

North Carolina Utilities Commission Public Staff

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Disclaimer

This ratemaking presentation provides a high level overview of the general ratemaking process for regulated utilities in North Carolina. Ratemaking is a fact-specific process, thus examples discussed herein may not always predict the outcome of any particular issue coming before the NCUC. The purpose of this presentation is to provide the audience with a better understanding of the framework within which decisions are made and the issues that regulators must weigh when reaching those decisions and should not be construed as offering opinions regarding the Public Staff's position in any present or future case. Many of the graphs contained herein are fictional examples for illustrative purpose only and should not be cited or relied upon.

What Is The Public Staff?

- Established in 1977 by N.C. Gen. Stat. § 62-15
- Represents the **using and consuming public** in North Carolina Utilities Commission proceedings
 - Not the public at-large
 - Economic regulator and advocate
- Eighty staff members organized into nine divisions
 - Electric, natural gas, water/sewer/communications, transportation
 - Accounting
 - Legal
 - Economic Research
 - Executive
 - Consumer complaint analysts

Differences Between NCUC and Public Staff

- Independent agencies
 - Separate staffs, leadership and budgets
- NCUC does not direct or oversee the Public Staff's operations
- Public Staff appears as a party before the NCUC
 - Public Staff subject to ex parte rules and cannot independently communicate with NCUC on pending matters
 - Public Staff does not participate in NCUC decision-making
- Staff roles
 - NCUC staff is an advisory staff
 - Public Staff is an audit/advocacy staff

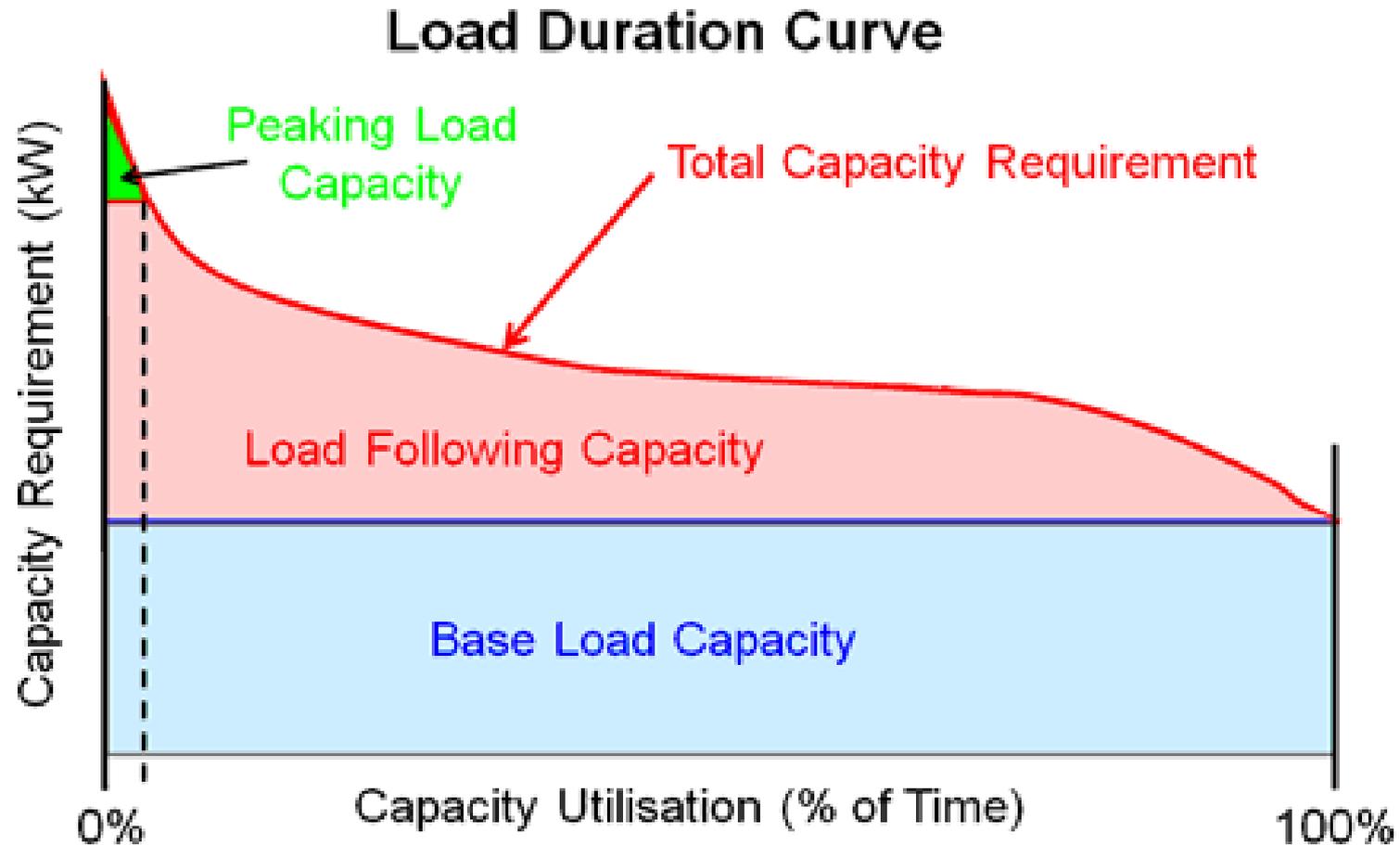
What Is The Regulatory Compact?

- Most utility functions are a “**natural monopoly**” for “**essential service**”
- In exchange for a regulator granting the utility a protected monopoly within its service territory, the utility commits to supply the full quantities demanded by customers at a regulated price
 - Public utility is **not subject to competition** within its service territory
 - Public utility has an **obligation to serve** anyone that requests service
 - Rates are regulated based upon the **cost of service**, which includes a **reasonable rate of return**

Energy v. Capacity

- **Energy** is actual electricity being produced or consumed
 - Measured in kilowatt hours (kWh) or megawatt hours (MWh)
- **Capacity** is the infrastructure needed to produce electricity
 - Measured in kilowatts (kW) or megawatts (MW)

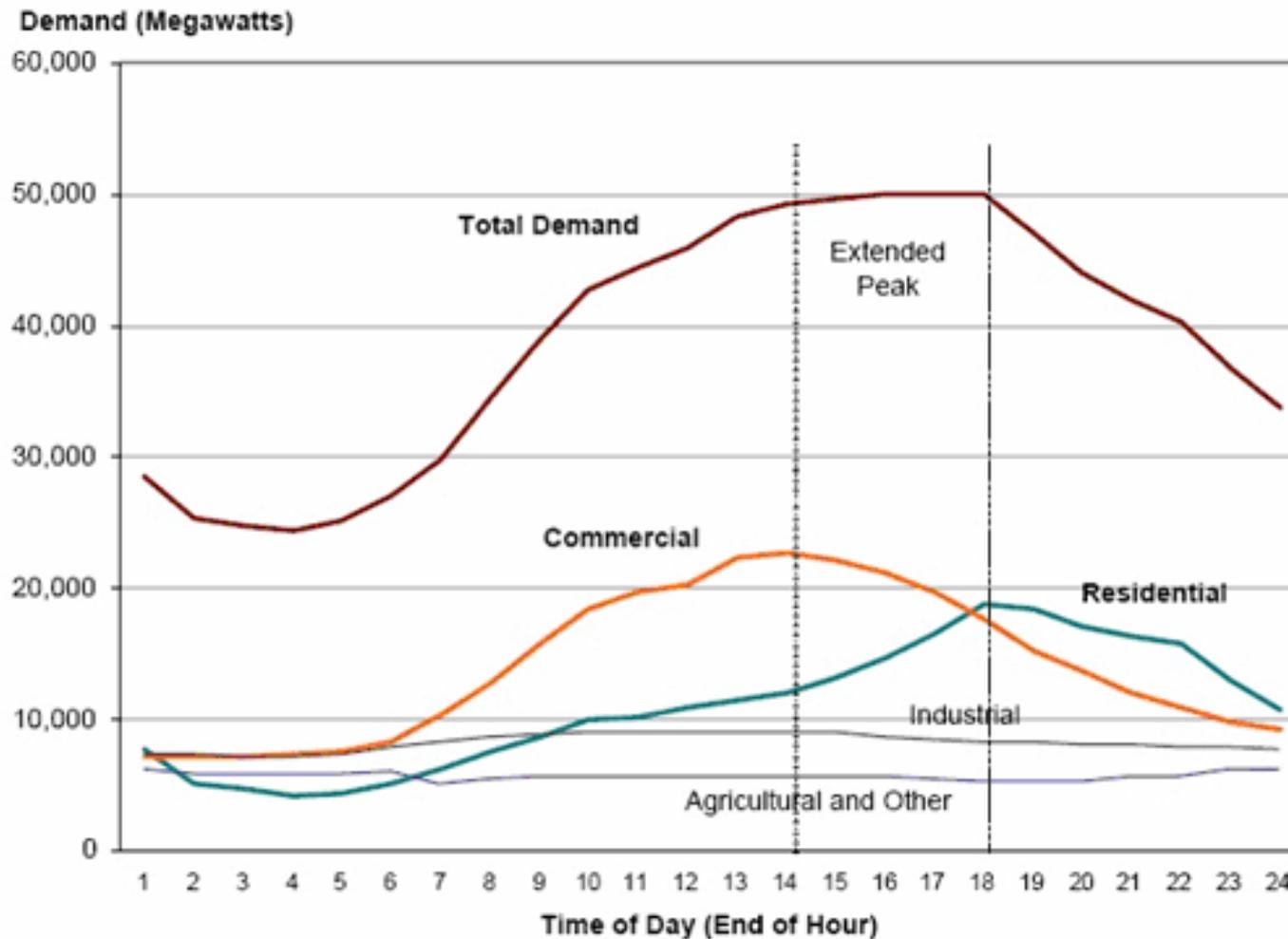
Capacity Requirements and Utilization



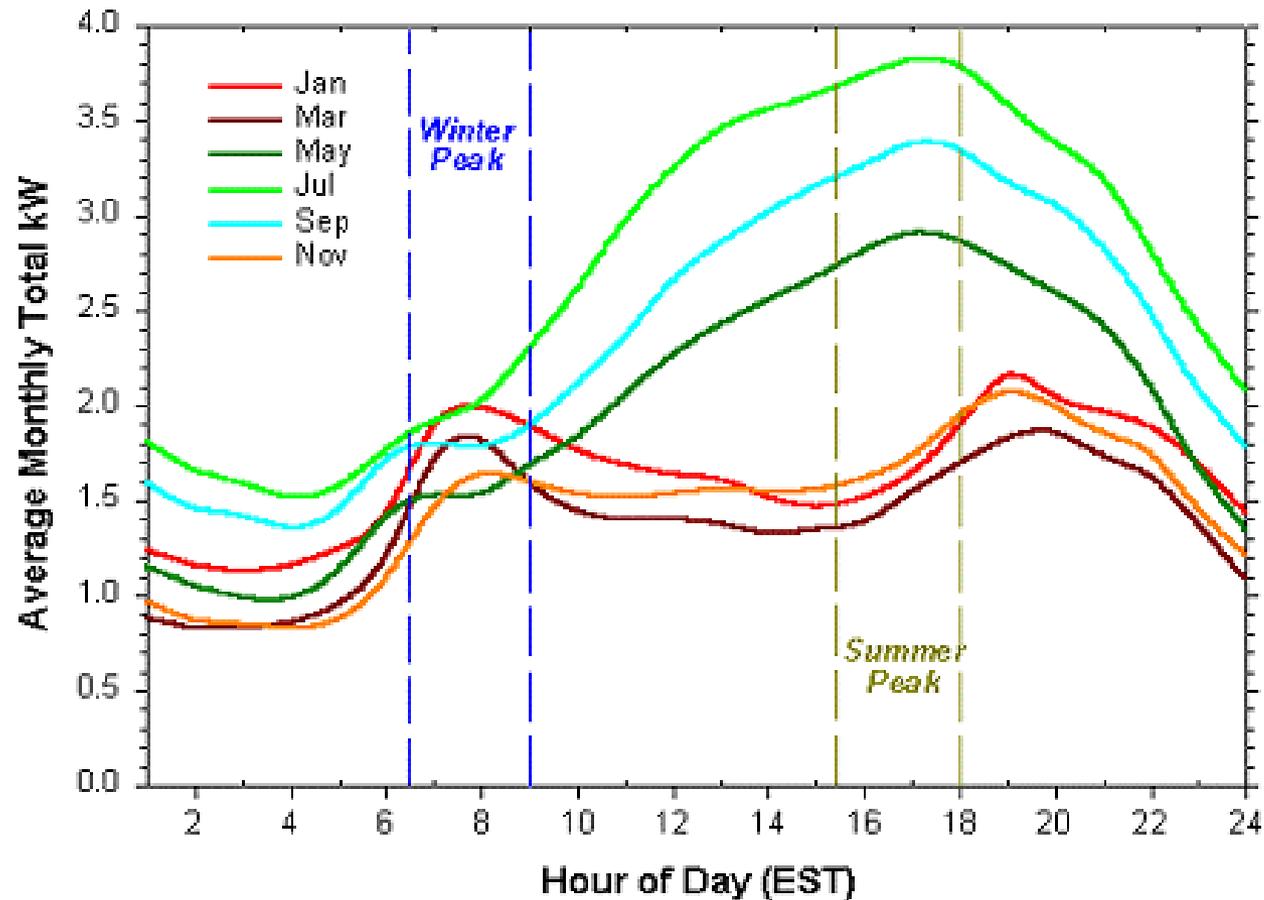
Peak Demand

- Utility must have enough capacity to meet peak demand
- Capacity must be **firm** and **dispatchable**
 - When you need power, it has to produce instantly
 - Cannot be intermittent
- When customer demand equals or exceeds generation output, the utility must:
 - Bring additional generation online
 - Purchase power from another source
 - Implement demand response measures
 - Curtail customer usage
- All-time system peaks:
 - DEC: 21,623 MW (January 5, 2018 between 7:00 am - 8:00 am)
 - DEP: 15,196 MW (February 20, 2015 between 7:00 am - 8:00 am)

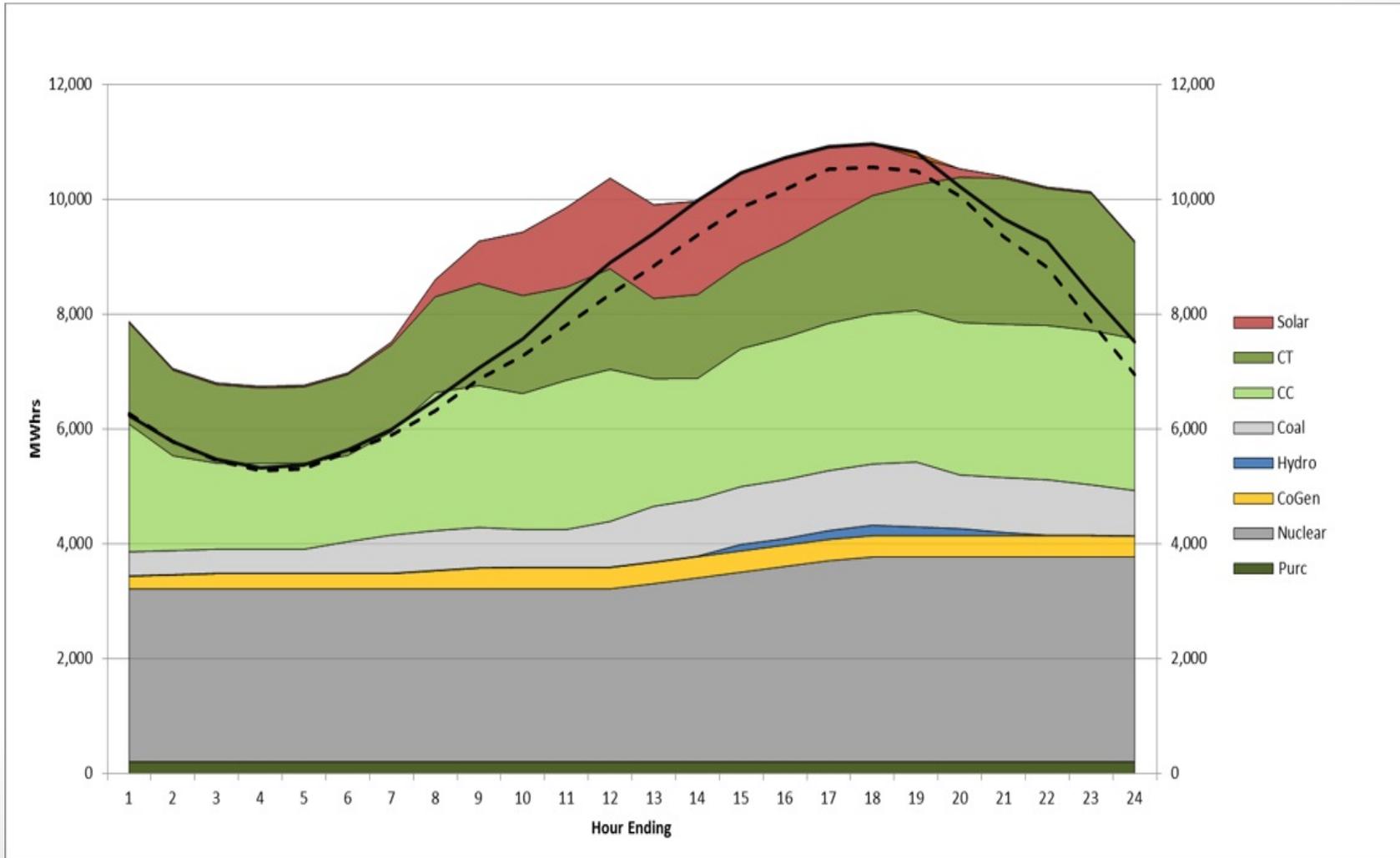
Demand Profiles



Seasonal Demand Variations



Generation Unit Dispatch



Rate Case Process – 270 Days

- 1) Utility files rate case application, exhibits, testimony and proposed rates
- 2) NCUC suspends rates and schedules customer and evidentiary hearings
- 3) Public Staff engages in discovery, audits/investigates, files testimony
- 4) Intervenors engage in discovery and file testimony
- 5) Settlement discussions may occur between parties
- 6) Customer and evidentiary hearings
- 7) Parties file proposed orders
- 8) NCUC reviews all evidence and issues order
- 9) Utility puts new rates into effect

Fundamental Ratemaking Questions

- It is important to understand the framework through which spending decisions are evaluated
 - Utility operating expenses are evaluated using general ratemaking principles
 - If these expenses do not conform to cost of service principles, regulators are less likely to allow recovery through rates
- Fundamental question for utilities:
“Can we recover it through rates?”
- Fundamental questions for regulators:
“Does it benefit ratepayers?”
“Is it least cost?”

General Ratemaking

- Utility base rates established pursuant to N.C. Gen. Stat. § 62-133
 - Must be **just and reasonable**
- Based on the **cost of service** in the test period, adjusted for non-recurring or non-representative costs
- Rates are established to recover future costs based on what the utility has already spent
 - Utilities typically do not recover expenses and capital costs in advance **or** after the fact

Least Cost Requirement

- N.C. Gen. Stat. § 62-2(3a) requires “...energy planning and fixing of rates in a manner to result in the **least cost** mix of generation and demand side reduction measures which is achievable...”
- Look for the reasonable least cost means of energy production and regulatory compliance
- This does not mean utilities buy the cheapest thing
 - Balance short-term and long-term costs
 - Consider reliability, maintenance, replacement, estimated obsolescence
 - Present value calculations

Test Year

- Financial data from a historical 12-month period
 - Serves as a proxy for the anticipated level of costs for the period of time the rates will be in effect
 - Pro forma update to include period prior to the hearing
- Example:
 - DEC rate case filed on August 25, 2017
 - Hearing date of March 5, 2018
 - Test year of January 1, 2016 – December 31, 2016
 - Updated through December 31, 2017

General Ratemaking Formula

- **Revenue Requirement** is determined as (**Rate Base** x **Rate of Return** (grossed up for income taxes)) + **Expenses**
- **Rate Base** – value of the property (net of depreciation) on which a utility may earn a rate of return.
 - Must be “used and useful” - Power plants, transmission and distribution lines, etc. actually used in providing service to customers
- **Rate of Return** – % return that utility may earn on invested capital, including debt and equity investments.
- **Expenses** – can recover reasonable and prudent expenses based on an historical test year.

Rate Base

- Rate base is the **reasonable and prudent** cost of property on which a public utility is authorized to earn its rate of return
- Rate base calculation:
 - Original cost of the utility assets** (prudent capital investment)
 - (minus)*
 - Accumulated depreciation expense**

Original Cost

- Original cost of the assets also includes capital additions since original construction
 - Example: The addition of an emissions control system on a generating plant would be folded into the original cost of the assets when calculating rate base
- The assets included in rate base must be **used and useful**
 - Utility cannot recover investment if it builds assets that it does not need
 - Reasonable planning horizon is allowed

Accumulated Depreciation

- Capital investment is recovered through the depreciation expense established in the test year
- Accumulated depreciation expense deducted from original cost to avoid double recovery

Utility Assets in Rate Base

- Generation facilities
- Transmission lines
- Distribution lines
- Transformers and substations
- Meters
- Computer and software systems
- Vehicles
- Equipment
- Buildings
- Pipelines
- Working capital

Rate of Return

- Percentage return that the utility is allowed to earn on its invested capital
- Designed to compensate investors for the use of their capital and associated risk
- Rate of return composed of three components:
 - Cost of equity
 - Cost of debt
 - Capital structure (debt and equity ratios)
- Rate of return is **not a guaranteed return** → it is the return the utility is authorized to earn
 - Rates are calculated using the rate of return

Rate of Return – Cost of Debt

- Debt is considered less risky than equity
 - Debt has senior claim on utility earnings
 - If utility bankrupts, debt holders are paid out before equity owners
- Lower risk results in lower required rate of return for debt as compared to equity
- Cost of debt calculation is straightforward
 - Based on the coupon (interest) rate of the debt
- Interest on debt is tax deductible
- Influenced by utility's corporate credit rating and risk profile
 - Standard & Poor's (AAA to D)
 - Duke Energy Carolinas: A-
 - Duke Energy Progress: A-
 - Dominion Energy: BBB+
 - Dow Jones US Utilities average: BBB+
 - Fitch (AAA to D); Moody's (Aaa to C)

Rate of Return – Cost of Equity

- Equity is considered more risky than debt
 - Equity has junior claim on utility earnings due to the contractual nature of debt
 - Shareholders get what is left once everyone else has been paid
- Higher risk → Higher rate of return required to induce investors to bear the risk
- Cost of equity is not tax deductible
- Cost of equity cannot be precisely calculated
 - Methodologies for estimating cost of equity
 - Discounted Cash Flow (DCF)
 - Capital Asset Pricing Mechanism (CAPM)
 - Risk Premium model

Rate of Return – Capital Structure

- Ratio of debt to equity impacts the ultimate cost to ratepayers and must be balanced appropriately
 - Since equity is more costly than debt, a higher percentage of equity will result in higher rates
 - BUT the cost of equity increases as a company adds more debt, which offsets the savings
- Typical capital structure ratio for ratemaking is 50:50
- Utilities Commission can impute capital structure for ratemaking purposes
 - Example: Utility A is capitalized with 65% equity and 35% debt. NCUC could establish rates by applying a 50% equity and 50% debt ratio to the rate base. This would result in lower rates for customers when compared to the actual capitalization ratio.

Rate of Return – Example Calculation

- Utility A has a capital structure of 55% equity and 45% debt
- Cost of equity estimated at 10%
- Income tax rate of 40%
- Cost of debt calculated at 4%
- Rate base is \$3,000,000,000
- Overall rate of return = 7.30%

Type of Capital	Capital Structure Ratio %	Cost Rate %	Weighted Cost %	Income Tax Gross-Up	Pre-Tax ROR %
Equity	55.00%	10.00%	5.50%	1.67	9.17%
Debt	45.00%	4.00%	1.80%	1.00	1.80%
Total	100.00%		7.30%		10.97%

- Pre-tax return (includes income tax gross-up) on rate base = $\$3,000,000,000 * 10.97\% = \$329,100,000$

Expenses

- Utilities are authorized to recover **reasonable and prudent** expenses
 - Maintenance expense
 - Operating expense
 - Depreciation
 - Salaries
 - Fuel
 - Transportation
 - Customer service
 - General taxes
 - Administrative
 - Uncollectibles
 - Testing
 - Legal
 - Rate case expenses
 - Purchased power costs
 - QF power costs

Depreciation Expense

- Depreciation amount charged during the test year
- Designed to recover the cost of the property over its estimated life
 - Sample depreciation rates (2011 study)

Coal generating plant: 60 years

Natural gas combined cycle: 40 years

Transmission facilities: 60 years

Distribution facilities: 40 years

AMI meters: 15 years

Computers: 5 years

- If item is fully depreciated but remains in utility service, there is no depreciation expense in the test year
 - Just because it is fully depreciated does not mean it is retired
 - Utility has fully recovered its capital investment and the rate of return
 - No longer earn rate of return on such property going forward

Cost Allocation

- Attribute costs to different customer classes based on the cost incurred to serve those classes
 - Residential, commercial and industrial classes
 - Capital requirements vary by customer class
 - Residential customers require significant distribution facilities
 - Economies of scale
 - Municipalities and industrial customers are cheaper to serve on a per kWh basis
 - Time differentiation
 - Contribution to peak vs. non-peak demand
 - Retail vs. wholesale
 - Municipalities and electric cooperatives
 - System costs across multiple state jurisdictions
 - North Carolina/South Carolina allocate costs approximately 65:35

Cost Allocation Methodologies

- Summer coincident peak
 - Customer's share of the system load at the system's summer peak
- Winter/summer coincident peak and average demand
- Non-coincident peak and average demand
- Twelve month average peaks

- North Carolina allocates based on load demand at summer coincident peak

Rate Design

- Rates established to meet the revenue requirement
 - Customer rate classes
 - Residential
 - Commercial
 - Industrial
 - Designed to mirror the cost of service to each class
 - Various rate schedules in each customer class
- Average NC retail price of electricity per customer class
 - Residential: 11.54 cents/kWh (National average: 13.32 cents/kWh)
 - Commercial: 8.46 cents/kWh (National average: 10.53 cents/kWh)
 - Industrial: 5.86cents/kWh (National average: 6.71 cents/kWh)

Tariff Designs

- Standard service
 - Small fixed charge
 - Rates do not vary based on cost of generation resource or system demand
- Real Time Pricing
 - Rates fluctuate hourly and are tied to actual generation cost
 - Higher prices when demand is higher
 - Requires a smart meter (two-way)
 - When you use energy is as important as how much you use
- Time-of-Use
 - Prices fixed based on typical demand periods
 - Rates are higher during period when demand is higher
 - When you use energy is as important as how much you use

Tariff Designs

- Critical Peak Pricing and Rebate
 - Higher pricing or rebate during critical times
- Curtailable Service
 - Lower rate in exchange for ability to be curtailed a certain number of hours each year
 - Premium charge if exceed demand during curtailment period
- Co-Generation
 - Customer self-generation allows customer to shave peak load
 - Demand and standby charges

Fixed and Variable Costs

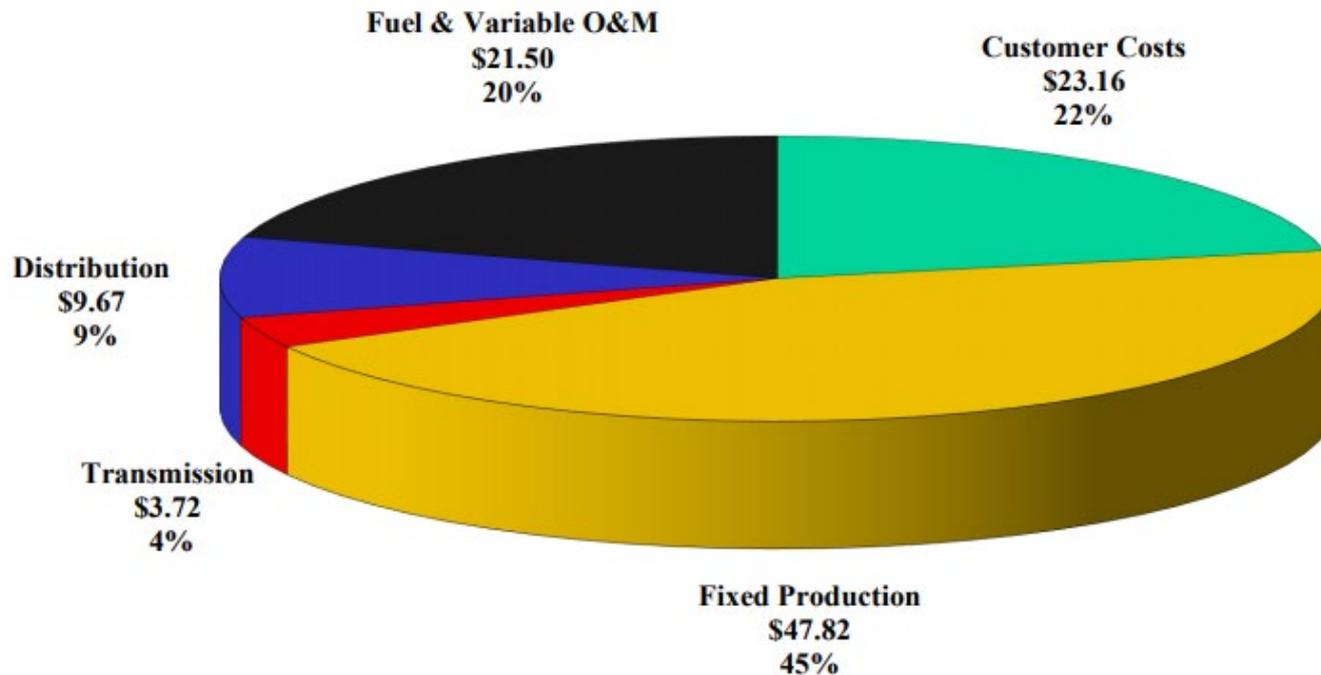
- Rate design includes fixed and variable components
 - Fixed (minimum) charges on the bill tend to be low
 - Designed to ensure customer pays a certain portion toward the fixed cost of the system
 - Do not reflect the true fixed cost of the system to serve the customer
 - Much of the fixed cost is recovered through the variable component
 - Variable charges can be influenced by customer behavior
 - Largest variable cost is fuel

Electric Bill Allocation

Duke Energy Carolinas

Typical Residential 1,000 kWh Monthly Bill Total \$105.87

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Fixed v. Variable Challenges

- Altering the allocation changes the winners and losers
- Higher fixed cost → discourages conservation
 - Could necessitate additional plant construction to meet demand, which increases rates
- Lower fixed cost → some customers may pay less than the true fixed cost the utility incurs to serve them
 - Cost recovery shifted to higher energy users
- Lower variable → helps and hurts low income customers
 - Hurts customers that are able to use less energy
 - Helps customers that lack energy efficient housing

Other Ratemaking Concepts

- Construction Work in Progress (CWIP)
 - Generally not included in rates until construction is complete and the plant is in service
- Allowance for Funds Used During Construction
 - Utility is allowed to accrue financing costs (debt and equity return) on the funds used for construction
 - Included in rate base along with the capital costs once project is complete
 - In certain circumstances, the financing costs incurred-to-date can be recovered as CWIP in a general rate case before the project is complete
- Early Retirement/Abandoned Plant
 - Unrecovered costs can be recovered when the early retirement/abandoned plant decision is deemed reasonable and prudent
 - NCUC has allowed sharing of risk by disallowing rate of return on the amount recovered

Regulatory Assets (Deferrals)

- Deferred Expenses
 - Regulator may allow a utility to record costs that would normally be expensed as an asset (called a regulatory asset)
 - Applies to both revenues and expenses
 - Must demonstrate the costs in question would have a material impact on the utility's earnings and overall financial condition absent the deferral
 - Utility must be earning below its authorized rate of return
 - Can include a rate of return on the deferred amount
 - Rates set by a regulator at a later date include recovery of the regulatory asset
 - NCUC has said these should be used sparingly

Fuel Rider

- Cost of fuel burned
 - Coal, gas, nuclear, biomass
- Cost of reagents used to treat emissions
- Certain purchased power costs*
 - Replacement power costs
 - Peak power purchases
 - Transmission charges
- Costs of energy and capacity purchased from qualifying facilities (QFs)*
- Net gains/losses from sale of fuel or by-products*
- Renewable energy procurement non-administrative costs*

*Limited to 2.5% annual increase in the aggregate amount of costs

Renewable Energy/Energy Efficiency Portfolio Standard Rider

- Incremental costs to comply with Renewable Energy Portfolio Standard (bundled costs minus avoided costs)
- Costs of Renewable Energy Certificates (RECs)
- Costs recoverable are capped by General Assembly
 - Residential rates: \$27/year
 - Commercial rates: \$150/year
 - Industrial rates: \$1,000/year

Demand Side Management (DSM)/Energy Efficiency (EE) Rider

- Costs of DSM/EE programs
 - LED bulbs
 - Refrigerator recycling program
 - Home energy audits
 - Load control
- Net lost revenues
 - First three years of program
- Utility incentives
 - Receive a percentage of savings achieved for customers from energy efficiency
- Must be cost effective

Public Utility Regulatory Policies Act of 1978

- Defines Qualifying Facilities (QFs)
 - Small power production facilities 80MW or less and whose primary energy source is renewable resources
 - Co-generation facilities sequentially producing electricity and another useful form of thermal energy
- Electric utilities “must purchase” electricity and capacity generated by QFs
 - Can be excused if access to sufficiently competitive market exists
 - IE: PJM, MISO, etc.
 - Electricity is purchased from QFs at the utility’s avoided cost
 - Established by state utility commission for regulated utilities
- Electric utilities “must sell” electricity and capacity when requested by a QFs

Avoided Cost Rates

- Incremental cost a utility would incur to generate or purchase the next kilowatt or kilowatt-hour of electricity
 - Cost of building the capacity
 - Cost of generating the energy
- “**Avoided**” because the utility has procured the electricity from another source rather than incurring the cost to produce the electricity itself
- Established for regulated electric utilities by the NCUC not less than every two years

How is Avoided Cost Calculated?

- North Carolina uses the Peaker Method
 - Capacity calculation based on the cost (per kW) of building a new peaking unit
 - Natural gas combustion turbine (peaking unit)
 - Energy calculation based on marginal system energy cost
 - Avoided cost elements must be “**known and quantifiable**”
- Variable and long-term fixed rate options
- Capacity payments are paid only for peak hours during which the unit is producing electricity

How is Avoided Cost Used?

- Rates for purchases from Qualifying Facilities
- Integrated Resource Plans
 - Allows utilities to assign dollar value to their options
- Determining savings from Demand Side Management/Energy Efficiency Programs
 - What did the utility save by avoiding the demand?
- Determining incremental costs of Renewable Energy Portfolio Standards compliance
 - What additional cost did the utility incur above the cost of the energy/capacity?
- Establishes ceiling for accepted bids under CPRE

Consumer Advocate Perspective

- Rates should be based on the **cost of service**
 - How much does it cost to provide safe, reliable service?
 - Should be based on **least cost** means for providing service
- Expenditure decisions should be both **reasonable and prudent**
 - Was the decision to build the plant prudent?
 - Were the costs incurred following the decision reasonable?
- Rates **allocate risk** between customers and utility shareholders
 - What is the appropriate allocation of risk?