

The table below shows how each of the functional and sub-functional costs was classified:

Function/Sub-Function	Cost Classification		
	Demand	Energy	Customer
Summer Capacity-Related Fixed Generation	X		
Winter Capacity-Related Fixed Generation	X		
Energy-Related Fixed Generation		X	
Off-Peak Energy (Fuel and Purchased Energy)		X	
On-Peak Energy (Fuel and Purchased Energy)		X	
Transmission	X		
Distribution Substations	X		
Primary Transformers	X		
Primary Lines	X		X
Secondary Lines	X		X
Secondary Transformers	X		X
Service Drops	X		X
Metering			X
Customer Services			X

As shown in the table above, primary lines, secondary lines, secondary transformers and service drops are classified as both “demand” and “customer” related costs. Costs of these sub-functions are driven by **both** the number of customers on the distribution system and the capacity requirements they place on the system. The analysis used to separate these costs into demand and customer components is called the Minimum Distribution System (MDS) method.

The Minimum Distribution System method involves comparing the cost of the minimum size of each type of facility used, to the cost of the actual sized facilities installed. The cost of the minimum-size facilities determines the “customer” component of total costs, and the “capacity” cost component is the difference between total installed cost and the minimum-sized cost.

The table also shows the percent of each cost element that was classified as “customer” related based on the most recent Minimum System study.

Equipment Type	% Classified as “Customer” Related
Overhead Lines Primary	38.8%
Primary Transformers	0%
Overhead Lines Secondary	50.2%
Underground Lines Primary	83.0%
Underground Lines Secondary	52.5%
Line Transformers Secondary	45.6%
Services	72.7%

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 13 of 20

Appendix 1: EXTERNAL ALLOCATORS – Descriptions and Applications

The table below lists and describes the external allocators used in the Class Cost of Service (CCOSS) model.

Code	Allocator For:	Description	Allocator Rationale and Background
C11	Connection charge revenues	Average monthly customers for the Test Year	Customer connection revenues are driven by number of customer services.
C10	Used to calculate C11	C11 less automatic protective lighting and load management services. C11 less number of customers with a second service.	
C11WAF	Used to calculate C11WA allocator	Customer accounting cost weighting factors. The weighting factor for residential customers is set at 1.0. The weighting factors for other classes are defined relative to costs for residential. E.g., if a class were three times costlier, its factor would be 3.0.	Weighting factors are set so as to reflect the relative costs of meter reading, billing and providing customer service for different classes of customers. For example some rate schedules are significantly more complex requiring more sophisticated meter reading capabilities, billing systems and customer service staff.
C11WA	Customer accounting costs	Average monthly customers weighted by each class' relative rating of customer accounting costs: C11 X C11WAF	Customer accounting costs are driven by number of customers and the complexity of their respective rate, billing issues and customer service requirements.
C12	Used to calculate C12WM allocator	Reflects actual number of meters. C11 with an adjusted street lighting customer count. Only selected street lighting rates are metered	
C12WMF	Used to calculate C12WM allocator	Average meter cost for each customer type	
C12WM	Meter costs	Number of meters multiplied by each class' average meter costs: C12 X C12WMF	Metering costs are driven by the number of customers in each class and the respective metering costs.
C61PS	The "customer" (minimum system) portion of primary distribution line costs	Average monthly customers served at primary or secondary voltage. C11 less transmission transformed and transmission voltage customers	The number of customers served at secondary and primary voltages drives the customer-related portion of primary distribution line costs. Transmission and Transmission Transformed voltage customers are excluded since they do not use the distribution system

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 14 of 20

Appendix 1: EXTERNAL ALLOCATORS – Descriptions and Applications

Code	Allocator For:	Derivation	Allocator Rationale and Background
C62Sec	The “customer” (minimum system) portion of secondary (not primary) distribution line costs	Average monthly customers served at secondary voltage. C61PS less primary voltage customers	The number of customers served at secondary voltage drives the customer related portion of <u>secondary distribution line</u> costs. Transmission and primary voltage customers are excluded since they do not use the secondary distribution system.
C62NL	The “customer” (minimum system) portion of <u>service-line</u> costs.	Adjusted average monthly secondary voltage customers. C62Sec less street lighting and C&I underground customers	The number of secondary customers drives the customer portion of <u>service line</u> costs. C&I underground secondary customers are excluded since they own their services. Lighting customers are excluded since they do not have services.
D60Sub	Distribution substation costs	Class Coincident peak measured at the high voltage side of the Distribution Substation less Class Coincident peak of Transmission Voltage customers	<u>Distribution substation</u> costs are driven by class peak demands, whenever they occur which is generally at times other than the total system peak. Transmission voltage customers are excluded since they do not use the distribution substation.
D61PS	The <u>capacity</u> portion of <u>primary</u> distribution line costs.	D60Sub less Transmission Transformed customer demands, less customer demands served by minimum distribution system and with reduced Residential Space Heating demands to reflect the fact that their summer peak is less than their winter peak.	The driver of <u>primary distribution line</u> costs is the class coincident demands less the minimum system demand of each class. The minimum demand is classified as a customer related cost. Also transmission and transmission transformed voltage customers are excluded since they do not use the distribution system.
D62Sec	Used to calculate the D62SecL allocator	D61PS less class coincident demands of primary voltage customers	
D62SecL	The <u>capacity</u> portion of <u>secondary</u> distribution line costs	D62SecL equals the average of D62Sec percent and non-coincident (or “individual customer peak”) secondary voltage percent.	Capacity related <u>secondary distribution line</u> costs are driven by both class coincident peak demand and individual customer maximum demand, less the minimum system demand of each class. (The minimum system demand is classified as customer related.) Also, transmission and primary voltage customers are excluded since they do not use the secondary distribution system.

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 15 of 20

Appendix 1: EXTERNAL ALLOCATORS – Descriptions and Applications

Code	Allocator For:	Derivation	Allocator Rationale
D62NLL	The <u>capacity</u> portion of <u>service-line</u> costs	Non-coincident (or “customer peak”) demand for secondary voltage customers, less the customer peak demand for street lighting, area lighting and C&I customers served underground	Capacity related <u>service line costs</u> are driven by individual customer maximum demands less the minimum system demand of each class. (The minimum system demand is customer related.) Transmission voltage, primary voltage and lighting customers are excluded since they do not cause service related costs. Also excluded are C&I underground customers since they install their own services.
D10S	Summer season portion of capacity-related generation costs	Each class’ % contribution to the single summer system peak. Summer months are June through September.	The class contribution to the system summer peak drives the summer portion of capacity-related <u>generation</u> costs.
D10W	Winter season portion of capacity-related generation costs	Each class’ % contribution to the single winter system peak. Winter months are October through May.	The class contribution to the system winter peak drives the winter portion of capacity-related <u>generation</u> costs.
D10T	Transmission plant costs	Weighted Class Contributions to Summer and Winter Peak loads. Allocator equals (D10W% plus (D10S% times 1.3649)) divided by (1 + 1.3649). The 1.3649 ratio is the ratio of the average summer and winter seasonal system peaks.	The driver for <u>transmission</u> costs is class contribution to the summer and winter system peaks. To reflect the fact that summer peaks have more impact, the summer peak contribution for each class is weighted by the ratio of average monthly summer and average monthly winter system peaks.
D10C	Capacity-related generation costs	Weighted of Class Contributions to Summer and Winter system peak loads. Allocator equals (D10W% plus (D10S% times 2.7846)) divided by (1 + 2.7846). The 2.7846 ratio is obtained from the average summer and winter season peak loads, after subtracting the average annual load from each monthly load.	Capacity- related <u>generation</u> costs are driven by class contribution to summer & winter system peaks. To reflect the fact that summer peaks have a disproportionate impact on capacity-related generation costs, the summer peak is weighted by the ratio of average monthly summer and winter system peaks, which are in excess of average annual demand.

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 16 of 20

Appendix 1: EXTERNAL ALLOCATORS – Descriptions and Applications

Code	Allocator For:	Derivation	Allocator Rationale
E8760	Energy-related portion of generation, nuclear fuel capital and generation step-up costs. Also allocator for fuel, purchased energy and energy-related fixed generation costs.	Class hourly energy (MWH) requirements multiplied by the corresponding hourly marginal energy cost.	The driver of these costs is energy requirements, which is measured by hourly energy requirements weighted by hourly marginal energy costs.

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 17 of 20

Appendix 2: INTERNAL ALLOCATORS – Descriptions and Applications

Internal Allocators are those that are determined from data generated within the Class Cost of Service Study (CCOSS). Below is a list of internal allocators that are used within the CCOSS.

Code	Allocator For:	Description	Allocator Rationale
C11P10	Expenses and labor related to customer assistance and instructional advertising	This allocator is the average of the Customer-related C11 allocator and the Production Plant investment P10 allocator.	Customer assistance and advertising expenses are driven by number of customers, and since most assistance pertains to helping customers reduce energy use, it affects production plant investment.
D57E43	Economic development expenses	<p>This allocator is based on the weighted average of the generation capacity and energy allocators. The weighting is based on an analysis of the fixed-cost-contribution margin of the General service tariff.</p> <p>$D57E43 = (\% \text{ Demand Impacts} \times D10C) + (\% \text{ Energy Impacts} \times E8760).$</p> <p>$\\$ \text{ Energy Impacts} = \text{kWh sales} \times (\text{Base Energy Charge} + \text{Fuel Costs} - \text{Marginal Energy Costs})$</p> <p>$\\$ \text{ Demand Impacts} = \text{Annual Billing kW} \times (((4 \times \text{Summer Demand Charge}) + (8 \times \text{Winter Demand Charge}))/12)$</p> <p>The demand portion is further split between Summer and Winter based on D10C; the energy portion is already split between on-peak and off-peak because E8760 is split that way.</p> <p>Total \$ Impacts = \$ Energy Impacts + \$ Demand Impacts</p>	Economic development program costs and benefits are assumed to be a function of the fixed cost (margin) contribution of the demand and energy charges that result from the ED program.
D40E60	CIP expenses	$D99E1 = (.99 \times D10C) + (.01 \times E8760).$	CIP program expenses are split between capacity and energy according to whether the purpose and result of program is to reduce peak load or energy requirements. In North Dakota, 99% of program impacts are demand-related. Once program costs are thus split, the standard capacity and energy allocators are applied to the separate pools of \$ expenses.

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 18 of 20

Appendix 2: INTERNAL ALLOCATORS – Descriptions and Applications

Code	Allocator For:	Description	Allocator Rationale
LABOR	Amortizations, Payroll Taxes and A&G Expenses that are labor related such as Salaries, Pension & Benefits, Injuries & Claims	Total Labor costs on Page 12 line 48 less A&G Labor on Page 12 line 46. A&G Labor is excluded to avoid a circular reference.	The specified expenses are directly related to Labor costs.
NEPIS	Property Insurance	Electric plant in service less accumulated provision for depreciation.	Property insurance is driven by net electric plant in service.
OXDTS	Distribution customer installation expenses and miscellaneous distribution expense	All Distribution O&M Expense, except Supervision and Engineering, Customer Install and Miscellaneous. Supervision and engineering expenses are excluded since they are an overhead expense. Customer installation expenses and miscellaneous distribution expense are excluded to avoid a circular reference. (lines 2 thru 7, 9 and 11 of page 8)	The OXDTS allocator represents the majority of Distribution O&M expenses (excl supervision and customer installation costs) which is a good indicator for miscellaneous distribution expenses.
OXTS	Selected administrative and general expenses such as Office Supplies, General Advertising, Contributions and maintenance of “General” plant	All O&M costs except Regulatory Expense and any A&G costs, which are the costs to be allocated on OXTS (lines 40 & 41 of page 7 and lines 12-15, 18-21, 32 and 33 of page 8). These A&G expenses are excluded to avoid circular references.	The OXTS allocator includes all O&M expenses except regulatory expense and those A&G items that are allocated with OXTS. Representing most O&M expenses, the OXTS allocator is appropriate for allocating A&G expenses.
P10	Interchange Production Capacity (i.e. fixed) inter-company Revenues. Rate base addition production-related materials and supplies	Total Production Plant: Original Plant in Service (line 6 of page 4)	Total production plant investment is closely associated with Interchange Agreement Capacity related revenues.
P10WoN	Interchange Production Capacity (i.e. fixed) inter-company costs	Total Production Plant less Nuclear Fuel: Original Plant in Service. Nuclear fuel is excluded since NSP Wisconsin does not have nuclear plants (Total Production Plant on line 6 of page 4 less Nuclear Fuel on line 5 of page 4)	Since Wisconsin does not have nuclear plants, Total production plant investment less nuclear fuel investment is a good indicator of Interchange Agreement Capacity related expenses.
P5161A	Used to allocate Step-up sub transmission labor costs	Total Generation Set-Up Transformer original plant in service: Tran Gener Step Up (line 9 of page 4) + Distrib Substn Step Up (line 14 of page 4)	Generation step-up plant investment drives step-up generation labor costs.
P61	Distribution Substation O&M expense and Distribution Substation labor	Distribution Plant: Substations Original Plant in Service (line 18, page 4)	Substation plant original investment drives Distribution Substation plant O&M costs and Distribution Substation Labor.

Northern States Power Company
Electric Utility - State of North Dakota

Case No. PU-12-____
Exhibit___(MAP-1), Schedule 2
Page 19 of 20

Appendix 2: INTERNAL ALLOCATORS – Descriptions and Applications

Code	Allocator For:	Derivation	Allocator Rationale
P68	All costs related to Distribution Plant “Line Transformers”	Distribution Plant: Line Transformers Original Plant in Service (line 37 of page 4)	Line transformer plant investment drives all line transformer costs.
P69	All costs related to Distribution Plant “Services”	Customer-Connection “Services” Original Plant in Service (line 40 of page 4)	Distribution “Services” plant investment drives all costs of “Services”.
P73	All costs related to Street Lighting	Street Lighting Original Plant in Service (line 42 of page 4)	Street Lighting plant investment drives all Street Lighting costs.
POL	All costs related to Overhead Distribution Lines including Rental costs and Distribution overhead line rent revenues	Distribution Plant: Overhead Lines Original Plant in Service (line 26 of page 4)	Overhead distribution line plant investment drives all costs related to Overhead Distribution Lines.
PT0	Working Cash	Total Real Estate & Property Taxes (line 50 of page 9)	Working Cash is closely related to Real Estate Taxes.
PTD	All costs related to General Plant and Electric Common Plant	Production + Transmission + Distribution Plant Original Plant Investment (lines 6, 13 and 43 of page 4)	Total investment in production, transmission and distribution plant is the best allocator for general and common plant.
PUL	All costs related to Underground Distribution Lines	Distribution Plant: Underground Lines Original Plant in Service (line 33 of page 4)	Underground distribution line plant investment drives all costs related to Underground Distribution Lines.
RTBASE	Income Tax Addition: Avoided tax interest	Total Rate Base (line 36 of page 6)	Total rate base drives avoided tax interest.
TD	Transmission and Distribution Materials and Supplies that are Rate Base Additions	Total Transmission and Distribution Original Plant in Service (Lines 13 and 43 of page 4)	Total Transmission and distribution plant investment drives investment in miscellaneous transmission and distribution materials and supplies
ZDTS	Supervision & Engineering and Customer Installation Distribution Labor	All Distribution Labor except Supervision and Engineering and Customer Installation. These items are excluded to avoid a circular reference. (All of lines 33 thru 42 on page 12, except lines 33 and 40)	Distribution labor (excluding Supervision & Engineering) drives Supervision and Engineering and Customer Installation Labor.

Appendix 3: CCOSS Customer Classes Vs. Tariff Cross Reference

A. Summary Customer Classes

	Customer Class	Rate Codes	Voltage Specifications
1	Residential	D01, D02, D03, D04, D05 (if residential), D10 (if residential)	
2	Commercial Not Demand Metered	D05 (if C&I), D10 (if C&I), D12, D14, D15, D18, D19, D34, D40, D42	
3	C&I Secondary Voltage	D16, D17, D20, D21, D22, D41, D62, D63	Secondary
4	C&I Primary Voltage	D16, D17, D20, D21, D22, D41, D62, D63	Primary
5	Street Lighting	D11, D30, D31, D32, D33	

B. Detailed Customer Sub-Classes

	Customer Class	Rate Codes	kW Size	Voltage Specifications
1	Residential without Space Heating	D01, D02, D03, D04		
2	Residential with Space Heating	D01, D02, D03, D04		
3	Load Management	D05, D10		
4	Small Commercial Not Demand Metered	D12, D14, D15, D18, D19, D34,		
5	Small C&I Secondary Voltage	D16, D17, D62	< 1,000 kW	Secondary
6	Small C&I Primary Voltage	D16, D17, D62	< 1,000 kW	Primary
7	Large C&I Secondary Voltage	D16, D17, D62	> 1,000 kW	Secondary
8	Large C&I Primary Voltage	D16, D17, D62	> 1,000 kW	Primary
9	Interruptible All Voltages	D20, D21, D22, D63	All sizes	All Voltages
10	Municipal not Demand Metered	D40, D42		
11	Municipal Demand Metered	D41		
12	Auto Protective Lighting	D11		
13	Street Lighting – Company Owned	D30		
14	Street Lighting – Customer Owned	D31, D32, D33		