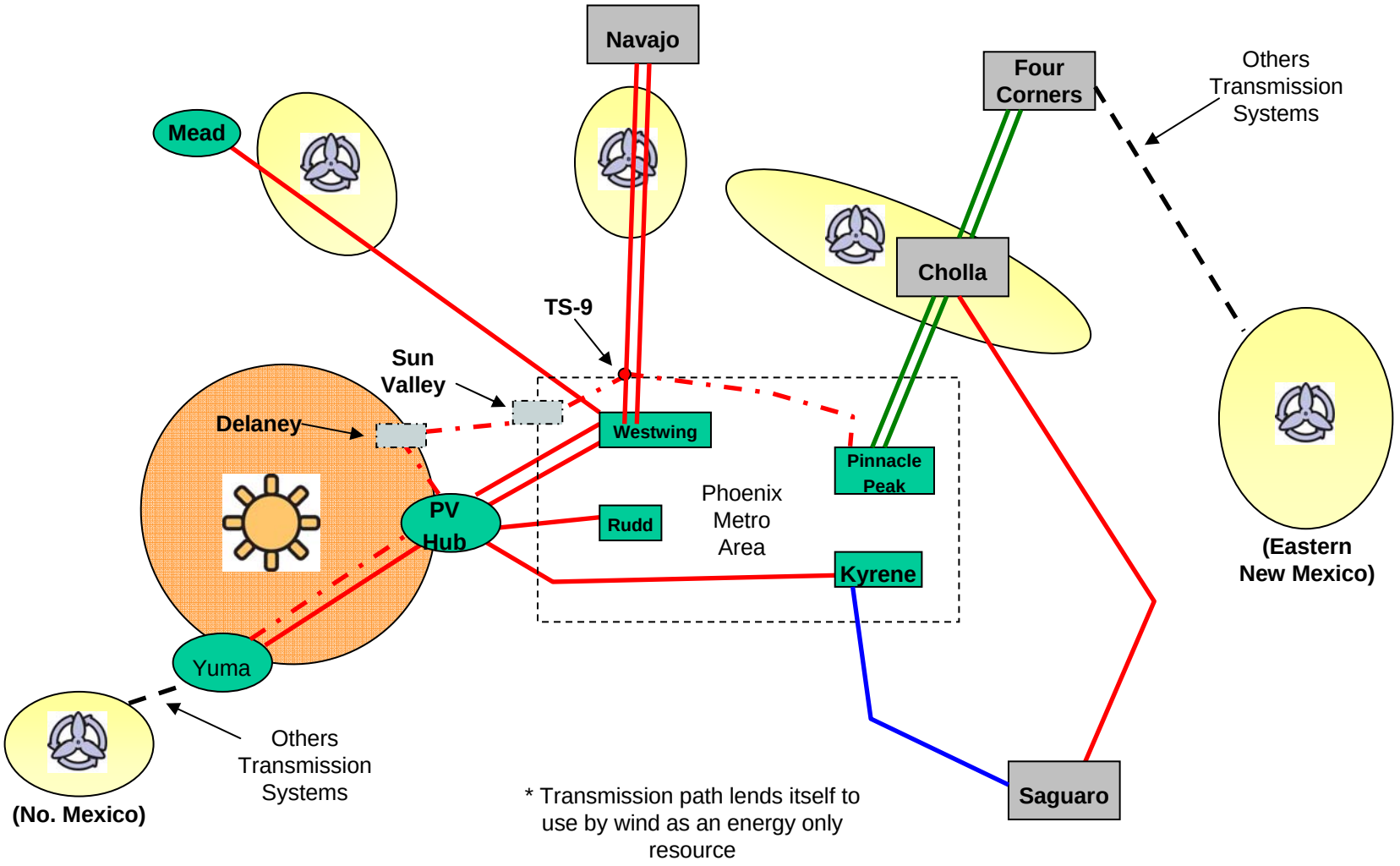
Transmission Need
(In-State Utility Perspective)

- **Steps to Defining Transmission Need:**
  - Resource Needs Identified in Resource Plan
    - Amounts, Types, Timing
    - Location of Resources is Assumed (probable locations)
  - Assess Capability of Transmission System to Support Needed Resources:
    - Current Transmission System Plus Planned Projects (10 Year Plan)
  - Identify Transmission Additions to Support Resource Plan
    - Specific Transmission Additions and Required Timing
    - Identify areas in which multiple resources can utilize the same transmission path:
      - PV-East upgrades can potentially be used for solar, new and existing gas, and market purchases
  - Regional Transmission Planning Process
    - Planning coordination and analysis thru SWAT

APS Resource Types and Related Transmission Need

Resource Type	Probable Location(s)	Transmission Solution(s)	Comments
Energy Efficiency, Distributed Renewable, Demand Response	Internal to Load Pockets	None	Reduces overall transmission need
Solar CSP, Solar PV	1. Palo Verde hub 2. W of PV 3. Gila Bend 4. Yuma	1. Generator interconnections, plus 2. Additional PV-East	Additions already in 10-Year plan will help to meet resource expansion needs
Wind	1. Northern Arizona 2. New Mexico	1. Use existing, or 2. New transmission	APS Resource Plan Report identified capability to use existing transmission system to import wind
Gas Combustion Turbines	1. Internal or Adjacent to Valley Network 2. Palo Verde hub	1. Generator interconnections, or 2. Additional PV-East	
Market Purchases	1. PV hub 2. Mead	1. Additional PV-East	

APS Transmission System Schematic



Planning vs. Procurement

- **Resource Planning Provides the "General" Direction:**
  - Includes assumptions regarding the amounts, types, timing, and general location of future renewable resources
  - Assumptions define the high-level path to fulfill future renewable resource and related transmission needs
- **Actual Renewable Resource Projects are Determined in the Procurement Process:**
  - Specific amounts, timing, types and location of renewable resources determined through future procurement processes
  - May lead to results that are different from the resource plan assumptions:
    - Economies of scale can impact project size
    - Technology developments can influence future renewable resource types
    - Location based upon specific project development
  - Future resource plans will be adjusted based upon actual procurement results

Other Drivers for Transmission Need

- **Out-of-State Utility Demand for Arizona Renewable Resources:**
  - These utilities will go through a similar process of defining renewable resource need
  - Will they find Arizona to be a favorable source of renewable energy?
    - Economics?
    - State policies (siting, permitting, land use, water)?
    - In-state preference?
- **Merchant Generation:**
  - Renewable projects are not currently being built without long-term utility commitments:
    - Renewable resources currently higher cost than market
    - Renewable resource projects solely driven by utility commitments
  - Challenges of sorting out merchant activity:
    - Extensive amount of interconnection requests and development activity
    - Difficult to determine the ultimate destination of the power
      - i.e., Arizona or California

Traditional Transmission Cost Recovery

- **Utility Transmission Line:**
  - Line included in 10-year plan (BTA review process)
    - Line that provides benefits to the system
  - Included in FERC rate base for all transmission customers
  - TCA mechanism for recovery from retail customers (APS case)
- **Generator Interconnection Process (LGIP):**
  - Generator pays for line(s) that connect project to transmission system
    - These lines would benefit generator only
  - Additional system upgrades are initially paid by generator and then "credit" given back to generator over time
    - Benefit system but the need is created by interconnection
    - Credit in the form of transmission service or cash payment
  - This process is established by FERC guidelines