

Differences Between Electric and Natural Gas Cost of Service Studies

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Electric and Gas Utility COSS Similarities

- Uniform System of Accounts
- Revenue Requirements
- Load Data/Load Factor
- Basic customer classes
- May include production, transmission, distribution, storage, intangible and general plant
- Customer demand has major impact of the cost of service affected by many factors including: Population density, price, weather, usage patterns, age, and utilization of equipment



Electric and Gas Utility COSS Differences

- Gas COSS is basically a few hundred lines in Excel
- Electric COSS Excel spreadsheet is in the thousands
- Gas COSS is just a simple functionalization and cost allocation with 15-20 factors
- Electric COSS includes the three step process of functionalization, classification, and allocation
- Litigious issues in Gas COSS are the allocation factors for distribution and storage
- Litigious issues in Electric COSS are the production cost and transmission allocation methods between capacity, energy and customer costs depending on a particular utility, class of customers, and developing just and reasonable rates
- Strong arguments are developed and Commission judgment or State Law to resolve these disputes



Enacted Electric Allocation Factors

- Public Act 286 of 2008—Rate alignment with COSS (Deskewing), 10% Cap on Retail Choice except for Mining load, Twelve month rate case timeline, certificate of need for new generation, M&A review authority, and file and use rates.
- Public Act 295 of 2008—Renewable and Energy Optimization Standards, Net metering, expedited transmission line certification,
- Public Act 160 of 2014-- The allocation formula mandated by the Legislature in MCL 460.11(1) consists of a 50% weighting of peak demand, a 25% weighting of on-peak energy use, and a 25% weighting of total energy use for the production cost allocation method.



Enacted Electric Allocation Factors

- Public Act 341 of 2016 Sec. 11(1) “The commission **shall ensure** that the cost of providing service to each customer class is based on the allocation of production-related costs based on the using the 75-0-25 method of cost allocation and transmission costs based on using the 100% demand method of cost allocation. The commission **may modify** this method if it determines that this method of cost allocation does not ensure that rates are equal to the cost of service.”
- The 75-0-25 ratio represents that 75% of the production allocator would be based on a class’s contribution to coincident peak demand measured in kW (total system-wide kW of energy demanded during the peak hour use). The other 25% of the production allocator would be based on a classes' yearly energy use (inflow) measured in kWh (totally system-wide kWh used during the 8760 hours/year).
- PA341 did not give guidance on distribution since not every customer class uses all portions of the distribution system, thus broken into subsystems and are allocated costs based on some measure of that class’s contribution to that subsystem peak. These non-coincident peaks (NCPs) occur at different hours than the system peak (CP).
- Currently DTE Electric and Consumers Energy are using the 4CP 75-0-25 production cost allocation method.



Embedded Cost Studies in Michigan

- To do an embedded cost study in Michigan, we use the following principal types of information:
 - i. plant investment data
 - ii. detailed property records
 - iii. balance sheets
 - iv. operating expenses
 - v. information on kW demand and kWh consumption and corresponding patterns



Uniform System of Accounts

- i. 100 Series Assets and other debits
- ii. 200 Series Liabilities and other credits
- iii. 300 Series Electric plant accounts
- iv. 400 Series Income and revenue accounts
- v. 500 Series Operations and maintenance
- vi. 900 Series Administrative and general



Uniform System of Accounts

- MPSC Uniform System of Accounts (USofA) governs utility accounting for ratemaking purposes and serves as the basis for functionalizing costs e.g., the USA requires utilities to record generating plant costs in accounts 310-359 and the associated O&M expense in accounts 500 -557. These costs are directly assigned to the power supply function.
- Similarly, there are accounts in which the USofA requires utilities to record distribution plant and O&M costs that are directly assigned to the distribution function. The O&M cost in accounts associated with providing customer service are directly assigned to distribution because they apply whether a customer receives power supply from the utility or an alternative electric supplier.
- Because Michigan utilities have divested transmission plant, all that remains in the USofA's accounts designated for transmission are the plant costs associated with generator step up transformers. These costs are directly assigned to power supply. In addition, power supply includes the expense charged to account 565, "Transmission of Electricity by Others" including MISO charges.



Functionalization of Electric COSS

Production

Generating Plant

Generating O&M

Fuel Costs

Purchased Power

Transmission

High Voltage

Transmission Lines

Transmission O&M

Transmission Stations

Distribution

Dist. Lines

Dist. Substations

Line Transformers

Dist. O&M

Customer

Meters & Reading

Service Lines

Billing

Customer
Accounting &

Service



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Functionalization of Natural Gas COSS

Production	Transmission	Storage	Distribution	Customer
Gas well Production	Pipelines	Owned storage Leased storage LNG/propane plant	Pipelines	Meters & reading Service lines Billing
O&M	O&M	O&M	O&M	Customer Accounting & Service

Administrative and General Costs (A&G) are similar to Electric

In Michigan we have annual gas cost recovery plan and reconciliation cases that project natural gas costs for the upcoming year and further five year forecast and then a true up for over or under recoveries and roll overs. The utilities do not make a rate of return on the cost of gas.

Cost of gas is used for pricing out the amount of gas in storage—working and base gas in working capital, losses and company use based upon three or five year historical usage. Company use and Losses occur with leaking pipelines, flaring gas, storage compressors, line compressors, etc.



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Production or Purchased power

- E Costs that are associated with power generation and wholesale purchases, whether that be fossil fuel, nuclear, hydro, solar or wind.
- NG Costs associated with producing natural gas owned by the utility including wells, gathering lines, processing plants, etc.



Transmission

- Includes the assets and expenses associated with high voltage or pressure systems
 - a) high voltage or pressure lines and substations or compressor stations
 - b) transmission systems are distinguished by voltages or pressure and the ways in which those facilities are configured such as generator step up transformers.



Distribution

- The system that connects the customer to the transmission system and is extensively subdivided in order to recognize the non-utilization of certain types of plant by particular utilization of certain types of plant by particular customer classes, (such as those that take power at the primary voltage).
- May be sub-functionalized into specific types
 - a.) primary
 - b.) secondary



Customer service

- Includes the plant and expenses that are associated with providing the service drop and meter reading, billing, and collection, and customer information and services.
- Customer related costs include billing, collections, information, customer service, and advertising and promotion.
 - Uncollectible accounts are included and are sometimes directly assigned to specific classes.
- These costs may be functionalized and classified as part of the distribution function related to customers.
 - Sometimes these are functionalized on a plant/labor based method.
- Customer account costs, sales costs and customer service costs are generally considered customer related, while load management and conservation efforts may be allocated based on program goals



Administrative and General

- Management costs, administrative buildings, that cannot be directly assigned to any other major cost functions.
- Administrative and General costs are costs not included elsewhere such as general salaries, insurance, general office building and expenses or transportation equipment transportation equipment.
- These costs are allocated either on the sum of the other operating and maintenance costs or based on whether they are labor related, plant related or can be directly assigned.
- The property tax associated with production plant is directly assigned to power supply based on tax information provided by the Property Tax Department.

–A share of the property tax associated with general and software plant is allocated to power supply in proportion to the power supply related general and software plant and the remaining balance is assigned to distribution.



Classification

- What causes the costs to be incurred?”
- The next step is to separate the functionalized costs into classifications based on the components of utility service being provided. There are three principal cost classifications for an electric utility.
 - a.) DEMAND COSTS
 - b.) ENERGY COSTS
 - c.) CUSTOMER COSTS



Principal Cost Classifications

- Demand Costs (Fixed costs)
 - costs that vary with the demand (kW) imposed by the customer
 - costs that include capital and operating expenses to provide sufficient capacity to meet peak demand
 - these costs are not affected by the number of customers or annual usage, but rather to serve customers at the max usage
- Energy Costs (Variable costs)
 - costs that vary with the energy (kWh) that the utility provides
 - costs that vary in direct proportion to the volume of service consumed
 - these costs are not related to capacity or customer costs
- Customer Costs
 - costs that are directly related by the number of customers served regardless of usage
 - these costs recovers customer related costs



Cost Classification NG Michigan

- In the natural gas industry, distribution mains comprise the largest single capital investment of the utility.
- There are elements of all three classifications in this cost category. Distribution mains carry energy and should be classified as an energy cost.
- However, the size of the distribution mains installed is determined by the peak design day. Therefore they are demand related.
- Finally, the number of customers also determines how extensive the distribution main system extends, thus, they could also be customer related.
- The key question then becomes: What portion of the distribution mains account should be classified as demand, energy, or customer related?
- What would be your answer?
- Would this same analogy work for storage?
- Would this same example work for transmission pipelines?



Cost Classification NG Michigan

- Classification of costs is largely a matter of judgment and that COSS is only a ratemaking guide or tool
- Parties litigating rate cases have proposed distribution mains as 50% energy and 50% customer (benefits industrial customers)
- Other parties argue 50% demand and 50% energy (benefits residential customers)
- Don't engineers design for the peak but build systems to be utilized daily?



Fixed or variable costs

- Fixed costs are related to installing capacity.
- Typically fixed costs are allocated on a demand basis while variable costs are on an energy or commodity basis.
- What about the zero intercept for cost allocation?
- However there are deviations from this standard:
 - Electric Average and Excess Allocation
 - Pipelines Average and Peak or 50% D/50% Commodity



Allocation

- Allocation is how much of the total cost should each customer class pay?
- After the costs have been functionalized and classified, the next step is to allocate them among the customer classes
- Direct allocation are known costs that are incurred on behalf of one class of customers or customer and can be directly assigned to them
 - For example in some states uncollectible expenses are normally assigned to residential customers
 - However, MPSC does not directly assigned uncollectible expenses to just the residential in NG rate cases, assigned to all customers based upon the COSS and Cost of Gas Factor since there are businesses that also go bankrupt and do not pay their bills
- The customers served are separated into several groups based on the nature of the service provided and characteristics and customer class ratios are developed to allocate the remaining costs.
 - Residential
 - Commercial
 - Industrial



Allocation Factors to Customer Classes

DEMAND

- CP demand
- 12CP (or multiple variation such as 4CP, 6CP...)
- Summer/Winter demand
- All peak hours
- NCP demand

HYBRID

- Average & Excess, including some hybrid of CP and Max NCP
- Equivalent Peaker
- Base & Peak
- Judgmental – such as “Peak and Average”
- Base-Intermediate Peak

ENERGY

- Energy Usage
- Time Differentiated Energy Usage
- Production Stacking
- Loss of Load Probability
- Probability of Dispatch

CUSTOMER

Customers
Weighted Customers



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Natural Gas Allocation Factors

1 -Commodity---Gas Production Plant, Lost & Company Use Gas

2-Throughput- Not used currently

3-Average & Peak---Transmission Plant--Including Dep. and O&M, Dist. Plant-Other

4-Average & Peak no SC--Mains

5-Storage-50%Peak& 50% Annual Capacity- used for Company Owned Storage

6-Weighted Customers-All—Services, Meter Reading Expenses, Customer Accounts-Supv., Customer Records

7-Weighted Customers –R+C—Meters R&C

8-Weighted Customers –LV—Meters Large Volume

9-Customers-All—Customer Accts-Other, Customer Assistance-Supv., Customer Services, Misc. Customer Expense

10-Customers –R+C

11-Customers-R

12-Customer Related Plant

13-Distribution Plant– Depr. Distribution

14-Distribution Plant no SC-O&M Distribution

15- Plant in Service—Intangible & General Plant--Including Dep., O&M & Amort., PHFFU, Property & Other Taxes,

16-Revenue-Working Capital Revenue

17-Revenue less Cost of Gas—Not used currently

18-O&M Expense less Cost of Gas—payroll taxes, amortization of reg debits, A&G expenses

19-Rate Base—state/city income taxes

20-COSS Allocation—Other Revenues such as midstream (off system) pipeline revenues, fees, charges

21-COSS + COS Allocation—used for uncollectible expenses

Direct Assignments—RIA—Standby Charges-Liquidated Damages Gas-In-Kind %—Lost & Company Use Gas allocated to
Transportation Volumes



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Electric Cost of Service Studies - Allocators

100 Series

Energy @ Generation
Energy On-Peak @ Generation
Energy Off-Peak @ Generation
Energy On-Peak @ Generation Summer
Energy Off-Peak @ Generation Summer
Energy On-Peak @ Generation Non-Summer
Energy Off-Peak @ Generation Non-Summer
Energy Critical On-Peak @ Gen
Energy Summer Mid-Peak @ Gen
Energy @ Generation Inc ROA
Energy On-Peak @ Generation Inc ROA
12CP Dmd @ Generation
4CP Dmd @ Generation
Class Peak @ Subtransmission
12CP Dmd @ Generation Exc Dedicated
Class Peak @ Subtransmission Exc Dedicated
12CP Including ROA
Average Demand Inc ROA
Classpeak @ Transmission
Billed Revenue
Production Revenue
Distribution Revenue
Total Rate Revenue
Billed Sales
Billed Sales Excluding Rate E1
Number Of Customers
Weighted Customer

200 Series

Energy On-Peak @ Generation Jurisdictional
Energy Off-Peak @ Generation Jurisdictional
4CP Average & Excess
4CP 75/0/25
4CP 75/0/25 Including ROA
4CP 75/0/25 Exc WFR
12CP 75demand/25Energy Exc WFR
4CP Dmd @ Gen Jurisdictional
12CP 75demand/25Energy
12CP Demand @ Subtrans
4CP Dmd @ Generation Excluding Wholesale
12CP 75/0/25
Classpeak @ Primary
Classpeak @ Secondary
Classpeak @ Primary for Commercial
Classpeak for Streetlighting
4CP 75/0/25 juris excl GSG
Classpeak @ Single Phase
Billed Sales - C&I
Billed Sales - Street & Highway
Billed Sales ROA
Billed Sales - Primary
PSCR Factor Sales Juris
Billed Sales - Jurisdictional
Customers - Residential
Customers - Drops
Customers - PID
Customers - NonPID
Customers - NonMunicipal
Customers - Center Suspensions
Customers - Underground Cable
Customers - Photoelectric

300 Series

PIS - Dist Direct
PIS - 138kV Distribution
PIS - 46kV Distribution
PIS - 138kV Dist Subs S&E
PIS - 46kV Dist Subs S&E
PIS - Overhead Primary System
PIS - Distribution Distribution
Overhead Distribution
Underground Distribution
Total Dist PIS
Distribution Services
Streetlighting Equipment
Line Equipment
Meters
PIS - System Power Control
PIS - General
Total PIS
Distribution Depreciation
CWIP
Working Capital
Rate Base

400-500-600 Series

Operations - Distribution excl Sup & Eng
Maintenance - Distribution excl Sup & Eng
Operations - 138kV Distribution excl Sup & Eng
Maintenance - 138kV Distribution excl Sup & Eng
Operations - 46kV Distribution excl Sup & Eng
Maintenance - 46kV Distribution excl Sup & Eng
HV Distribution O&M exp.
Distribution O&M, excl. HV Dist
Customer Accounting
Customer Accounts & Service
Distribution O&M
Customer & Sales O&M
Administrative and General O&M
Production O&M
Jurisdictional Distribution O&M
O&M Excluding Adjustments
Pre Tax NOI
R&PP Tax
Meter Reading/Uncollectibles O&M
Depreciation & Amortization Expense
Non PSCR O&M Expense
Distribution Depreciation Expense
Gen/Comm/Int Depreciation Expense
Production Labor
Total Labor
50% O&M, 50% Net Plant
50/50 PIS & Labor
Revenue Requirement
Customer Assistance



Jurisdictional Allocation

- Objective to fairly and fully allocate overall revenue requirements to jurisdictions.
 - Utilities providing service in more than two states and regulated by two different state commissions.
 - Utilities providing wholesale service regulated by the FERC and providing retail service regulated by the state PUC
 - Rate cases are filed and orders are issued at different times
 - Cost allocation's primary method of allocation RR
 - Direct assignment may be appropriate such as retail choice costs, environmental costs, renewable costs, deskewing
 - Revenue offsets are used in some cases
 - Respect dominant state's PUC's functionalization, classification and allocation factors



Questions?

Thank you

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Appendix



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Definitions

- System Peak Demand—The highest total hourly demand (MW) for all customers served on the utility’s distribution system within a specific period (day, month, year). Typically referred to as the ‘system peak’.
- Coincident Peak Demand—The demand of any class within a specific period (day, month, year) that occurs at the same time as the system peak demand for the same period.
- Coincident 12 CP Demand—The demand value derived by averaging the actual demand values registered on the monthly peak days for January through December.
- Non-Coincident Peak Demand –The maximum demand of any class within a specific period but not necessarily occurring at the time of the system peak demand for that period.
- Coincident 4 CP Demand—The demand value derived by averaging the actual demand values registered on the monthly peak days for June-September.



Definitions

- Losses –A term used to define the difference between the electrical energy delivered to a customer (or a given point on the electrical distribution system) and the amount of electrical energy that must be generated at the power plant to serve that customer.
- In other words, losses refer to the amount of power lost in transferring power from the power plant to the point of delivery (often referred to as line loss). Line losses will vary by rate class based upon the voltage level at which each class is served.



Load Factor

- The ratio of the average load over a designated period of time to the peak load occurring during that period
- A residential and small commercial customer will have a low load factor
- Large industrial customers generally have high load factors
- Load Factor determination is a science all to its self
- Demand Studies are performed to determine peak usage



Methodologies of Cost Studies

- Accounting Based (Embedded)–Cost study based on monies actually spent (embedded) for plant and operating expenses and fully allocate or distributed them among the classes of customers according to the principals of cost causation.
- Marginal Cost Methodologies–Based on theory that in a perfectly competitive equilibrium, that the amount consumers are willing to pay for the last unit of good or service equals the marginal price (an amount equal to the resources used to produce it). Attempts to set prices at marginal cost.
- Michigan Uses an Embedded Cost Study



Accounting Based Method (Embedded)

- Works better in a historical environment without high inflation or high construction costs.
- Verifiability and simplicity of the embedded cost study outweighs any hoped efficiencies and benefits of imperfect approximations of using a marginal cost methodology.

