



La Cámara de Comercio de Puerto Rico
y su Comité de Energía y Agua presentan el Foro:

Cambios que se aproximan en el Sector Energético

Cooperativas Electricas
Martha A. Duggan
National Rural Electric
Cooperative Association

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ccion

The Big Balancing Act

Core elements of most electric cooperative mission statements

**Reliable
service**

**Member
satisfaction**

**Competitive
rates**

**Sound
business
practices**

How Dependable Electricity Reaches You

It's easy to take reliable electric power for granted. But there's a lot involved in getting that power to you, and the path of electricity starts well before a light switch is flipped.

Power Plant

At a generating plant, water is heated to steam using fuels such as natural gas, coal and oil; the steam turns turbines that turn generators to produce electric energy. In some areas, nuclear power or water flowing through hydroelectric dams powers the turbines.

Step-Up Substation

Transformers at the generating plant increase the voltage up to 345,000 volts, so it can travel long distances over high-voltage transmission lines.

High-Voltage Transmission Lines

These lines carry the electric energy over long distances. Insulators on the towers prevent the power from flowing to the towers or the ground.

Transmission Substation

Transformers reduce the electric energy up to 69,000 volts, making it suitable for high-volume delivery over short distances.

Large Industrial User

Most industries need 2,400 to 4,160 volts to run heavy machinery. They usually have their own substation at the facility.

Consumer-Owned Renewable Generation

A wind turbine, solar panel array or methane digester is interconnected to the co-op's lines through a cut-off switch and other equipment. The switch disconnects the turbine from the line to ensure the safety of linemen working during outages and regular maintenance projects.

Local Distribution Substation

Local electric co-ops operate several of these substations to reduce electricity to 7,200-14,400 volts for distribution to their members.

Distribution Lines

Lines belonging to local electric co-ops carry electricity to transformers that reduce power levels to 120/240 or 120/208 volts for use in schools, farms, homes and small businesses.

Schools

Farms

Homes

Small
Businesses

Power Supply - the Vocabulary

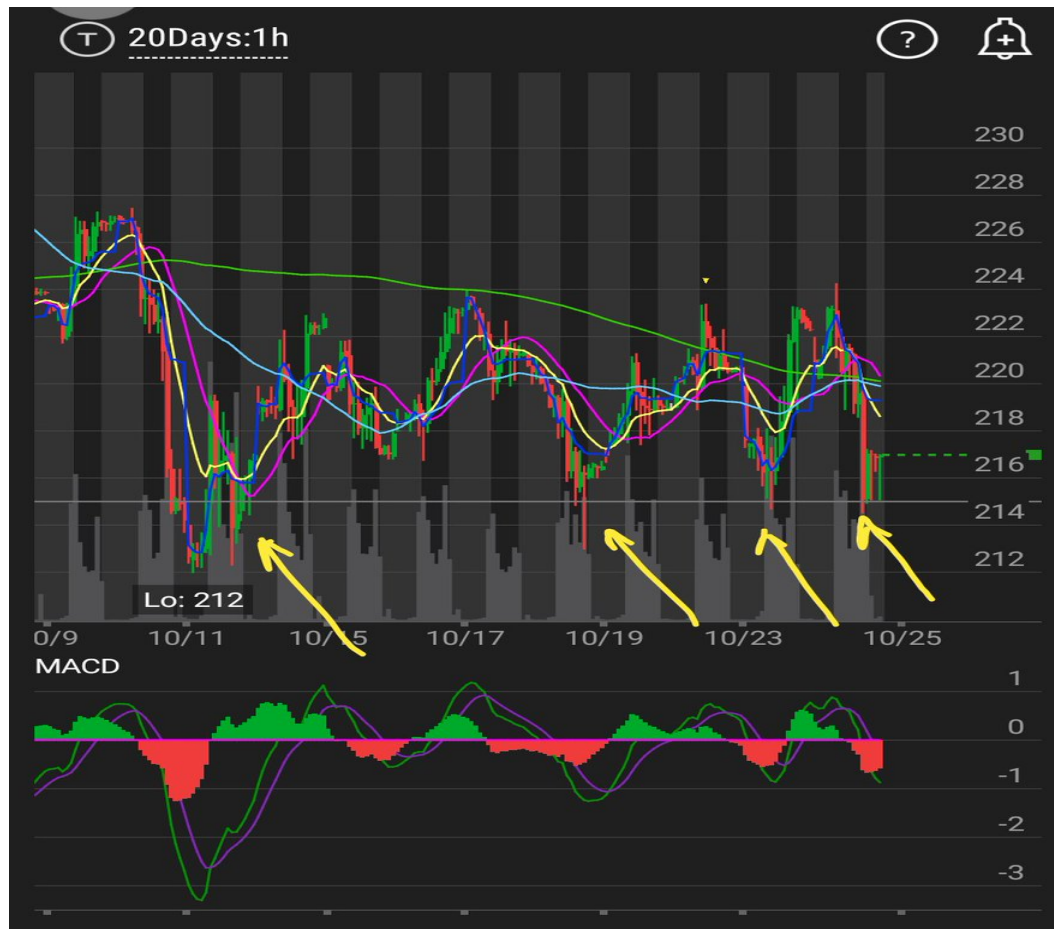
- **Demand** – driven by consumers (kW)
- **Capacity** – how big the units/lines are
- **Energy** – how long they run (kWh)
- **Capacity Factor** – what it could produce
- **Availability Factor** – amount of time it is able to produce

Power Supply

- Power supply is the acquisition of capacity and energy to meet the needs of the cooperative members.
- This includes generation and transmission facilities and costs.
- Can be significant portion of the cooperative's Total Cost of Electric Service.
- Acquisition models vary.

Generation

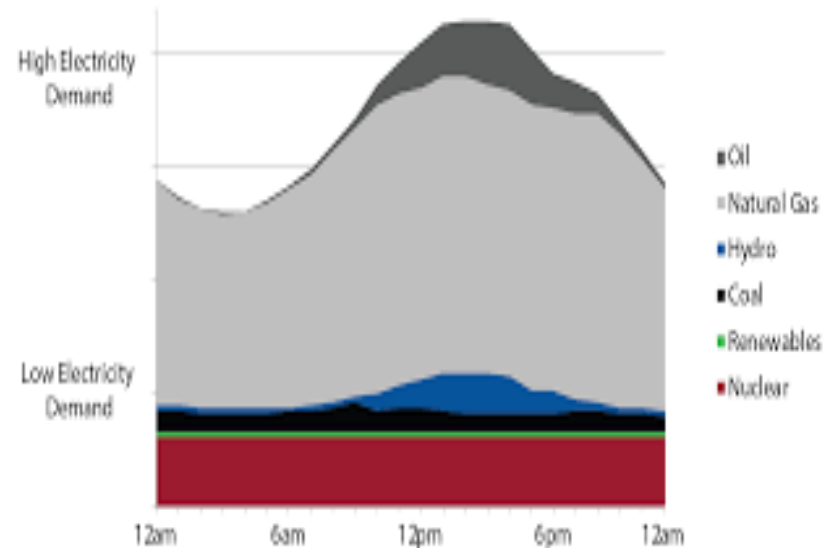
Generation resources must be able to meet the demand in real time.



Generation

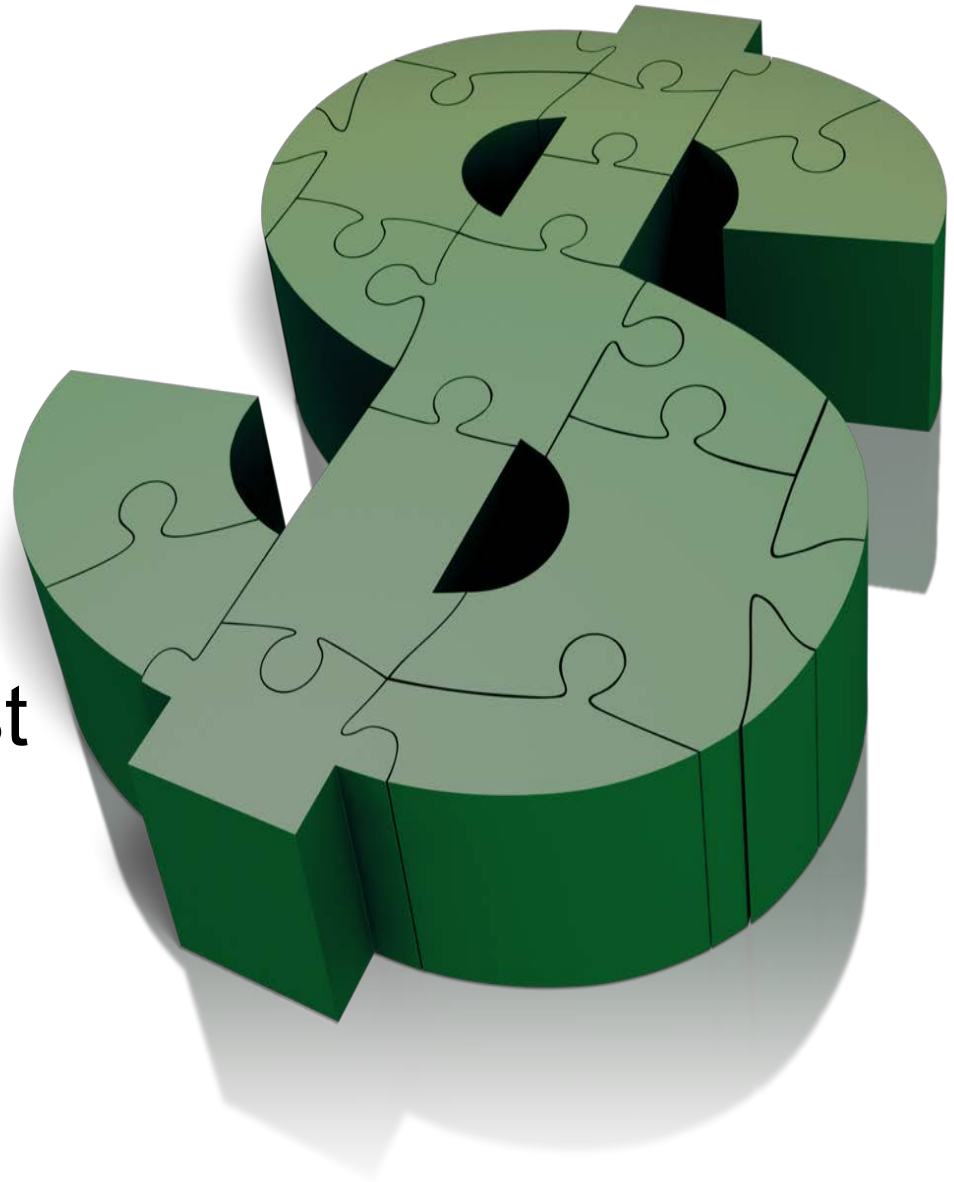
- Peak demand is typically driven by weather and is used for a relatively short amounts of time.
- Varying types of generation and demand side resources are used to meet the varying demand.

Fuel Mix on a Summer Peak Day (8/12/16)



Generation Cost

- Capital cost
- Fuel cost
- Efficiency
- Capacity factor
- Other subsidies
- Compliance cost



U.S. average levelized costs (2012 \$/MWh) for plants entering service in 2019

Plant type	Capacity factor (%)	Levelized capital cost	Fixed O&M	Variable O&M (including fuel)	Transmission investment	Total system LCOE	Subsidy ¹	Total LCOE including Subsidy
Dispatchable Technologies								
Conventional Coal	85	60.0	4.2	30.3	1.2	95.6		
Integrated Coal-Gasification Combined Cycle (IGCC)	85	76.1	6.9	31.7	1.2	115.9		
IGCC with CCS	85	97.8	9.8	38.6	1.2	147.4		
Natural Gas-fired								
Conventional Combined Cycle	87	14.3	1.7	49.1	1.2	66.3		
Advanced Combined Cycle	87	15.7	2.0	45.5	1.2	64.4		
Advanced CC with CCS	87	30.3	4.2	55.6	1.2	91.3		
Conventional Combustion Turbine	30	40.2	2.8	82.0	3.4	128.4		
Advanced Combustion Turbine	30	27.3	2.7	70.3	3.4	103.8		
Advanced Nuclear	90	71.4	11.8	11.8	1.1	96.1	-10.0	86.1
Geothermal	92	34.2	12.2	0.0	1.4	47.9	-3.4	44.5
Biomass	83	47.4	14.5	39.5	1.2	102.6		
Non-Dispatchable Technologies								
Wind	35	64.1	13.0	0.0	3.2	80.3		
Wind-Offshore	37	175.4	22.8	0.0	5.8	204.1		
Solar PV ²	25	114.5	11.4	0.0	4.1	130.0	-11.5	118.6
Solar Thermal	20	195.0	42.1	0.0	6.0	243.1	-19.5	223.6
Hydro ³	53	72.0	4.1	6.4	2.0	84.5		

Hydro



Pros

- Renewable and sustainable
- No ash or carbon output
- Known technology
- Low operational cost
- Beneficial fishing and recreational opportunities
- Water storage
- Energy storage
- Long Life
- Load tracking and following



Cons

- Ecosystem and land impacts
- Fish migration and breeding
- Silting
- Dam failure issues
- Drought impacts

Wind



Pros

- Renewable and sustainable
- Typically meets RPS requirements
- Abundant domestic supply
- No ash or carbon output
- Known technology
- Relatively low operation cost



Cons

- Non-dispatchable; low availability factor
- View shed and noise issues
- Wildlife impact – primarily birds and bats
- Microclimate impacts
- Rural sites require transmission infrastructure
- Large sites required for MW output

Solar



Pros

- Renewable and sustainable
- Typically meets RPS requirements
- Abundant domestic supply
- No ash or carbon output.
- Known technology
- Relatively low operation cost
- Well suited for distributed generation
- No significant noise

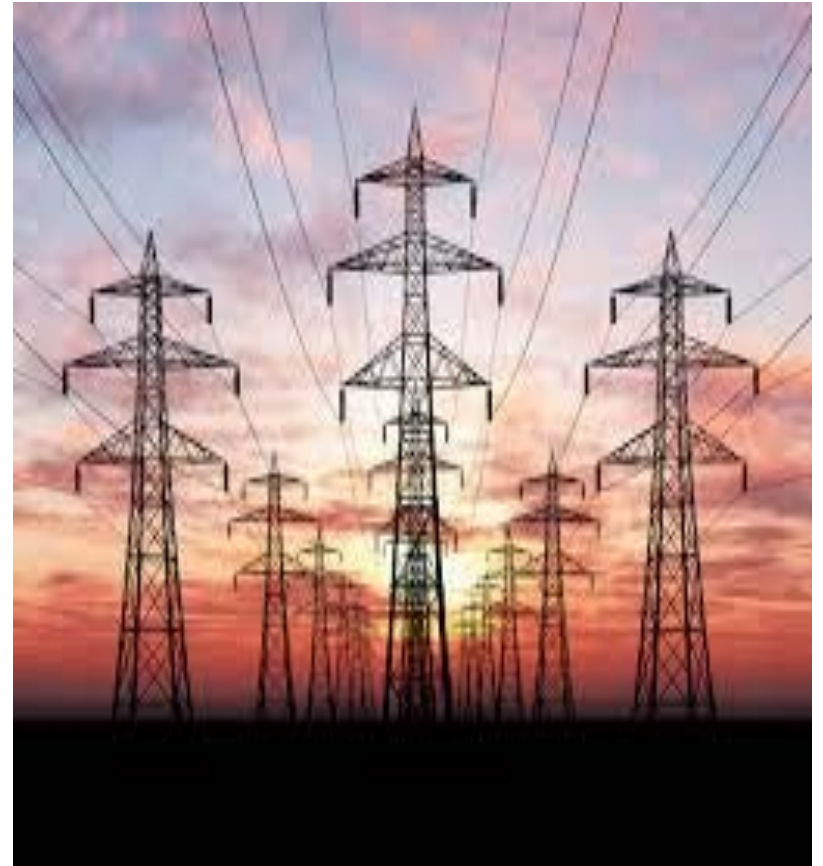


Cons

- Non-dispatchable low availability factor.
- Relatively high cost
- Generates DC
- Exotic fragile materials required in many thin-film systems
- Requires a relatively large amount of open space
- Relatively low efficiency
- Relatively low energy density

Transmission Issues

- Mandatory reliability
 - Electric Reliability Organization (ERO)
- Constraints and capacity
- NIMBY
- Cybersecurity
- Physical Security



Long Range Planning

- Long range planning is a data driven forecast on the future needs of the cooperative.
- The first step is the development of a 10-20 year long-range plan (LRP) – macro tool.
- The LRP guides the development of the Construction Work Plans CWP.

Construction Work Plan (CWP)

- Two to four year window
- Must be consistent with LRP
- Includes cost/engineering justification for each project
- Should maintain a current board approved CWP for all new construction, improvements, replacements and retirements of distribution and transmission plant

Construction Work Plan (CWP) - Budgets

- The CWP will be a budget driver
- Assists with prioritization
- Financial and operating data will be included
- Unforeseen and extraordinary issues should be reported to the board and justified

Technology Plan



Emergency Restoration Plan (ERP)

According to the U.S. Department of Agriculture Rural Utilities Service regulations, the ERP is to include:

- Emergency telephone numbers
- A list of key utility management and other personnel
- Chain of command
- Procedures for recovery from loss of power to the headquarters, key offices, and/or operation center facilities;
- A plan to maintain or re-establish business operations
- Other items required by the lender



What Does the Distribution Budget Buy?

- The projects in the construction work plan, technology plan, and operations functions include a variety of equipment and operations functions.

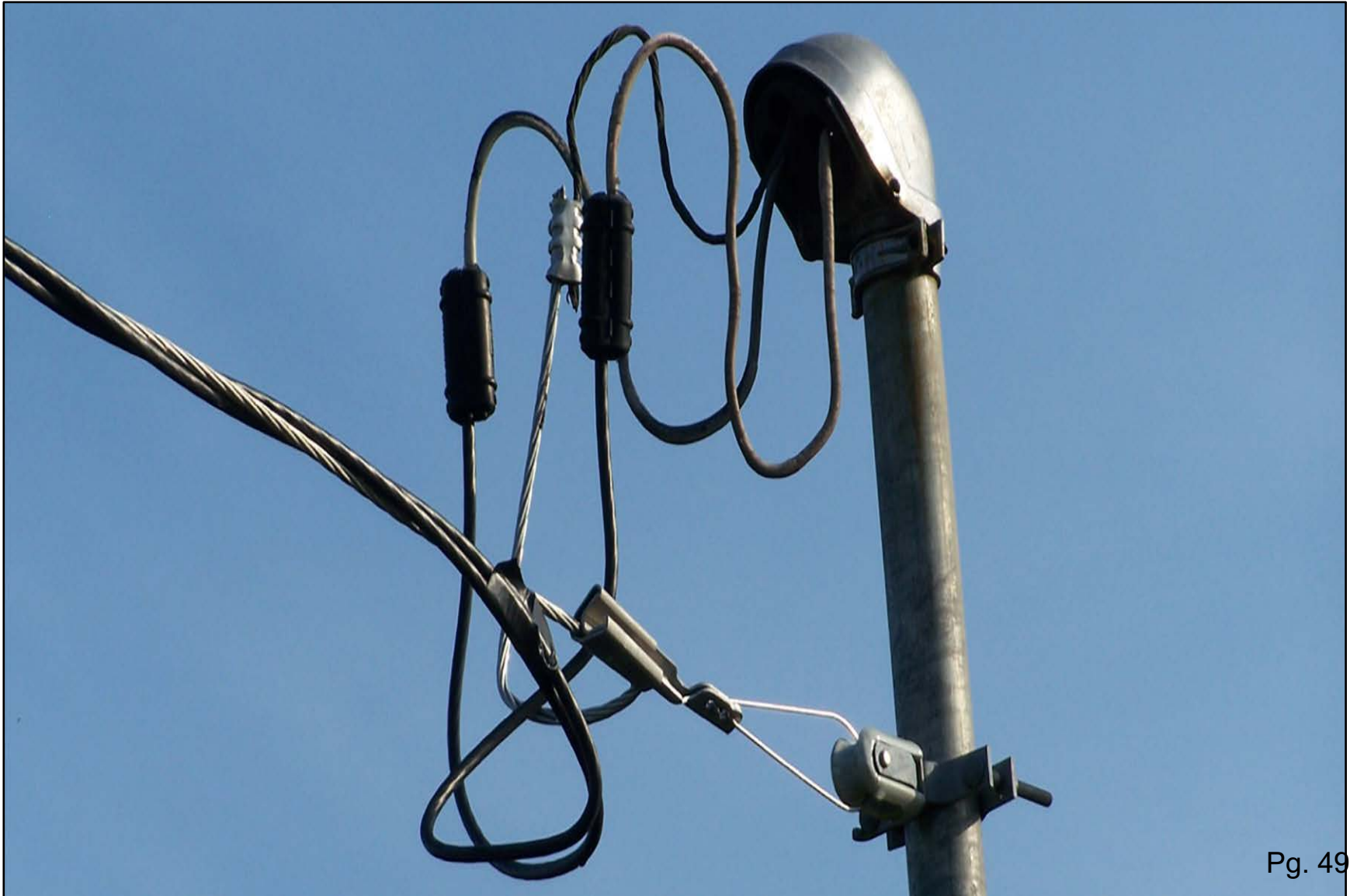
Substations



Distribution Line and Transformer



Weather Head – Service Drop



Metering



Maintenance Operations Programs

- Right of way (ROW) clearing – tree trimming
 - Maintenance of the right of way is likely to be one of the largest O&M expenditures at your cooperative.
 - Neglecting ROW clearing can have negative impacts on cost, safety, reliability, and member satisfaction.
- Outage Management and Reliability



Safety as a Core Value

Safety is embraced as a core value

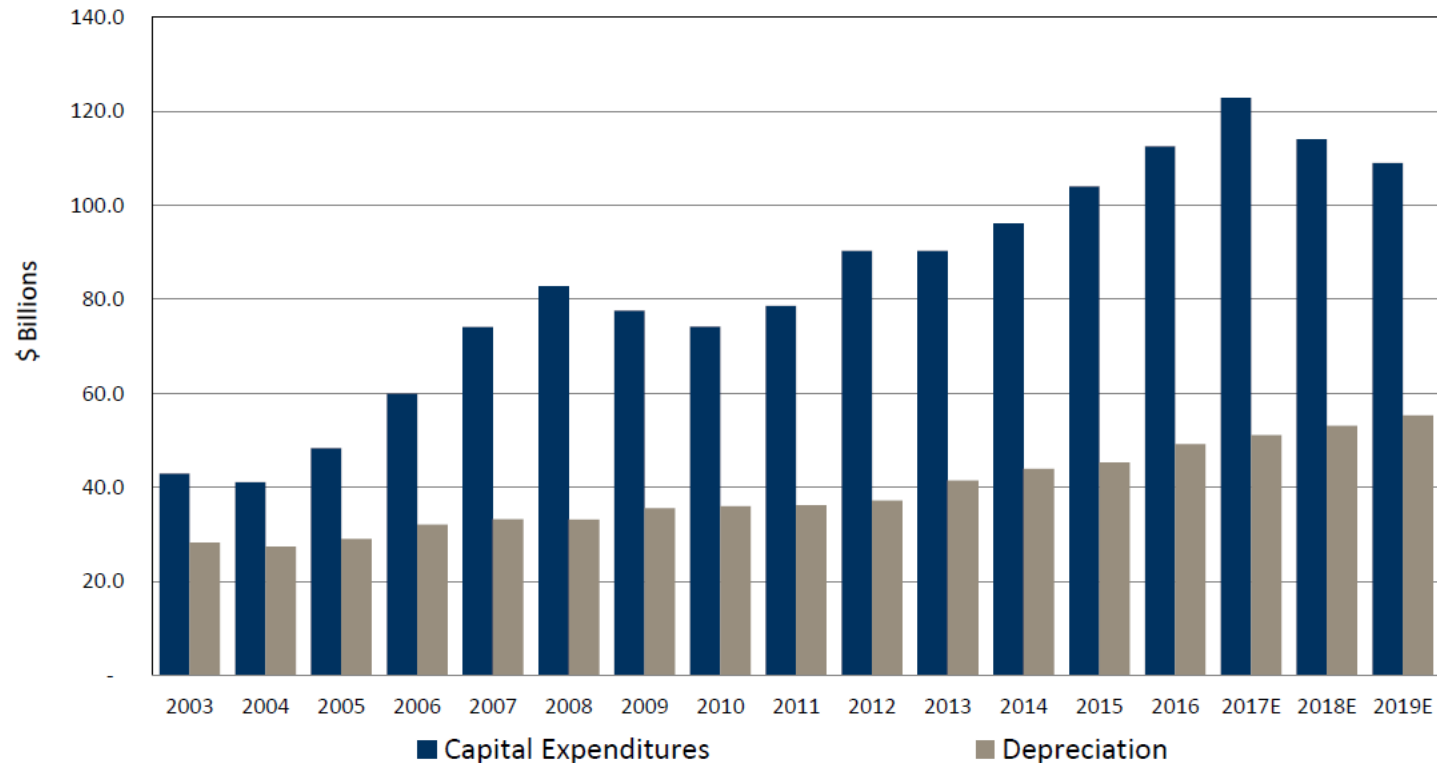
- Actions and decisions reflect a fundamental and unwavering commitment to safety at all levels of the cooperative.
- Cooperative leadership accepts accountability for a culture that drives safety performance.



Capital Intensity of the Electric Utility

(Capital Spending by U.S. Utilities in 15 years)

Capital Spending > Depreciation = Rate Base Growth

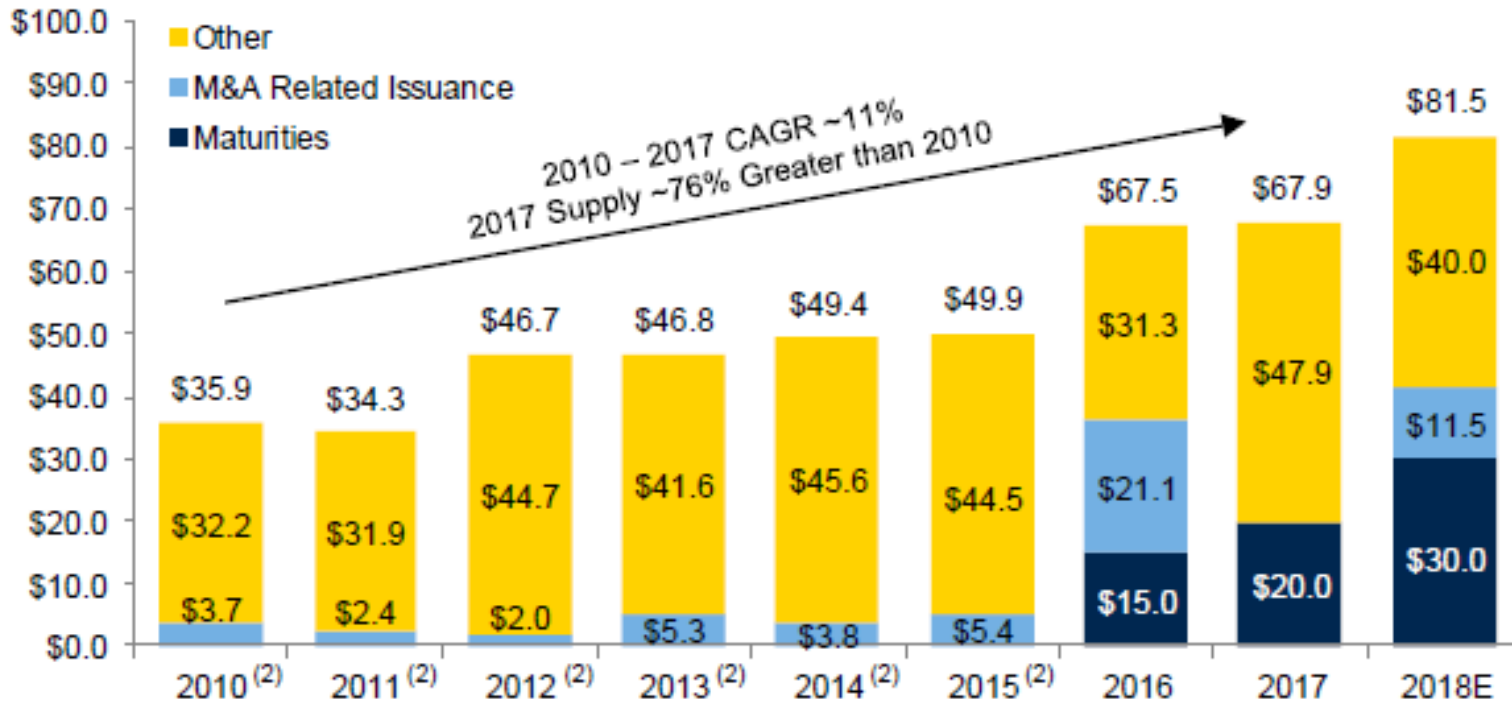


Source: Edison Electric Institute, RBC Capital Markets

Utility Debt Issuances

Historical Utility Supply & Go-Forward Expectations ⁽¹⁾

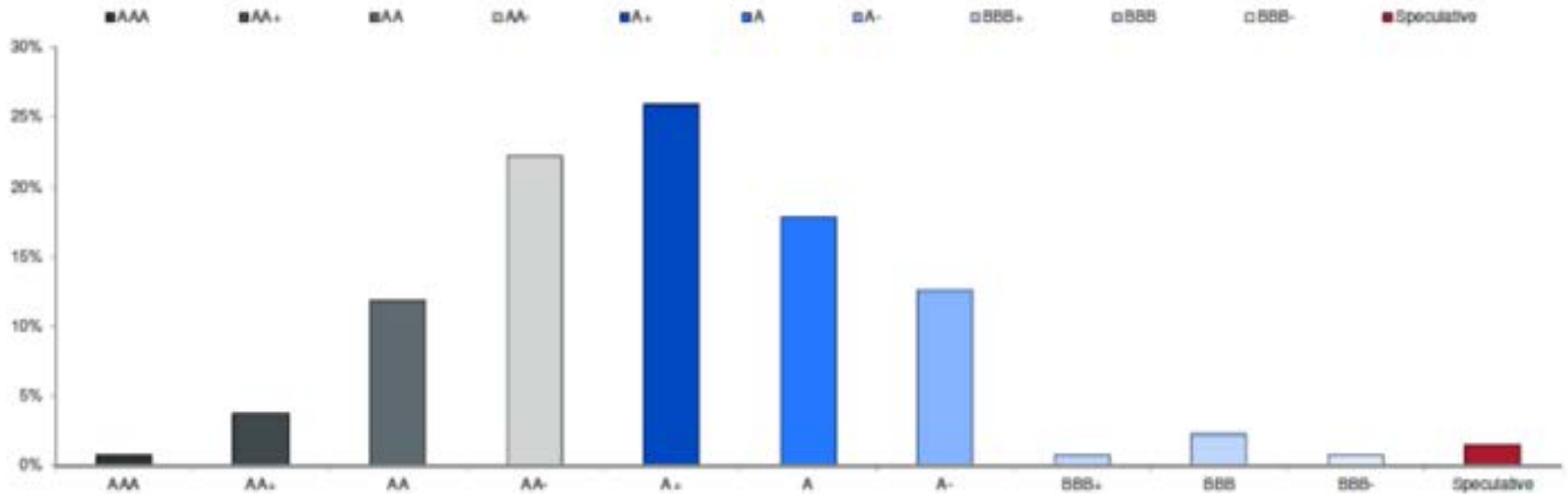
Issuance (\$ billion)



Source: Bloomberg, Informa Global Markets, RBC Capital Markets.

Publicly Rated U.S. Utilities

Rating Distribution



Note: For Obligors with FY 2016 audits unavailable, FY 2015 data is repeated for 2016.

Number of Rated Obligors: 135

2018 Outlook: U.S. Public Power and Electric Cooperative Sector



Rating Outlook

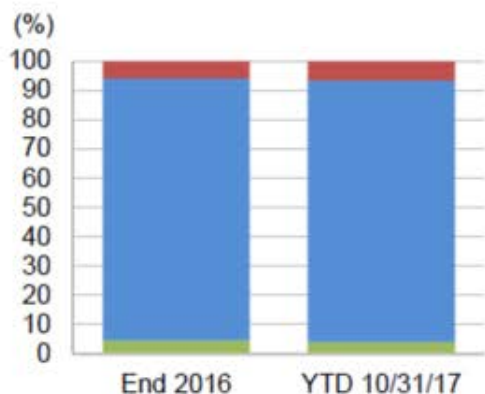
STABLE
(2017: Stable)

Sector Outlook

STABLE
(2017: Stable)

Rating Outlooks

■ Positive ■ Stable ■ Negative



FitchRatings
Public Finance

Public Power / U.S.A.

Fitch 2018 Outlook: U.S. Public Power and Electric Cooperative Sector

Outlook Report

Rating Outlook
STABLE
(2017: Stable)

Rating Outlooks
→ Positive → Stable → Negative

Source: Fitch

Sector Outlook
STABLE
(2017: Stable)

- Electric affordability improves to precession levels.
- Environmental compliance burdens decline.
- Declining capital investment.

Related Research
Other Outlooks
www.fitchratings.com/outlooks

Other Research
[State Economic Outlook \(December 2017\)](#)

Analysts
Dennis Poberny
+1 212 209-0738
dennis.poberny@fitchratings.com
Ashlyn Kalesnik
+1 612 219-3732
ashlyn.kalesnik@fitchratings.com

Rating and Sector Outlooks Stable: Fitch Ratings' 2018 outlook for the public power and electric cooperative sector is stable. Strong sector characteristics, including autonomous rate-setting authority, the essential nature of electric service and reliable cash flow, should allow the sector to retain a solid fiscal foundation. The outlook for ratings is also stable.

Affordability Returns to Precession Levels: Strong growth in household income has contributed to electric cost affordability that has returned to precession levels, easing rate pressures for most public power and cooperative issuers. Favorable operating conditions, a continued ability and willingness to increase electric rates to preserve margins, and modest economic growth should help sustain the sector's trend of improving financial metrics.

Regulations Uncertain: Actions by the Trump administration, including a proposed repeal of the Clean Power Plan (CPP) and withdrawal from the Paris climate agreement, make the future of environmental regulations aimed at reducing carbon dioxide (CO₂) emissions uncertain at best. Revisions to the CPP and CO₂ regulations would likely benefit coal-dominant utilities over the near term by easing or eliminating the burden of compliance.

Carbon Pressures Remain: Despite the shifting regulatory landscape, Fitch expects that state-level renewable mandates as well as mounting pressure from consumers, local governments and investors will pressure public power utilities to reduce CO₂ emissions over time. The proliferation of policies that reduce liquidity or force premature retirement could result in financial strain and downward rating pressure.

Declining Rate of Capital Investment: Capital investment as a percentage of depreciation has steadily declined throughout the public power sector since 2010, driven by lower growth in electric consumption and ample access to alternative generating capacity. Lower spending ratios should continue during the near term as consumption and resource development trends limit sector-wide investment in generation. Lower funding requirements and redirection of cash flow toward reserves and debt reduction would be supportive of credit quality.

Favorable Operating Environment: Low natural gas prices and interest rates should support financial performance through the outlook period, but future gains may be limited. Fitch expects natural gas prices to remain low by historical standards at \$3.00 per thousand cubic feet (mcf) for 2018. Long- and short-term interest rates are expected to rise steadily through 2018, but higher levels should not pose a material risk to issuers given the sector's concentration of fixed-rate debt and lower funding requirements.

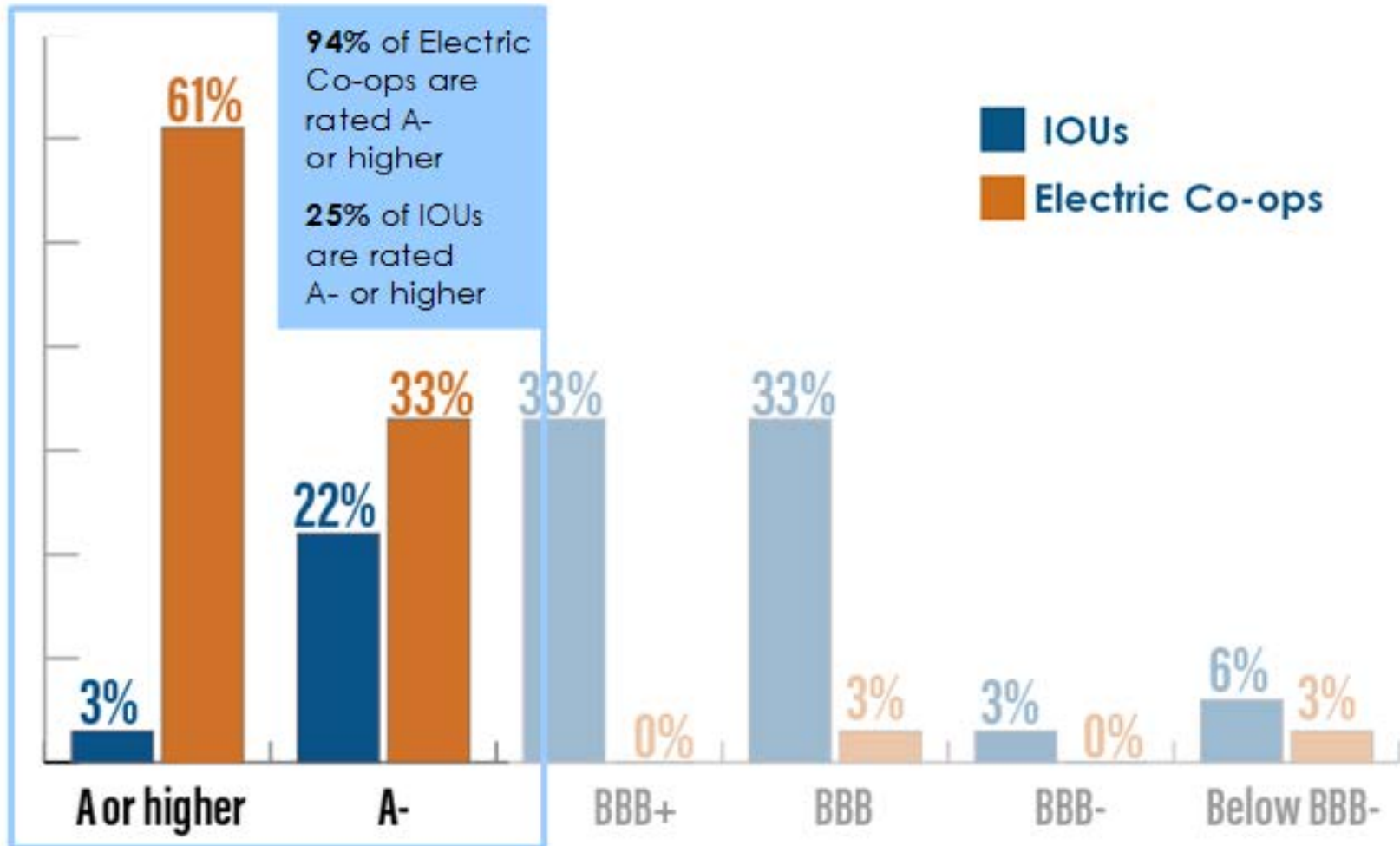
Outlook Sensitivities

Stable Sector Outlook: The essential services provided by the sector, monopolistic business nature and autonomous rate-setting authority are key factors in the sector's historical performance stability. Given the sector's fundamentals and Fitch's expectation for modest economic growth nationally, a shift in the sector's stable outlook in 2018 is unlikely.

Unwillingness to Support Metrics: A widely observed unwillingness of public power and cooperative issuers to raise rates to support current and projected financial metrics in response to economic weakness, increased cost pressures or declining consumption, could change the sector rating outlook to negative.

www.fitchratings.com Learn more at our Outlooks site: December 6, 2017

Comparative Ratings Distribution



Financing Electric Cooperatives



What Does The Financial Community Look?

In order to have confidence that its investment in a cooperative is protected:

- Credit Quality
- Strong balance sheet
- Collection Policies
- Strength/tenure/experience of management
- Legal/regulatory system that protects the investment.

USDA-RUS

- 700 borrowers in 46 states
- Loan Portfolio of \$46 Billion
- General Field Representatives (GFR's) assist borrowers with completing application and supporting documents.
- Historical interest rate = Treasury plus 125 BPS (compare to Treasury plus 200 for other lenders).



Committed to the future of rural communities.

Thank you!

Martha A. Duggan

Senior Director, Regulatory Affairs

National Rural Electric Cooperative Association

Email: Martha.Duggan@NRECA.coop

Office: (703) 907-5848

Mobile: (202) 271-4395



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