Cost of Service Ratemaking

Michigan Public Service Commission

Department of Licensing and Regulatory Affairs

Chuck Putnam, MPSC Staff

Regulation Status of Michigan Electric Utilities

- 8 Investor-Owned Electric Utilities (regulated by MPSC)
- 9 Cooperative Electric Utilities
  - 3 rate-regulated by MPSC
  - 6 member-regulated
- 41 Municipal Electric Utilities (not regulated by MPSC)

General Rate Case Process

- Request for rate increase initiated by utility
- Provides MPSC Staff, other interveners (Attorney General, ABATE, MCAAA, MEC, etc.) ability to scrutinize requests through contested case proceeding
- MPSC determines final rates

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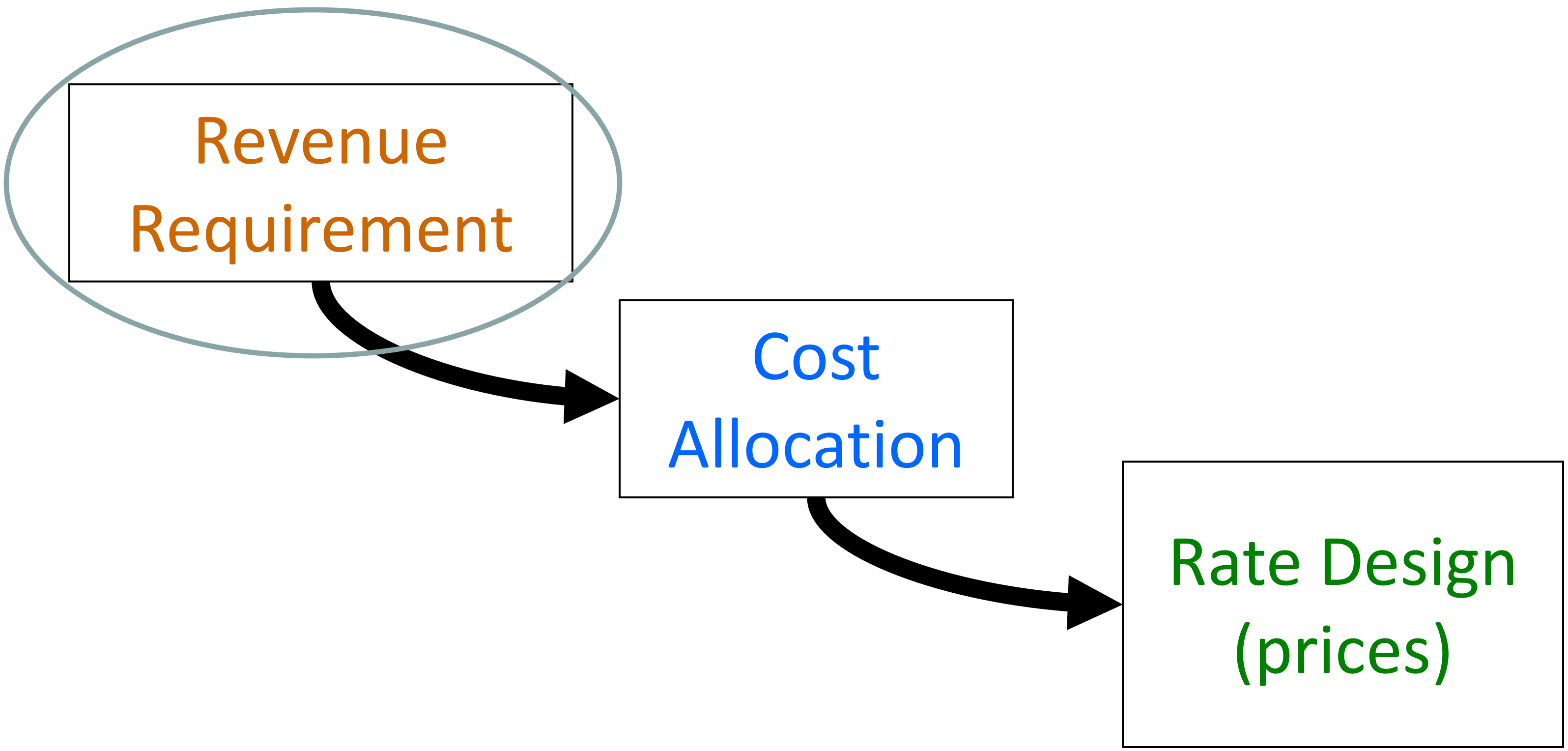
Rate Development

- Determination of **Revenue Requirement** (cost assessment) for a test year
- **Allocation of Costs** to customer classes based on usage patterns
    - Cost of service study
- **Rate Design** to recover costs through rates and charges

The Traditional Ratemaking Process



REVENUE REQUIREMENT FORMULA

Revenue Requirements = r(RB) + E + D + T

r = overall rate of return

RB = rate base

E = operating expense

D = depreciation and amortization

T = taxes

Revenue Requirement Formula:

RR = r(RB) + E + D + T

RR (ratemaking) =

r(RB) + E + D + T – Other Revenue

Revenue Requirements Formula:

Revenue Deficiency =

r(RB) + E + D + T – Other Revenue – Current Revenue

Revenue Deficiency =

RR (ratemaking) - Current Revenue

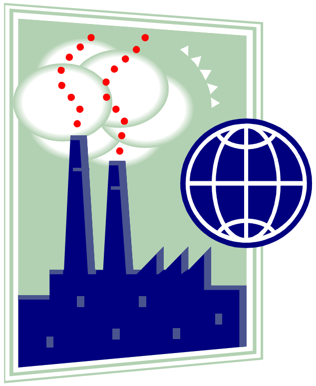
Therefore,

RR(ratemaking) =

Current Revenue + Revenue Deficiency

RATE BASE

Rate base = net plant + working capital



(from the balance sheet)

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RATE BASE

		Schedule B1 ($000)	
	Applicant		Per
Total Electric - Rate Base	Projection	Adjustments	**Order**
Utility Plant in Service:			
Plant in Service	$15,218,948	($20,792)	**$15,198,156**
Plant Held for Future Use	4,460	(3,474)	**986**
Construction Work in Progress	660,856	7,363	**668,219**
Total Utility Plant	$15,884,264	($16,903)	**$15,867,361**
Less: Accum. Depreciation and Depletion	(6,480,556)	33,313	**(6,447,243)**
Net Utility Plant	$9,403,708	$16,410	**$9,420,118**
Net Nuclear Fuel Property	149,949	0	**149,949**
Net Plant	$9,553,657	$16,410	**$9,570,067**
Allowance for Working Capital	592,444	(82,784)	**509,660**
Rate Base	$10,146,101	($66,374)	**$10,079,727**

Calculation of Net Operating Income (U-16472)

Schedule C1			
($000)	Applicant		
Description	Projection	Adjustments	**Per Order**
Revenues	$4,299,038	$39,664	**$4,338,702**
Operating Expenses			
Fuel and Purchased Power	$1,405,606	$14,802	**$1,420,408**
Operations and Maintenance Expense	1,520,953	(134,950)	**1,386,003**
Depreciation and Amortization	590,435	(28,177)	**562,258**
Property and Other Taxes	262,340	(1,256)	**261,084**
State Income Taxes	28,143	5,350	**33,493**
Federal Income Taxes	74,192	61,070	**135,262**
Total Operating Expenses	$3,881,669	($83,161)	**$3,798,508**
Operating Income	$417,369	$122,825	**$540,194**
Other Income Adjustments			
AFUDC and Other	$7615	$164	**$7,779**
Total Electric Net Operating Income	$424,984	$122,989	**$547,973**

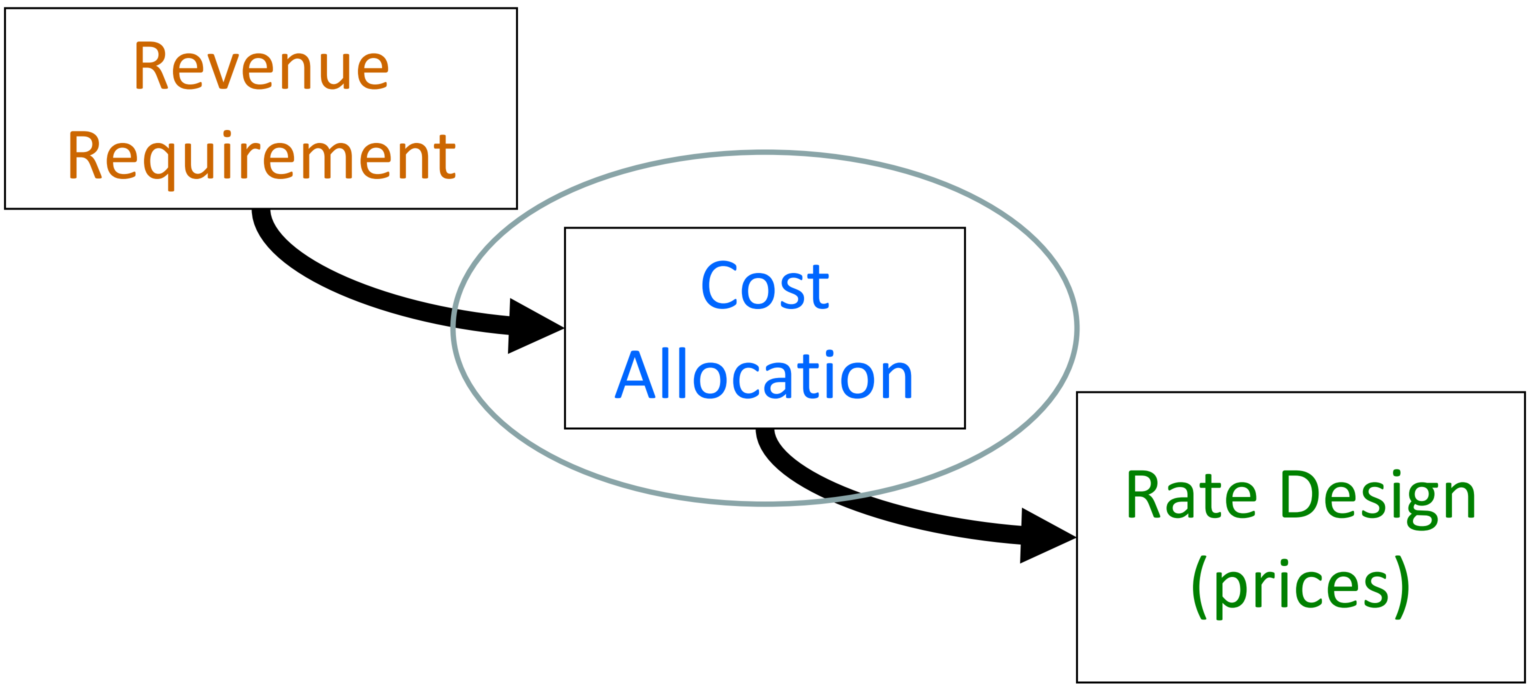
Calculation of Revenue Deficiency (U-16472)

	Schedule A1		
	($000)		
	Applicant		**Per**
Description	Projection	Adjustments	**Order**
Rate Base	$10,146,101	($66,374)	**$10,079,727**
Adjusted Net Operating Income	$424,984	$122,989	**$547,973**
Overall Rate of Return	4.1886%	1.2477%	**5.4364%**
Rate of Return	6.8646%	-0.2783%	**6.5863%**
Income Requirements	$696,489	($32,608)	**$663,881**
Income Deficiency / (Sufficiency)	$271,505	($155,597)	**$115,908**
Revenue Conversion Factor	1.6355		**1.6355**
Revenue Deficiency / (Sufficiency)	$444,046	($254,478)	**$189,568**

Revenue Requirement (U-16472)

	($000)		
	Applicant		**Per**
	Projection	Adjustments	**Order**
Current Revenues	$4,299,038	$39,664	**$4,338,702**
Revenue Deficiency	$444,046	($254,478)	**$189,568**
Revenue Requirement	$4,743,084	($214,814)	**$4,528,270**

The Traditional Ratemaking Process



Cost Allocation

- A class cost of service study is a study in which the total company cost of service (revenue requirement) is spread or allocated to customer classes.
- Customer Class or Class of Service – A set of customers with similar characteristics who have been grouped for the purpose of setting an applicable rate for electric service
  - Common classifications include residential, commercial, primary service and industrial
- The allocation of the total company cost of service to the individual customer classes can provide a revenue requirement target for each customer class, so that each class of customers pays the costs that the utility incurs to serve that class.

Cost of Service Study Steps

- Functionalize: costs broken down into production, transmission, distribution
- Jurisdictionalize: costs allocated to the federal jurisdiction or the Michigan jurisdiction
- Classify: costs classified by customer, energy, demand
- Allocate: costs allocated to different customer classes – residential, commercial, industrial, street lighting

Cost of Service Study

INPUTS

Input1: WACC, RevMult, Function Percents, Individual Costs
Input 2: Direct Assignments, Revenues, #Meters, #Customers
12PSAlloc: Allocators for Power Supply Function
12DistAlloc: Allocators for Distribution Function

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COSS

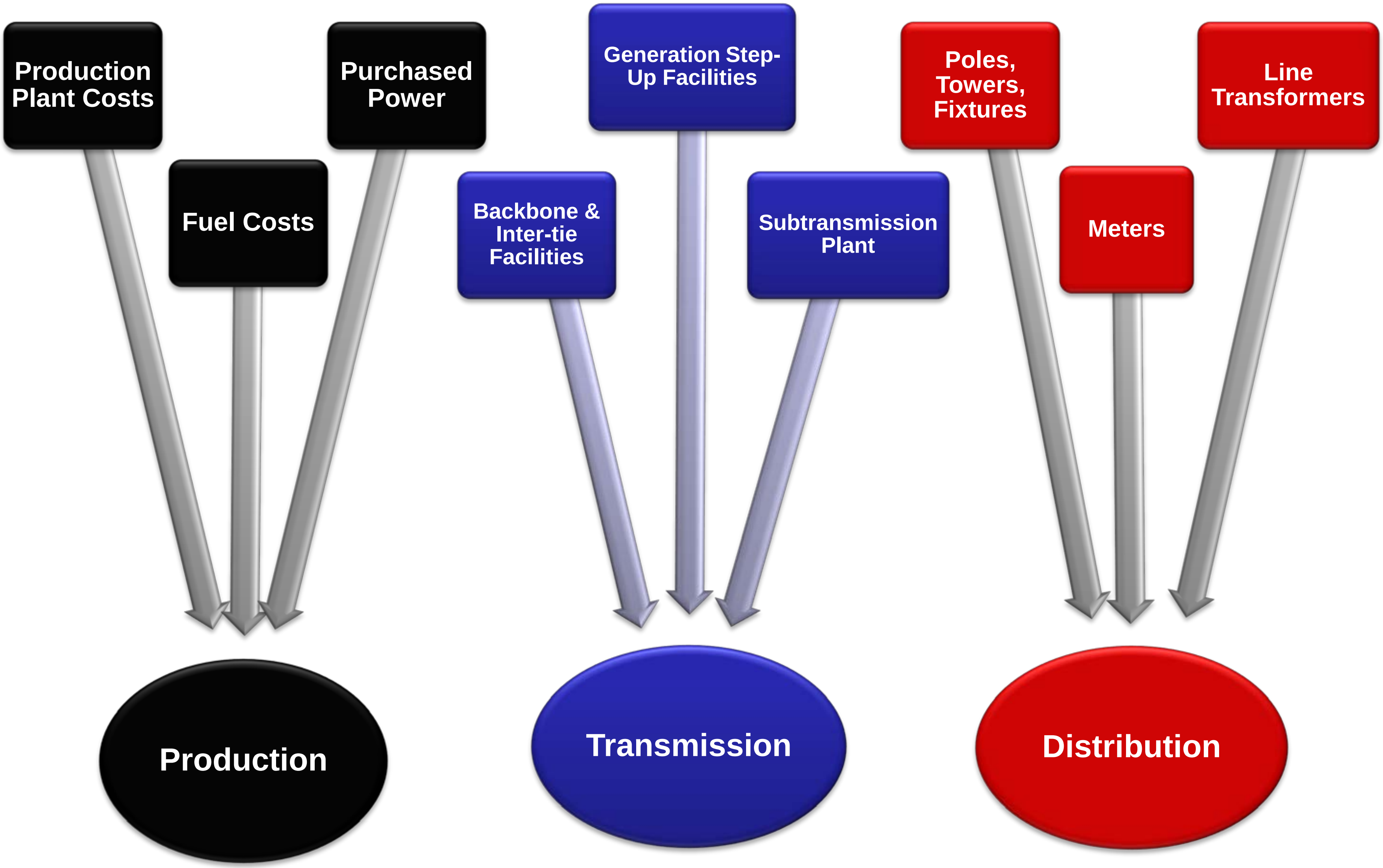
Functionalize – Jurisdictionalize – Classify - Allocate

↓

OUTPUTS

Revenue Requirement by Customer Class and SubClass

Cost Functionalization



Functionalization of Rate Base

	Schedule B1 ($000)			
Total Electric - Rate Base		**Inputs**	**Production**	**Distribution**
Utility Plant in Service:				
Plant in Service	$15,198,156	44	**$8,135,736**	**$7,062,420**
Plant Held for Future Use	986	1	**421**	**565**
Construction Work in Progress	668,219	17	**500,659**	**167,560**
Total Utility Plant	$15,867,361		**$8,636,816**	**$7,230,545**
Less: Accum. Depreciation and Depletion	(6,447,243)	41	**(3,721,923)**	**(2,725,320)**
Net Utility Plant	$9,420,118		**$4,914,893**	**$4,505,225**
Net Nuclear Fuel Property	149,949	1	**149,949**	**0**
Net Plant	$9,570,067		**$5,064,842**	**$4,505,225**
Allowance for Working Capital	509,660	24	**562,974**	**(53,314)**
Rate Base	$10,079,727	128	**$5,627,816**	**$4,451,911**
			55.8%	**44.2%**

Jurisdictionalization of Rate Base

	Schedule B1 ($000)					
Total Electric - Rate Base	Total Production	Michigan Jurisdiction	Federal Jurisdiction	Total Distribution	Michigan Jurisdiction	Federal Jurisdiction
Utility Plant in Service:						
Plant in Service	$8,135,736	$8,037,901	$97,835	$7,062,420	$7,055,873	$6,547
Plant Held for Future Use	421	416	5	565	565	0
Construction Work in Progress	500,659	494,638	6,021	167,560	167,476	84
Total Utility Plant	$8,636,816	$8,532,955	$103,861	$7,230,545	$7,223,914	$6,631
Less: Accum. Depreciation and Depletion	(3,721,923)	(3,677,165)	(44,758)	(2,725,320)	(2,722,530)	(2,790)
Net Utility Plant	$4,914,893	$4,855,790	$59,103	$4,505,225	$4,501,384	$3,841
Net Nuclear Fuel Property	149,949	147,372	2,577	0	0	0
Net Plant	$5,064,842	$5,003,162	$61,680	$4,505,225	$4,501,384	$3,841
Allowance for Working Capital	562,974	557,875	5,099	(53,314)	(53,017)	(297)
Rate Base	$5,627,816	$5,561,037	$66,779	$4,451,911	$4,448,367	$3,544
		98.8%	1.2%		99.9%	0.1%

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Functionalization to Classification

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Distribution

- Poles, towers, fixtures
- Line transformers
- Meters
- Station Equipment

Demand & Customer
- Line transformers
- Poles, towers, fixtures

Demand
- Station Equipment

Customer
- Meters

Production

- Production Plant
- Fuel costs
- Purchased Power

Demand & Energy
- Purchased Power
- Production Plant

Demand
- Production Plant

Energy
- Fuel costs

Transmission

- Backbone & Inter-tie Facilities
- Generation Step-up Facilities
- Subtransmission Plant

Demand & Energy
- Transmission costs are charged to utilities based on MISO schedules, some of which are based on demand, some on energy.

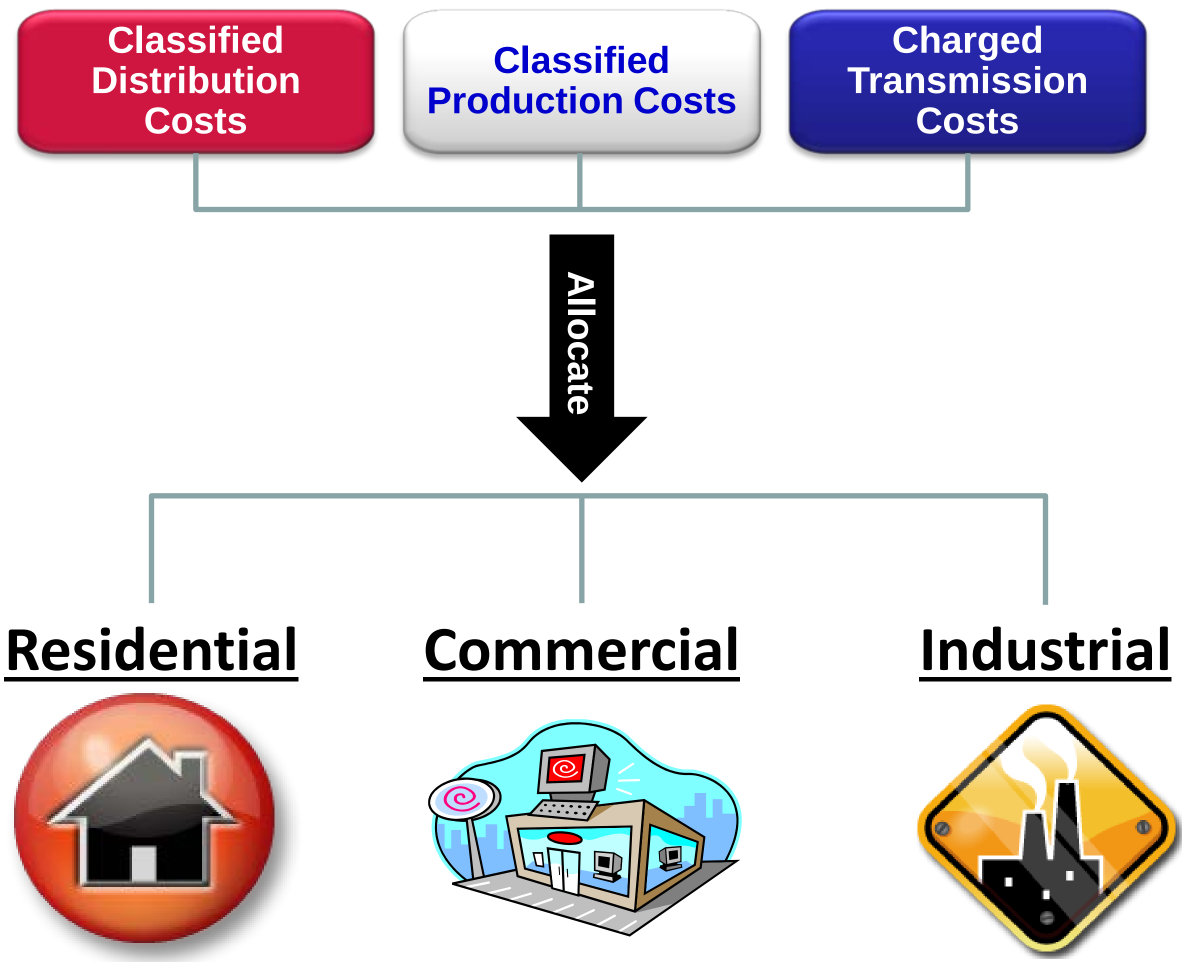
Classification of Rate Base

- A COSS is prepared by the utility. MPSC Staff uses the Utility's COSS but replaces the Company's inputs with Staff's inputs.
- The COSS witness for the utility discusses classification as follows:
  - "In this case, I have not formally classified the costs because the allocation methods employed within the cost of service recognized and properly accounted for whether the item being allocated is customer, demand, or energy related. Also, classification beyond that implicit in the allocation methods is not required by Witnesses who are responsible for the rate design in this case."

Example of Classification in U-17087

($000)	Total Residential	Total Secondary	Total Primary	Total Lighting & Unmetered	Rate GSG	Total Non Jurisdictional
Proposed Rate Design Revenue	1,087,083	665,421	1,057,308	16,616	3,358	28,061
Production: Capacity Related Cost	641,022	391,266	586,389	7,623	1,597	13,467
Production: Energy Related Cost	446,061	274,154	470,919	8,993	1,762	14,593
Distribution Related Cost	496,335	248,697	102,811	23,885	1,963	661
Customer Related Cost	142,474	44,691	26,504	1,433	78	505

Classification to Allocation



Allocation of Rate Base

- After the 128 inputs that comprise Rate Base have been functionalized, the production related costs are allocated using 10 different allocators
- 3.3% of the distribution related costs are directly assigned. The remaining indirect costs are allocated using 25 different allocators.

Operating Revenues

- Using forecasted billing determinants and the existing rate structure, current rate revenues are forecasted to be about $4.2 billion and are directly assigned to their respective rate classes on the input2 tab.
- An additional $150 million of revenues are projected to come from sources other than rates. These other revenues use 22 inputs on the COSS input1 tab. They are functionalized and then allocated using 10 different allocators

Operating Expenses

- Operating expenses are forecasted at $3,8 billion. They use 133 inputs on the COSS input1 tab. The inputs mirror the uniform system of accounts. The uniform system of accounts classify all costs into specific categories and, as such, is the first step in cost classification. These costs are functionalized and then allocated using 56 different allocators.

Cost Allocation

Classified Distribution Costs

Classified Production Costs

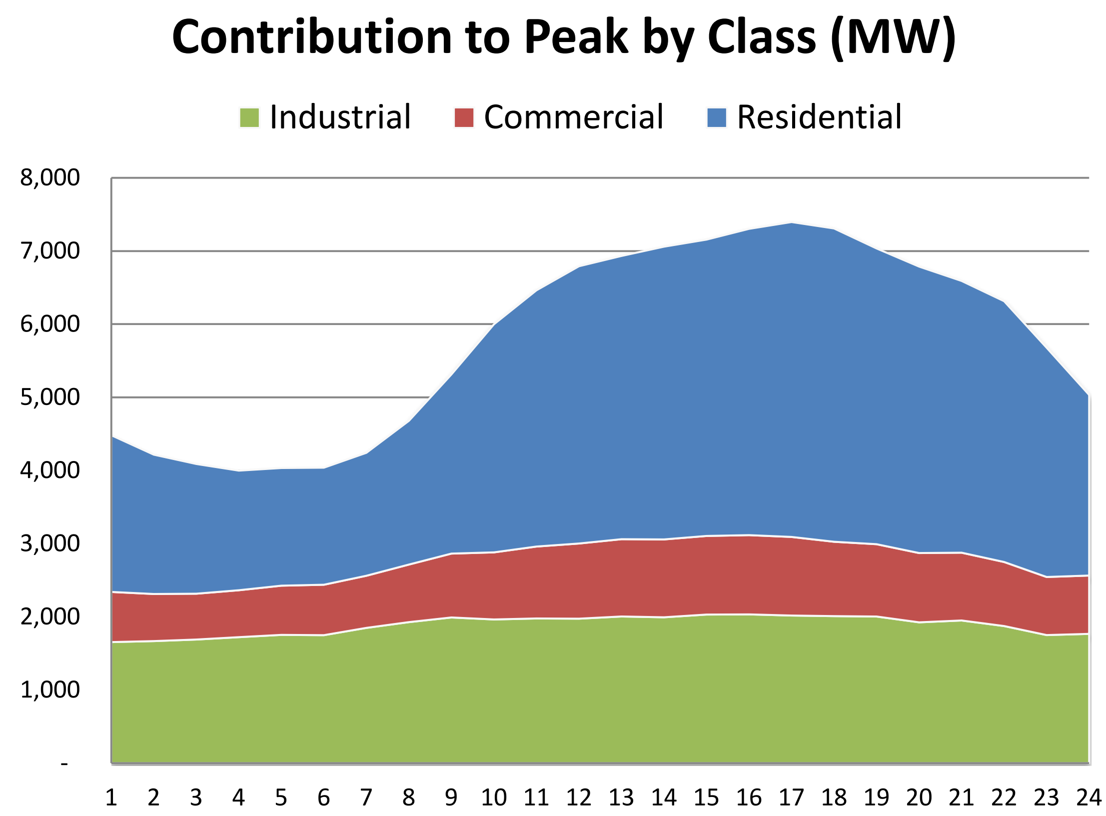
Charged Transmission Costs

Allocate

Function	Allocation Factor	Residential	Commercial	Industrial
Production	Demand & Energy	% Production Plant + Purchase	%	%
	Energy	% Fuel Purchase	%	%
Transmission	Demand & Energy	% Transmission	%	%
Distribution	Demand	% Wires	%	%
	Customer	% Meters	%	%

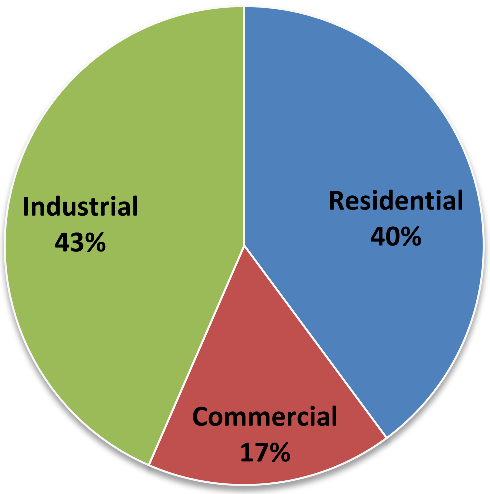
Class Responsibility for Revenue Requirement

	- Total Electric	Alloc Juris Electric	Total Residential	Total Commercial Secondary	Total Primary	E-1 St Lgt D9 OPL E-2 Signals	12 CP FERC Total Wholesale
Rate Base	10,079,727	10,009,401	4,610,095	2,379,815	2,752,313	267,178	70,321
Revenue excl Secur Bond & Tax	4,338,702	4,294,609	1,864,286	983,566	1,382,480	64,276	44,093
Expenses:							
Fuel	1,157,713	1,134,226	414,175	246,331	465,658	8,062	23,488
Purchased Power	262,695	262,695	84,354	49,800	126,676	1,864	-
O & M Expense	1,386,003	1,374,992	698,803	288,942	372,201	15,046	11,012
Depreciation	562,258	558,974	276,073	131,672	137,646	13,583	3,284
Other Taxes	261,084	259,210	121,552	60,186	71,872	5,601	1,874
Income Taxes	168,754	167,687	66,343	47,730	48,841	4,774	1,067
Amortizations	-	-	-	-	-	-	-
Total Expenses	3,798,508	3,757,784	1,661,300	824,660	1,222,894	48,929	40,724
Net Oper Income	540,194	536,825	202,986	158,906	159,586	15,347	3,369
AFUDC & Other	7,779	7,779	2,866	1,747	3,122	44	0
Net Adjustments	0	0	0	0	0	0	0
Adj Net Oper Income	547,973	544,604	205,853	160,653	162,708	15,391	3,369
Rate of Return	5.44%	5.44%	4.47%	6.75%	5.91%	5.76%	4.79%
Return @ 6.5863 %	663,881	659,249	303,635	156,742	181,276	17,597	4,632
Income Deficiency	115,908	114,645	97,782	(3,911)	18,568	2,206	1,262
Total Revenue Def/ (Sufficiency)	189,568	187,502	159,923	(6,397)	30,368	3,609	2,065
Revenue Requirement	4,528,270	4,482,111	2,024,209	977,169	1,412,848	67,885	46,158

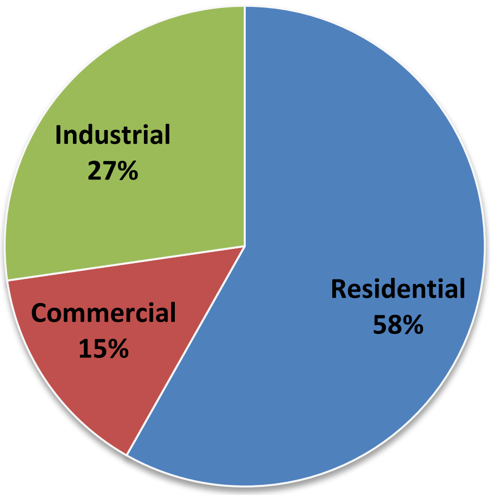


Consumers Energy Load Data from July 5th, 2010

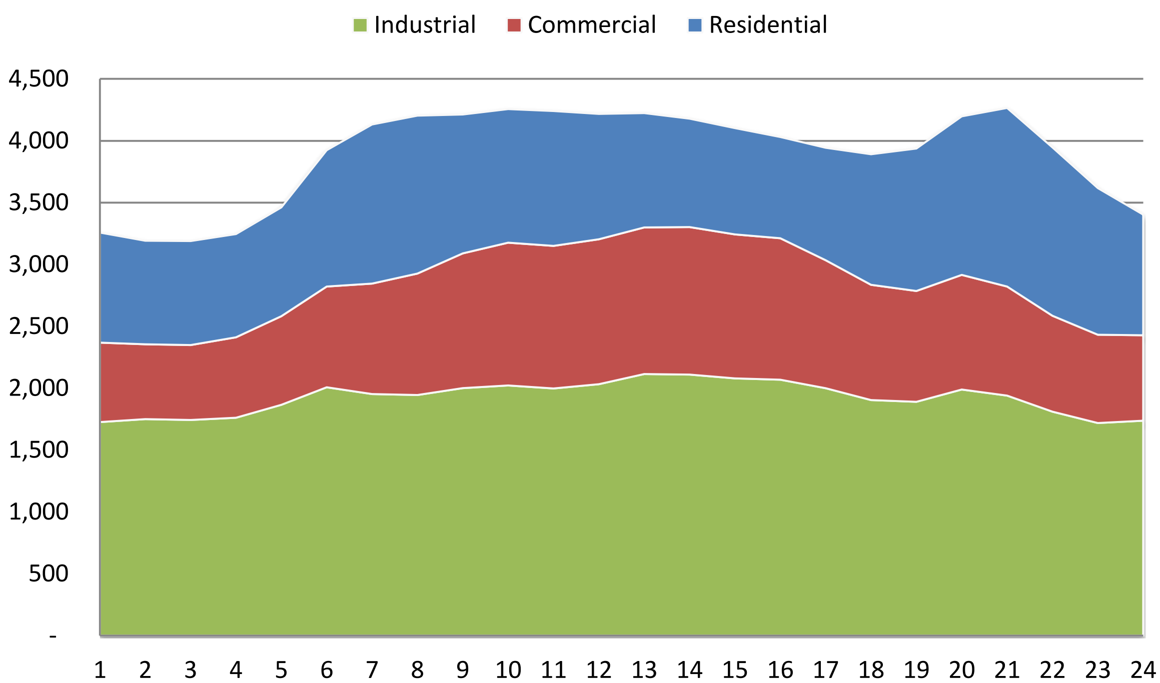
5am Total Load by Class



5pm Total Load by Class

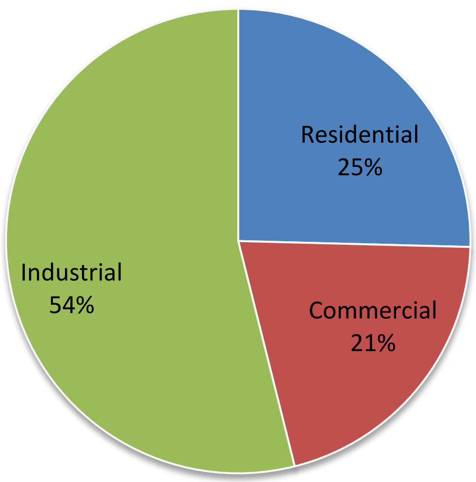


Contribution to Peak by Class (MW)

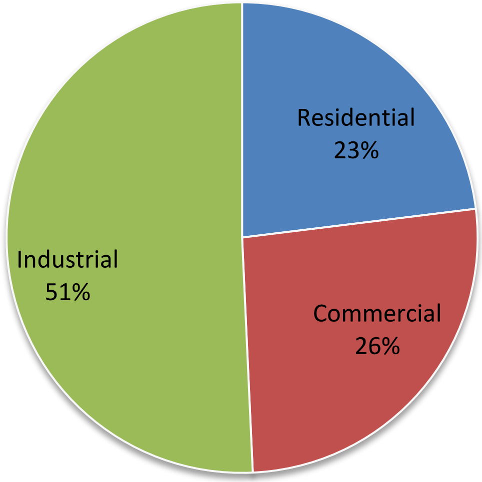


Consumers Energy Load Data from April 14th, 2010

5am Total Load by Class



5pm Total Load by Class



Consumers Energy Case No. U-17087 Example

Total Revenue Requirement: $4 Billion

Cost Allocation Across 3 Rate Classes

Residential
43.6%

Class Requirement:
$1.8 Billion

Commercial
25.6%

Class Requirement:
$1 Billion

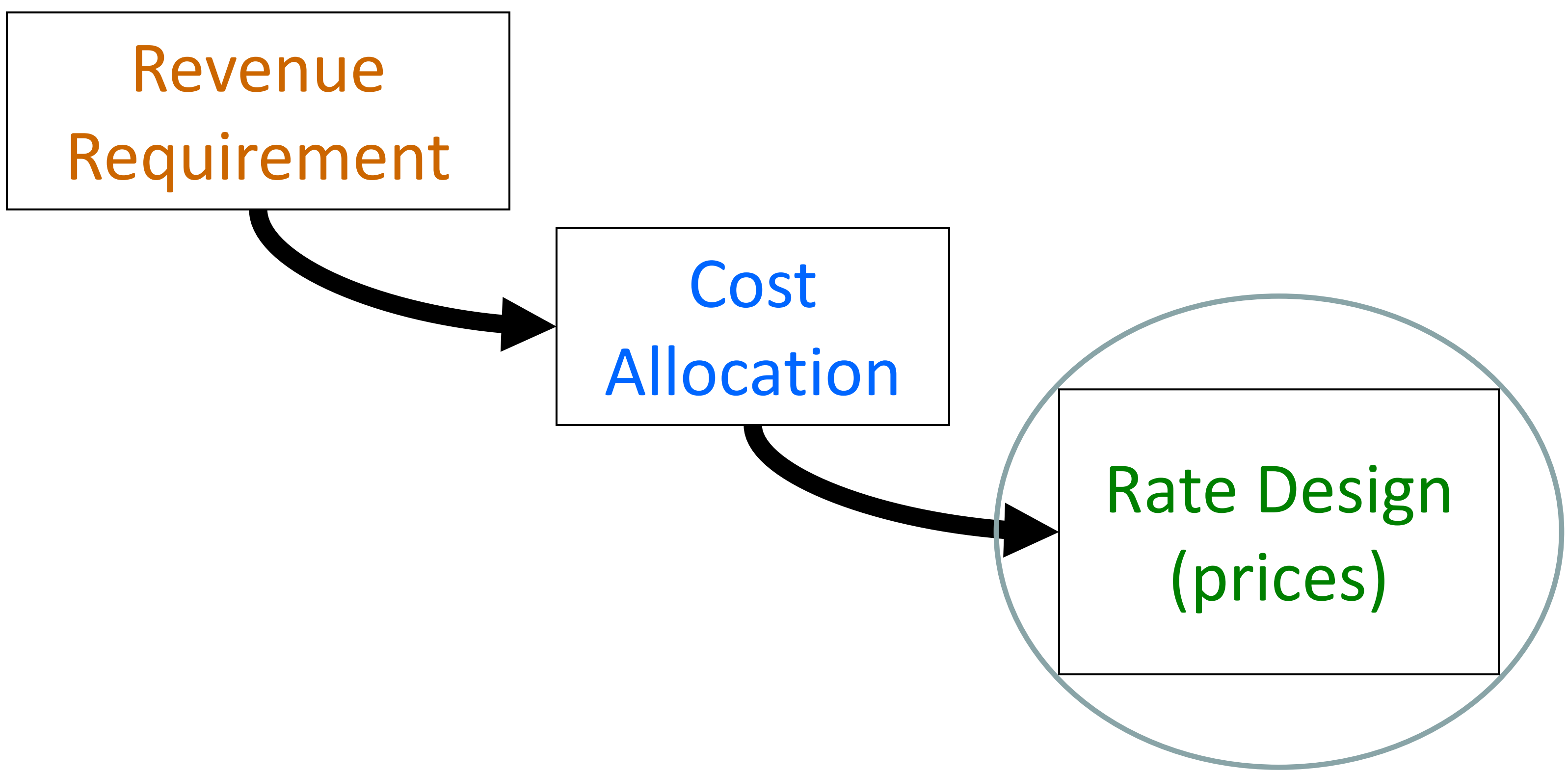
Industrial
30.8%

Class Requirement:
$1.2 Billion

PA 286 of 2008

- Sec. 11(1) requires MPSC to move to cost-of-service rates (“de-skewing”)
  - By Oct. 6, 2013 for DTE and Consumers (deadline met)
  - Electric rates for other companies moved toward cost of service
- Limits ability to approve special contracts or rates
- Unique to Michigan

The Traditional Ratemaking Process



Ratemaking Process

- Cost allocation determines *how many dollars to collect* from various classes or services
- Rate design determines *how to collect dollars* from various customer groups and services
- In principle, costs should be recovered through charges matching their classification and functionalization
  - fixed costs, however, are often recovered through usage charges (particularly for residential and other small customers)

Pricing Attributes

Dr. James C. Bonbright in his book “Principles of Public Utility Rates” (1961), which is often quoted by rate design witnesses, provides a list of eight traditional rate-making or pricing attributes:

- Simplicity and public acceptability
- Freedom from controversy
- Revenue sufficiency
- Revenue stability
- Stability of rates
- Fairness in apportionment of total costs
- Avoidance of undue rate discrimination
- Encouragement of efficiency

Determining How Costs Will be Recovered From Customers Within Each Customer Class

- Customer Charge
  - Covers basic fixed cost of serving a customer (e.g., cost of customer hook-up)
    - Meter reading, billing, etc.
    - Charge for basic facilities used to provide service
- Capacity or Demand Charge
  - Covers cost imposed on the system by the user's maximum load or usage
  - Usually excluded for residential service
- Usage Charge
  - Covers incremental cost of each unit of service

Rate Design

- Michigan employs a three step structure:
  - Power Supply Charges :
    - Charge for on each unit of sale (kWh or MWh).
    - Charge for each unit of demand (KW or MW) for larger commercial and industrial customers
  - Delivery Charges:
    - Customer Charge – Fixed monthly charge.
    - Distribution Charge – per kWh Energy (and Demand for some Commercial & all Industrial rates) charge on each unit of sale.
  - Surcharges:
    - Power Supply Cost Recovery
    - Reconciliation for self-implemented rates
    - Funding for low income assistance, Renewable Energy, and Energy Efficiency programs

DTE Residential Rate Example

Residential (D1)		
		650 kWh
Distribution Charges		
Service Charge	$6.00	$6.00
Delivery Distribution Charge	$0.0500300	32.52
Surcharges		
VHWF	-$1.59	-$1.59
LIEAF Surcharge	$0.99	$0.99
EOS	$0.0027330	1.78
RRA	$0.0032080	2.09
NDS	$0.0007780	0.51
SBC	$0.0045600	2.96
SBTC	$0.0030200	1.96
Power Supply Charges		
Energy Charge		
1st 510 (17kwh*30Days)	$0.0691200	35.25
Excess	$0.0825700	11.56
Surcharges		
REPS	$0.43	$0.43
PSCR	$0.0010000	0.65
	Bill	**$95.10**
	$$/kWh	**$0.1463**

DTE Commercial Rate Example

Small Commercial (D3)		5 kW Demand
		1,000 kWh
Distribution Charges		
Service Charge	$8.78	$8.78
Delivery Distribution Charge	$0.0355500	35.55
Surcharges		
VHWF	-$1.35	($1.35)
LIEAF Surcharge	$0.99	$0.99
EOS (581-1650 kwh)	$4.41	4.41
RRA	-$0.0040180	(4.02)
NDS	$0.0007780	0.78
SBC	$0.0045600	4.56
SBTC	$0.0030200	3.02
Power Supply Charges		
Energy Charge	$0.0759500	75.95
Surcharges		
REPS (Comm. 851 - 1650 kWh)	$1.83	$1.83
PSCR	$0.0010000	1.00
	Bill	**$131.50**
	$$/kWh	**$0.1315**

DTE Industrial Rate Example

Industrial (D6 @ Primary Voltage)		**1,000**	**kW Demand**
		432,000	**kWh**
Distribution Charges			
Service Charge	$275.00	$275.00	
Max Demand Charge	$2.35	2,350.00	
Distribution Delivery Chg	$0.0034000	1,468.80	
Surcharges			
VHWF	-$1.30	($1.30)	
LIEAF Surcharge	$0.99	$0.99	
EOS 11,500+ kWh	$502.43	502.43	
RRA	-$0.0030640	(1,323.65)	
NDS	0.00077800	336.10	
SBC	$0.0045600	1,969.92	
SBTC	$0.0030200	1,304.64	
Power Supply Charges			
Billing Demand Charge	$14.34	13,264.50	**92.5%** On-Peak Demand
On-Peak	$0.0440800	5,331.92	**28.0%** On-Peak Energy
Off-Peak	$0.0410800	12,777.52	**72.0%** Off-Peak Energy
Surcharges			
REPS (Prim. >41,500)	$26.68	$26.68	
PSCR	$0.0010000	432.00	
	Bill	**$38,715.55**	
	$$/kWh	**$0.0896**	

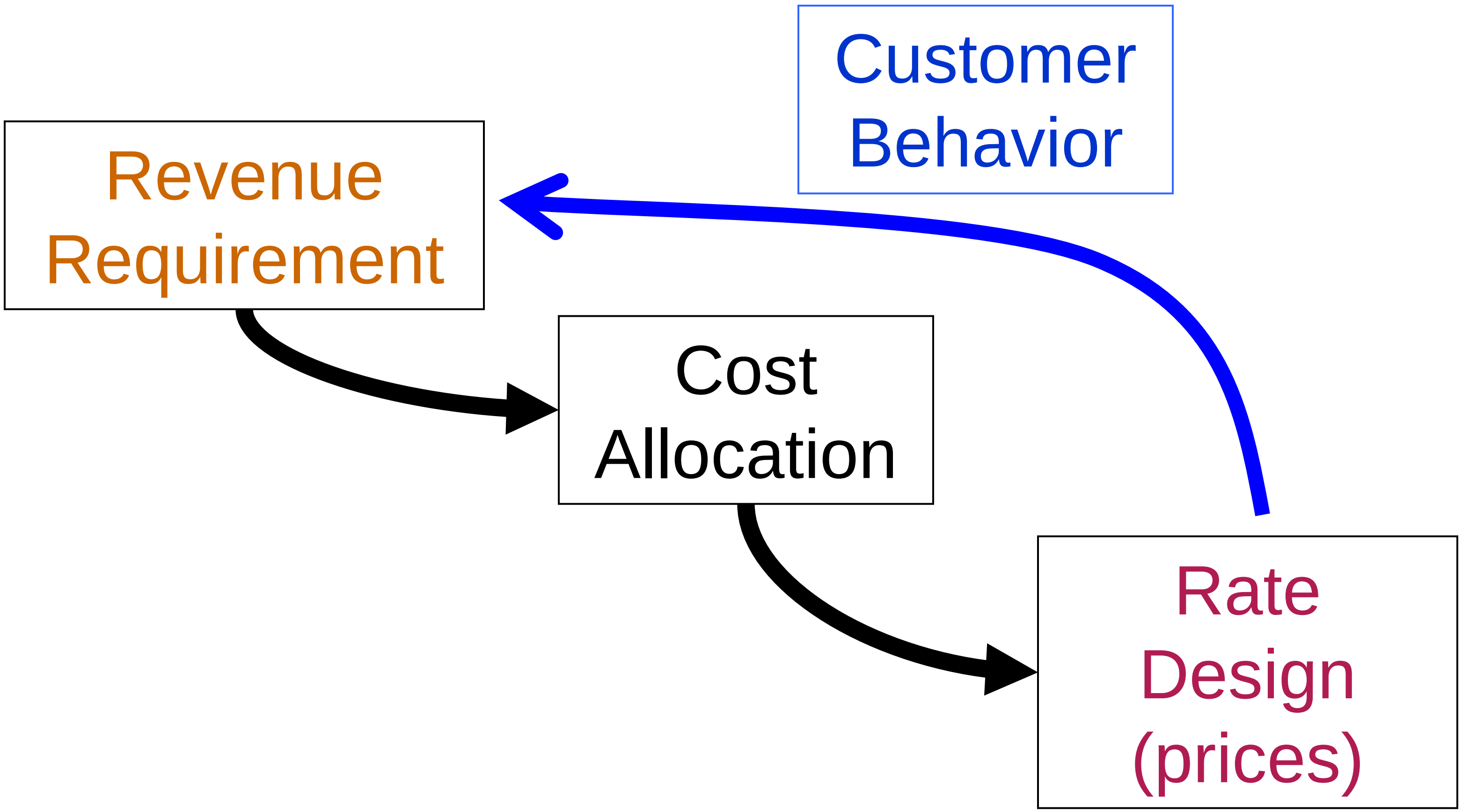
A Charge by Any Other Name…

Utility	Monthly Charge
Alpena Power	Customer Charge
Cloverland Electric Coop	Facility Charge
DTE Electric	Service Charge
Consumers Energy	System Access Charge
I&M	Service Charge
Midwest Energy Coop	Monthly Availability Charge
Northern States Power (Xcel)	Customer Charge
Thumb Electric Coop	Basic Service Charge
UPPCo	Service Charge
WPSC	Customer Charge
WePCo	Facilities Charge

Points to Consider:

- Utility rates are prices
- People respond to prices
  - Prices provide incentives and signals to producers and consumers
- Rate design will affect behavior
  - Expect a different response to a high customer charge and low usage charge than to a low customer charge and a high usage charge, even if the two are designed to produce equal revenues in the short run *(Why?)*
    - Rate design affects behavior, which affects future costs

A Feedback Loop



Other Ratemaking Processes

- REP, EO, LIEAF, Securitization, etc.
  - Authorized by legislation (PA 295, PA 286, etc.)
  - Used to track specific expenses
  - Pay for specific utility programs
- Generally recovered in per kWh charges
  - Sometimes on a per customer basis for the residential class
- Created, reconciled, and approved outside of rate cases

Other Ratemaking Processes (Cont.)

- Utility Self-Implemented rates
  - reconciled after approval of final rates
- Special Contracts
  - Individually approved by the Commission
- TIER ratemaking
  - Simple mechanism used for rural co-ops

Power Supply Cost Recovery (PSCR)

- Recovers costs for purchased power and fuel
- The rate consists of a base and factor.
- The PSCR base is imbedded in the base power supply rates
- The factor can change each month up to the maximum factor and is recovered through a surcharge
- Utility is required to submit a multi-year forecast of customer power supply requirements

DTE Residential Rate Example

Residential (D1)		
		650 kWh
Distribution Charges		
Service Charge	$6.00	$6.00
Delivery Distribution Charge	$0.0500300	32.52
Surcharges		
VHWF	-$1.59	-$1.59
LIEAF Surcharge	$0.99	$0.99
EOS	$0.0027330	1.78
RRA	$0.0032080	2.09
NDS	$0.0007780	0.51
SBC	$0.0045600	2.96
SBTC	$0.0030200	1.96
Power Supply Charges		
Energy Charge		
1st 510 (17kwh*30Days)	$0.0691200	35.25
Excess	$0.0825700	11.56
Surcharges		
REPS	$0.43	$0.43
PSCR	$0.0010000	0.65
	Bill	**$95.10**
	$$/kWh	**$0.1463**

Principles of Rate Regulation

- Fairness to both the regulated utility (its owners (or stockholders)) and the ratepayers
- Avoidance of unjust or undue discrimination between rate classes or customers
  - Cost causation - the concept of the cost causer pays the costs it imposed on the utility system
  - PA 286 of 2008 requires cost based rates