

# Transmission 101

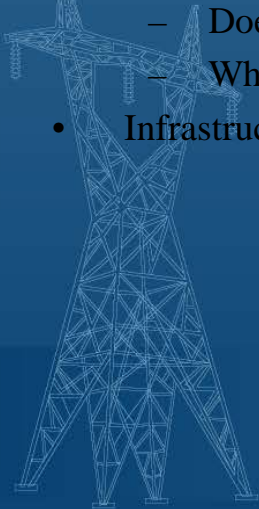
An Overview of Transmission development processes



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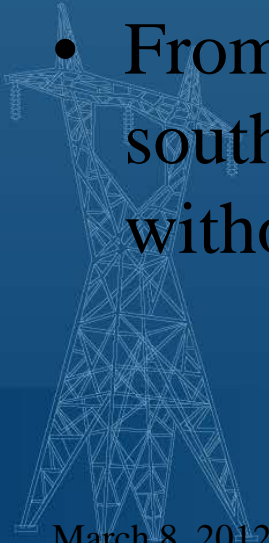
# Topics

- Realities of existing transmission grid and available capacity
  - Transmission Capacity Availability
  - Reliability Issues
    - What is a Balancing Authority?
    - Ancillary Services
- Integration of transmission planning with solar project planning
  - Developing power purchase agreements based on viable transmission connectivity
  - Ensuring lack of transmission access doesn't delay or jeopardize a project
- Inter-relationship between transmission development and renewable energy development
  - Does one process drive the other?
  - What are the issues associated with integration of renewable energy resources into the grid?
- Infrastructure requirements for transmission connection

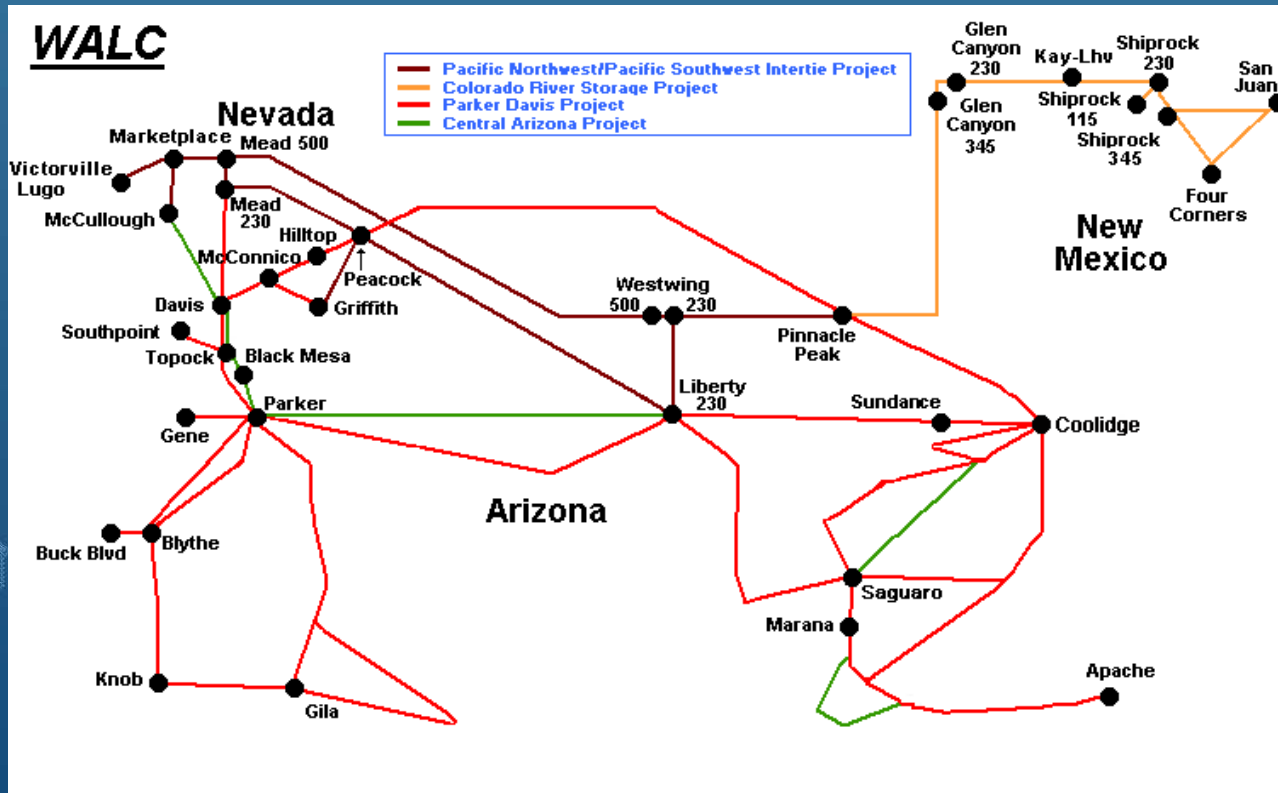


# Existing transmission grid and available capacity

- Location, Location, Location
  - Locations of solar areas (Generator) compared to the location of energy needs (Load)
- Low hanging fruit has been picked
- From a Western perspective access to markets in southern Nevada or California may be limited without upgrades.



# Existing transmission grid and available capacity



# Reliability Issues

- What is a Balancing Authority (BA)?
  - NERC definition: The collection of generation, transmission, and loads within the metered boundaries of the Balancing Authority. The Balancing Authority maintains load resource balance within this area.
- The role of a BA
  - Balancing of resources and loads
- Impacts to developers
  - Need to obtain certain ancillary services.



# Reliability Issues

- Renewables impacts to a BA
  - The output uncertainty factor
  - Strain on the availability of ancillary services.
- Impacts to developer
  - Obtaining ancillary services
    - Regulation and Generator Imbalance



# Transmission development and renewable energy development

- **Does one process drive another?**
  - The developers juggling act
  - Power Purchase Process
  - Transmission Service Request Process
  - Interconnection Process
  - Environmental Process
  - Local Processes (municipalities, counties)



# Transmission development and renewable energy development

- Issues associated with integration of renewable energy
  - Transmission constraints to deliver energy to the markets/loads.
  - Environmental Issues for analysis on new lines.
  - Is environmental work on a transmission service request from a generator a connected action?
  - Time is of the essence.
  - Conditional Firm, a possible solution.





# Transmission development and renewable energy development

- **Issues list continued**

- Available resources vs. existing workload
- Schedule for construction start
- Desired in service date
- Seasonal considerations
- Queue issues - time spent in queue before initiating system studies
- System studies
  - Identifying facility improvements
  - Changes in the project



# Infrastructure requirements for transmission connection

- For Interconnection
  - Location, location, location
  - Based upon results of the system impact study
  - Typically, a 3-Breaker Ring switchyard
- For Transmission Service
  - Varies, from upgrading equipment at a substation to building a new line

