Adapting to Change
Electric Cooperative Perspective

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Who are the co-ops?

• Private, independent utilities, owned by the members they serve
• Consumer-governed by boards of directors elected by and from the membership
• Co-op boards serve as local regulators in most states
• Not-for-profit
• Serve over half of the US, 80+ percent of counties, 93% of persistent poverty counties, but only 12% of the population
• Serve 42 million Americans in 47 states
Key Takeaways

• Remember the Goal: Providing consumers/members/voters with safe, reliable, affordable and environmentally sustainable power
• The power supply world is changing, but not at the same pace or to the same degree everywhere
• States have a lot of control over the pace and direction of change
• New technologies and management practices are important and valuable, but they’re only part of the picture
• The states need to act to ensure that the markets will recognize their choices
• Co-ops are a valuable partner
This is who we all work for
The job is incredibly complicated

Conflicting Goals

• Safety
• Reliability 24/7/365
• Environmental sustainability
• Enable consumer options
• Low Prices
• Stable Prices

Many Risks

• Operational risks at all levels of the system
• Input price volatility
• Wholesale market price volatility
• Counterparty risk
• Changing regulatory requirements
• Changing consumer preferences and priorities

Optimizing across assets

• Owned generation resources
• Contracted for generation resources
• Short-term market resources
• Transmission
• Distribution
• Customer-side resources
Simple Way to Uncork A Bottle by Rube Goldberg

Elephant (A) eats peanuts (B) as bag gets lighter weight (C) drops and spile (D) punctures balloon (E) - explosion scares monkey (F) - his hat (G) flies off and releases hook (H), causing spring (I) to pull string (J), which tilts tennis racket (K) - racket hits ball (L), making it spin around on attached string, thereby screwing corkscrew into cork (M) - ball hits sleeping dog (N) who jumps and pulls cork out of bottle with string (G) - my, how simple!
The Resource Portfolio Is Changing

U.S. net electricity generation from select fuels
billion kilowatthours

- coal
- natural gas
- nuclear
- renewable energy
- petroleum

Reference case projections
No Clean Power Plan projections


NRECA 75 Years of Service
America’s Electric Cooperatives

U.S. Energy Information Administration

#AEO2017  www.eia.gov/aeo

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Increase in solar is a big story
Solar growth is not the same everywhere

**Top 10 States**

1. CA: 18,963 MW
2. NC: 3,288 MW
3. AZ: 3,151 MW
4. NV: 2,269 MW
5. NJ: 2,114 MW
6. MA: 1,592 MW
7. UT: 1,527 MW
8. GA: 1,478 MW
9. TX: 1,228 MW
10. NY: 1,012 MW
Wind is also growing fast
But not everywhere

https://greenmatterscsg.files.wordpress.com/2017/03/u-s-wind-energy-share-of-electricity-generation.png
State policy is a significant driver
But renewables aren’t the biggest source of change in power resources
Change can lead to disruption if we don’t focus on the whole process
Growth of variable generation can cause operational stress

Figure 2: The duck curve shows steep ramping needs and overgeneration risk

Net load - March 31

- Ramp need ~13,000 MW in three hours
- Overgeneration risk
And economic/operational challenges

**BRIEF**

CAISO: Renewable energy curtailment could hit 8,000 MW this spring
Southern California braces for summer blackouts due to Porter Ranch gas leak

By Alice Walton, Paige St. John and Corina Knoll - Contact Reporters

STATE OFFICIALS WARN THAT SOUTHERN CALIFORNIA COULD FACE AS MANY AS 14 DAYS OF SCHEDULED BLACKOUTS THIS SUMMER BECAUSE OF DEPLETED RESERVES OF NATURAL GAS CAUSED BY THE MASSIVE LEAK IN ALISO CANYON.

The canyon in the hills above Porter Ranch is a crucial gas storage facility, supplying 17 power plants in the Los Angeles Basin. But the four-month leak that began in October left the facility at one-fifth of its capacity and new injections of gas have been prohibited until all of its wells have passed comprehensive tests.

Officials estimate the storage facility won’t be back on line for months, leaving local power plants without a key source of natural gas.
Change also creates economic stress

A map of closed or closing nuclear power plants (shown in red), as well as plants especially vulnerable to future closures (shown in orange) in the United States, according to experts.

(Click to enlarge map)

Credit: Paul Horn for InsideClimate News
We’re adding new resources
But not growing load by much
Demand Response and Storage have a role in managing change
Customer-side resources help co-ops manage risks and keep rates down

When integrated into the portfolio, customer-side resources can:

- Reduce capacity costs
- Reduce energy costs
- Reduce exposure to market prices and market risks
- Provide an operational tool for system, e.g. maintenance and outage recovery

At co-ops, savings from programs shared by all member-owners
Co-ops are Demand Response Leaders

Nationwide, cooperatives can control 4.8 GW of load. Those co-ops with demand response programs can control an average of 8.1% of their load. Leading cooperatives can control 20% or more of their annual peak load. Cooperatives can control over 22 thousand water heaters.
About East River

• Headquarters in Madison, SD
• 8 regional maintenance centers
• 21 member systems
• 36,000 square mile service area
Dairyland Power System
Load Management System (2006)

- 82,000 Residential electric water heaters
- 30,000 Residential dual fuel heating systems
- 15,000 Residential Air Conditioners
- 8,000 Residential heat storage systems
- 380 commercial and industrial generators
- 170 Peak Alert voluntary load reduction (C&I)
- 190 Agricultural grain dryers.
- 6 C&I bulk interruptible under direct control
Class A 2006-07 Full Load Control

Morning Water Heater Control

Difference at 7pm = 133.6 MW

Average Control Days
Comparison Day
But, Wait, There’s More!

Enter the Community Storage Initiative!

Your electric storage water heater is a thermal battery that can help integrate renewable energy into the grid.
New control options provide more value

Brattle Report – Lots of Options to Save $
Kauai Electric Co-op 20 MW
28 MW solar array with a 20 MW, 100 MWh battery system
13 MW solar array with a 52 MWh battery

Golden Valley Battery electric storage system
Residential battery storage

PEC Empower Loans

For more than 75 years, PEC has powered this region’s energy needs with reliable, affordable electricity. Now, people not only want electric power; they want to be empowered. To install interconnected solar. To explore new battery technology. To develop new ways to power their lives.

In all kinds of ways, people are thinking of energy differently, and PEC supports this new way of thinking. With low-cost financing and on-bill repayment, PEC Empower Loans can lower the barriers to grid-tied solar installations and battery storage for our members.

To learn more, explore the program criteria, requirements and process below. Visit the System Interconnection page to learn about the policy and agreement required for interconnected systems.

Flathead Electric, youth agency team up on solar storage demonstration

Posted on February 17, 2017 by Kevon Storie

A solar electricity storage project in Kalispell, Montana, combines three things at which electric cooperatives excel: testing new technology to see if it is a good fit for members, helping members lower their electric bills and forming partnerships in the community.

Flathead Electric Cooperative (FEC) recently selected the Flathead Youth Home to test rooftop solar panels and a Tesla Powerwall battery storage system. The 7.2-kilowatt, net-metered solar array and backup system will save on average about $44 per month on the home’s electric bills while the co-op collects and evaluates performance data on it.
Save big on a new Wi-Fi programmable thermostat. Take control of your energy use anytime, anywhere.

The Smart Response Thermostat Program is an opportunity for cooperative members like you to help conserve energy during hours of peak demand. A programmable Wi-Fi thermostat can also help you achieve energy savings while improving your indoor comfort. A Smart Thermostat also allows you to control your home from your mobile device, a feature,
Down-line visibility and control
And looking forward to electrification of transportation
But, we’re still figuring out the details
Some of these tools won’t work everywhere
The necessary infrastructure isn’t always in place

It’s about the data

• Sensors
• Broadband
• Data management
• Integration of data into operations

And control

• Down-line controls
• Customer-side controls
• Smart inverters
• Contracts, rates, and state policy
And, this is only a part of the solution
And it’s not always the most cost effective
We will continue to need other options

Golden Spread Elk Station
Quick Start Gas Units
Texas

Oglethorpe Electric Power Corp
Vogtle 3 & 4 Nuclear Units
Georgia

Integrated Test Center X-Prize
For Carbon Capture and Beneficial Reuse
Wyoming
The key is local flexibility to address local needs
AEE files notice in Kentucky PSC authority case

July 03, 2017

Advanced Energy Economy (AEE) filed a notice at FERC about a Kentucky PSC order in a case where the question of whether the state has authority over efficiency bidding into PJM was debated. The state regulator determined its jurisdiction only extends to those utilities covered under state law and does not include third parties involved in aggregating or bidding efficiency in PJM’s markets.

SUPREME COURT OF THE UNITED STATES

Syllabus

HUGHES, CHAIRMAN, MARYLAND PUBLIC SERVICE COMMISSION, ET AL. v. TALEN ENERGY MARKETING, LLC, FKA PPL ENERGYPLUS, LLC, ET AL.

CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FOURTH CIRCUIT

No. 14-014. Argued February 24, 2016—Decided April 19, 2017

The Federal Power Act (FPA) vests in the Federal Energy Regulatory Commission (FERC) exclusive jurisdiction over wholesale sales of electricity in the interstate market, but “leaves to the States alone, the regulation of [retail electricity sales].” FERC v. Electric Power Supply Assn., 577 U.S. ___, ___. In Maryland and other States that

DOE grid study has wind and solar lobbyists spooked — rightly so

BY MICHAEL DIBRUISE AND MEDIA HARRIS, OPINION CONTRIBUTORS - 08/22/17 04:00 PM EDT

THE HILL

489 SHARES

United States of America

FEDERAL ENERGY REGULATORY COMMISSION

State Policies and Wholesale Markets Operated by ISO


Docket No. AD17-11-000

NOTICE OF TECHNICAL CONFERENCE

(March 3, 2017)
Who decides how to balance among goals in defining retail electric service?
Which is the tail and which the dog?

Wholesale markets

Wholesale customers

Political representatives of customers?
Time to look for new friends