VDER Rate Design Working Group
Joint Utilities Presentations: ECOS Analysis

March 6, 2018

Agenda and Preliminary Matters

- Presentation Objective:

  Utilities present details on the functionalization and classification of costs in their respective ECOS studies with emphasis on classification of Distribution costs between "Customer Related" and "Demand Related."

- Agenda:
  - Utility ECOS information
  - Comparison – similarities, differences, and discussion

ECOS PROCESS: FUNCTIONALIZATION, CLASSIFICATION, ALLOCATION

Functionalization

- Plant investment costs and operating expenses are categorized by associated operational **functions,** e.g., Production, Distribution
  - The plant and expense data in a Utility's system of accounts is organized by function.

Classification

- Functionalized cost elements are **classified** according to factors of utilization that match cost causation, e.g. customer, demand and energy.
  - Customer costs are associated with the presence of a customer on the system; these costs do not vary with usage.
  - Demand costs are incurred to meet demand requirements that customers place on the system
  - Energy costs vary in relation to the amount of electricity consumed by customers. Except for purchased power and fuel, almost all electric utility costs do not vary with energy usage; very little of a distribution service cost structure is energy-related

Allocation

- Plant and Expenses are **allocated** to customer classes according to factors that best reflect responsibility for the costs, by function
  - For example, customer-related costs may be allocated according to the number of customers, or number of bills; Demand-related costs may be allocated according to measures of demand (non-coincident peak (NCP) demand, coincident peak (CP) demand)

ECOS and Rate Design - Observations

- The following Slides provide detailed JU Embedded Cost of Service (ECOS) results, with a focus on the classification of Distribution and Transmission Service costs to Customer and Demand-related categories, and the allocation of the Customer and Demand-related costs to Residential Service Classification No. 1 (SC 1)

  - SC 1 revenue requirements are determined by each utility's (a) overall cost structure and level of costs; (b) ECOS methodologies, and (c) SC 1 load characteristics and usage patterns

  - Modifications to ECOS methodologies that would change the classification of Distribution service costs to Customer and Demand-related categories would affect the allocation of costs (and revenue requirements) to all service classifications – including Residential SC 1. Changing class revenue requirements – including the Residential SC 1 revenue requirement – is <u>outside the scope of the Rate Design / Bill Impact project</u>.

  - Currently effective SC1 customer charges are less than the Customer-related SC1 costs. Refer to Slide 25 and February 8 Presentation, Slides 16, 17, 18.

- The Cost Causation rate design principle means that rates should generally reflect ECOS results – by rate component; rate design should also be informed by Marginal Costs.

CON EDISON CLASSIFICATION AND ALLOCATION OF COSTS

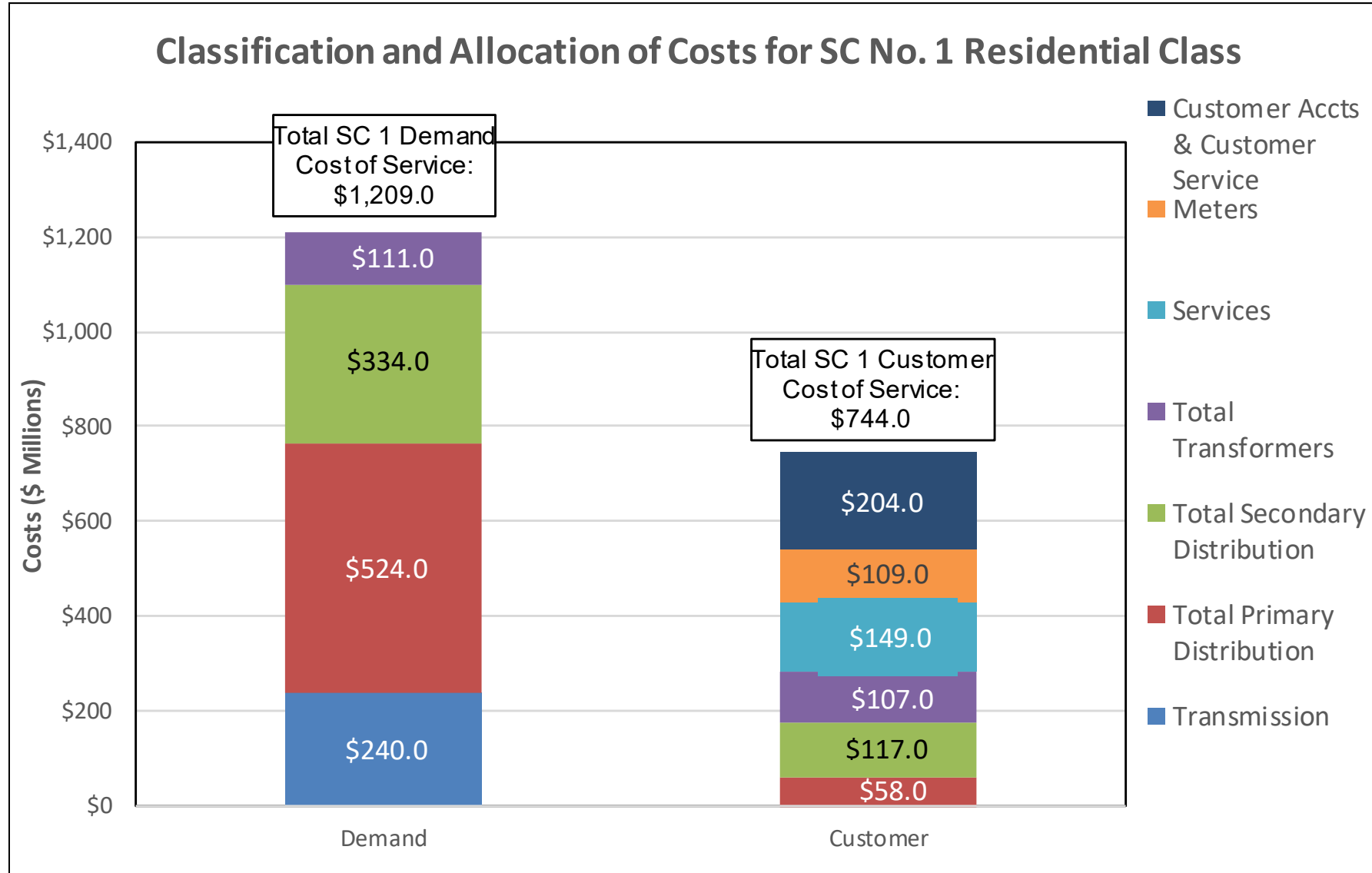|	Classification			Class Allocation Methodology		SC 1 (Residential) Allocation (millions)	
	Demand	Customer	Methodology	Demand	Customer	Demand	Customer
Transmission	100%			system peak (kW)		$ 240.0	
Primary Distribution							
Substations	100%			class peaks (kW) [1]		188.6	
Feeders	91%	9%	Minimum System [2]	class peaks (kW) [1]	same as secon. cust.	335.4	58.0
Secondary Distribution							
OH Lines	85%	15%	Minimum System [2]	blend of class peaks and individual customer max demands [3]	study of # of overhead and underground service connections by class [4]	33.0	14.0
UG Lines	79%	21%	Minimum System [2]			301.0	103.0
OH Transformers	54%	46%	Minimum System [2]			12.0	26.0
UG Transformers	61%	39%	Minimum System [2]			99.0	81.0
Services		100%			study of cost of services by class [4]		149.0
Meters		100%			study of the # and cost of meters by class		109.0
Customer Accounting		100%			# of customers*		173.0
Customer Service		100%			# of customers		31.0
						$ 1,209.0	$ 744.0

The terms with bracketed red numbers are explained on the following slide   *   Con Edison number of SC1 customers - 2,898,748 (2013 ECOS)

CON EDISON CLASSIFICATION AND ALLOCATION OF COSTS

[1] Non-coincident maximum class demands.

[2] Minimum system represents a minimum size distribution system, consisting of primary/secondary conductors, poles and transformers built to serve the minimum loading requirements of a customer. It is the portion of distribution facilities that is related to the presence of customers on the utility's system, regardless of their load.

[3] This cost allocation methodology recognizes that investments in distribution assets closest to the customer are driven more by individual customer demands , while investments in distribution system components further from the customer tend to be driven by overall non-coincident class peaks.

[4] The Company conducts a services study based on a sample of service connections across its service territory. For each customer in the sample, the number of services and their associated book cost is determined in relation to how these customers are connected to the Company's distribution system. From this information two allocators are developed: (1) the number of overhead and underground services by class, used to allocate the customer component of overhead and underground lines and transformers; and (2) the actual book cost of services by class used to allocate the services function in the ECOS study.

CLASSIFICATION OF DISTRIBUTION COSTS – CON EDISON

Classification and Allocation of Costs for SC No. 1 Residential Class

O&R CLASSIFICATION AND ALLOCATION OF COSTS

	Classification			Class Allocation Methodology		SC1 (Residential) Allocation (millions)	
	Demand	Customer	Methodology	Demand	Customer	Demand	Customer
Transmission	100%			system peak (kW)		$ 29.0	
Primary Distribution							
Substations	100%			class peaks (kW) [1]		16.0	
Feeders	95%	5%	Minimum System [2]	class peaks (kW) [1]	same as secon. cust.	50.0	4.0
Secondary Distribution							
OH Lines	88%	12%	Minimum System [2]	avg. of class peaks and individual customer max demands [3]	study of # of overhead and underground service connections by class [4]	24.0	4.0
UG Lines	35%	65%	Minimum System [2]			1.0	1.0
OH Transformers	64%	36%	Minimum System [2]			4.0	3.0
UG Transformers	39%	61%	Minimum System [2]			1.0	3.0
Services		100%			study of cost of services by class [4]		3.0
Meters		100%			study of the # and cost of meters by class		14.0
Customer Accounting		100%			# of customers		17.0
Customer Service		100%			# of customers		6.0
						$ 125.0	$ 55.0

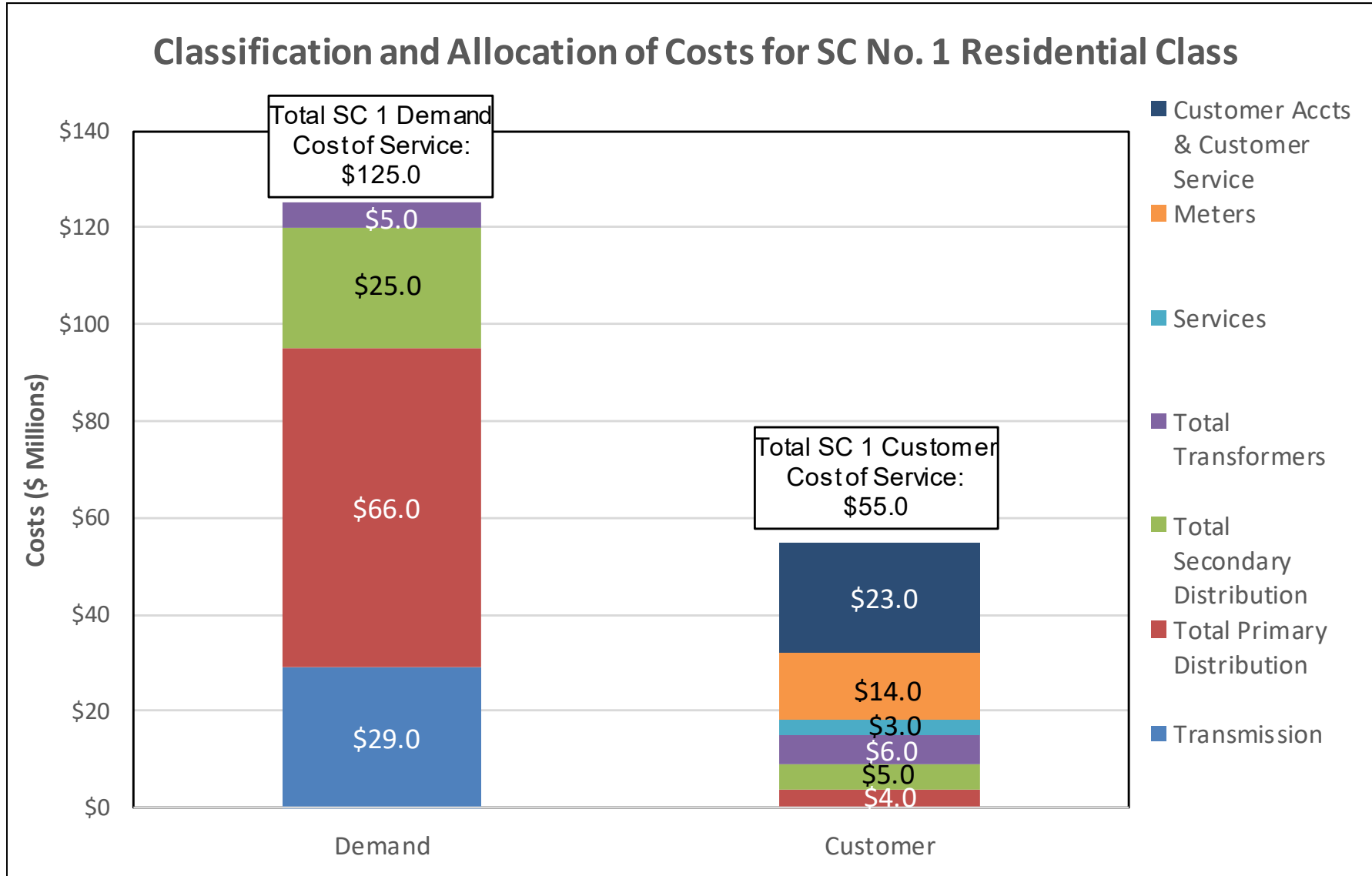The terms with bracketed red numbers are explained on the following slide   * O&R number of SC1 customers – 192,747 (2015 ECOS)

O&R CLASSIFICATION AND ALLOCATION OF COSTS

[1]   Non-coincident maximum class demands.

[2]   Minimum system represents a minimum size distribution system, consisting of primary/secondary conductors, poles and transformers built to serve the minimum loading requirements of a customer. It is the portion of distribution facilities that is related to the presence of customers on the utility's system, regardless of their load.

[3]   This cost allocation methodology recognizes that investments in distribution assets closest to the customer are driven more by individual customer demands , while investments in distribution system components further from the customer tend to be driven by overall non-coincident class peaks.

[4]   The Company conducts a services study based on a sample of service connections across its service territory. For each customer in the sample, the number of services and their associated book cost is determined in relation to how these customers are connected to the Company's distribution system. From this information two allocators are developed: (1) the number of overhead and underground services by class, used to allocate the customer component of overhead and underground lines and transformers; and (2) the actual book cost of services by class used to allocate the services function in the ECOS study.

CLASSIFICATION OF DISTRIBUTION COSTS – O&R

Classification and Allocation of Costs for SC No. 1 Residential Class

NYSEG CLASSIFICATION AND ALLOCATION OF COSTS

	Classification				Class Allocation Methodology			SC1 (Residential) Allocation (millions)		
	Demand	Customer	Energy	Methodology	Demand	Customer	Energy	Demand	Customer	Energy
Fixed Production										
Hydro			100%				Class usage			$ 8.6
Other	100%				system peak (2 CP) (kW) [2]			0.2		
Transmission	100%				system peak (12 CP) (kW) [3]			43.1		
Primary Distribution										
Station Equipment	100%				Class peaks (NCP) (kW) [4]					
Poles, Towers, Fixtures	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
OH Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
UG Conduit	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
UG Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
Total Primary Distribution								45.1	69.3	
Secondary Distribution										
Poles, Towers, Fixtures	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
OH Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
UG Conduit	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
UG Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
Total Secondary Distribution								7.0	10.5	
Line Transformers	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs		7.9	13.7	
Services		100%				# Sec. custs			7.5	
Meters		100%				study of # and cost of meters by class			34.3	
Customer Accts & Customer Service		100%				# of customers, # bills*			44.4	2.7
								$ 103.2	$ 179.7	$ 11.2

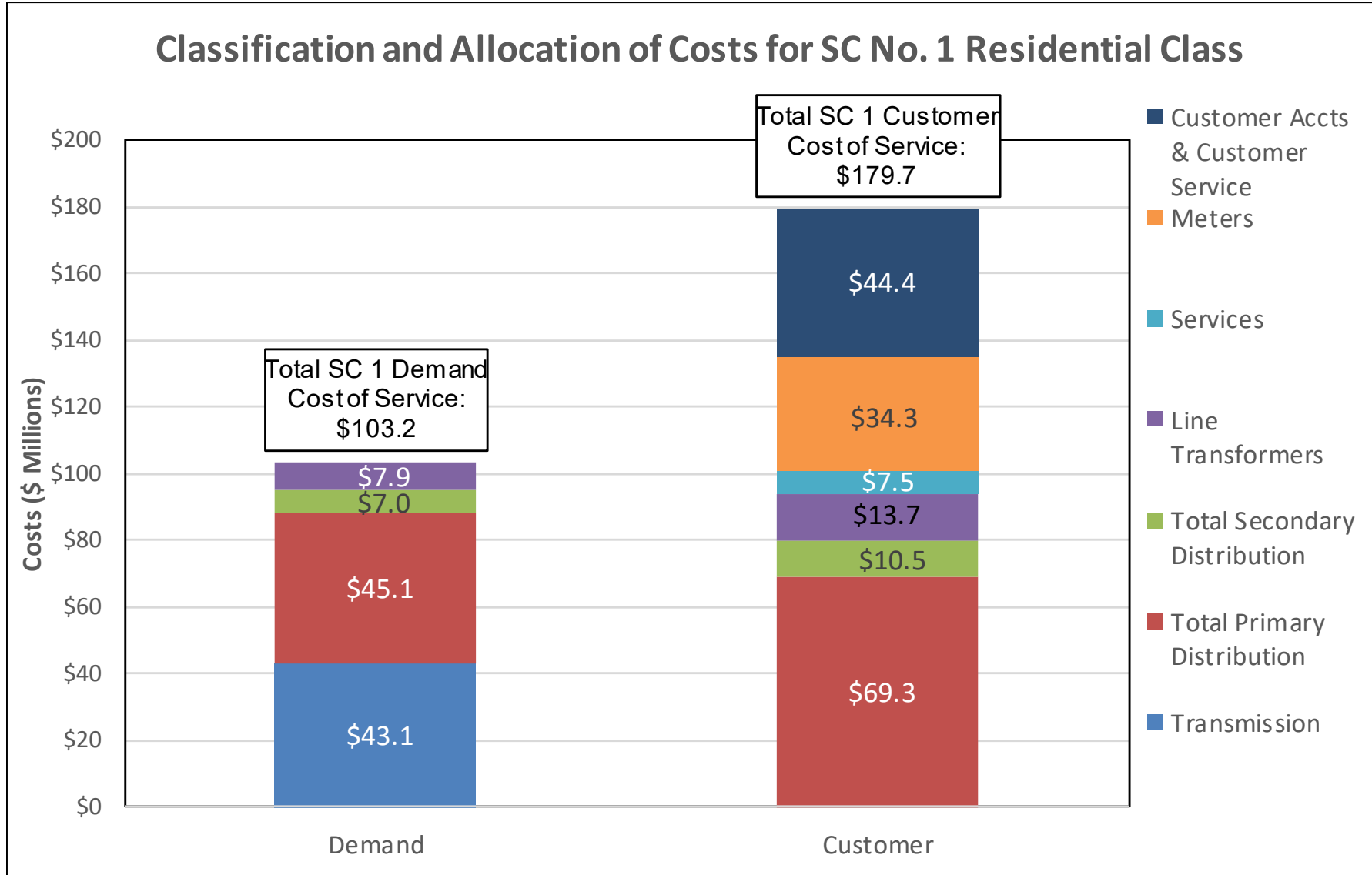The terms with bracketed red numbers are explained on the following slide

NYSEG number of SC1 customers – 622,077 (2013 ECOS)

Slide 10

NYSEG CLASSIFICATION AND ALLOCATION OF COSTS

[1] 50%/50% classification between demand and customer for Primary and Secondary Plant and Line Transformers was the result of a settlement in prior rate cases (Cases 09-E-0715, 09-E-0717).

[2] Fixed Production Costs allocated on the basis of the average of the summer and winter contribution to System peak. (2CP) (2 CP identifies the highest one hour demand on the Company's distribution system in the summer period (June-September) and the highest one hour demand on the Company's distribution system in the winter period (December-February)

[3] Transmission Costs allocated on the average of the 12 monthly contributions to System peak. (12 CP) (12 CP identifies the highest one hour demand on the Company's distribution system for each month)

[4] Distribution Costs allocated on class contribution to the Non-Coincident Peak (NCP). (NCP examines the peak demand of each class for each month)

CLASSIFICATION OF DISTRIBUTION COSTS - NYSEG

Classification and Allocation of Costs for SC No. 1 Residential Class

Totals also include Production: $.2 (Demand)
Chart does not include Production: $11.2 (Energy)

RG&E CLASSIFICATION AND ALLOCATION OF COSTS

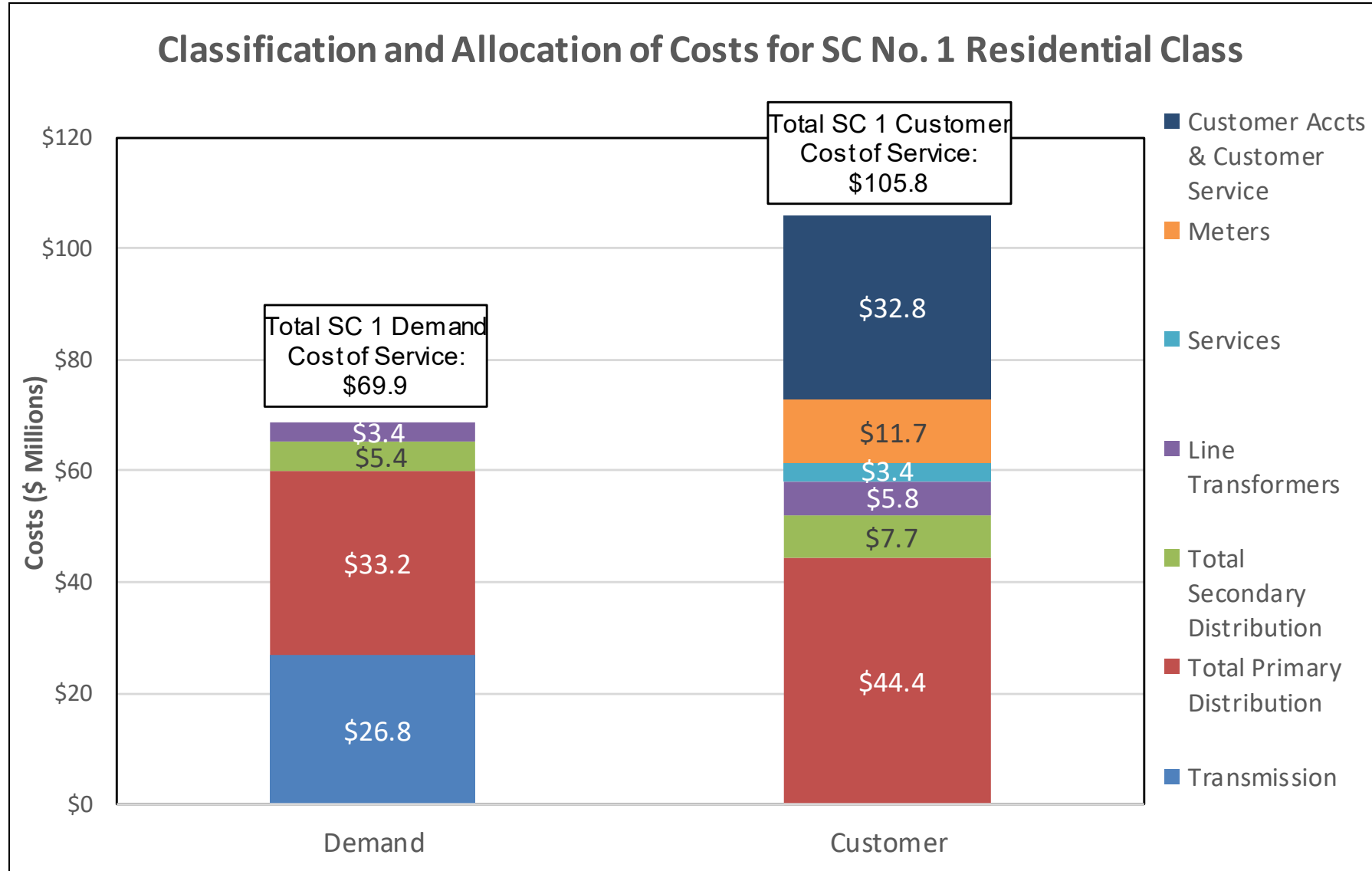|	Classification				Class Allocation Methodology			SC1 (Residential) Allocation (millions)		
	Demand	Customer	Energy	Methodology	Demand	Customer	Energy	Demand	Customer	Energy
Fixed Production										
Hydro			100%				Class usage			$ 16.7
Other	100%				system peak (2 CP) (kW) [2]			1.0		
Transmission	100%				system peak (12 CP) (kW) [3]			26.8		
Primary Distribution										
Station Equipment	100%				Class peaks (NCP) (kW) [4]					
Poles, Towers, Fixtures	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
OH Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
UG Conduit	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
UG Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Prim. custs				
Total Primary Distribution								33.2	44.4	
Secondary Distribution										
Poles, Towers, Fixtures	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
OH Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
UG Conduit	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
UG Conductors	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs				
Total Secondary Distribution								5.4	7.7	
Line Transformers	50%	50%		Settlement [1]	Class peaks (NCP) (kW) [4]	# Sec. custs		3.4	5.8	
Services		100%				# Sec. custs			3.4	
Meters		100%				study of # and cost of meters by class			11.7	
Customer Accts & Customer Service		100%				# of customers, # bills*			32.8	(0.4)
								$ 69.9	$ 105.8	$ 16.2

The terms with bracketed red numbers are explained on the following slide

RG&E number of SC1 customers – 325,171 (2013 ECOS)

RG&E CLASSIFICATION AND ALLOCATION OF COSTS

[1]   50%/50% classification between demand and customer for Primary and Secondary Plant and Line Transformers was the result of a settlement in prior rate cases (Cases 09-E-0715, 09-E-0717).

[2]   Fixed Production Costs allocated on the basis of the average of the summer and winter contribution to System peak. (2CP) (2 CP identifies the highest one hour demand on the Company's distribution system in the summer period (June-September) and the highest one hour demand on the Company's distribution system in the winter period (December-February)

[3]   Transmission Costs allocated on the average of the 12 monthly contributions to System peak. (12 CP) (12 CP identifies the highest one hour demand on the Company's distribution system for each month)

[4]   Distribution Costs allocated on class contribution to the Non-Coincident Peak (NCP). (NCP examines the peak demand of each class for each month)

CLASSIFICATION OF DISTRIBUTION COSTS – RG&E

Classification and Allocation of Costs for SC No. 1 Residential Class

Total SC 1 Demand Cost of Service: $69.9

Total SC 1 Customer Cost of Service: $105.8

Costs ($ Millions)

Demand: $26.8, $33.2, $5.4, $3.4

Customer: $44.4, $7.7, $5.8, $3.4, $11.7, $32.8

Legend:
- Customer Accts & Customer Service
- Meters
- Services
- Line Transformers
- Total Secondary Distribution
- Total Primary Distribution
- Transmission

Totals also include Production: $1.2 (Demand)
Chart does not include Production: $16.2 (Energy)

NATIONAL GRID CLASSIFICATION AND ALLOCATION OF COSTS

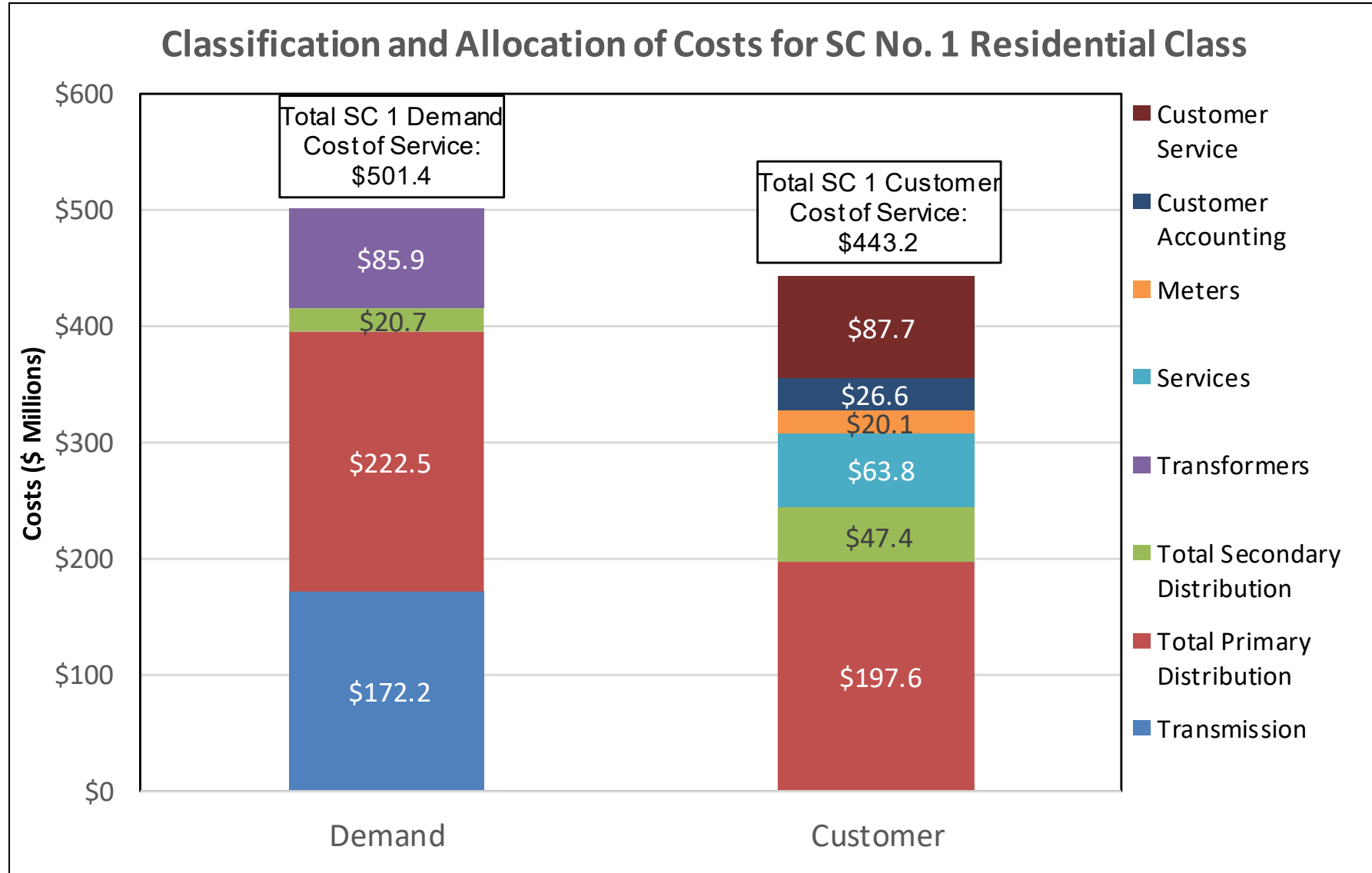|	Classification			Class Allocation Methodology		SC1 (Residential) Allocation (millions)	
	Demand	Customer	Methodology	Demand	Customer	Demand	Customer
Transmission	100%			1CP [2] at Transmission		$ 172.2	
Primary Distribution							
Substations	100%	0%		Class NCP at Primary [3]		88.0	
Feeders	50%	50%	JP in Case 12-E-0201	Class NCP at Primary [3]	Customers at Primary	134.5	197.6
Secondary Distribution							
OH Lines	41.56%	58.44%	Zero Load Study [1]	Class NCP at Secondary [4]	Customers at Secondary	16.5	39.6
UG Lines	48.25%	51.75%	Zero Load Study [1]	Class NCP at Secondary [4]	Customers at Secondary	4.2	7.7
Transformers	100.00%	0.00%		Directly assigned based on customers using each Transformer type		85.9	
Services		100%			Current cost of Services-Residential vs Commercial		63.8
Meters		100%			Current cost of typical Meter types for each class		20.1
Customer Accounting		100%			Study of activities in Account 903; each activity is allocated		26.6
Customer Service		100%			Study of activities in Account 908; each activity is allocated; includes ETIP and REV		87.7
						$ 501.4	$ 443.2

The terms with bracketed red numbers are explained on the following slide

- National Grid number of customers – 1,486,732
  (SC 1: 1,481,644; SC 1C (Opt. TOU): 5,088)
  (Niagara Mohawk 2018 Rate Case ECOS Study)

NATIONAL GRID CLASSIFICATION AND ALLOCATION OF COSTS

[1] Zero Load Study – This study was performed in place of a zero-intercept study, because it is less data-intensive. The study computes the labor portion of total capital invested in each of the Wires Accounts (365 & 367) for years 2008 – 2015. The labor-only portion of these costs have zero load carrying capacity, are largely independent of the capacity installed, and varies with the length of the distribution system installed and is incurred primarily to connect customers to the system. The results are used just as the zero-intercept would be used, to determine the portion of costs classified as customer-related.

[2] 1CP at Transmission – The contribution of each service class to the Company's annual system peak.

[3] Class NCP at Primary – For each service class at the secondary or primary voltage delivery level, the ratio of the class's annual peak demand to the sum of annual peak demands for all classes at the secondary and primary voltage delivery level. This is computed by applying class load factors to forecast annual kWh.

[4] Class NCP at Secondary - For each service class at the secondary voltage delivery level, the ratio of the class's annual peak demand to the sum of the annual peak demands for all classes at the secondary voltage delivery level. This is computed by removing Primary voltage customers from the NCP- Primary allocator.

CLASSIFICATION OF DISTRIBUTION COSTS – NATIONAL GRID

Classification and Allocation of Costs for SC No. 1 Residential Class

CENTRAL HUDSON CLASSIFICATION AND ALLOCATION OF COSTS

|	Classification				Class Allocation Methodology		SC1 (Residential) Allocation (millions)	
	Demand	Customer	Energy	Methodology	Demand	Customer	Demand	Customer
Production	21%	0%	79%	Energy: hydro; Demand: CTs	summer/ winter average CP [3]	avg hourly delivery demand at BUS level	$ 1.3	$ 3.4
Transmission	100%				most at system peak (kW) - some at summer/ winter average CP, NCP		42.6	
Primary Distribution								
Substations	100%				Class NCP at Dist Subs [4]		14.9	
Feeders	28%	72%		Minimum system; conductor cost varies w/ load [1]	Class NCP at Primary [4]	# custs at prim	12.5	43.8
Total Primary Distribution							27.3	43.8
Secondary Distribution								
OH Lines	11%	89%		Minimum system; conductor cost varies w/ load [1]	∑ NCP at Secondary [5]	# custs at sec	2.5	10.3
UG Lines	24%	76%		Minimum system; conductor cost varies w/ load [1]	∑ NCP at Secondary [5]	# custs at sec	3.0	12.6
Transformers	46%	53%		Minimum Size [1]	Class & ∑ NCP Average	# custs at sec	3.5	4.9
Total Secondary Distribution							9.0	27.9
Services	64%	36%		Cust: labor unit cost x avg ft. [2]	∑ NCP at Secondary [5]	# of service drops	2.7	1.4
Installations on Customer Premises	0%	100%				plant study		4.8
Meters		100%				study of # and cost of meters by class		5.4
Customer Accounting		100%				study of activities		27.6
Customer Service		100%				study of activities		9.7
							$ 82.9	$ 124.0

The terms with bracketed red numbers are explained on the following slide CH number of SC1 customers - 255,505 (RY 3; from 2012 ECOS, 2014 Rate Case)

# CENTRAL HUDSON CLASSIFICATION AND ALLOCATION OF COSTS

[1]   Minimum system representing minimum size system built to serve the minimum loading requirements of a customer.

[2]   Based on average service length of 75 ft.

[3]   Average of contribution of each service class to the Company's summer and winter peaks.

[4]   Ratio of each class' annual peak to the sum of the annual peak demands for all classes at various service levels.

[5]   Ratio of each class' annual peak to the sum of the annual peak demands for all classes, based on each customer consuming at maximum measured rate.

# CLASSIFICATION OF DISTRIBUTION COSTS – CENTRAL HUDSON

Classification and Allocation of Costs for SC No. 1 Residential Class
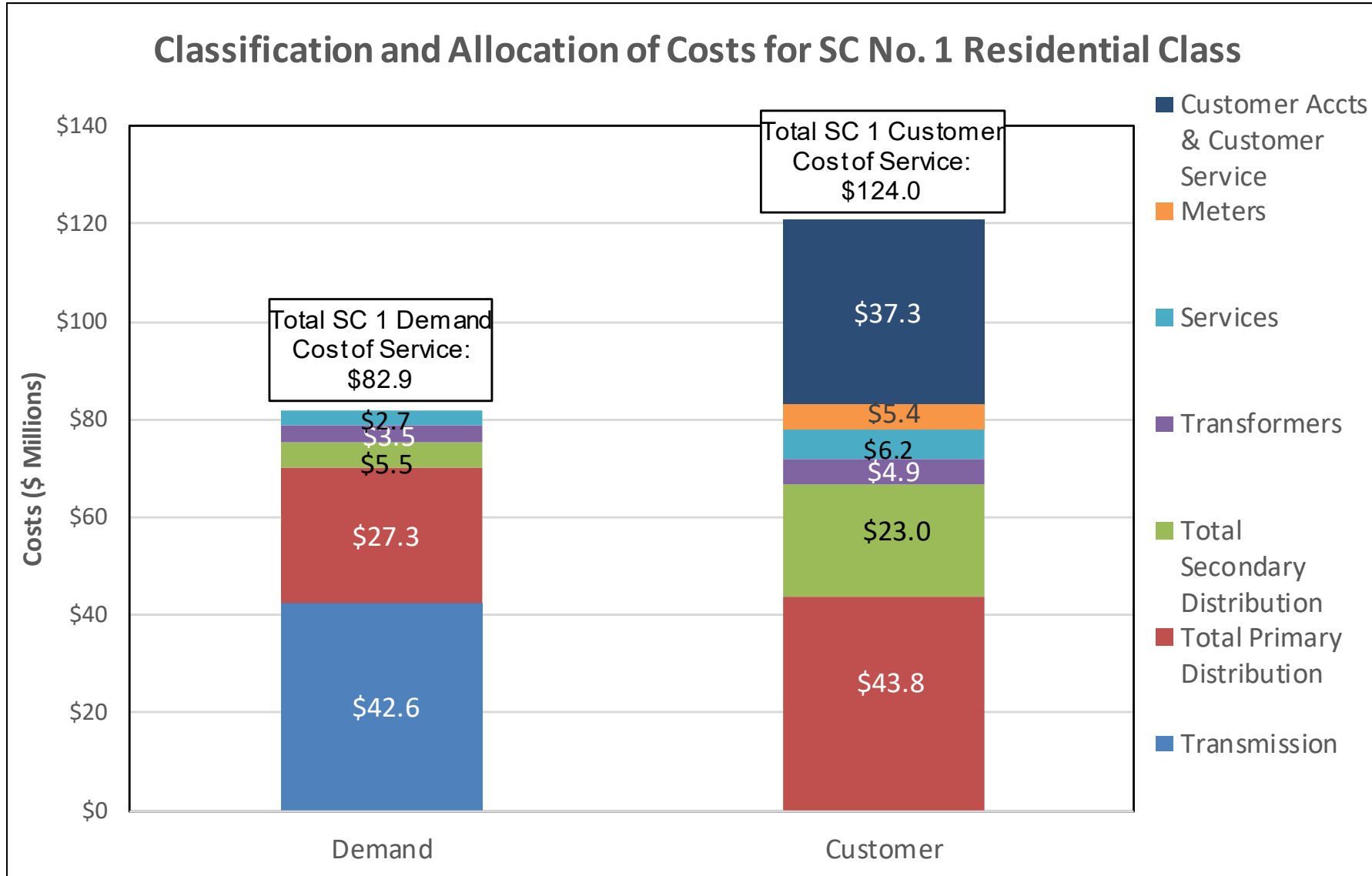
Totals include Production Costs: $1.3 (Demand); $3.4 (Customer)

CLASSIFIED CUSTOMER COSTS – CATEGORY SHARES

Customer Cost Composition by Cost Category
Allocated SC 1 Customer Costs (Revenue Requirement)
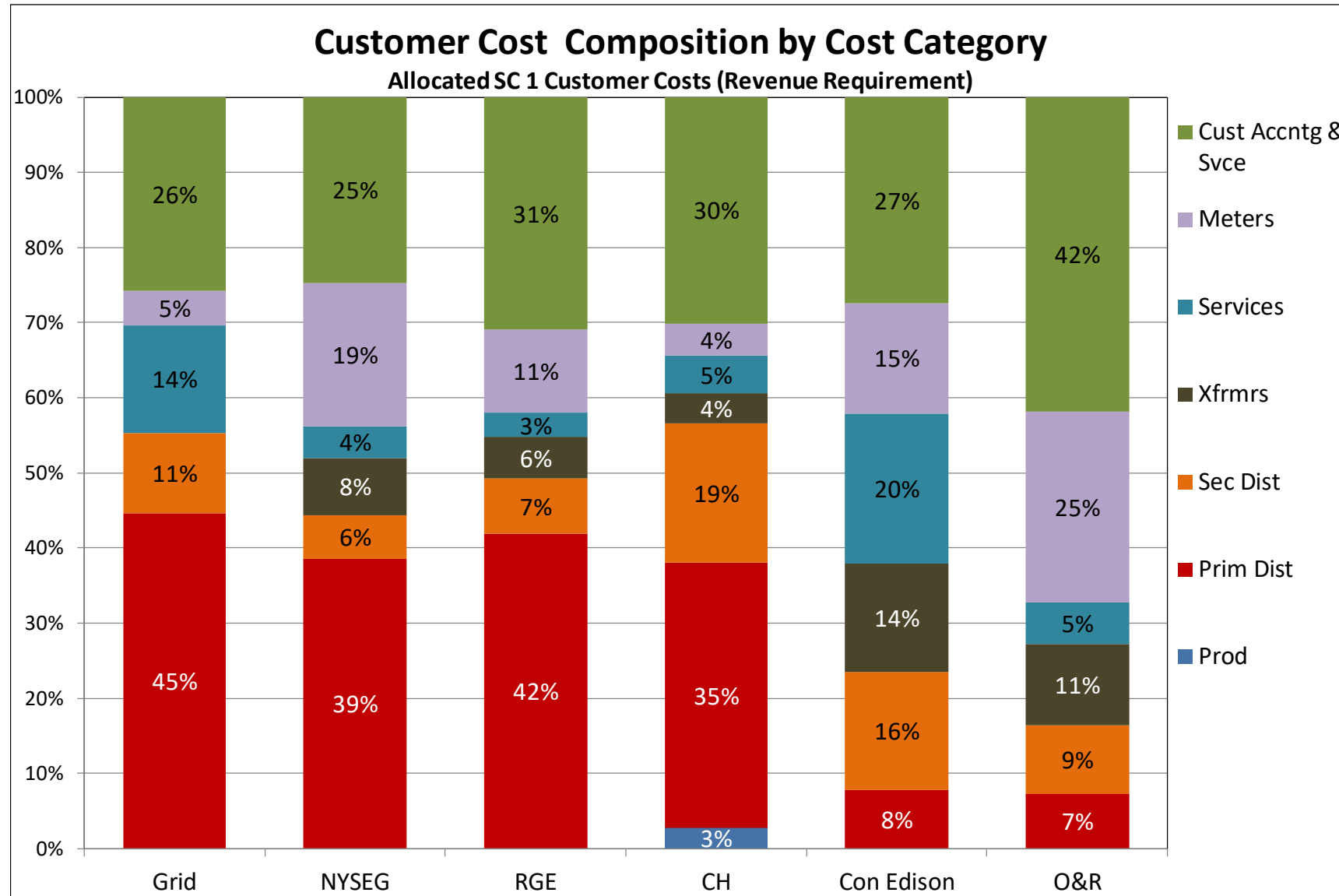
This chart shows the composition of SC 1 allocated customer-related costs that are derived from the ECOS results that are summarized in Slides 4 - 21
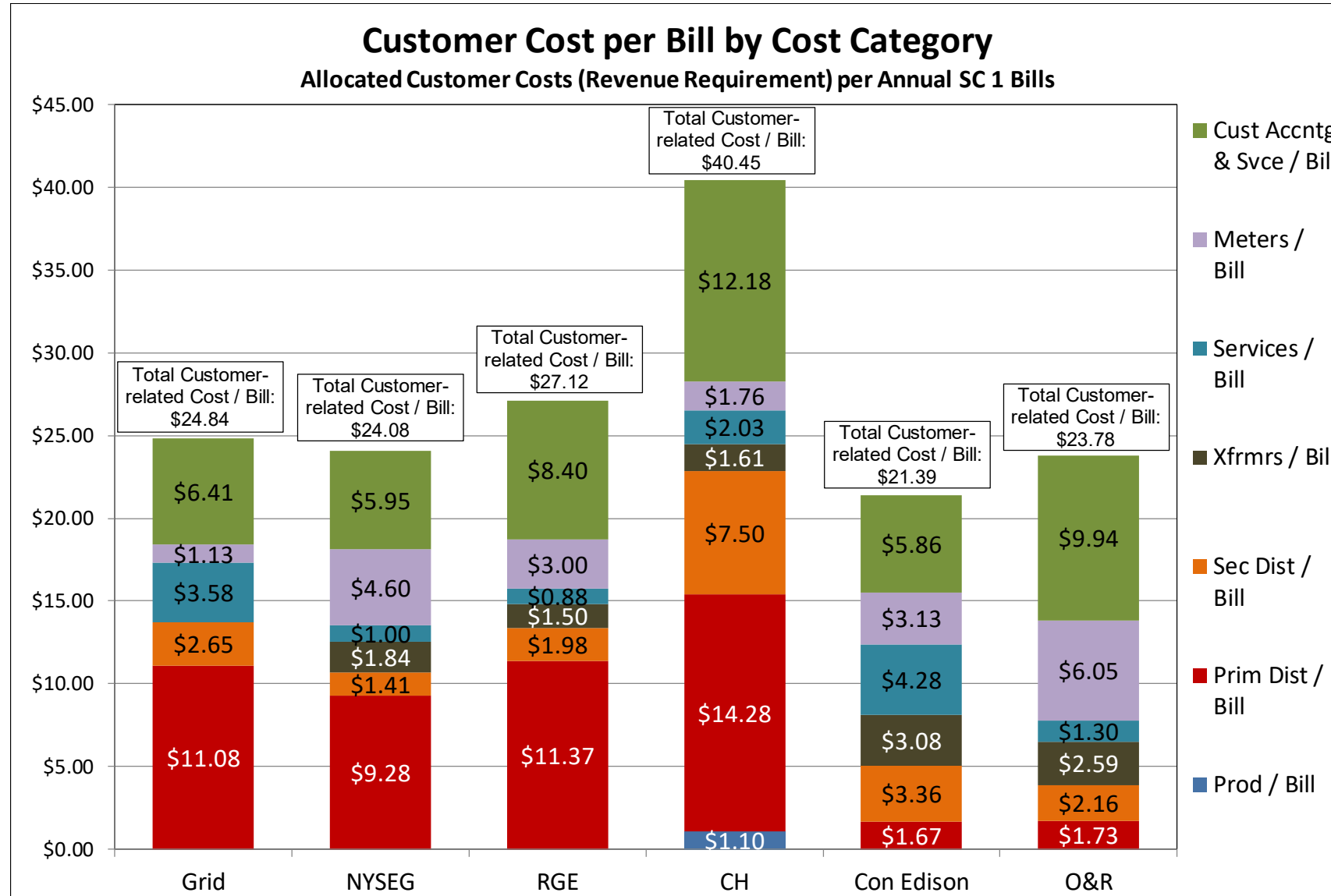
CLASSIFIED CUSTOMER AND DEMAND COSTS – CATEGORY SHARES

Cost Composition by Cost Category
Allocated SC 1 Customer, Demand Costs (Revenue Requirement)
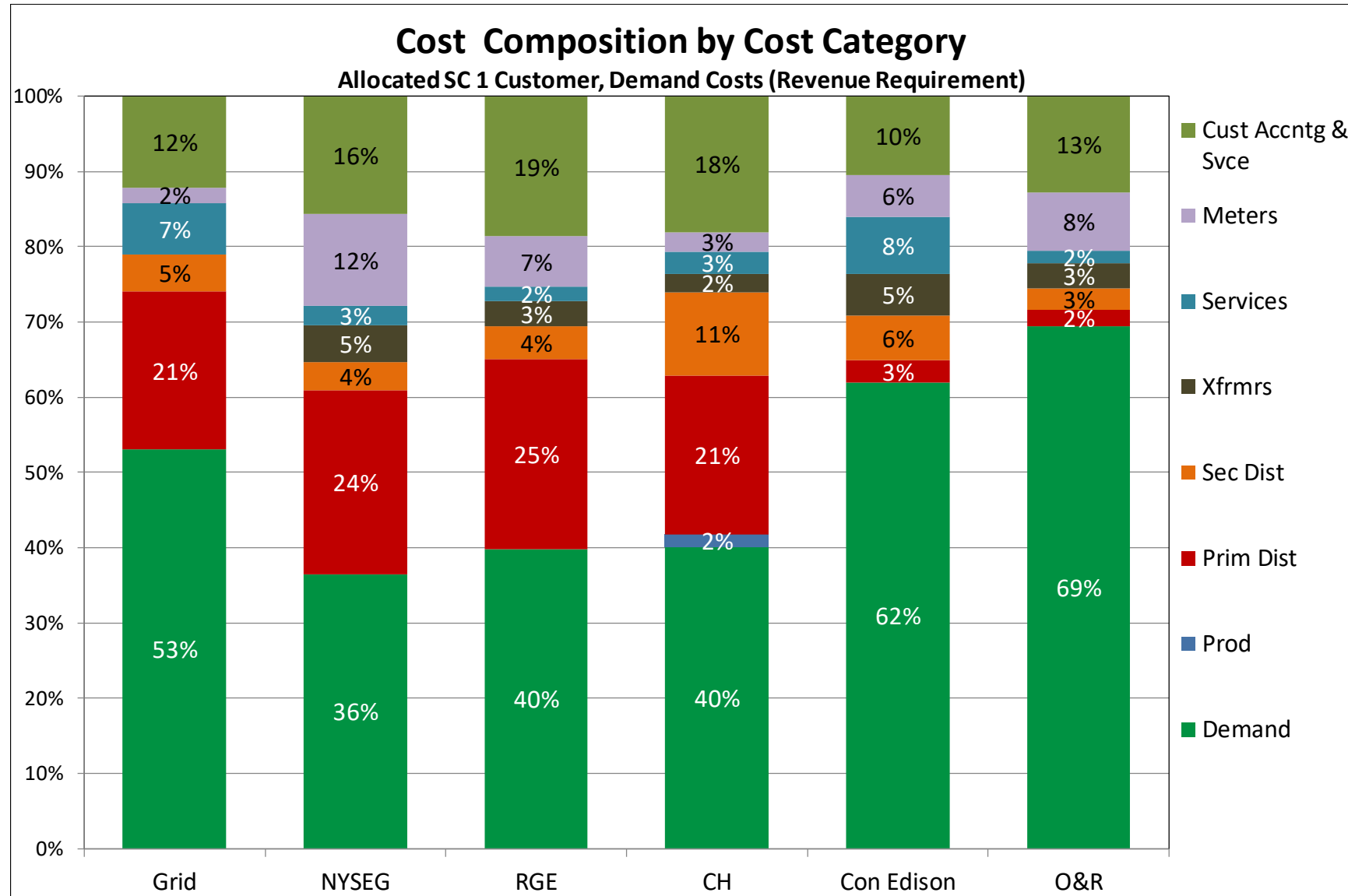
This chart shows the detailed category shares of SC 1 allocated customer-related costs and the total share of SC 1 allocated demand-related costs. The SC 1 allocated customer-related and demand-related costs are derived from the ECOS results summarized in Slides 4 - 21
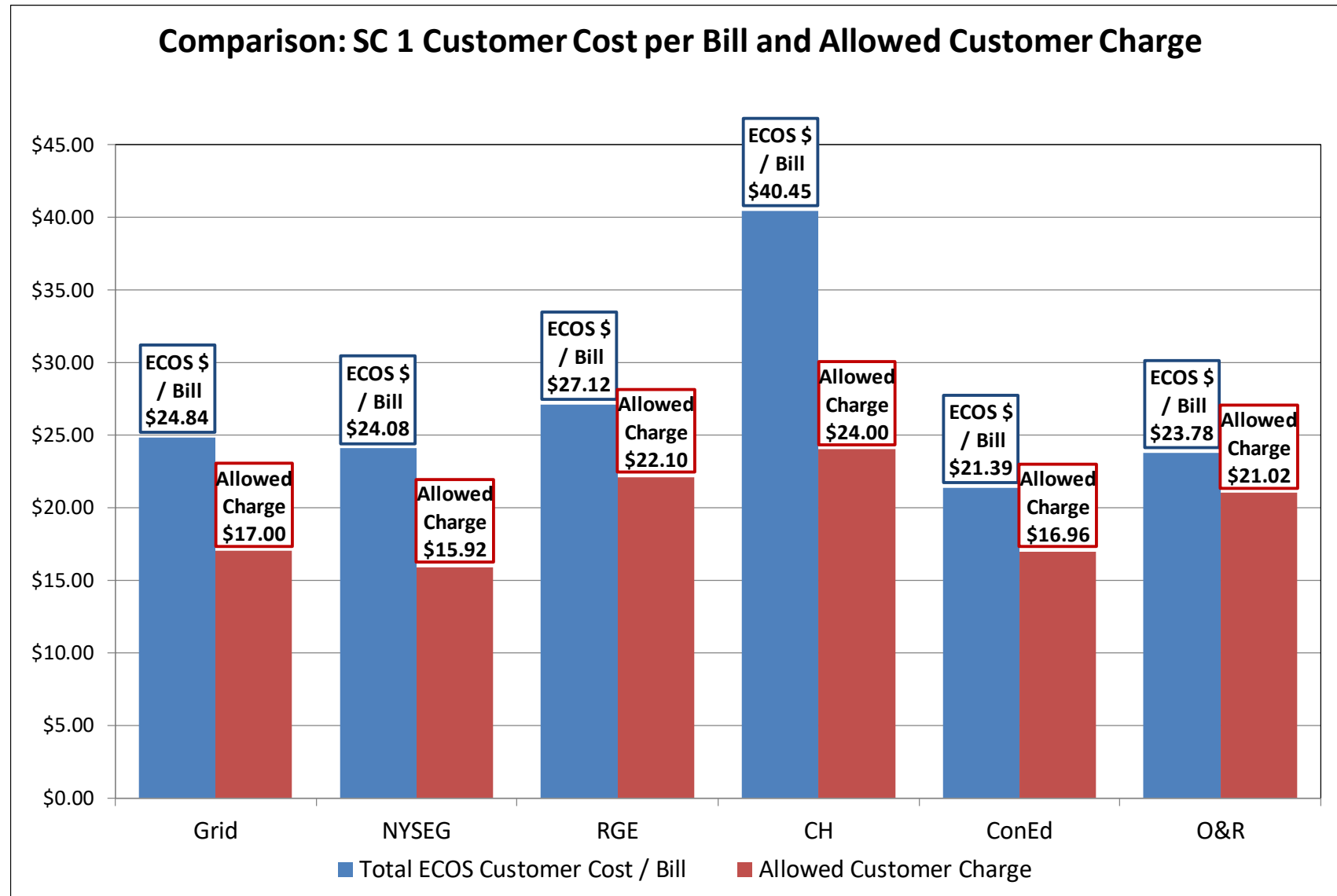
Slide 23

CLASSIFIED CUSTOMER COSTS – CUSTOMER COSTS PER BILL

Customer Cost per Bill by Cost Category
Allocated Customer Costs (Revenue Requirement) per Annual SC 1 Bills

This chart shows the composition of SC 1 customer costs per bill - derived from the ECOS results summarized in Slides 4 – 21.

SC 1 Customer-related costs per bill that are shown on this chart are not equivalent to allowed (tariffed) SC 1 customer charges. The following Slide 25 demonstrates that the ECOS customer-related costs are greater than the allowed customer charges for all six utilities.

COMPARISON: ECOS CUSTOMER COSTS AND ALLOWED CUSTOMER CHARGES

Comparison: SC 1 Customer Cost per Bill and Allowed Customer Charge

This chart demonstrates that each utilities' SC 1 Customer-related ECOS cost of service per bill (Slide 24) is greater than the allowed customer charges

Chart data:

Utility	Total ECOS Customer Cost / Bill	Allowed Customer Charge
Grid	ECOS $ / Bill $24.84	Allowed Charge $17.00
NYSEG	ECOS $ / Bill $24.08	Allowed Charge $15.92
RGE	ECOS $ / Bill $27.12	Allowed Charge $22.10
CH	ECOS $ / Bill $40.45	Allowed Charge $24.00
ConEd	ECOS $ / Bill $21.39	Allowed Charge $16.96
O&R	ECOS $ / Bill $23.78	Allowed Charge $21.02

■ Total ECOS Customer Cost / Bill   ■ Allowed Customer Charge

CONCLUSION

Presentation Objective:

Utilities presented details on the functionalization and classification of costs in their respective ECOS studies with emphasis on classification of Distribution costs between "Customer Related" and "Demand Related."

Agenda:

- Utility ECOS information
- Comparison – similarities, differences, and discussion