



Western  
Area Power  
Administration

# Energy Markets

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DOE Tribal Webinar



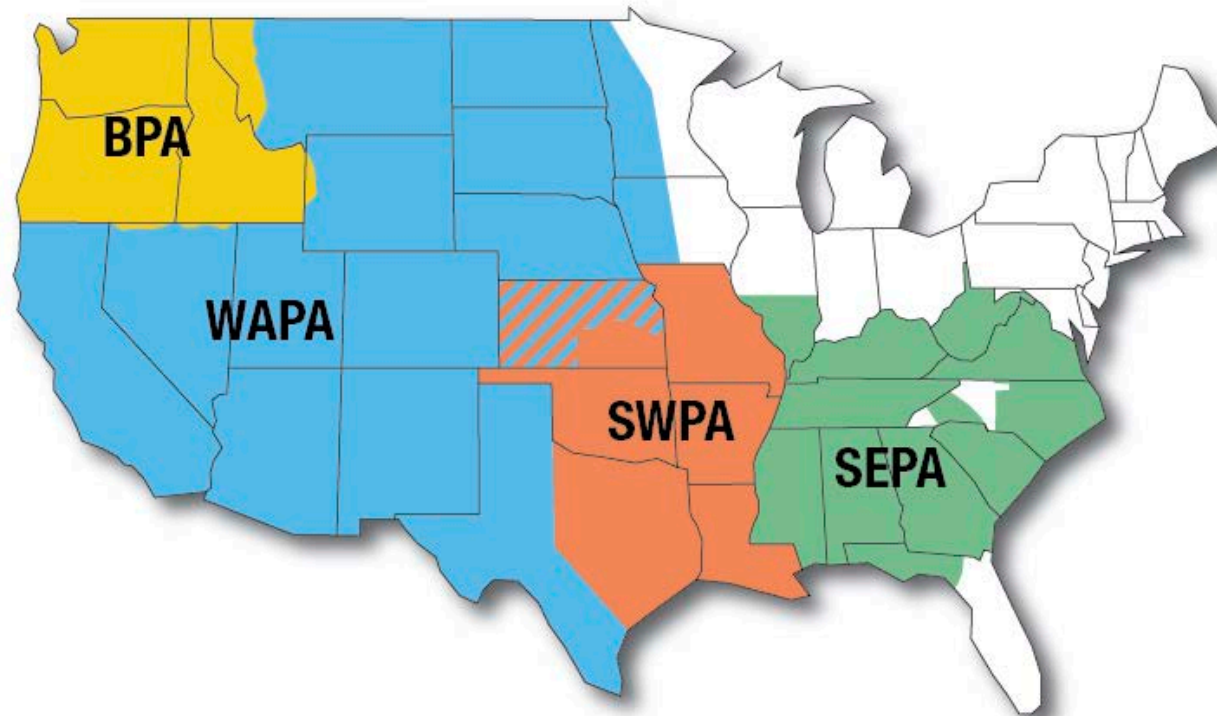
# What is WAPA?



- Market, transmit, and deliver low-cost, reliable, and clean hydropower to federal preference customers
- Over 700 customers
  - Cities and towns
  - Rural electric cooperatives
  - Irrigation districts
  - Public power districts
  - Federal and state agencies
  - Native American tribes

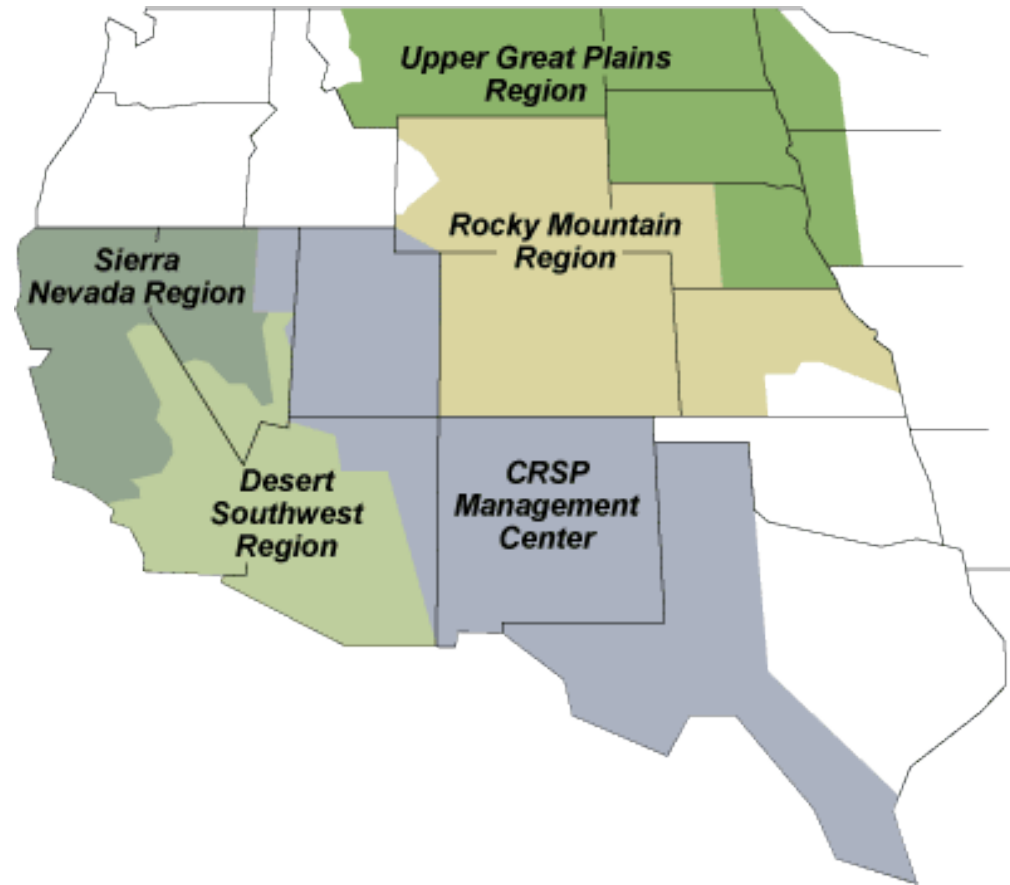


# One of four (4) Power Marketing Administrations



# Our service territory

- Serving customers in 15 states from 4 regional offices
- 56 hydropower plants
- 10,479 MW of installed capacity
- 17,107 miles of high voltage transmission lines



# Our power comes from

## POWERPLANTS



- Hydroelectric energy produced at Federal generating agencies
- Multi-purpose projects
- Variable water availability



# WAPA's hydro projects

- Power marketed on a project-specific basis
- Marketing plans developed through public processes
- Normally consist of:
  - Marketing criteria
    - How power is sold
  - Allocation criteria
    - Who receives power
    - No total load requirement



# Energy Management Services that WAPA provides:

- Supplemental energy procurements
- Contract negotiations
- Scheduling services
- Resource management and optimization
- Demand forecasting
- Develop market bidding strategies
- Real Time monitoring and mitigation
- Planning (short, mid, & long term)



# The energy landscape in the West is changing

- CAISO Energy Imbalance Market (EIM)
- Possible expansion of CAISO RTO
- Utilities in the Rocky Mountain region are in negotiations with the Southwest Power Pool for possible membership
- Utilities in the Desert Southwest have formed a group to explore possible market participation
- Community Choice Aggregation is expanding in California





# Even more changes...

- Large Las Vegas Casinos pay millions of dollars to leave NVEnergy
- Process for developing net metering rates has become contentious.
- As a result of the increase in solar and wind generation in California, the CAISO has experienced over generation during certain hours of the day and as a result has had to pay utilities to take energy in order to balance their system.
- People want choice!!



*“Yeah, that’s interesting, but what does it mean to me?”*



# That depends on where you fit into the energy supply chain?

- We are all consumers of some sort
- Do you self-supply?
- Are you a tribal utility?
- Do you have any co-gen?
- Do you take transmission service?
- Is your load residential, commercial, industrial?



# ...and what your energy goals are?

- Be a more responsible and informed consumer
- Maintain long term price stability
- Supply assurance
- Be more environmentally conscious
- Generate revenue/jobs
- ???

*If you don't have well defined goals, then you need to develop a plan!*



# Today's Agenda

- Understanding the Electricity supply chain and where you fit in
- Energy Availability & Affordability...two forces that affect markets?
- Bi-Lateral vs Organized Market
- Opportunities for tribes
- Where do you go for help?

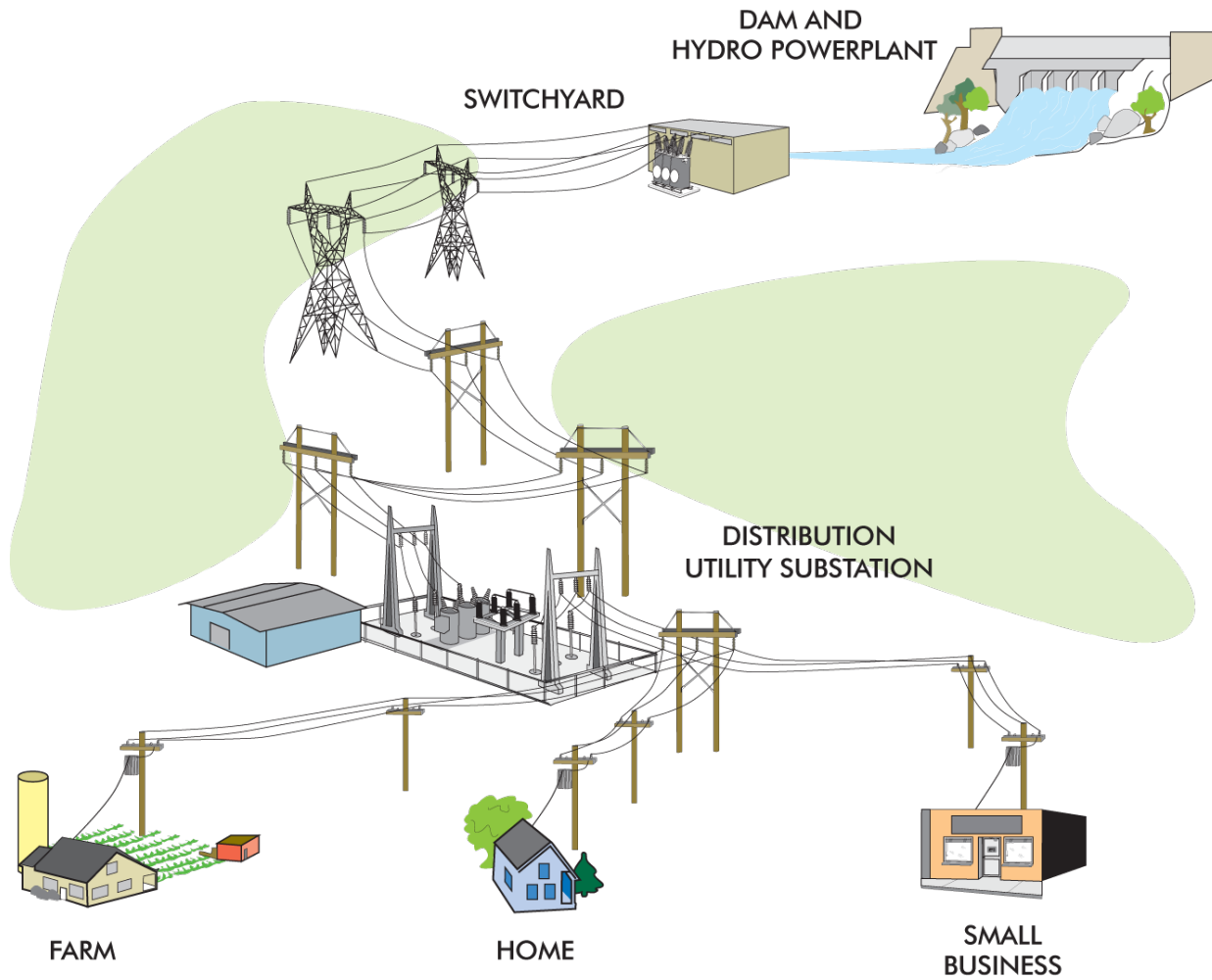


# Energy has its challenges

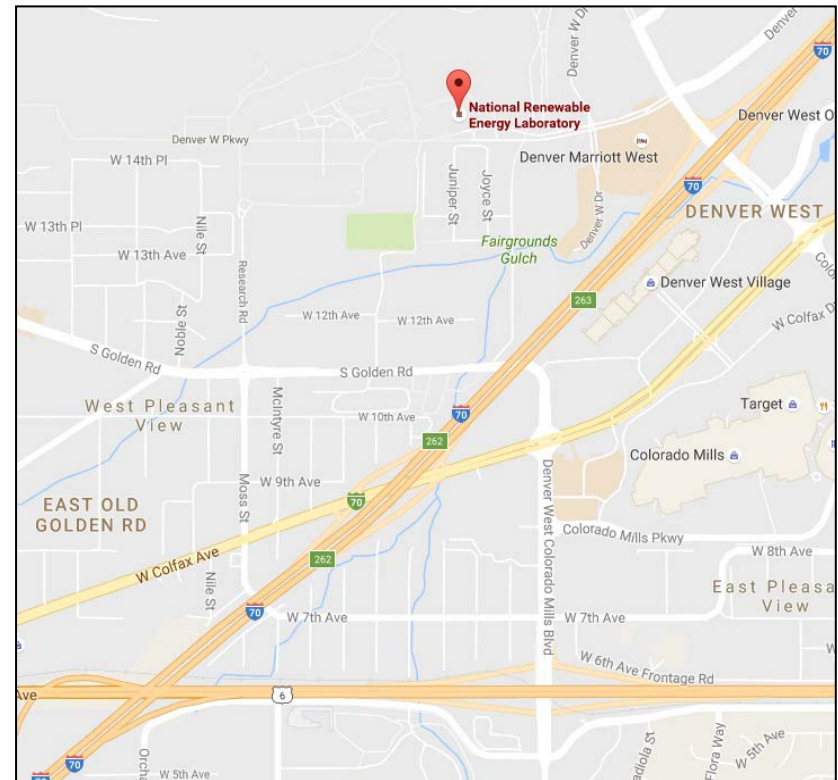
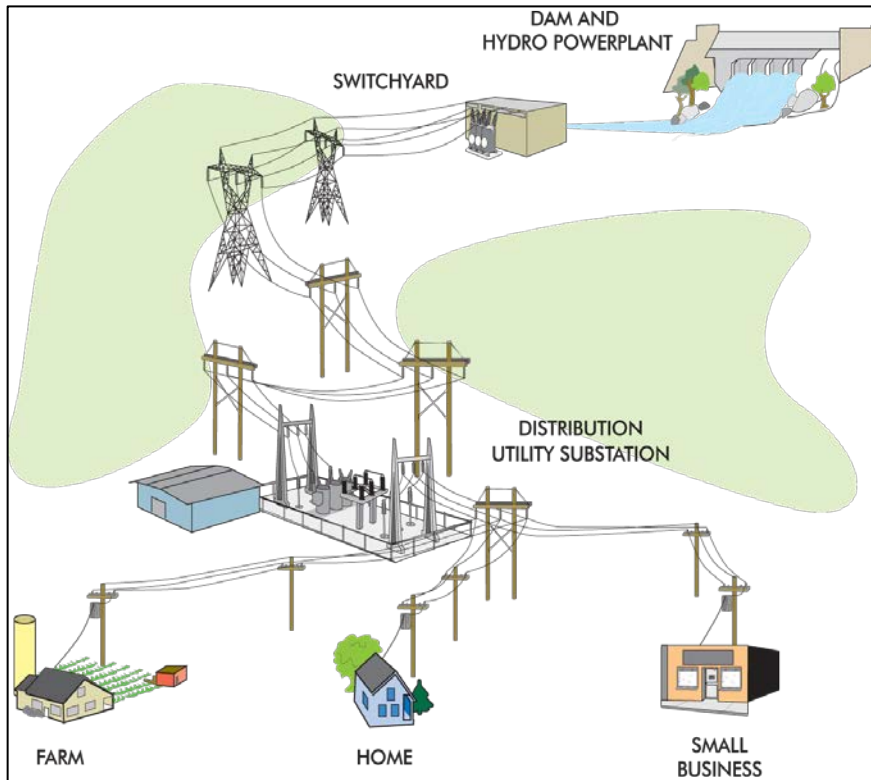
- Electricity requires a physical path (wires) to move from one place to another. There is no “wireless” electrical network.
- Storing electricity (at least on any large scale) has been impossible up until recently.
- The physics of electricity require a constant balance between supply and demand or bad things can happen
- Producing electricity and the necessary supporting infrastructure is a capital intense effort



# The Power Grid



# Power Grid is similar to our roadways



*The high voltage transmission system is like our interstate highway system, while  
The distribution system is like our city streets.*

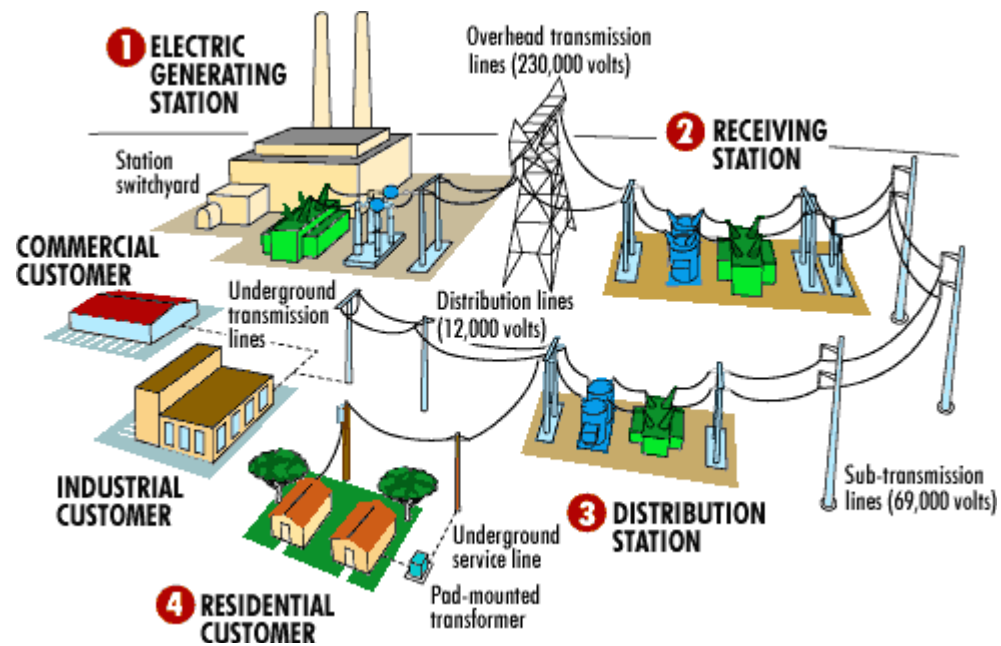




# The Energy Supply Chain

*Where do you fit in?*

- Generation “Supply”
- Transmission
- Distribution
- Consumption “Load or Demand”



# Two competing demands that affect the Supply Chain

- Reliability – the demand for a reliable, safe, and constant supply of electricity all at “the flip of switch”
- Economics – the demand for affordable, least-cost products and services



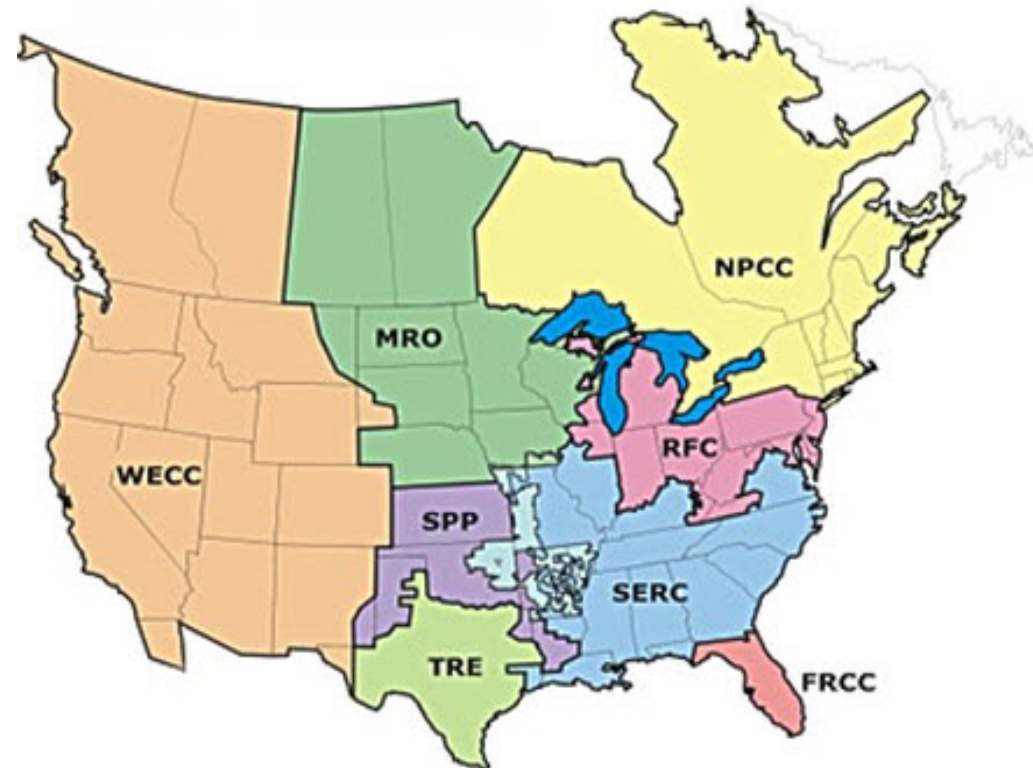
# Let's take a look at Reliability

- The North American Electric Reliability Corporation (NERC) is the organization whose primary focus is the reliability of the power grid.
- NERC was formed after the Northeast blackout of 1965.
- Developed a functional model that defines roles and tasks that must be performed to ensure reliable operations.
- Develops and Maintains a set of Reliability Standards that establish how the grid should be operated.
- NERC can levy sanctions for non-compliance



# Regional Reliability Organizations

- Responsible for compliance monitoring and enforcement
- Perform regular audits
- Maintain models of the electric system for planning activities
- Coordinates planning and operating activities in their region
- Develops region-specific standards

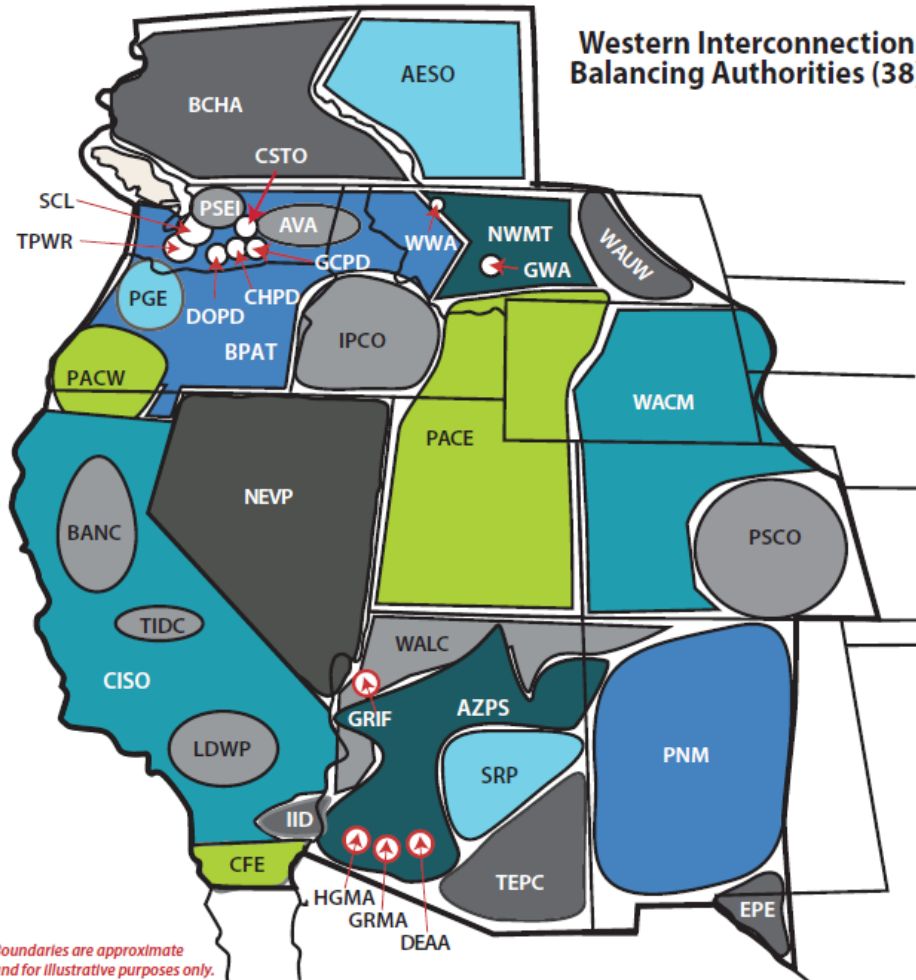


# Balancing Authority (BA)

- Entity that is responsible for running a specific portion of the power grid
- Maintain balance between Resources (Supply) and Loads (Demand)
- Manage energy flows between BAs and on all their transmission lines
- Must adhere to stringent reliability standards
- Assure ancillary services are in place



# Balancing Authorities in the West



# Common Utility Functions/Responsibilities

- Maintain adequate supply of resources to serve demand obligations
- Construct and maintain transmission and distribution networks (the wires)
- Meet all NERC reliability standards
- Plan for future load growth
- Provide transmission services under a FERC filed tariff
- Establish Rates through regulated process



# How do utilities secure a reliable, low cost supply of energy?

- Forecast their demand obligations (load & exports)
- Develop a day ahead plan to meet energy and ancillary service requirements
- Identify resources they have available to meet the demand (internal generation, imports, purchases)
- Economically dispatch resources
- Make adjustments in real time to account for changes to demand and resources



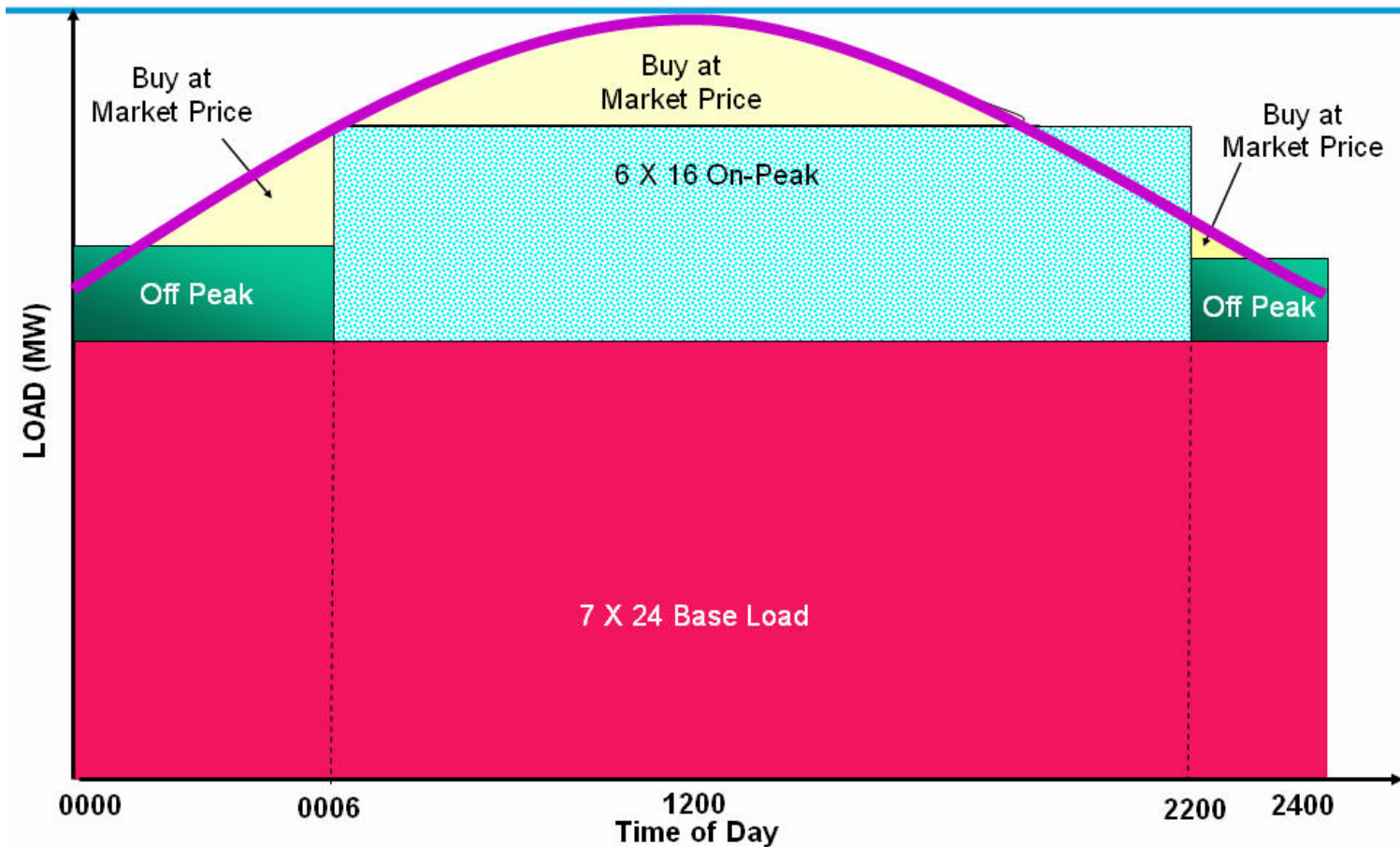


# Bi-Lateral Markets

- Utilities constantly compare wholesale market prices relative to their own production costs and will buy/sell accordingly.
- Different time horizons – Forward, Day Ahead, Real Time (hour ahead)
- Transactions priced at \$/MWh.
- Limited sub-hourly volumes
- Contracts are settled directly with counterparties
- Liquidity can be limited depending on location



# Developing a Supply Plan



# Bilateral vs Centralized Markets

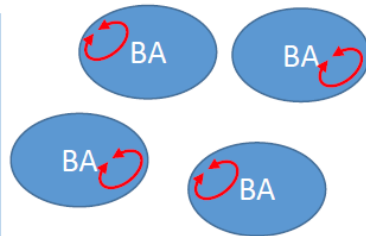
Bilateral Markets	RTO Centralized Markets
One party sells to another party (like buying a car)	Electricity products cleared by a centralized market operator (like the stock market)
Hourly transactions - poorly matched to increasing amounts of renewable generation	5 minute transactions - much more responsive to changing system conditions
Fragmented operating footprints result in capital and operating inefficiencies	Larger operating footprints with diverse resources are more efficient and more reliable
Limited visibility to conditions on neighboring systems can create reliability issues	Wide area situational awareness and control of the system has reliability benefits



# How is a centralized market different than what we have now?

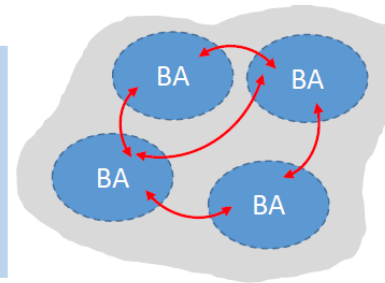
## Without a market

Each BA must balance loads and resources **within its borders.**



## In a market

The market dispatches resources across BAs to balance energy



- Poor situational awareness & control
- Limited pool of balancing resources
- Inflexibility
- Hourly scheduling and dispatch
- High levels of reserves
- Economic inefficiencies
- Increased costs to integrate wind/solar

- Advanced situational awareness & control
- Diverse pool of balancing resources
- Increased flexibility
- Five minute dispatch
- Decreased levels of regulating reserves
- More economically efficient
- Decreased integration costs



# What is an RTO?

- An independent operator of the transmission system and generation resources.
- RTOs do not own transmission and generation – they operate the system on behalf of utilities.
- Maintains a wide-area overview of the entire footprint.
- Operates and oversees a centralized market for energy and ancillary services.
- Is the Reliability Coordinator (RC) for the operating footprint.
- Facilitates transmission planning.
- Performs Market Monitoring.



# What is the difference between an RTO and the CAISO EIM?

## RTO

- Energy and ancillary services
- Day ahead and Real Time
- Responsible for all BA functions
- Transmission operations and planning
- Administer transmission tariff
- Balance loads and resources across entire footprint

## EIM

- Limited to real time balancing energy only
- BAs responsible for their own ancillary services and all other BA functions
- Bi-Lateral transactions for all non sub-hourly transactions



# RTOs in North America

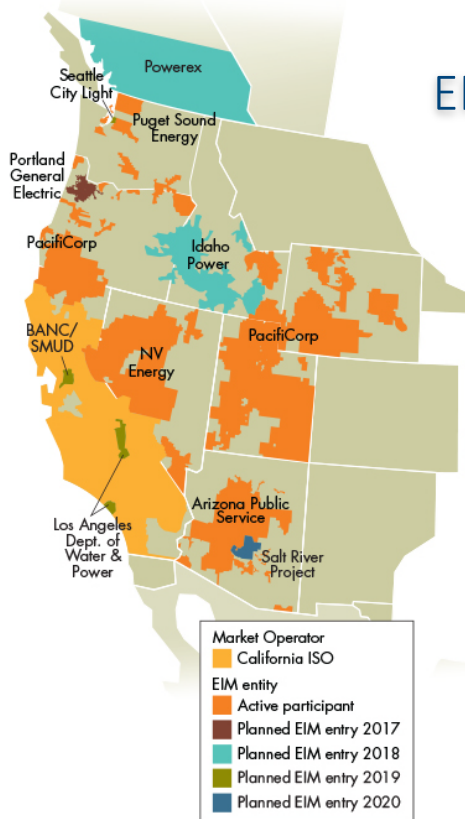


Source: FERC



# Other Initiatives in the West

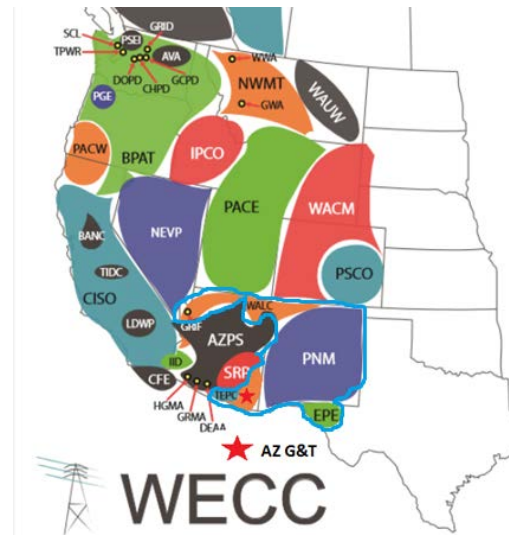
Western EIM active and pending participants



EIM

MWTG

SMAG





# What are some of the options for Tribes?

- Develop an energy plan
- Explore partnership opportunities with your host utility
- Self Supply
- Form a tribal utility
- Get to know where you fit in the supply chain and what that means
- Engage with other tribes



Thank you...



# Resources

- DOE Tribal programs

<https://energy.gov/indianenergy/office-indian-energy-policy-and-programs>

- WAPA Energy Management & Marketing Offices

[www.wapa.gov](http://www.wapa.gov)

- NREL

[www.nrel.gov](http://www.nrel.gov)

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