

Future of the Bulk Electric System

National Academy of Sciences

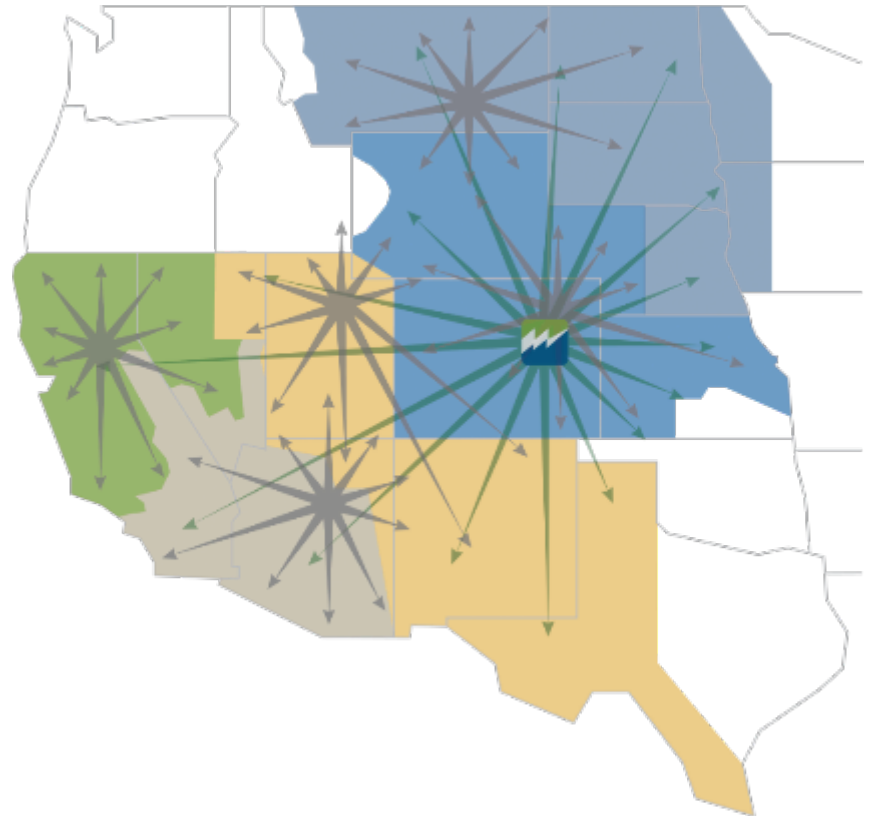
June 2, 2020 | Webinar

Mark A. Gabriel

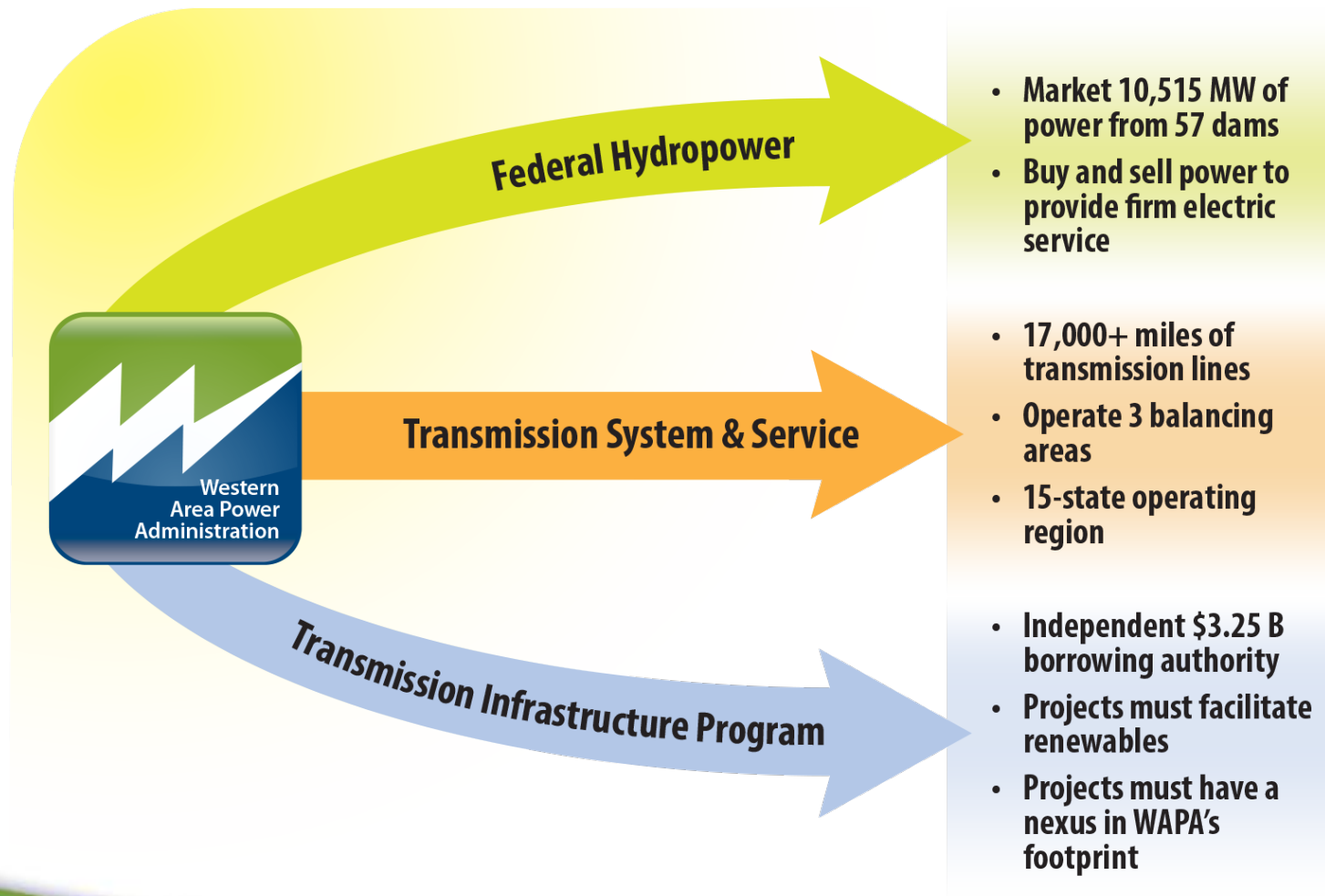
Administrator and CEO

Who we are

- Serve 40 million Americans
- 15-state footprint
- 1.4 million square miles
- 49 offices
- ~700 customers
- Top-10 largest transmission utility in country

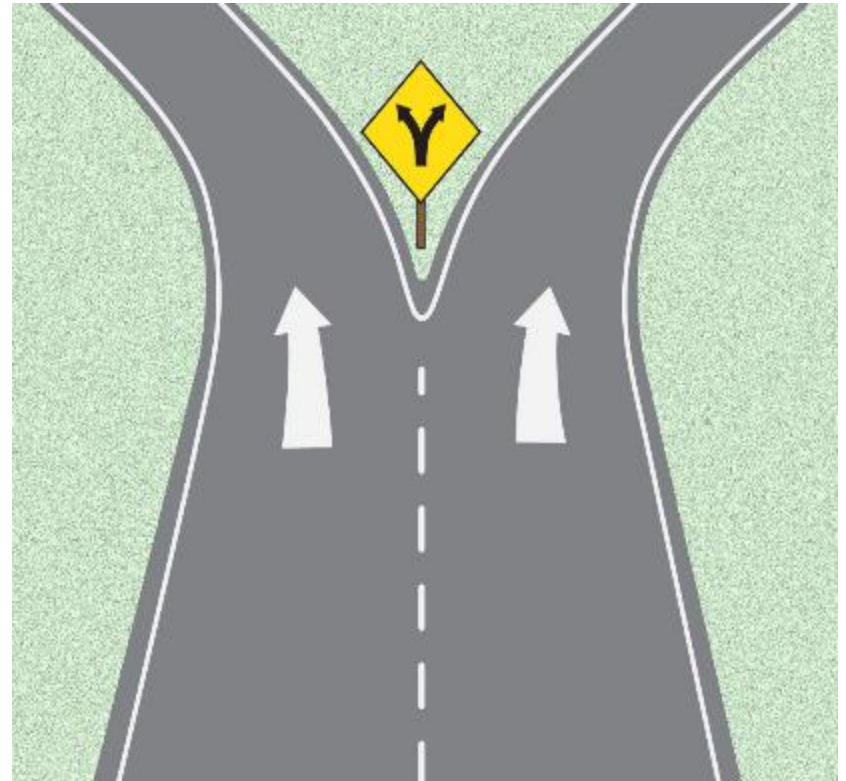


What we do



Challenges in the energy frontier

- Aging Infrastructure
- Intermittent resources
- Varying hydropower production
- More customer-side resources
- Lack of integration
- Carbon/capacity conflict
- Changing markets
- Security



Carbon constraints/capacity conflict

- Demand for new power sources will outstrip capacity
- The physics barrier
- Public perception contrasts the reality system operations
- Renewables are being promoted the only answer
- Renewables create financial challenges



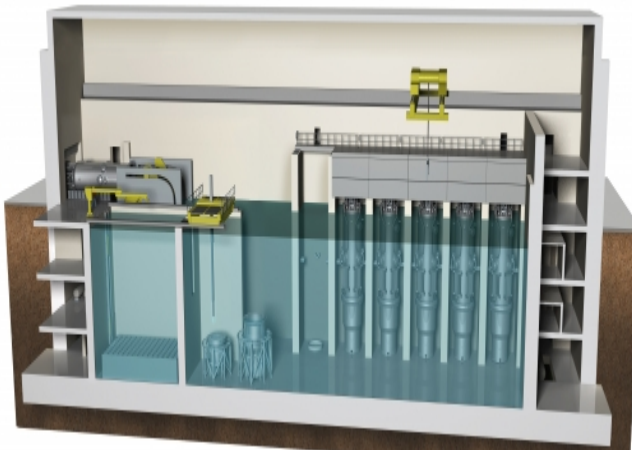
Developed world
demand dead?
Developing world
demand galloping!

Contrasting world views

- Reality of system ops generally ignored
- Sky is falling?
- Sky is not falling?
- Reliability hangs in balance
- Surge in demand may lead to significant shortages
- Timing of regulations affect regions differently
- Belief, not engineering, leads the way



Preparing for the future



USVI Solar Farm post hurricane



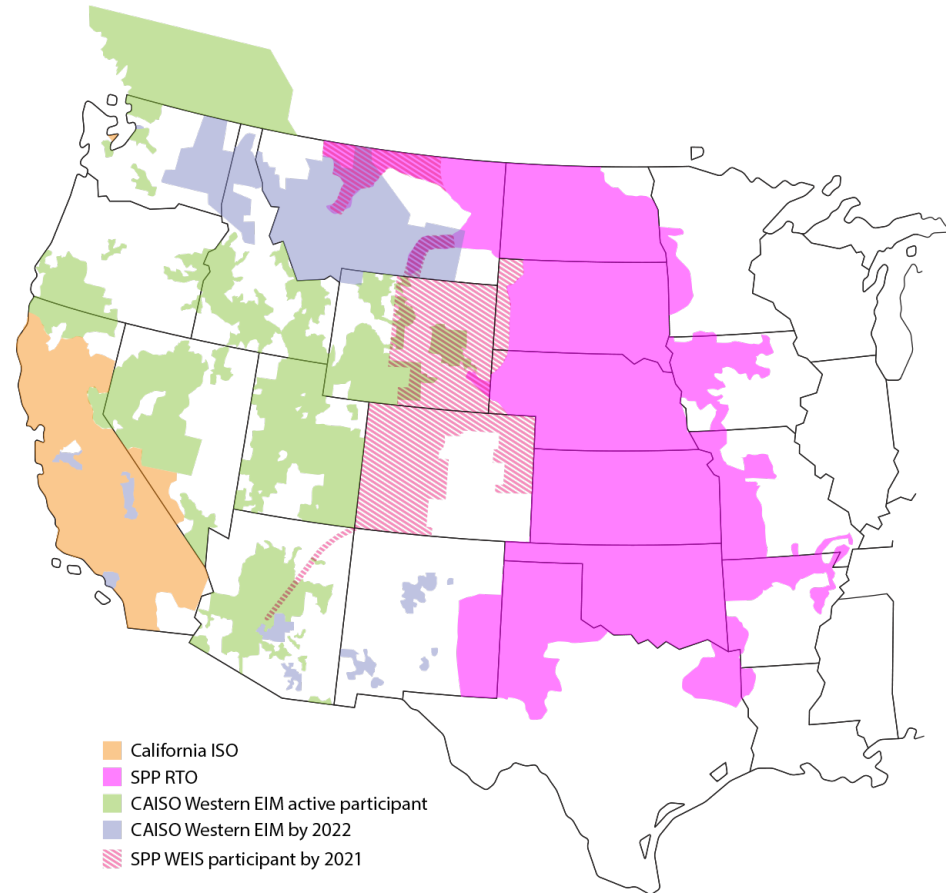
Grid of the future

- Used more in fewer hours
- Different payback models
- Interplay between transmission & communications architecture
- Take advantage of AC-DC ties
- Accommodate new technologies
- Secure against cyber, physical threats



Future of markets

- Widespread agreement future of markets is in the West
- Will these market structures exist in 10 years?
- Planning should consider current complexity of the system and not try to fix that but rather work the edges



Fundamental change

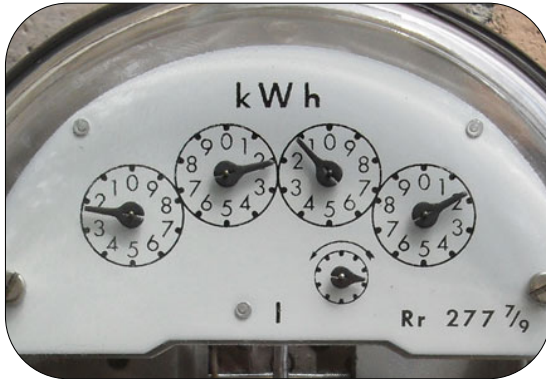
The challenge for the utility of today is not only what is real but what is perceived as real.



Societal changes



Radical thoughts



The kilowatt-hour
is dead



Time-of-purchase
vs. time-of-use



All-you-can-eat
energy

Key takeaways

The industry is changing at a rapid pace.
There is no microgrid without a macrogrid.
Focus on optimizing existing technologies & assets
Today's markets may not exist in a decade.



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