
Cost of Service Principles

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Objectives

- Understand customer classes
- Types of costs and allocation of costs based on cost causation
- Information provided by a Cost of Service Study
- How to use the cost of service in design of electric rates

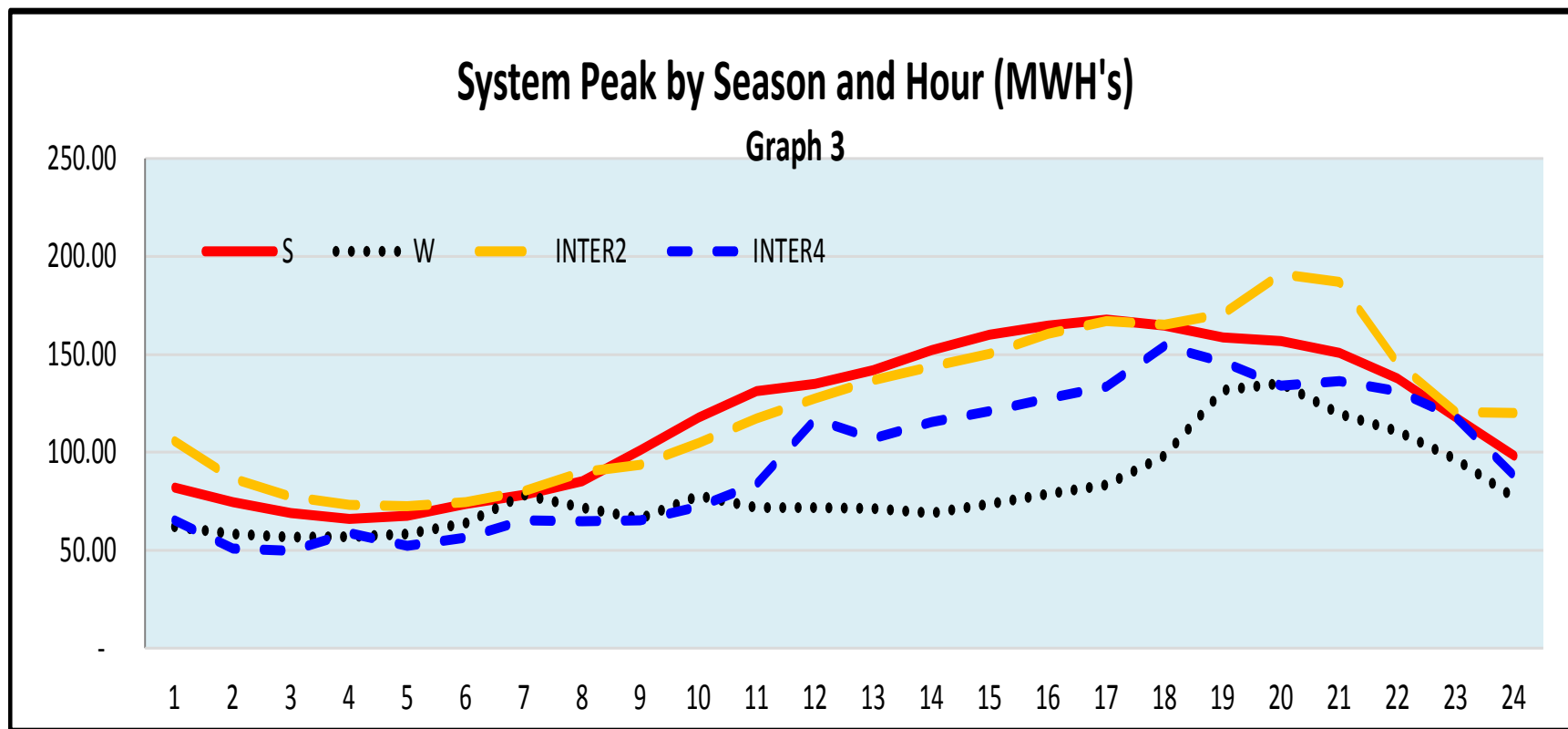
Cost of Service Process

- Determination of Revenue Requirements of Utility
- Allocation of Revenue Requirements to customer classes based on cost causation
- Identification of cost-based rate structure
- Determination of Rate Design

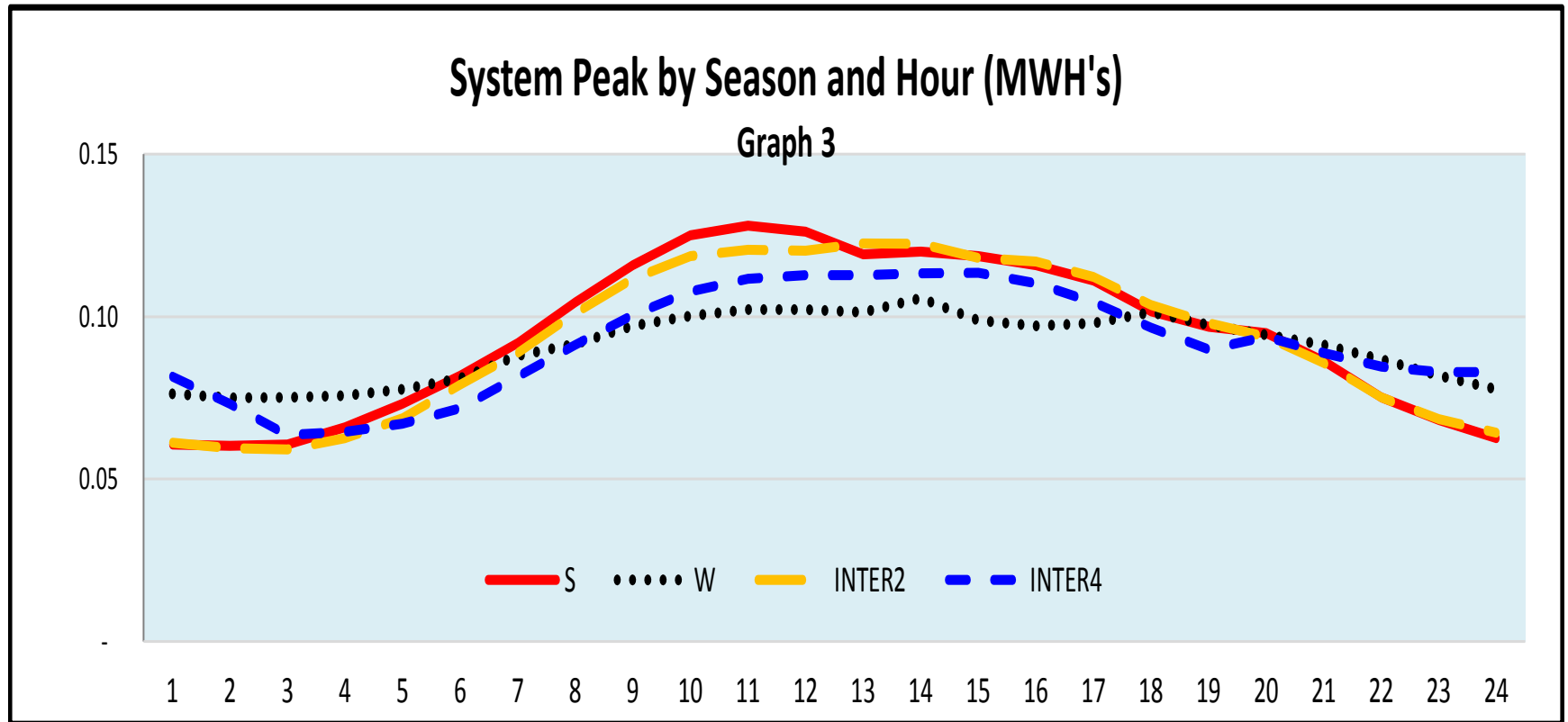
Customer Classes

- Customers are grouped into classes based on similar usage patterns or service characteristics
- Customers usage patterns from load research and identifies when customers use electricity
- Research identifies peak demands created by class and contribution to the overall system peaks

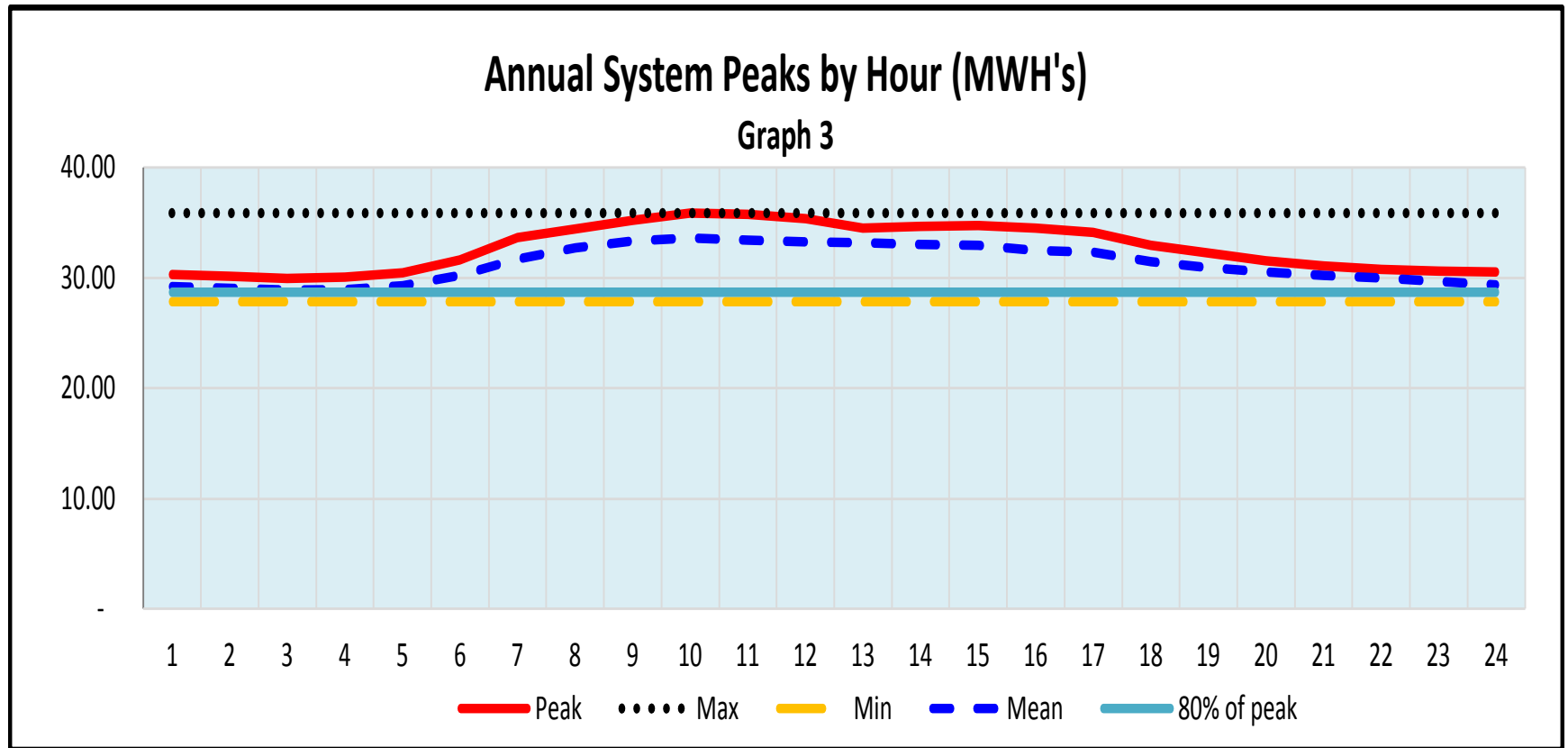
Residential Usage Pattern



Small Commercial & Industrial Usage Pattern



Large General Service Usage Pattern



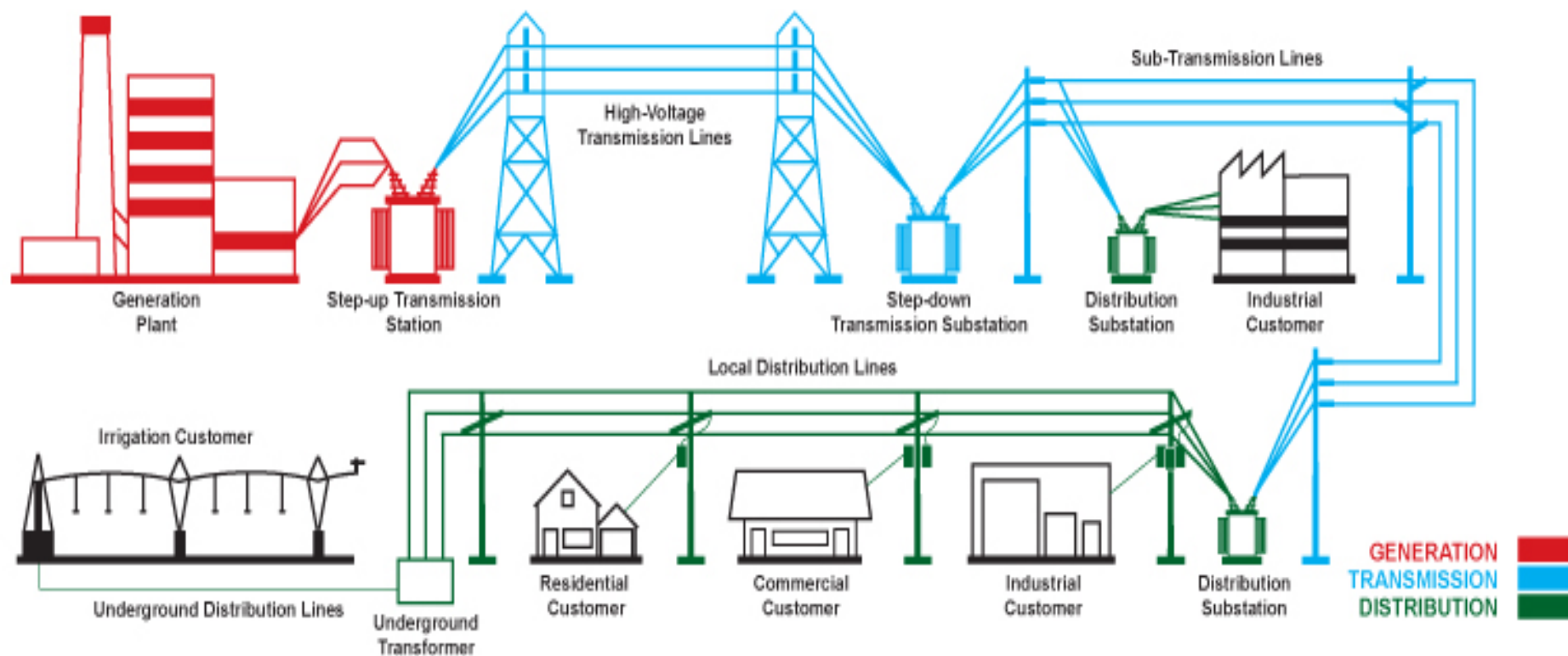
Cost Components of an Electric System

- Utility costs (Revenue Requirements) are from three areas:
 - Power Supply – From owned generating resources or purchased from market
 - Transmission – Delivery of electricity to Austin
 - Local Distribution System – Delivery of electricity to customer's facilities

Electric Customer Classes

Use of Infrastructure

Power Supply From Generation to End-Use Customer



Distribution System Costs

- Operation and maintenance of lines & facilities located within Austin:
 - Substations, Sub-Transmission, Primary lines, Secondary lines and service drops to customers, transformers & meters
- Expenses to service customer accounts
 - Meter Reading, Billing and Collections, Customer Services

Customer Rate Structures

- Customer Charges to recovery cost that do not vary based on consumption
- Energy charges to recover cost that vary based on energy use
- Demand charges to recover cost created to handle a customers peak demands

Cost of Service Customer Charge Includes the Following Components

- Distribution costs that do not vary with kWh usage
 - Meter operation, maintenance and replacement costs
 - Meter reading costs or AMR installation costs
 - Billing costs
 - Customer service department
 - Service into customers facilities
 - Portion of distribution system

Demand

- The peak demand a customer is creating measured in kW or kVa
 - The utility has to provide capacity to handle customer peak demands
 - Determined for a certain period of time typically a month

What Makes Up Demand Charges

- Power Supply Demand
 - Based on contribution toward system peak or at time power supply demand is determined
 - May be long term; short term or current costs
- Transmission Demand
 - Based on contribution toward peak at time transmission demand is determined
 - Current cost
- Distribution Demand
 - Need to consider infrastructure
 - Infrastructure close to customer
 - » Service drops
 - » Transformers
 - » Distribution lines
 - Infrastructure further away from customer
 - » Main substations of utility
 - » Sub-Transmission facilities

Illustrative Customer Charge Breakdown

	General Service		
	Residential	GS1	Demand GS2
Distribution Customer Costs	\$ 9.43	\$ 18.87	\$ 66.04
Transformer Customer Costs	1.14	2.29	8.00
Substation Customer Costs	1.89	3.77	13.21
Meter O&M	3.88	8.14	8.14
Meter Reading	-	-	-
Billing	1.63	3.25	11.38
Services	1.48	2.97	10.39
Customer Service	0.56	1.13	3.94
Customer Charge	\$ 20.02	\$ 40.41	\$ 121.11

Distribution Usage Charges

- Most inaccurate method of distribution cost recovery is through a kWh charge
- Distribution system is constructed to handle a customer's peak demand or a class's peak demand and are not constructed to handle kWhs
- Costs are allocated based on class's peak demand requirements that are created on the distribution system

Distribution Costs

- Customers are served at different voltage levels:
 - Secondary Voltage – Uses all the infrastructure of the distribution system
 - Primary Voltage – Customer owns transformer and service drop
 - Sub-transmission – Customer avoids all the distribution system infrastructure

Illustrative Distribution Usage Breakdown

	General Service		
	Residential	GS1	Demand GS2
Distribution	\$ 0.0196	\$ 0.0176	\$ 4.73
Transmission	0.0019	0.0019	0.46
Transformer	0.0014	0.0012	0.33
Substation	0.0095	0.0085	2.29
Direct	-	-	-
Marketing	-	-	-
Subtotal - kWh or kW Charge	\$ 0.0324	\$ 0.0292	\$ 7.8078

Production Costs

- Capacity Costs – Cost related to the construction of the generating units
 - Debt Service
 - Fixed Operation and Maintenance
 - System Losses
- Energy Costs – Costs to produce kWhs
 - Fuel
 - Purchased Power
 - Variable O&M
 - System Losses

Capacity Cost Allocations

- Capacity is allocated to customer classes based on the class's contribution to the overall system peak demands
 - Base Load Units – Operate 24 hours a day; seven days a week
 - Intermediate units – Operate during the peak time of the day
 - Peaking units – Operate only during the peak times of the year

Production Capacity Allocation Factors

- 1 CP – Cost are allocated based on the single peak of the entire year. For example if the system peaks on July 22 at 2PM the costs are allocated based on how much each class is using at that same time

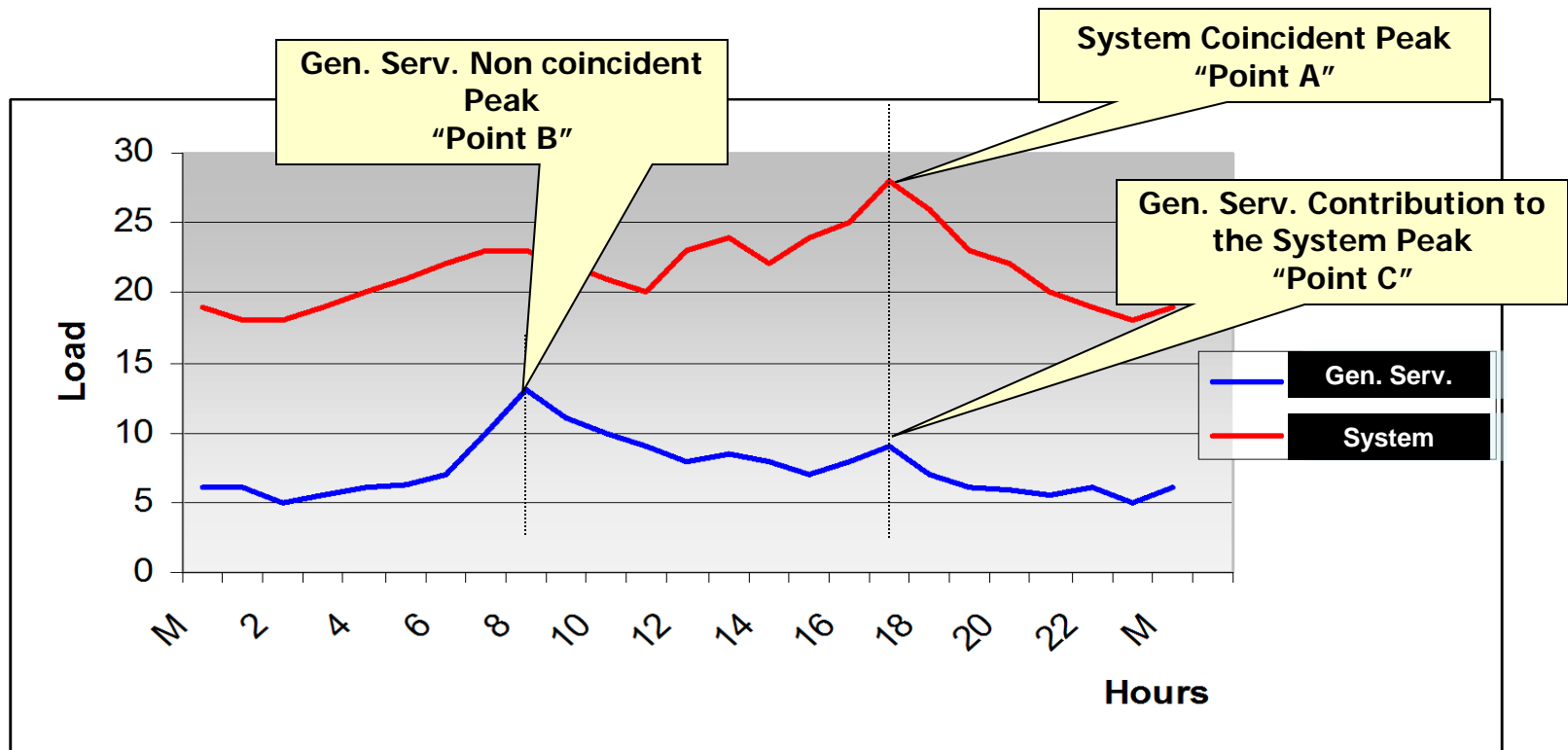
Production Capacity Allocation Factors

- 4 CP - Cost are allocated based on the utilities four highest peak of the year. Each class is allocated costs based the classes usage during each of the four periods
- 12 CP – Cost allocated based on peaks for each month. FERC advocates 12 CP for Transmission

Production Capacity Allocation Factors

- Average & Excess – Allocates the average usage of the system to energy. Usage above the average is treated as demand related and allocated on demand factors described above

Allocation of Capacity Costs



A = System Coincident Peak

B = Gen. Serv. Class Non coincident Peak

C = Gen. Serv. Class Contribution to System Peak

C/B = Gen. Serv. Class Coincidence Factor

Illustrative Power Supply Breakdown

	Residential	General Service GS1	General Service Demand GS2
	kWh	kWh	KW
Annual Costs			
Demand	0.0390	0.0478	12.85
Energy	0.0470	0.0467	0.0468
	0.0860	0.0945	
Summer/Winter Costs			
Summer Demand	0.0445	0.0483	12.22
Summer Energy	0.0507	0.0507	0.0507
	0.0952	0.0990	
Winter Demand	0.0355	0.0475	13.24
Winter Energy	0.0447	0.0448	0.0448

Illustrative Cost of Service Summary

Customer Class	Cost of Service	Projected Revenues	% Change
Residential	\$ 73,688,624	\$ 71,526,869	3%
General Service GS1	20,430,556	19,277,036	6%
Street Lights SL	604,878	-	
Metered Outdoor Lighting OLR	249,806	256,224	-3%
General Service Demand GS2	47,954,760	47,070,886	2%
Primary PRIM	18,792,890	17,392,842	8%
Transmission TRAN	2,472,393	2,190,295	13%
Total	\$ 164,193,908	\$ 157,714,151	4.1%