

North Carolina Sustainable Energy Association

Energy 101: Ratemaking

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- Background
- Mechanics of a Rate Case
- Steps to Ratemaking
 1. Determine revenue requirement
 2. Functionalize, classify, and allocate costs
 3. Design rate tariffs
- Other Ratemaking Concepts

How People Think Rates Are Set



How Rates Are Actually Set

- N.C. Gen. Stat. § 62-133(b)
 - In fixing such rates, the Commission shall:
 - (1) Ascertain the reasonable original cost of the public utility's property used and useful, or to be used and useful within a reasonable time after the test period, in providing the service rendered to the public within the State, less that portion of the cost that has been consumed by previous use recovered by depreciation expense. In addition, construction work in progress may be included in the cost of the public utility's property under any of the following circumstances:
 - a. To the extent the Commission considers inclusion in the public interest and necessary to the financial stability of the utility in question, reasonable and prudent expenditures for construction work in progress may be included, subject to the provisions of subdivision (4a) of this subsection.
 - b. For baseload electric generating facilities, reasonable and prudent expenditures shall be included pursuant to subdivisions (2) or (3) of G.S. 62-110.1(f1), whichever applies, subject to the provisions of subdivision (4a) of this subsection.
 - (1a) Apply the rate of return established under subdivision (4) of this subsection to rights-of-way acquired through agreements with the Department of Transportation pursuant to G.S. 136-19.5(a) if acquisition is consistent with a definite plan to provide service within five years of the date of the agreement and if such right-of-way acquisition will result in benefits to the ratepayers. If a right-of-way is not used within a reasonable time after the expiration of the five-year period, it may be removed from the rate base by the Commission when rates for the public utility are next established under this section.
 - (2) Estimate such public utility's revenue under the present and proposed rates.
 - (3) Ascertain such public utility's reasonable operating expenses, including actual investment currently consumed through reasonable actual depreciation.
 - (4) Fix such rate of return on the cost of the property ascertained pursuant to subdivision (1) of this subsection as will enable the public utility by sound management to produce a fair return for its shareholders, considering changing economic conditions and other factors, including, but not limited to, the inclusion of construction work in progress in the utility's property under sub-subdivision b. of subdivision (1) of this subsection, as they then exist, to maintain its facilities and services in accordance with the reasonable requirements of its customers in the territory covered by its franchise, and to compete in the market for capital funds on terms that are reasonable and that are fair to its customers and to its existing investors.
 - (4a) Require each public utility to discontinue capitalization of the composite carrying cost of capital funds used to finance construction (allowance for funds) on the construction work in progress included in its rate based upon the effective date of the first and each subsequent general rate order issued with respect to it after the effective date of this subsection; allowance for funds may be capitalized with respect to expenditures for construction work in progress not included in the utility's property upon which the rates were fixed. In determining net operating income for return, the Commission shall not include any capitalized allowance for funds used during construction on the construction work in progress included in the utility's rate base.
 - (5) Fix such rates to be charged by the public utility as will earn in addition to reasonable operating expenses ascertained pursuant to subdivision (3) of this subsection the rate of return fixed pursuant to subdivisions (4) and (4a) on the cost of the public utility's property ascertained pursuant to subdivisions (1) and (1a) of this subsection.

Background

- “Used and Useful”
 - Rates allow a utility to recover future costs based on what they have already spent
 - Assets must be “used and useful” in order for a utility to recover their costs
 - Exception: Construction Work In Progress (CWIP)
- Fundamental ratemaking question for utilities:
 - “Can we recover it through rates?”

Background

- Reasonableness
 - “Reasonable and Prudent”
 - Costs must be “reasonable and prudent” for a utility to recover them in rates
 - “Just and Reasonable”
 - “The Commission shall make, fix, establish or allow just and reasonable rates for all public utilities subject to its jurisdiction.”
 - N.C. Gen. Stat. § 62-130(a)

Background

- Least Cost
 - 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...”
 - This does not mean utilities buy the cheapest thing
 - Balance short-term and long-term costs
 - Note: NCUC does not consider externalities to be costs for least cost calculation purposes
 - Present value calculations

Background

- Who asks for rates to be changed?
 - “[N]o public utility shall make any changes in any rate which has been duly established under this Chapter, except after 30 days' notice to the Commission . . .”
 - N.C. Gen. Stat. § 62-134(a)

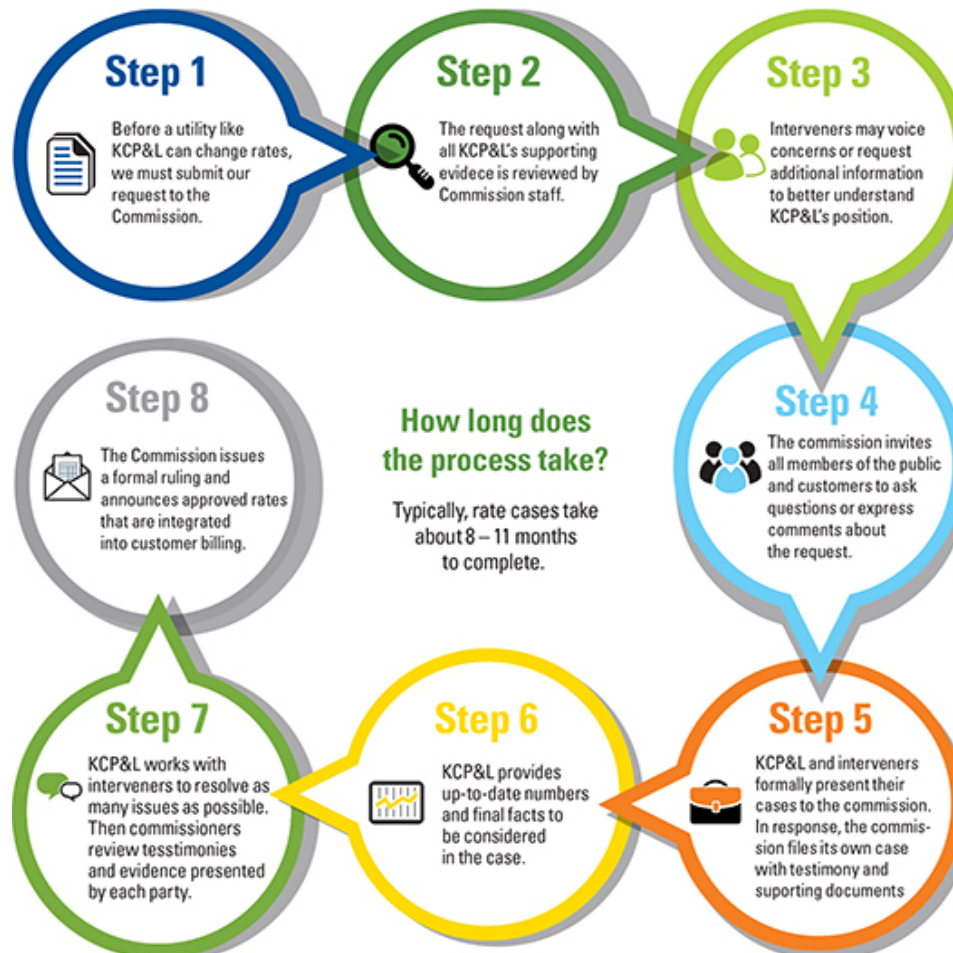
Background

- So only a utility can ask for new rates?
 - “Whenever the Commission . . . finds that the existing rates in effect and collected by any public utility are unjust, unreasonable, insufficient or discriminatory, or in violation of any provision of law, the Commission shall determine the just, reasonable, and sufficient and nondiscriminatory rates to be thereafter observed . . .”
 - N.C. Gen. Stat. § 62-136(a)



Mechanics of a Rate Case

Electric utility rate case process at a glance



Mechanics of a Rate Case

- Dominion North Carolina Power (2012)
 - Notice of Intent – Feb. 29, 2012
 - Application – March 30, 2012
 - 3,397 pages
 - Order Granting Rate Increase – Dec. 21, 2012
 - Attorney General & NUCOR Steel Notices of Appeal – Feb. 18 & 19, 2013
 - Supreme Court of North Carolina Opinion – July 2, 2014
 - NCUC order affirmed in part, reversed and remanded in part
 - Order on Remand – July 23, 2015
- Total Length: 3 years, 4 months, 24 days

Mechanics of a Rate Case

- Progress Energy Carolinas
 - Notice of Intent – Sept. 5, 2012
 - Application – Oct. 12, 2012
 - 2,335 pages
 - Order Granting Rate Increase – May 30, 2013
 - Attorney General's Notice of Appeal – July 1, 2013
 - Supreme Court of North Carolina Opinion – Sept. 9, 2014
 - NCUC order affirmed
- Total Length: 2 years, 4 days

Mechanics of a Rate Case

- Duke Energy Carolinas
 - Notice of Intent – Jan. 4, 2013
 - Application – Feb. 4, 2013
 - 5,012 pages
 - Order Granting Rate Increase – Sept. 24, 2013
 - Attorney General & NC WARN Notices of Appeal – Oct. 23 & 24, 2013
 - Supreme Court of North Carolina Opinion – Feb. 18, 2015
 - NCUC order affirmed
- Total Length: 2 years, 1 month, 14 days

Mechanics of a Rate Case

- Dominion North Carolina Power (2016)
 - Notice of Intent – March 1, 2016
 - Application – March 31, 2016
 - 2,588 pages
 - 106 sets of discovery requests (as of 7/26)
- Total Length: ?

Steps to Ratemaking

1. Determine revenue requirement
2. Functionalize, classify, and allocate costs
 - Cost of service study
3. Design rate tariffs

Revenue Requirement

The Revenue Requirements Formula

$$\text{Revenue Requirement, } RR = O + T + d + \overbrace{r \cdot (V - D)}^{\substack{\text{"Return Dollars on Rate Base"} \\ \text{Expenses} \quad \text{"Rate Base"}}}$$

O = Operating Expenses (O&M/A&G)

T = Taxes (corporate income taxes + other taxes)

d = Annual Depreciation Expense

V = Gross Investment

D = Accumulated Depreciation (sum of past "d")

r = % Overall Rate of Return (weighted-average cost of capital)

Revenue Requirement

- A utility's revenue requirement is the amount of income necessary for it to recover its expenses as well as to earn a reasonable rate of return on its rate base

Revenue Requirement

- Components:
 - Expenses
 - Operating Expenses
 - Taxes
 - Annual Depreciation Expense
 - Rate Base
 - Gross Investment
 - Accumulated Depreciation
 - Rate of Return

Revenue Requirement

- Operating Expenses
 - Allowed expenses are recovered in rates
 - Example – Fuel
 - Disallowed expenses are recovered from shareholders
 - Examples – Lobbying expenses, most advertising expenses, etc.

Revenue Requirement

- Annual Depreciation Expense
 - Assets have limited lifespans and lose value over time; depreciation attempts to measure this
 - Depreciation rates (2011 study)
 - Coal generation plant – 60 years
 - Natural gas combined cycle plant – 40 years
 - Transmission facilities – 60 years
 - Distribution facilities – 40 years
 - AMI meters – 15 years
 - Computers – 5 years
 - As an asset ages, part of its cost is recovered through depreciation; the remaining cost stays in the rate base

Revenue Requirement

- Rate Base
 - Gross Plant in Service
 - Generation Plant
 - Transmission Plant
 - Distribution Plant
 - General Plant
 - Offices, company cars, tools, etc.
 - Intangible Plant
 - Licenses, software, right-of-ways, etc.

Revenue Requirement

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

Revenue Requirement

- Rate of Return
 - Sources of Financial Capital:
 - Debt
 - Loans
 - Cost – fixed interest payments
 - Equity
 - Investor-provided capital (money raised by selling stocks)
 - Cost – fixed (for preferred stock) or variable (for common stock) dividend payments

Revenue Requirement

- Rate of Return
 - Duke Energy Carolinas
 - Capital Structure
 - 47% debt, 53% equity
 - Rate of Return
 - Debt: 5.26%
 - Equity: 10.20%
 - Combined: 7.88%

Revenue Requirement

- Rate of Return
 - Duke Energy Progress
 - Capital Structure
 - 47% debt, 53% equity
 - Rate of Return
 - Debt: 4.57%
 - Equity: 10.20%
 - Combined: 7.55%

Revenue Requirement

- Rate of Return
 - Dominion North Carolina Power (2012)
 - Capital Structure
 - 47.5% debt, 52.5% equity
 - Rate of Return
 - Debt: 5.27%
 - Equity: 10.2%
 - Combined: 7.8%

Revenue Requirement

- Rate of Return
 - Dominion North Carolina Power (2016)
 - Capital Structure
 - 46.6% debt, 53.4% equity
 - Rate of Return (proposed)
 - Debt: 4.89%
 - Equity: 10.50%
 - Combined: 7.88%

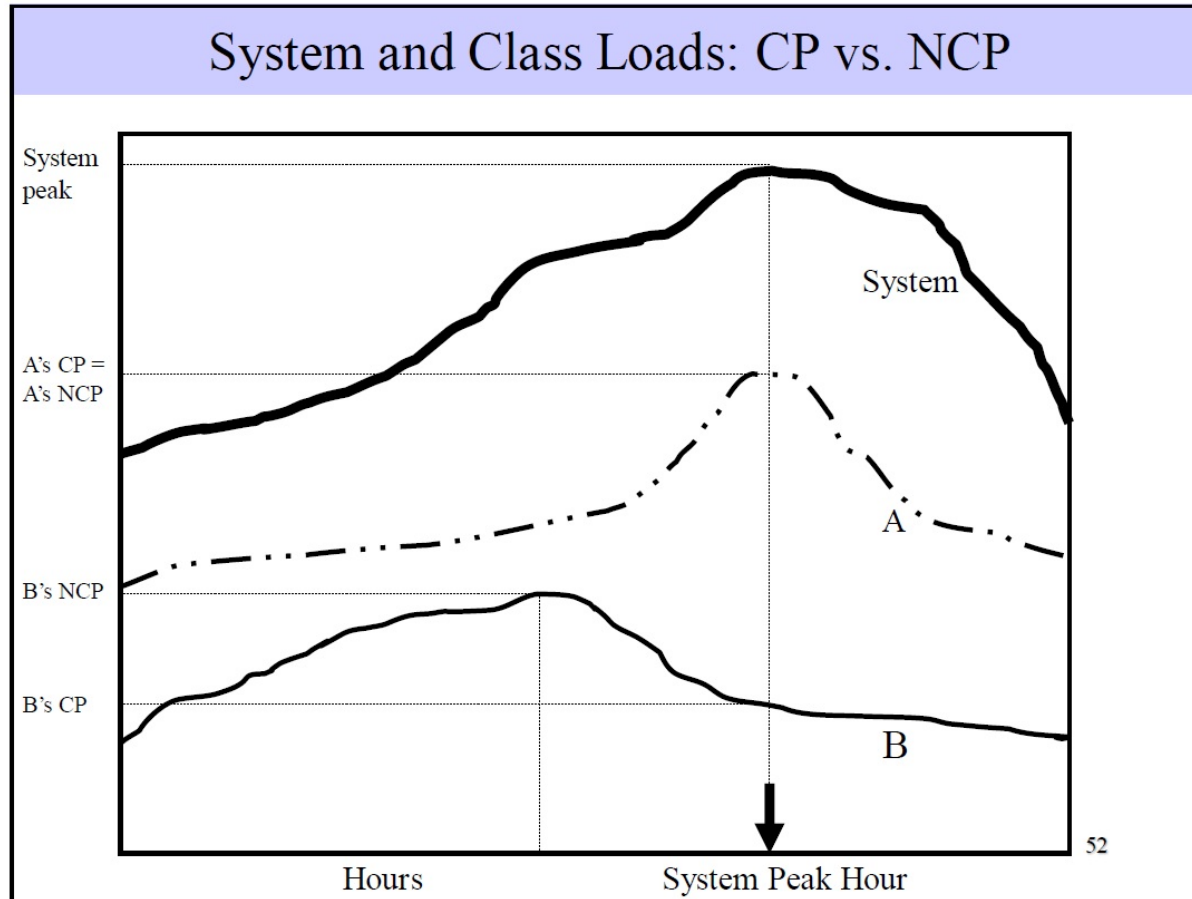
Cost of Service

- Goal is to functionalize, classify, and allocate the utility's costs
- Costs are attributed to customer classes based on the costs incurred to serve those classes
 - Classes:
 - Residential
 - Commercial
 - Industrial

Cost of Service

- Cost allocation methodologies
 - Coincident peak – The load of a class at the time of the system's peak
 - North Carolina allocates based on load at the summer coincident peak
 - Non-coincident peak – The maximum load of a class, regardless of time

Cost of Service



Cost of Service

- Classify costs
 - Costs can be classified into three categories:
 - Demand-related costs (capacity-related costs)
 - Energy-related costs
 - Customer-related costs
 - Average residential bill in NC:
 - 54% energy costs
 - 46% capacity costs

Cost of Service

- Classify costs
 - Demand-related costs
 - Vary based on instantaneous (or maximum) load
 - Examples: Costs of generation capacity, costs of transmission, costs of distribution
 - Average residential bill in NC:
 - 64% generation costs
 - 36% transmission & distribution costs
 - Energy-related costs
 - Vary based on amount of energy required
 - Examples: Costs of fuel, costs of purchased power
 - Customer-related costs
 - Vary with the number of customers on the system
 - Examples: Cost of metering, cost of billing and account processing

Cost of Service

- Allocate costs
 - Allocation should reflect the actual planning and operating characteristics of the utility's system
 - Allocation should reflect cost causation
 - Allocation should recognize customer class characteristics (load demand, peak period consumption, number of customers, etc.)
 - Allocation should produce stable results year-to-year

Rate Tariff Design

- Rates should be designed to allow the utility to recover its expenses, but can also serve policy objectives or induce particular behaviors
- Three components of rates:
 - Demand Charge
 - Variable charge, per kW, of maximum demand in a month
 - Energy Charge
 - Variable charge, per kWh, of energy consumed in a month
 - Customer Charge
 - Fixed charge for customer-related costs

Rate Tariff Design

- So what about rates that don't have a demand charge?
 - Demand-related costs must be recovered either through the energy or customer charge

Rate Tariff Design

- Demand Charge Variations
 - Ratchets
 - Customer is billed based on the higher of (i) their maximum demand in the current month or (ii) their maximum demand in the previous 13 months
 - Rationale: Each customer within the rate class pays their fair share of capacity-related costs based on their full demand for capacity
 - Interruptible-Service Rates
 - All or a portion of a customer's load can be shut off by the utility, reducing the customer's demand-related charges (or providing a monthly discount)
 - Complete Interruption – Irrigation
 - Partial Interruption – Air conditioner load switch

Rate Tariff Design

- Energy Charge Variations
 - Net Energy Metering
 - Customers pay an energy charge for kWh they consume from the utility, but are credited an energy charge for kWh they export to the grid
 - Time-of-Use
 - Energy price is based on the estimated cost of electricity during a particular time block
 - Real-Time Pricing
 - Energy price is based on actual cost of electricity at any given time (wholesale spot market prices, utility costs of production, weather)

Rate Tariff Design

- Energy Charge Variations
 - Declining Block Rates
 - For the first 500 kWh consumed, customer pays 10 c/kWh; for all additional kWh consumed, customer pays 4 c/kWh
 - Rationale:
 - Declining average costs (i.e., economies of scale)
 - Inclining Block Rates
 - For the first 500 kWh consumed, customer pays 4 c/kWh; for all additional kWh consumed, customer pays 10 c/kWh
 - Rationale:
 - Promotes energy conservation

Other Ratemaking Concepts

- Construction Work in Progress (CWIP)
 - Generally, costs are not included in rates until an asset is used and useful
 - In NC, certain costs may be recovered via CWIP
 - N.C. Gen. Stat. § 62-133(b)

Other Ratemaking Concepts

- Early Retirement / Abandoned Plant
 - Sometimes, the most reasonable and prudent thing a utility can do is to shut down an asset before the end of its useful life
 - Example: Early retirement of coal generation resources that still have remaining useful lives

Other Ratemaking Concepts

- Riders
 - Single-issue miniature ratemaking proceedings
 - Used in places where costs are outside the control of a utility and may fluctuate from year to year
 - In NC, there are four annual riders:
 - Fuel rider
 - DSM/EE rider
 - REPS rider
 - Joint Agency Asset Recovery Rider (Duke Energy Progress only)

Other Ratemaking Concepts

- 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
 - Costs of energy purchases from qualifying facilities
 - Biomass, landfill gas
 - Solar purchases if bundled with REC

Other Ratemaking Concepts

- REPS rider
 - Incremental costs to comply with the REPS
 - Incremental costs are the bundled costs (costs of electricity purchases plus REC purchases) less the avoided cost
 - Costs of RECs
 - Certain other costs
 - Administration
 - Research

Other Ratemaking Concepts

- DSM/EE rider
 - Costs of DSM/EE programs
 - Net lost revenues
 - Recovery only available during the first three years of a program
 - Costs of utility incentives
 - Utilities earn a rate of return on EE expenditures, similar to the rate of return earned on invested capital

Other Ratemaking Concepts

- JAAR Rider
 - Recovers the costs associated with Duke Energy Progress' purchase of generation assets from the North Carolina Eastern Municipal Power Agency in 2015
 - Adjusted annually to reflect savings/expense associated with changes in the fuel cost