

November 14, 2016

Executive Secretary
North Dakota Public Service Commission
State Capitol Building
Bismarck, ND 58505-0480

Re: Application and Notice of Change
in Electric Rates
Case No. PU-16-666

Enclosed please find twelve (12) copies of Montana-Dakota Utilities Co.'s workpapers supporting Statement M in the above referenced docket to include with the workpapers that were filed on November 3, 2016.

Please acknowledge receipt by stamping or initialing the duplicate copy of this letter attached hereto and returning the same in the enclosed self-addressed, stamped envelope.

Sincerely,



Tamie A. Aberle
Director of Regulatory Affairs

Attachments
cc: K. Liepitz

**MONTANA-DAKOTA UTILITIES CO.
FILED WORKPAPERS
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Class Cost of Service Study

**MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Embedded Class Cost of Service Study**

**Plant in Service
(000's)**

| | Projected 2017 |
|----------------------------------|--------------------|
| Electric Plant in Service | |
| Production Plant | 458,444 |
| Wind Production Plant | 0 |
| Total Production Plant | 458,444 |
| Transmission Plant | 210,983 |
| Distribution Plant | |
| Land | 2,482 |
| Rights of Way | 164 |
| Station Equipment | 54,034 |
| Poles, Towers, & Fixtures | 22,236 |
| Overhead Conductors & Device | 19,210 |
| Underground Conduit | 183 |
| Underground Conductor & Device | 84,901 |
| Line Transformers | 49,650 |
| Services | 22,690 |
| Meters | 12,223 |
| Installation on Customer Premise | 1,303 |
| Street Light & Signal System | 4,397 |
| Distribution Plant | 273,473 |
| General Plant | 21,576 |
| Intangible Plant - General | 4,314 |
| Common Plant | 34,047 |
| Intangible Plant - Common | 10,669 |
| Intangible Plant - Common - CC&B | 6,867 |
| Acquisition Adjustment | 7,500 |
| Total Electric Plant | \$1,027,873 |

M2

MONTANA-DAKOTA UTILITIES CO.
 ELECTRIC UTILITY - NORTH DAKOTA
 CLASS COST OF SERVICE STUDY
 2017 PROJECTED PLANT
 DISTRIBUTION PLANT ALLOCATION
 (000's)

| | Total | Allocation |
|-------------------------------------|-----------|---|
| Land | \$2,482 | Factor No. 4 |
| Land Rights | 164 | Factor No. 4 |
| Station Equipment | 54,034 | Factor No. 4 |
| Poles, OH & UG Conductors & Conduit | 126,530 | |
| 57.50% Customer Related | 72,755 | Factor No. 7 |
| 42.50% Demand Related | 53,775 | Factor No. 4 |
| Line Transformers | 49,650 | |
| 69.45% Customer Related | 34,482 | Factor No. 11 |
| 30.55% Demand Related | 15,168 | Factor No. 5 |
| Services | 22,690 | Factor No. 10 |
| Meters | 12,223 | Factor No. 8 |
| Installation on Customer Premise | 1,303 | Direct to Private Lighting Direct |
| Street Light & Signal System | 4,397 | Direct to Municipal Owned St. Lighting Direct |
| Total Distribution Plant | \$273,473 | |

M3

**MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Embedded Class Cost of Service Study**

**Accumulated Reserve for Depreciation
(000's)**

| | Project 2017 |
|--------------------------------------|------------------|
| Accumulated Reserve for Depreciation | |
| Production Plant | 189,003 |
| Wind Production Plant | 0 |
| Total Production Plant | 189,003 |
| Transmission Plant | 67,877 |
| Distribution Plant | |
| Rights of Way | 123 |
| Station Equipment | 13,283 |
| Poles, Towers, & Fixtures | 10,270 |
| Overhead Conductors & Device | 8,076 |
| Underground Conduit | 84 |
| Underground Conductor & Device | 18,994 |
| Line Transformers | 16,036 |
| Services | 13,914 |
| Meters | 217 |
| Installation on Customer Premise | 600 |
| Street Light & Signal System | 2,224 |
| Distribution Plant | 83,821 |
| General Plant | 7,908 |
| Intangible Plant - General | 1,725 |
| Common Plant | 12,391 |
| Intangible Plant - Common | 7,131 |
| Intangible Plant - Common - CC&B | 1,776 |
| Acquisition Adjustment | 7,499 |
| Total Accumulated Reserve | \$379,131 |

M4

North Dakota Distribution Percentages

Updated: 9/13/2016

| 2016 Plant Account | Minimum System | Normal System | Customer Component |
|---------------------------------|-----------------|------------------|--------------------|
| Pole (Acct 364) ~ | \$14,924 | \$23,723 | 62.9% |
| Overhead Conductor (Acct 365) * | \$7,244 | \$14,083 | 51.4% |
| Total | \$22,168 | \$37,806 | 58.6% |
| | | | |
| URD Conductor (Accl. 367 & 366) | \$38,578 | \$67,843 | 56.9% |
| Weighted Average | \$60,746 | \$105,649 | 57.50% |

Notes:

- Distribution System values are obtained from the spreadsheet:
ND_URD_OH_MIN_Normal_2015.xlsx OH_MIN; OH_Norm; URD_MIN; URD_Norm tabs
- * The primary voltage percentages equal the secondary voltage percentages for all three plant accounts.

Customer Component - as a % of Entire Investment

Conductor

| | Linear Feet | Total Conductor Feet |
|---|-------------------|----------------------|
| Underground Primary | 4,609,810 | 8,831,717 |
| Overhead Primary | 7,060,918 | 16,468,441 |
| Overhead Neutral | 5,625,781 | 5,625,781 |
| Primary Total | 17,296,509 | 30,925,938 |
| Underground Secondary | 1,013,452 | 1,060,708 |
| Overhead Secondary | 3,088,517 | 4,676,679 |
| Secondary Total | 4,101,969 | 5,737,387 |
| Percentage of Primary & Secondary Conductors | | |
| Primary | 80.83% | 84.35% |
| Secondary | 19.17% | 15.65% |

Notes:

- Linear Footage considers 3-phase lines the same footage as 1-phase lines of the same span length.
- Total Primary Conductor Footage multiplies the linear footage by the number of phases and includes the neutral
- Overhead Secondary includes the neutral.
- Per Rebecca Naslund (1/30/09) Secondary footages do not include services or footage to yard lights. They do include secondary footage for streetlights.

| | PRIMARY CONDUCTORS | | | | | Circuit Count * | Customer Count ** |
|-------------------|-------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------|-------------------|
| | Recap Data | | GIS Data | | | | |
| ND | Primary + Neu OHD (Conductor Miles) | Primary URD (Conductor Miles) | Primary OHD (Conductor Miles) | Neutral OHD (Conductor Miles) | Primary URD (Conductor Miles) | | |
| North Dakota | 5222 | 1663 | 3,119 | 1,065 | 1,673 | 372 | 91591 |
| Difference | 1,037 | -10 | | | | | |

Notes:

- Recap data is pulled from the previous year and slight differences should exist
- OHD conductor miles on the Recap data pulls in the neutral footage plus the OH Service footag. GIS query does not.
- GIS query data pulled 6/13/2016
- ** Data is from the file: 2015 Outage Data.xlsx "IndicesDistrict" tabs for 2015 GIS Customer Connection - 98133

| | TRANSFORMERS | | | | | |
|---------------|---------------|------------------|---------------|------------------|------------|----------------|
| | GIS | | Recap | | Difference | |
| | Count | KVA | Count | KVA | Count | KVA |
| Padmount | 8,458 | 656,813 | 8,541 | 756,615 | -83 | -99,803 |
| Pole Type | 12,968 | 400,049 | 12,963 | 398,519 | 5 | 1,530 |
| Totals | 21,426 | 1,056,862 | 21,504 | 1,155,134 | -78 | -98,273 |

Notes:

- Transformer GIS data pulled 6/11/2016
- Recap data from 12/31/2015 (Recap data includes the sum of the data from City Limits and Farm Line totals)

| ND | MDU Poles (All Poles) |
|-------------------|-----------------------|
| GIS North Dakota | 49,468 |
| Recap | 49,520 |
| Difference | 52 |

| GIS Primary and Secondary Conduit Footage (Feet) | |
|--|----------------|
| TOTAL | 158,820 |

Notes:

The total is all of the conduit in the North Dakota that is captured in GIS. This includes Primary Underground, Secondary Underground, Street Light Underground, etc.

| Pole Percentages | |
|------------------|--------|
| Primary Poles | 87.25% |
| Secondary Poles | 12.75% |

Notes:

- Poles associated with Transmission voltages are not counted in the primary poles percentages
- Streetlight and yard light poles are not counted in the secondary poles percentages. Transmission underbuild and service poles are not counted for poles.

MS

Project: Minimum Mile of OHD Single-Phase Line

| <u>Construction:</u> | <u>Item</u> | <u>Units</u> | <u>Quantity</u> | <u>Cost/Each</u> | <u>Amount</u> | <u>Pole</u> |
|--|-------------------------|--------------|-----------------|------------------------------------|-----------------|-----------------|
| 1) Total Material | Non-Exempt | | | | \$9,671 | \$7,335 |
| | Exempt | | | | \$877 | \$37 |
| | | | | Total = | \$10,548 | \$7,371 |
| 2) Direct Labor | | | | | | |
| | Line Crew Average | Hours | 88 | \$40.04 | \$3,523 | \$2,290 |
| | Engineering | Hours | 15 | \$42.97 | \$645 | \$419 |
| (Assistant for Survey) | Engineering Associate | Hours | 7 | \$29.94 | \$210 | \$136 |
| | Construction Supervisor | Hours | 5 | \$34.61 | \$173 | \$112 |
| | Drafting | Hours | 2 | \$23.85 | \$48 | \$31 |
| | | | | Total Labor = | \$4,598 | \$2,989 |
| 2a) Labor Loading | | | | Payroll Loading = | \$2,299 | \$1,494 |
| 50.00% | | | | Total Labor with Loading = | \$6,897 | \$4,483 |
| 3) Contract Charge | | | | | | |
| | Directional Boring | Ft | 0 | \$14.15 | \$0 | \$0 |
| | Crossings | each | 0 | \$53.00 | \$0 | \$0 |
| | Dig Splice Pits | each | 0 | \$8.00 | \$0 | \$0 |
| | Hand Labor | Hr | 0 | \$53.00 | \$0 | \$0 |
| | Trenching | Ft | 0 | \$3.03 | \$0 | \$0 |
| | | | | Total = | \$0 | \$0 |
| 4) Transportation & Equipment | | | | | | |
| | 42 Line Truck | Hours | 27 | \$40.00 | \$1,080 | \$702 |
| | 18 Crew Pickup | Miles | 110 | \$0.75 | \$83 | \$54 |
| | 5 Engineering Car | Miles | 45 | \$0.30 | \$14 | \$9 |
| | 43 Man Lift Truck | Hours | 14 | \$45.00 | \$630 | \$410 |
| | | | | Total = | \$1,806 | \$1,174 |
| 5) Subtotal | | | | Subtotal = | \$19,251 | \$13,028 |
| 6) ES & GA | ES | 13.75% | | | \$2,647 | \$1,721 |
| | GA | 1.40% | | | \$270 | \$175 |
| | | 15.15% | | Total = | \$2,917 | \$1,896 |
| 7) Project Total | | | | Subtotal w/o Loadings = | \$16,952 | \$11,534 |
| | | | | Grand Total with Loadings = | \$22,168 | \$14,924 |

ML

Project: Normal Mile of OHD Single-Phase Line

| <u>Construction:</u> | <u>Item</u> | <u>Units</u> | <u>Quantity</u> | <u>Cost/Each</u> | <u>Amount</u> | <u>Pole</u> |
|--|-------------------------|--------------|-----------------|------------------------------------|-----------------|-----------------|
| 1) Total Material | Non-Exempt | | | | \$16,810 | \$10,046.93 |
| | Exempt | | | | \$2,496 | \$422.90 |
| | | | | Total = | \$19,306 | \$10,470 |
| 2) Direct Labor | | | | | | |
| | Line Crew Average | Hours | 160 | \$40.04 | \$6,406 | \$4,163.88 |
| | Engineering | Hours | 16 | \$42.97 | \$687 | \$446.87 |
| (Assistant for Survey) | Engineering Associate | Hours | 8 | \$29.94 | \$240 | \$155.69 |
| | Construction Supervisor | Hours | 8 | \$34.61 | \$277 | \$179.96 |
| | Drafting | Hours | 2 | \$23.85 | \$48 | \$31.00 |
| | | | | Total Labor = | \$7,658 | \$4,977 |
| 2a) Labor Loading | | | | Payroll Loading = | \$3,829 | \$3,829 |
| 50.00% | | | | Total Labor with Loading = | \$11,486 | \$8,806 |
| 3) Contract Charge | | | | | | |
| | Directional Boring | Ft | 0 | \$14.15 | \$0 | \$0.00 |
| | Crossings | each | 0 | \$53.00 | \$0 | \$0.00 |
| | Dig Splice Pits | each | 0 | \$8.00 | \$0 | \$0.00 |
| | Hand Labor | Hr | 0 | \$53.00 | \$0 | \$0.00 |
| | Trenching | Ft | 0 | \$3.03 | \$0 | \$0.00 |
| | | | | Total = | \$0 | \$0 |
| 4) Transportation & Equipment | | | | | | |
| | 42 Line Truck | Hours | 30 | \$40.00 | \$1,200 | \$780.00 |
| | 18 Crew Pickup | Miles | 200 | \$0.75 | \$150 | \$97.50 |
| | 5 Engineering Car | Miles | 50 | \$0.30 | \$15 | \$9.75 |
| | 43 Man Lift Truck | Hours | 15 | \$45.00 | \$675 | \$438.75 |
| | | | | Total = | \$2,040 | \$1,326 |
| 5) Subtotal | | | | Subtotal = | \$32,832 | \$20,602 |
| 6) ES & GA | ES | | 13.75% | | \$4,514 | \$2,833 |
| | GA | | 1.40% | | \$460 | \$288 |
| | | | 15.15% | Total = | \$4,974 | \$3,121 |
| 7) Project Total | | | | Subtotal w/o Loadings = | \$29,003 | \$16,773 |
| | | | | Grand Total with Loadings = | \$37,806 | \$23,723 |

M7

Project: Minimum Mile of URD Single-Phase Line

| <u>Construction:</u> | | <u>Item</u> | <u>Units</u> | <u>Quantity</u> | <u>Cost/Each</u> | <u>Amount</u> |
|-------------------------------|------------------------|-------------------------|--------------|-----------------|------------------------------------|-----------------|
| 1) Total Material | | Non-Exempt | | | | \$12,867 |
| | | Exempt | | | | \$72 |
| | | | | | Total = | \$12,938 |
| | | | | | | |
| 2) Direct Labor | | Line Crew Average | Hours | 38 | \$40.04 | \$1,521 |
| | | Engineering | Hours | 7 | \$42.97 | \$301 |
| | (Assistant for Survey) | Engineering Associate | Hours | 0 | \$29.94 | \$0 |
| | | Construction Supervisor | Hours | 5 | \$34.61 | \$173 |
| | | Drafting | Hours | 1 | \$23.85 | \$24 |
| | | | | | Total Labor = | \$2,019 |
| 2a) Labor Loading | | | | | Payroll Loading = | \$1,010 |
| | 50.00% | | | | Total Labor with Loading = | \$3,029 |
| | | | | | | |
| 3) Contract Charge | | Directional Boring | Ft | 100 | \$11.45 | \$1,145 |
| | | Crossings | each | 0 | \$53.00 | \$0 |
| | | Dig Splice Pits | each | 0 | \$8.00 | \$0 |
| | | Hand Labor | Hr | 0 | \$53.00 | \$0 |
| | | Trenching | Ft | 5280 | \$3.03 | \$15,998 |
| | | | | | Total = | \$17,143 |
| | | | | | | |
| 4) Transportation & Equipment | | 42 Line Truck | Hours | 8 | \$40.00 | \$320 |
| | | 18 Crew Pickup | Miles | 80 | \$0.75 | \$60 |
| | | 5 Engineering Car | Miles | 40 | \$0.30 | \$12 |
| | | 43 Man Lift Truck | Hours | 0 | \$45.00 | \$0 |
| | | | | | Total = | \$392 |
| | | | | | | |
| 5) Subtotal | | | | | Subtotal = | \$33,502 |
| | | | | | | |
| 6) ES & GA | | ES | | 13.75% | | \$4,607 |
| | | GA | | 1.40% | | \$469 |
| | | | | 15.15% | Total = | \$5,076 |
| | | | | | | |
| 7) Project Total | | | | | Subtotal w/o Loadings = | \$32,493 |
| | | | | | Grand Total with Loadings = | \$38,578 |

M8

Project: Normal Mile of URD Single-Phase Line

| <u>Construction:</u> | <u>Item</u> | <u>Units</u> | <u>Quantity</u> | <u>Cost/Each</u> | <u>Amount</u> |
|--|-------------------------|--------------|-----------------|------------------------------------|-----------------|
| 1) Total Material | Non-Exempt | | | | \$37,438 |
| | Exempt | | | | \$130 |
| | | | | Total = | \$37,569 |
| 2) Direct Labor | | | | | |
| | Line Crew Average | Hours | 46 | \$40.04 | \$1,842 |
| | Engineering | Hours | 8 | \$42.97 | \$344 |
| (Assistant for Survey) | Engineering Associate | Hours | 0 | \$29.94 | \$0 |
| | Construction Supervisor | Hours | 6 | \$34.61 | \$208 |
| | Drafting | Hours | 1 | \$23.85 | \$24 |
| | | | | Total Labor = | \$2,417 |
| 2a) Labor Loading | | | | Payroll Loading = | \$1,208 |
| 50.00% | | | | Total Labor with Loading = | \$3,625 |
| 3) Contract Charge | | | | | |
| | Directional Boring | Ft | 100 | \$14.15 | \$1,415 |
| | Crossings | each | 0 | \$53.00 | \$0 |
| | Dig Splice Pits | each | 2 | \$8.00 | \$16 |
| | Hand Labor | Hr | 2 | \$53.00 | \$106 |
| | Trenching | Ft | 5180 | \$3.03 | \$15,695 |
| | | | | Total = | \$17,232 |
| 4) Transportation & Equipment | | | | | |
| | 42 Line Truck | Hours | 10 | \$40.00 | \$400 |
| | 18 Crew Pickup | Miles | 100 | \$0.75 | \$75 |
| | 5 Engineering Car | Miles | 50 | \$0.30 | \$15 |
| | 43 Man Lift Truck | Hours | 0 | \$45.00 | \$0 |
| | | | | Total = | \$490 |
| 5) Subtotal | | | | Subtotal = | \$58,917 |
| 6) ES & GA | ES | | 13.75% | | \$8,101 |
| | GA | | 1.40% | | \$825 |
| | | | 15.15% | Total = | \$8,926 |
| 7) Project Total | | | | Subtotal w/o Loadings = | \$57,708 |
| | | | | Grand Total with Loadings = | \$67,843 |

M9

TRANSFORMERS & CAPACITORS - INSTALLATION COSTS FOR 2015

(Estimated ES & GA Rate = 18%)

Cost Last Update: 2/9/2016

Last Update:

8/31/2016

| PUN | Transformers - Acct. 368 Description | Estimated Purchase Cost | Estimated Installed Cost | Total Cost | Total Cost with ES & GA | KVA Size | Counts in ND | Replacement Cost | 0-Intercept Values | |
|------|---|----------------------------|-----------------------------|---------------|----------------------------|----------|---|---------------------|---|--|
| 0030 | 3Ø PADMOUNT TRANSFORMER 30KVA | | \$550 | \$550 | \$649 | | | | 3-Phase PAD Xfmr Zero Intercept | |
| 0045 | 3Ø PADMOUNT TRANSFORMER 45KVA | \$4,630 | \$550 | \$5,180 | \$6,112 | 45 | 127 | \$776,274.80 | \$8,819 | |
| 0075 | 3Ø PADMOUNT TRANSFORMER 75KVA | \$4,990 | \$550 | \$5,540 | \$6,537 | 75 | 343 | \$2,242,259.60 | 0-Intercept Total Replacement Cost | |
| 0112 | 3Ø PADMOUNT TRANSFORMER 112.5KVA | \$5,790 | \$550 | \$6,340 | \$7,481 | 112.5 | 238 | \$1,760,525.60 | \$12,990,802.68 | |
| 0150 | 3Ø PADMOUNT TRANSFORMER 150KVA | \$6,370 | \$550 | \$6,920 | \$8,166 | 150 | 400 | \$3,266,240.00 | For Three Phase xfmr Zero Intercept use 45, 75, 112.5, 225, 300, 500, 750, 1000, 1500k, and 2000 VA sizes | |
| 0225 | 3Ø PADMOUNT TRANSFORMER 225KVA | \$7,620 | \$755 | \$8,375 | \$9,883 | 225 | 216 | \$2,134,620.00 | | |
| 0300 | 3Ø PADMOUNT TRANSFORMER 300KVA | \$8,530 | \$755 | \$9,285 | \$10,956 | 300 | 258 | \$2,826,725.40 | | |
| 0500 | 3Ø PADMOUNT TRANSFORMER 500KVA | \$11,590 | \$1,465 | \$13,055 | \$15,405 | 500 | 179 | \$2,757,477.10 | | |
| 0750 | 3Ø PADMOUNT TRANSFORMER 750KVA | \$14,870 | \$1,565 | \$16,435 | \$19,393 | 750 | 71 | \$1,376,924.30 | | |
| 1000 | 3Ø PADMOUNT TRANSFORMER 1000KVA | \$17,300 | \$1,665 | \$18,965 | \$22,379 | 1000 | 44 | \$984,662.80 | | |
| 1500 | 3Ø PADMOUNT TRANSFORMER 1500KVA | \$20,620 | \$1,865 | \$22,485 | \$26,532 | 1500 | 17 | \$451,049.10 | | |
| 2000 | 3Ø PADMOUNT TRANSFORMER 2000KVA | \$24,840 | \$2,165 | \$27,005 | \$31,866 | 2000 | 12 | \$382,390.80 | 0-Intercept/Real Replacement Cost Ratio | |
| 2500 | 3Ø PADMOUNT TRANSFORMER 2500KVA | | | | | | | | 0.68 | |
| | | | | | | | TOTAL 3Ø PADMOUNT TRANSFORMER IN ND | 1905 | | |
| | | | | | | | TOTAL REPLACEMENT COST - 3Ø PADMOUNT TRANSFORMER IN ND | | \$18,979,149.50 | |

| PUN | Transformers - Acct. 368 Description | Estimated Purchase Cost | Estimated Installed Cost | Total Cost | Total Cost with ES & GA | KVA Size | Counts in ND | Replacement Cost | 0-Intercept Values | |
|------|---|----------------------------|-----------------------------|---------------|----------------------------|----------|---|---------------------|--|---|
| 4010 | 1Ø PADMOUNT TRANSFORMER 10KVA | \$0 | \$445 | \$445 | \$525 | 10 | | | 1-Phase PAD Xfmr Zero Intercept | |
| 4015 | 1Ø PADMOUNT TRANSFORMER 15KVA | \$1,060 | \$445 | \$1,505 | \$1,776 | 15 | 404 | \$717,464 | \$1,487 | |
| 4025 | 1Ø PADMOUNT TRANSFORMER 25KVA | \$1,180 | \$445 | \$1,625 | \$1,918 | 25 | 3017 | \$5,785,097.50 | 0-Intercept Total Replacement Cost | |
| 4050 | 1Ø PADMOUNT TRANSFORMER 50KVA | \$1,390 | \$450 | \$1,840 | \$2,171 | 50 | 2313 | \$5,021,985.60 | \$9,326,666.40 | |
| 4075 | 1Ø PADMOUNT TRANSFORMER 75KVA | \$1,820 | \$460 | \$2,280 | \$2,690 | 75 | 358 | \$963,163.20 | For Single Phase xfmr use 25, 50, and 75 KVA sizes | |
| 4100 | 1Ø PADMOUNT TRANSFORMER 100KVA | \$2,180 | \$465 | \$2,645 | \$3,121 | 100 | 181 | \$564,919.10 | | |
| 4167 | 1Ø PADMOUNT TRANSFORMER 167KVA | \$2,970 | \$475 | \$3,445 | \$4,065 | 167 | | | | |
| | | | | | | | TOTAL 1Ø PADMOUNT TRANSFORMER IN ND | 6273 | | 0-Intercept/Real Replacement Cost Ratio |
| | | | | | | | TOTAL REPLACEMENT COST - 1Ø PADMOUNT TRANSFORMER IN ND | | \$13,052,629.00 | 0.71 |

M10

| PUN | Transformers - Acct. 368 Description | Estimated Purchase Cost | Estimated Installed Cost | Total Cost | Total Cost with ES & GA | KVA Size | Counts in ND | Replacement Cost | 0-Intercept Values |
|------|---|----------------------------|-----------------------------|---------------|----------------------------|----------|--|---------------------|---|
| 5003 | LINE TRANSFORMER 3KVA | | | \$0 | \$0 | | | | 1-Phase Line Xfmr Zero Intercept |
| 5005 | LINE TRANSFORMER 5KVA | | | \$0 | \$0 | | | | \$1,473 |
| 5007 | LINE TRANSFORMER 7.5KVA | | | \$0 | \$0 | | | | 0-Intercept Total Replacement Cost |
| 5010 | LINE TRANSFORMER 10KVA | \$620 | \$855 | \$1,475 | \$1,741 | 10 | 1686 | \$2,934,483 | \$18,078,538.10 |
| 5015 | LINE TRANSFORMER 15KVA | \$730 | \$855 | \$1,585 | \$1,870 | 15 | 2243 | \$4,195,083 | |
| 5025 | LINE TRANSFORMER 25KVA | \$880 | \$855 | \$1,735 | \$2,047 | 25 | 4571 | \$9,358,208 | |
| 5050 | LINE TRANSFORMER 50KVA | \$1,200 | \$875 | \$2,075 | \$2,449 | 50 | 3278 | \$8,026,183 | For Single Phase xfmr's use , 25, 50, and 75, KVA sizes |
| 5075 | LINE TRANSFORMER 75KVA | \$1,760 | \$875 | \$2,635 | \$3,109 | 75 | 301 | \$935,899 | |
| 5100 | LINE TRANSFORMER 100KVA | \$2,110 | \$895 | \$3,005 | \$3,546 | 100 | 194 | \$687,905 | |
| 5167 | LINE TRANSFORMER 167KVA | | | | | 167 | | | |
| 5250 | LINE TRANSFORMER 250KVA | | | | | | | | 0-Intercept/Real Replacement Cost Ratio |
| 5333 | LINE TRANSFORMER 333KVA | | | | | | | | 0.69 |
| 5500 | LINE TRANSFORMER 500KVA | | | | | | | | |
| 5833 | LINE TRANSFORMER 833KVA | | | | | | | | |
| | | | | | | | TOTAL 1Ø LINE TRANSFORMER IN ND | 12273 | |
| | | | | | | | TOTAL REPLACEMENT COST - 1Ø LINE TRANSFORMER IN ND | | \$26,137,761.10 |

| PUN | Capacitors - Acct. 368 Description | Estimated Purchase Cost | Estimated Installed Cost | Total Cost | Total Cost with ES & GA |
|------|---------------------------------------|----------------------------|-----------------------------|---------------|----------------------------|
| 7025 | SINGLE PHASE CAPACITOR 25 KVAR | \$447 | \$575 | \$1,022 | \$1,206 |
| 7050 | SINGLE PHASE CAPACITOR 50 KVAR | \$895 | \$575 | \$1,470 | \$1,734 |
| 7100 | SINGLE PHASE CAPACITOR 100 KVAR | \$1,789 | \$575 | \$2,364 | \$2,790 |
| 8300 | THREE PHASE CAPACITOR 300 KVAR | \$5,368 | \$1,545 | \$6,913 | \$8,157 |

Notes:

Capacitors quoted June 9, 2008 (BSE). Estimate yearly increase of 3% for inflation.

Data provided is from the Xfmr_Capacitor_Costs.xlsx spreadsheet "Installation" tab
In the Installation_Estimating Folder

| SUMMARY | | TRANSFORMER VALUATION | | | |
|--|---------------|----------------------------|----------------------------|---------------------|--------------|
| | | 3Ø PADMOUNT TRANSFORMER | 1Ø PADMOUNT TRANSFORMER | LINE TRANSFORMER | TOTAL |
| Perform Z1 regressions on each group's transformers to be purchased in future. | Z1-Repl. Cost | \$12,990,803 | \$9,326,696 | \$18,078,538 | \$40,396,037 |
| Multiply intercept by replacement value of that group's units. | Total | \$18,979,149.50 | \$13,052,629 | \$26,137,761 | \$58,169,540 |
| Add customer-related values and total replacement costs across groups. | Cust share | 68.45% | 71.45% | 69.17% | 69.45% |
| Divide customer-related cost by total replacement cost of all units. | | | | | |

M

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY
NORTH DAKOTA
Embedded Class Cost of Service Study
Summary Sheet-Projected 2017
(000's)

| | Total North Dakota | Total Residential | Total Small General | Total Large General | Total Lighting | Total Municipal Pumping |
|-------------------------------------|-----------------------|----------------------|---------------------------|---------------------------|-------------------|-------------------------------|
| Operating Revenues | | | | | | |
| Sales Revenues | 182,637 | 73,955 | 12,793 | 90,801 | 2,316 | 2,772 |
| Other Revenues | 3,671 | 1,582 | 218 | 977 | 854 | 40 |
| Total Operating Revenues | 186,308 | 75,537 | 13,011 | 91,778 | 3,170 | 2,812 |
| Operating Expense | | | | | | |
| Cost of Fuel and Purchased Power | 54,166 | 20,856 | 3,188 | 28,366 | 714 | 1,042 |
| Other O&M Expense | 55,419 | 27,038 | 4,414 | 22,251 | 857 | 859 |
| Total O&M Expense | 109,585 | 47,894 | 7,602 | 50,617 | 1,571 | 1,901 |
| Depreciation Expense | 26,861 | 12,547 | 2,019 | 11,498 | 358 | 439 |
| Taxes Other Than Income Taxes | 7,041 | 3,325 | 541 | 2,958 | 104 | 113 |
| Current Income Taxes - Fed. & State | 11,188 | 2,118 | 697 | 7,954 | 366 | 53 |
| Total Operating Expenses | 154,675 | 65,884 | 10,859 | 73,027 | 2,399 | 2,506 |
| Projected Operating Income | 31,633 | 9,653 | 2,152 | 18,751 | 771 | 306 |
| Rate Base | 541,766 | 252,851 | 41,166 | 231,901 | 6,883 | 8,965 |
| Projected Rate of Return | 5.839% | 3.818% | 5.228% | 8.086% | 11.202% | 3.413% |

MRZ

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
EMBEDDED CLASS COST OF SERVICE STUDY
ALLOCATION FACTORS
PROJECTED 2017

| Rate | Customer Class | Factor No. 1 | Factor No. 2 | Factor No. 3 | Factor No. 4 | Factor No. 5 | Factor No. 6 | Factor No. 7 | Factor No. 8 | Factor No. 10 | Factor No. 11 | Factor No. 12 |
|------|---|---------------------------|--------------|----------------|--------------|---------------------------|-----------------|------------------------------|--------------------------|----------------------------|--------------------------------|----------------------------|
| | | Energy @ Generation Level | 12 CP @ Gen | Demand/ Energy | NCP KW @ Gen | NCP KW @ Supply Secondary | Total Customers | Total Customers Less Rate 52 | Weighted Customer Meters | Weighted Customer Services | Weighted Customer Transformers | Weighted Customer Accounts |
| 10 | Residential Electric Service | 830,448,274 | 150,464 | 664,390,712 | 248,019 | 218,764 | 79,355 | 79,355 | 82,163 | 82,163 | 79,355 | 79,355 |
| 20 | Small General Electric Service | 121,211,954 | 23,382 | 96,974,240 | 32,234 | 28,432 | 11,063 | 11,063 | 18,727 | 12,763 | 33,632 | 12,833 |
| 25 | Irrigation Power Service | 1,364,801 | 101 | 1,091,861 | 1,761 | 1,553 | 45 | 45 | 213 | 103 | 909 | 94 |
| 30 | Large General Service - Primary | 208,731,047 | 30,332 | 166,990,904 | 54,649 | 0 | 40 | 40 | 2,776 | 0 | 0 | 119 |
| | Large General Service - Secondary | 814,338,054 | 141,488 | 651,498,741 | 197,016 | 173,777 | 4,113 | 4,113 | 30,090 | 9,284 | 49,644 | 9,378 |
| | Space Heating - Billed @ Rate 30 | | 0 | 0 | 0 | 0 | | | | | | |
| | Total Large General Service - Secondary | 814,338,054 | 141,488 | 651,498,741 | 197,016 | 173,777 | 4,113 | 4,113 | 30,090 | 9,284 | 49,644 | 9,378 |
| | Total Large General Service | 1,023,069,101 | 171,820 | 818,489,645 | 251,665 | 173,777 | 4,153 | 4,153 | 32,866 | 9,284 | 49,644 | 9,497 |
| | Contracts - Primary | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31 | TOD Large General Service Primary | 2,218,830 | 322 | 1,775,129 | 706 | 0 | 1 | 1 | 69 | 0 | 0 | 6 |
| 31 | TOD Large General Service Secondary | 19,060,645 | 3,312 | 15,249,178 | 4,611 | 4,067 | 56 | 56 | 702 | 282 | 740 | 236 |
| 32 | Space Heating - Secondary 1/ | 60,259,122 | 7,547 | 48,208,807 | 20,653 | 18,217 | 35 | 35 | 3,384 | 0 | 0 | 2,492 |
| | TOTAL LARGE GENERAL | 1,104,607,698 | 183,002 | 883,722,759 | 277,635 | 196,061 | 4,245 | 4,245 | 37,021 | 9,566 | 50,384 | 12,231 |
| 40 | Small Municipal Electric Service | 4,390,629 | 782 | 3,512,660 | 1,284 | 1,132 | 278 | 278 | 595 | 299 | 1,485 | 317 |
| 41 | Municipal Lighting - Primary | 1,832,854 | 126 | 1,466,308 | 682 | 0 | 49 | 49 | 49 | 0 | 0 | 49 |
| | Municipal Lighting - Secondary | 19,526,235 | 1,254 | 15,621,239 | 9,306 | 8,208 | 356 | 356 | 398 | 613 | 1,182 | 490 |
| | TOTAL MUNICIPAL LIGHTING | 21,359,089 | 1,380 | 17,087,547 | 9,988 | 8,208 | 405 | 405 | 447 | 613 | 1,182 | 539 |
| 48 | Municipal Pumping - Primary | 14,814,237 | 2,264 | 11,851,843 | 5,349 | 0 | 4 | 4 | 347 | 0 | 0 | 17 |
| | Municipal Pumping - Secondary | 27,110,734 | 4,186 | 21,689,424 | 9,839 | 8,679 | 283 | 283 | 1,361 | 476 | 3,130 | 495 |
| | TOTAL MUNICIPAL PUMPING | 41,924,971 | 6,450 | 33,541,267 | 15,189 | 8,679 | 287 | 287 | 1,708 | 476 | 3,130 | 512 |
| 52 | Outdoor Lighting | 8,010,924 | 822 | 6,408,904 | 2,839 | 2,500 | 151 | 0 | 281 | 247 | 0 | 2,319 |
| 39 | Interruptible Power Service | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 38 | IT Demand Response - 381 | | | | | 0 | 2 | 2 | 139 | 0 | 0 | 7 |
| | IT Demand Response - 382 | | | | | 0 | 1 | 1 | 69 | 0 | 0 | 4 |
| | IT Demand Response - 380 | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 33,995,798 | 4,313 | 27,197,501 | 9,733 | 0 | 3 | 3 | 208 | 0 | 0 | 11 |
| | TOTAL NORTH DAKOTA ELECTRIC | 2,167,314,139 | 380,695 | 1,733,927,451 | 598,681 | 465,328 | 95,832 | 95,681 | 141,363 | 106,230 | 170,077 | 108,211 |

Energy share of Factor No. 3
Demand share of Factor No. 3

| |
|-----|
| 0.8 |
| 0.2 |

M3

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
EMBEDDED CLASS COST OF SERVICE STUDY
WEIGHTED CUSTOMERS
PROJECTED 2017

| Rate | Customer Class | Projected Billing Units 1/ | Projected Active Customers | Projected Meter Numbers | Projected Meters 2/ Weight | Services 3/ Customers | Weight | Transformers 4/ Customers | Weight | Customer Accounts 5/ Customers | Weight | Customers |
|------|--|----------------------------|----------------------------|-------------------------|-------------------------------|--------------------------|--------|------------------------------|--------|-----------------------------------|--------|----------------|
| 10 | - Residential Electric Service | 80,003 | 79,355 | 82,163 | 1.00 | 82,163 | 1.00 | 82,163 | 1.00 | 79,355 | 1.00 | 79,355 |
| 20 | - Small General Electric Service | 11,512 | 11,063 | 11,928 | 1.57 | 18,727 | 1.07 | 12,763 | 3.04 | 33,632 | 1.16 | 12,833 |
| 25 | - Irrigation Power Service | 46 | 45 | 56 | 3.81 | 213 | 1.84 | 103 | 20.20 | 909 | 2.08 | 94 |
| 40 | - Small Municipal Electric Service | 309 | 278 | 299 | 1.99 | 595 | 1.00 | 299 | 5.34 | 1,485 | 1.14 | 317 |
| | Total Small General | 11,867 | 11,386 | 12,283 | | 19,535 | | 13,165 | | 36,026 | | 13,244 |
| 30 | - Large General Service - Primary | 43 | 40 | 40 | 69.41 | 2,776 | 0.00 | 0 | 0.00 | 0 | 2.97 | 119 |
| | - Large General Service - Secondary | 4,587 | 4,113 | 4,761 | 6.32 | 30,090 | 1.95 | 9,284 | 12.07 | 49,644 | 2.28 | 9,378 |
| | Total Large General Service | 4,630 | 4,153 | 4,801 | | 32,866 | | 9,284 | | 49,644 | | 9,497 |
| | - Contracts - Primary | 0 | 0 | 0 | 69.41 | 0 | 0.00 | 0 | 0.00 | 0 | 3.00 | 0 |
| | - Contracts - Primary - Rate 30T | 0 | 0 | 0 | 69.41 | 0 | 0.00 | 0 | 0.00 | 0 | 3.00 | 0 |
| | Total Rate 30 | 4,630 | 4,153 | 4,801 | | 32,866 | | 9,284 | | 49,644 | | 9,497 |
| 31 | - TOD Large General Service Primary | 1 | 1 | 1 | 69.41 | 69 | 0.00 | 0 | 0.00 | 0 | 6.00 | 6 |
| 31 | - TOD Large General Service Secondary | 68 | 56 | 111 | 6.32 | 702 | 2.54 | 282 | 13.21 | 740 | 4.21 | 236 |
| 32 | - Space Heating | 623 | 35 | 636 | 5.32 | 3,384 | 0.00 | 0 | 0.00 | 0 | 4.00 | 2,492 |
| 38 | - IT Demand Response - DSU | 2 | 2 | 2 | 69.41 | 139 | 0.00 | 0 | 0.00 | 0 | 3.67 | 7 |
| | - IT Demand Response - State Capitol | 1 | 1 | 1 | 69.41 | 69 | 0.00 | 0 | 0.00 | 0 | 3.67 | 4 |
| | IT Demand Response - Matheson | 0 | 0 | 0 | 69.41 | 0 | 0.00 | 0 | 0.00 | 0 | 3.67 | 0 |
| | Total Rate 38 | 3 | 3 | 3 | | 208 | | 0 | | 0 | | 11 |
| 39 | - Interruptible Power Service - Primary | 1 | 0 | 0 | 69.41 | 0 | 0.00 | 0 | 0.00 | 0 | 3.00 | 0 |
| | Total General | 5,326 | 4,248 | 5,552 | | 37,229 | | 9,566 | | 50,384 | | 12,242 |
| 41 | - Municipal Lighting Service - Primary Metered | 49 | 49 | 49 | 1.00 | 49 | 0.00 | 0 | 0.00 | 0 | 1.00 | 49 |
| | - Municipal Lighting Service - Secondary Metered | 362 | 356 | 398 | 1.00 | 398 | 1.54 | 613 | 2.65 | 943 | 1.00 | 356 |
| | Non-Metered | 150 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 1.59 | 239 | 0.89 | 134 |
| | Total Municipal Lighting | 561 | 405 | 447 | | 447 | | 613 | | 1,182 | | 539 |
| 48 | - Municipal Pumping - Primary | 4 | 4 | 5 | 69.41 | 347 | 0.00 | 0 | 0.00 | 0 | 4.20 | 17 |
| | - Municipal Pumping - Secondary | 319 | 283 | 315 | 4.32 | 1,361 | 1.51 | 476 | 11.06 | 3,130 | 1.75 | 495 |
| | Total Municipal Pumping | 323 | 287 | 320 | | 1,708 | | 476 | | 3,130 | | 512 |
| 52 | - Outdoor Lighting Metered | 168 | 151 | 179 | 1.57 | 281 | 1.38 | 247 | 0.00 | 0 | 1.00 | 151 |
| | Non-Metered | 2,436 | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.89 | 2,168 |
| | Total Outdoor Lighting | 2,604 | 151 | 179 | | 281 | | 247 | | 0 | | 2,319 |
| | TOTAL NORTH DAKOTA ELECTRIC | 100,684 | 95,832 | 100,944 | | 141,363 | | 106,230 | | 170,077 | | 108,211 |

1/ Projected billing units derived from number of days billed divided by number of days in month.

2/ Meters calculated using projected meter numbers.

3/ Services calculated using projected meter numbers, except Rates 41 & 52 Non-Metered which is calculated using projected billing units..

4/ Transformers calculated using projected active customers, except Rate 41 Non-Metered service which is calculated using projected billing units.

5/ Customer Accounts calculated using projected active customers, except Rate 32 & Rates 41 and 52 Non-Metered service which is calculated using projected billing units.

M14

NORTH DAKOTA SERVICE WEIGHTS
ELECTRIC RATE CASE FILING FALL 2016

| CLASS | RATE | COUNT | SUM OF COSTS | | WEIGHTS |
|--------------------------------|-----------|---------------|-------------------|----------|---------|
| Residential | MDUND 100 | 77,306 | 44,859,712 | | |
| | MDUND 106 | 1 | 1,272 | | |
| | MDUND 130 | 7 | 4,251 | | |
| | MDUND 160 | 8 | 6,106 | | |
| | | <u>77,322</u> | <u>44,871,341</u> | 580.32 | 1.00 |
| Small General | MDUND200 | 10,074 | 6,242,389 | | |
| | MDUND205 | 1 | 229 | | |
| | MDUND260 | 26 | 34,256 | | |
| | | <u>10,101</u> | <u>6,276,874</u> | 621.41 | 1.07 |
| Irrigation | MDUND250 | 31 | 33,138 | 1,068.97 | 1.84 |
| Small Municipal | MDUND400 | 38 | 32,243 | | |
| | MDUND401 | 267 | 143,857 | | |
| | | <u>305</u> | <u>176,100</u> | 577.38 | 1.00 |
| Large General - Secondary | MDUND301 | 3,933 | 4,430,183 | 1,126.41 | 1.95 |
| Large General - TOD | MDUND311 | 40 | 58,915 | | |
| | | <u>40</u> | <u>58,915</u> | 1,472.88 | 2.54 |
| Space Heat | MDUND321 | 4 | 2,174 | | |
| | MDUND322 | 5 | 4,718 | | |
| | MDUND323 | 452 | 407,616 | | |
| | | <u>461</u> | <u>414,508</u> | 899.15 | 1.55 |
| Municipal Lighting - Primary | MDUND410 | 10 | 8,649 | 864.90 | 1.49 |
| Municipal Lighting - Secondary | MDUND412 | 351 | 317,571 | | |
| | MDUND414 | 4 | - | | |
| | | <u>355</u> | <u>317,571</u> | 894.57 | 1.54 |
| Municipal Pumping - Secondary | MDUND480 | 122 | 94,406 | | |
| | MDUND481 | 194 | 182,411 | | |
| | | <u>316</u> | <u>276,817</u> | 876.00 | 1.51 |
| Outdoor Lighting - Secondary | MDUND522 | 162 | 129,878 | 801.72 | |
| | | <u>162</u> | <u>129,878</u> | 801.72 | 1.38 |

MIS

North Dakota Transformer Weighting by Customer Rate

Updated: 9/23/20

| RATE AND DESCRIPTION | Sample Size | Sample Fraction of Rate | Zero Intercept Cost | Customers Per Transformer | Cost Per Transformer | Weighted Average | Weighting |
|---|--------------|-------------------------|---------------------|---------------------------|----------------------|------------------|------------|
| MDUND100 (Residential Electric Service) | | | | | | | |
| Single Phase | 69719 | 0.90098 | 1487 | 6.20 | \$239.88 | \$216.13 | |
| Three Phase | 7662 | 0.09902 | 6819 | 37.32 | \$182.70 | \$18.09 | |
| Total | 77381 | 1 | | | | \$234.22 | 1.0 |
| MDUND106 (Residential Electric Service Rate 10 and 05) | | | | | | | |
| Single Phase | 1 | 1 | 1487 | 4.00 | \$371.70 | \$371.70 | |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 | |
| Total | 1 | 1 | | | | \$371.70 | 1.0 |
| MDUND130 (Residential Electric Thermal Energy Storage) | | | | | | | |
| Single Phase | 7 | 1 | 1487 | 4.57 | \$325.68 | \$325.68 | |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 | |
| Total | 7 | 1 | | | | \$325.68 | 1.0 |
| MDUND160 (TOD Residential Electric Service) | | | | | | | |
| Single Phase | 8 | 1 | 1487 | 2.27 | \$654.61 | \$654.61 | |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 | |
| Total | 8 | 1 | | | | \$654.61 | 1.0 |

| RATE AND DESCRIPTION | Sample Size | Sample Fraction of Rate | Zero Intercept Cost | Customers Per Transformer | Cost Per Transformer | Weighted Average | Weighting |
|---|--------------|-------------------------|---------------------|---------------------------|----------------------|-------------------|-------------|
| MDUND200 (General Electric Rate Non Demand) | | | | | | | |
| Single Phase | 9069 | 0.89881 | 1487 | 2.43 | \$612.30 | \$550.34 | |
| Three Phase | 1021 | 0.10119 | 6819 | 4.29 | \$1,588.41 | \$160.73 | |
| Total | 10090 | 1 | | | | \$711.07 | 3.0 |
| MDUND205 (General Electric Rate 20 Non Demand Net Billing Rate 95) | | | | | | | |
| Single Phase | 1 | 1 | 1487 | 2.00 | \$743.40 | \$743.40 | |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 | |
| Total | 1 | 1 | | | | \$743.40 | 3.1 |
| MDUND250 (Irrigation Power Service) | | | | | | | |
| Single Phase | 27 | 0.87097 | 1487 | 0.44 | \$3,412.82 | \$2,972.46 | |
| Three Phase | 4 | 0.12903 | 6819 | 0.50 | \$13,638.64 | \$1,759.82 | |
| Total | 31 | 1 | | | | \$4,732.28 | 20.2 |
| MDUND260 (Optional TOD Small General Electric) | | | | | | | |
| Single Phase | 26 | 1 | 1487 | 2.08 | \$713.89 | \$713.89 | |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 | |
| Total | 26 | 1 | | | | \$713.89 | 3.0 |

| RATE AND DESCRIPTION | Sample Size | Sample Fraction of Rate | Zero Intercept Cost | Customers Per Transformer | Cost Per Transformer | Weighted Average | Weighting |
|---|-------------|-------------------------|---------------------|---------------------------|----------------------|-------------------|-------------|
| MDUND300 (General Primary Service) | | | | | | | |
| Single Phase | 22 | 0.70968 | 1487 | 2.00 | \$743.40 | \$527.57 | |
| Three Phase | 9 | 0.29032 | 6819 | 0.82 | \$8,334.72 | \$2,419.76 | |
| Total | 31 | 1 | | | | \$2,947.33 | 12.5 |
| MDUND301 (General Secondary Service) | | | | | | | |
| Single Phase | 2195 | 0.5581 | 1487 | 1.06 | \$1,398.40 | \$780.45 | |
| Three Phase | 1738 | 0.4419 | 6819 | 1.47 | \$4,630.60 | \$2,046.27 | |
| Total | 3933 | 1 | | | | \$2,826.72 | 12.0 |
| MDUND310 (Optional TOD Primary Electric Service) | | | | | | | |
| Single Phase | 0 | 0 | 1487 | 0.00 | \$0.00 | \$0.00 | |
| Three Phase | 1 | 1 | 6819 | 2.00 | \$3,409.66 | \$3,409.66 | |
| Total | 1 | 1 | | | | \$3,409.66 | 14.5 |
| MDUND311 (Optional TOD Secondary Electric Service) | | | | | | | |
| Single Phase | 26 | 0.65 | 1487 | 0.98 | \$1,518.37 | \$986.94 | |
| Three Phase | 14 | 0.35 | 6819 | 1.13 | \$6,021.03 | \$2,107.36 | |
| Total | 40 | 1 | | | | \$3,094.30 | 13.2 |

M16

| | | | | | | |
|---|------------|----------|------|------|------------|-------------------|
| MDUND321 (General Space Heating Secondary) | | | | | | |
| Single Phase | 2 | 0.5 | 1487 | 1.54 | \$966.42 | \$483.21 |
| Three Phase | 2 | 0.5 | 6819 | 2.00 | \$3,409.66 | \$1,704.83 |
| Total | 4 | 1 | | | | \$2,188.04 |
| MDUND322 (General Space Heating Secondary No Demand) | | | | | | |
| Single Phase | 4 | 0.8 | 1487 | 1.26 | \$1,177.05 | \$941.64 |
| Three Phase | 1 | 0.2 | 6819 | 2.00 | \$3,409.66 | \$681.93 |
| Total | 5 | 1 | | | | \$1,623.57 |
| MDUND323 (General Space Heat Secondary (Seasonal Meter)) | | | | | | |
| Single Phase | 288 | 0.63436 | 1487 | 1.83 | \$810.39 | \$514.08 |
| Three Phase | 166 | 0.36564 | 6819 | 2.06 | \$3,316.14 | \$1,212.51 |
| Total | 454 | 1 | | | | \$1,726.59 |
| MDUND324 (General Space Heat Primary (Seasonal Meter)) | | | | | | |
| Single Phase | 1 | 1 | 1487 | 1.00 | \$1,486.80 | \$1,486.80 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 1 | 1 | | | | \$1,486.80 |
| MDUND380 (IT Large Power Demand Resonse) | | | | | | |
| Single Phase | 1 | 1 | 1487 | 0.00 | \$0.00 | \$0.00 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 1 | 1 | | | | \$0.00 |
| MDUND390 (IT Large Power Service Rate 39 (American Colloid)) | | | | | | |
| Single Phase | 1 | 1 | 1487 | 0.00 | \$0.00 | \$0.00 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 1 | 1 | | | | \$0.00 |

| | | | | | | |
|--|------------|----------|------|-------|------------|-------------------|
| MDUND400 (Small Municipal Lighting Rate (Close)) | | | | | | |
| Single Phase | 33 | 0.86842 | 1487 | 1.81 | \$819.37 | \$711.56 |
| Three Phase | 5 | 0.13158 | 6819 | 1.67 | \$4,091.59 | \$538.37 |
| Total | 38 | 1 | | | | \$1,249.92 |
| MDUND401 (Small Municipal Lighting Rate Non Demand (Close)) | | | | | | |
| Single Phase | 266 | 0.99625 | 1487 | 2.12 | \$701.45 | \$698.82 |
| Three Phase | 1 | 0.00375 | 6819 | 2.00 | \$3,409.66 | \$12.77 |
| Total | 267 | 1 | | | | \$711.59 |
| MDUND410 (Municipal Lighting Primary (Metered)) | | | | | | |
| Single Phase | 10 | 1 | 1487 | 12.12 | \$122.63 | \$122.63 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 10 | 1 | | | | \$122.63 |
| MDUND412 (Municipal Lighting Secondary Primary (Metered)) | | | | | | |
| Single Phase | 348 | 0.98864 | 1487 | 2.53 | \$586.79 | \$580.12 |
| Three Phase | 4 | 0.01136 | 6819 | 1.87 | \$3,653.21 | \$41.51 |
| Total | 352 | 1 | | | | \$621.64 |
| MDUND413 (Municipal Lighting Secondary Primary (UnMetered)) | | | | | | |
| Single Phase | 24 | 1 | 1487 | 4.00 | \$372.05 | \$372.05 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 24 | 1 | | | | \$372.05 |
| MDUND414 (Municipal Light (Remals)) | | | | | | |
| Single Phase | 4 | 1 | 1487 | 5.00 | \$297.36 | \$297.36 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 4 | 1 | | | | \$297.36 |
| MDUND480 (Municipal Pumping Secondary (Connected HP)) | | | | | | |
| Single Phase | 119 | 0.97541 | 1487 | 1.06 | \$1,400.14 | \$1,365.71 |
| Three Phase | 3 | 0.02459 | 6819 | 1.20 | \$5,682.77 | \$139.74 |
| Total | 122 | 1 | | | | \$1,505.45 |
| MDUND481 (Municipal Pumping Secondary KW Billed) | | | | | | |
| Single Phase | 153 | 0.78866 | 1487 | 0.61 | \$2,417.60 | \$1,906.67 |
| Three Phase | 41 | 0.21134 | 6819 | 1.06 | \$6,458.95 | \$1,365.04 |
| Total | 194 | 1 | | | | \$3,271.70 |

M17

| | | | | | | |
|---|------------|----------|------|-------|------------|-------------------|
| MDUND 480 and 481 Combined | | | | | | |
| Single Phase | 272 | 0.86076 | 1487 | 0.75 | \$1,972.47 | \$1,697.82 |
| Three Phase | 44 | 0.13924 | 6819 | 1.06 | \$6,406.03 | \$891.98 |
| Total | 316 | 1 | | | | \$2,589.80 |
| MDUND484 (Municipal Pumping Primary (Special Metered) Williston Treatment) | | | | | | |
| Single Phase | 1 | 0.5 | 1487 | 0.00 | \$0.00 | \$0.00 |
| Three Phase | 1 | 0.5 | 6819 | 1.00 | \$6,819.32 | \$3,409.66 |
| Total | 2 | 1 | | | | \$3,409.66 |
| MDUND520 (Outdoor Lighting Primary (Metered)) | | | | | | |
| Single Phase | 2 | 1 | 1487 | 10.00 | \$148.68 | \$148.68 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 2 | 1 | | | | \$148.68 |
| MDUND522 (Outdoor Lighting Secondary (Metered)) | | | | | | |
| Single Phase | 146 | 0.90123 | 1487 | 1.84 | \$806.47 | \$726.82 |
| Three Phase | 16 | 0.09877 | 6819 | 2.09 | \$3,267.59 | \$322.72 |
| Total | 162 | 1 | | | | \$1,049.55 |
| MDUND523 (Outdoor Lighting Secondary (UnMetered)) | | | | | | |
| Single Phase | 13 | 1 | 1487 | 2.25 | \$660.22 | \$660.22 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 13 | 1 | | | | \$660.22 |
| MDUND524 (Outdoor Light (Rental)) | | | | | | |
| Single Phase | 12 | 1 | 1487 | 4.09 | \$363.25 | \$363.25 |
| Three Phase | 0 | 0 | 6819 | 0.00 | \$0.00 | \$0.00 |
| Total | 12 | 1 | | | | \$363.25 |

Notes:

- 1) Rate are taken and match the Service Weights by Customer Tab in ND_ServiceWeights_Loss_Factors_2015
- 2) The relatively high number of customers per three-phase transformer for Residential reflects large apartment dwellings
- 3) Three Phase - reflects only three-phase padmount transformers. Customers using 3, single-phase transformers configured to provide a three-phase service would fall under the single-phase weighting.

M18

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
CUSTOMER WEIGHTS

| sort | Description | Rate Codes | Count of Rate Class | Sum of # of Reg | Registers per Meter | Customer Weights |
|------|---------------------------------|--------------------|---------------------|-----------------|---------------------|------------------|
| 1 | Residential | 100, 106, 130, 160 | 78,901 | 78,925 | 1.00 | 1.00 |
| 2 | Small General | 200, 205, 260 | 10,586 | 12,325 | 1.16 | 1.16 |
| 3 | Irrigation | 250 | 49 | 102 | 2.08 | 2.08 |
| 4 | Small Municipal | 400, 401 | 300 | 343 | 1.14 | 1.14 |
| 5 | Large General - Primary | 300, 305 | 34 | 101 | 2.97 | 2.97 |
| 6 | Large General - Secondary | 301 | 4,111 | 9,366 | 2.28 | 2.28 |
| 7 | Large General - TOD - Primary | 310 | 1 | 6 | 6.00 | 6.00 |
| 8 | Large General - TOD - Secondary | 311 | 67 | 282 | 4.21 | 4.21 |
| 9 | IT Demand Response | 380, 381 | 3 | 11 | 3.67 | 3.67 |
| 10 | Contracts Rate | 302, 303, 304, 390 | 4 | 12 | 3.00 | 3.00 |
| 11 | Space Heat | 323 | 558 | 2,232 | 4.00 | 4.00 |
| 12 | Municipal Lighting - Primary | 410 | 49 | 49 | 1.00 | 1.00 |
| 13 | Municipal Lighting - Secondary | 412 | 398 | 398 | 1.00 | 1.00 |
| 14 | Municipal Pumping - Primary | 482, 484 | 5 | 21 | 4.20 | 4.20 |
| 15 | Municipal Pumping - Secondary | 480, 481 | 315 | 550 | 1.75 | 1.75 |
| 16 | Outdoor Lighting - Primary | 520 | 1 | 1 | 1.00 | 1.00 |
| 17 | Outdoor Lighting - Secondary | 522 | 178 | 178 | 1.00 | 1.00 |
| | | | 95,560 | 104,902 | | |

b119

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
METER WEIGHTS

| Sort | Description | Rate Codes | Count of Rate Class | Sum of Total Cost | Cost per Meter | Meter Weights |
|------|---------------------------------|--------------------|---------------------|-------------------|----------------|---------------|
| 1 | Residential | 100, 106, 130, 160 | 78,901 | \$ 7,518,677.00 | \$ 95.29 | 1.00 |
| 2 | Small General | 200, 205, 260 | 10,586 | \$ 1,587,542.00 | \$ 149.97 | 1.57 |
| 3 | Irrigation | 250 | 49 | \$ 17,782.00 | \$ 362.90 | 3.81 |
| 4 | Small Municipal | 400, 401 | 300 | \$ 57,030.00 | \$ 190.10 | 1.99 |
| 5 | Large General - Primary | 300, 305 | 34 | \$ 224,879.00 | \$ 6,614.09 | 69.41 |
| 6 | Large General - Secondary | 301 | 4,111 | \$ 2,474,303.00 | \$ 601.87 | 6.32 |
| 7 | Large General - TOD - Primary | 310 | 1 | \$ 6,614.00 | \$ 6,614.00 | 69.41 |
| 8 | Large General - TOD - Secondary | 311 | 67 | \$ 40,058.00 | \$ 597.88 | 6.27 |
| 9 | IT Demand Response | 380, 381 | 3 | \$ 19,842.00 | \$ 6,614.00 | 69.41 |
| 10 | Contracts Rate | 302, 303, 304, 390 | 4 | \$ 26,456.00 | \$ 6,614.00 | 69.41 |
| 11 | Space Heat | 323 | 558 | \$ 282,923.00 | \$ 507.03 | 5.32 |
| 12 | Municipal Lighting - Primary | 410 | 49 | \$ 4,391.00 | \$ 89.61 | 1.00 |
| 13 | Municipal Lighting - Secondary | 412 | 398 | \$ 36,029.00 | \$ 90.53 | 1.00 |
| 14 | Municipal Pumping - Primary | 482, 484 | 5 | \$ 33,070.00 | \$ 6,614.00 | 69.41 |
| 15 | Municipal Pumping - Secondary | 480, 481 | 315 | \$ 129,531.00 | \$ 411.21 | 4.32 |
| 16 | Outdoor Lighting - Primary | 520 | 1 | \$ 827.00 | \$ 827.00 | 8.68 |
| 17 | Outdoor Lighting - Secondary | 522 | 178 | \$ 26,546.00 | \$ 149.13 | 1.57 |
| | | | 95,560 | \$ 12,486,500.00 | | |

M20

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
EMBEDDED CLASS COST OF SERVICE STUDY
PROJECTED 2017 METERS AND CUSTOMERS

| Rate | Customer Class | 2015 Billing Units | 2017 Projected Billing Units | 2015 Active Customers | Customers to Billing Unit Ratio - 2015 | 2017 Projected Customers | 2015 Meters | Meters to Billing Unit Ratio - 2015 | 2017 Projected Meters |
|------|--|--------------------------|---------------------------------------|-----------------------------|--|--------------------------------|----------------|---|-----------------------------|
| 10 | - Residential Electric Service | 76,826 | 80,003 | 76,206 | 99.19% | 79,355 | 78,901 | 102.70% | 82,163 |
| 20 | - Small General Electric Service | 10,217 | 11,512 | 9,819 | 96.10% | 11,063 | 10,586 | 103.61% | 11,928 |
| 25 | - Irrigation Power Service | 40 | 46 | 39 | 97.50% | 45 | 49 | 122.50% | 56 |
| 40 | - Small Municipal Electric Service | 310 | 309 | 279 | 90.00% | 278 | 300 | 96.77% | 299 |
| | Total Small General | 10,567 | 11,867 | 10,137 | | 11,386 | 10,935 | | 12,283 |
| 30 | - Large General Service - Primary | 37 | 43 | 34 | 91.89% | 40 | 34 | 91.89% | 40 |
| | - Large General Service - Secondary | 3,961 | 4,587 | 3,552 | 89.67% | 4,113 | 4,111 | 103.79% | 4,761 |
| | Total Large General Service | 3,998 | 4,630 | 3,586 | | 4,153 | 4,145 | | 4,801 |
| | - Contracts - Primary | 0 | 0 | 0 | | | 0 | | 0 |
| | - Contracts - Primary - Rate 30T | 0 | 0 | 0 | | | 0 | | 0 |
| | Total Rate 30 | 3,998 | 4,630 | 3,586 | | 4,153 | 4,145 | | 4,801 |
| 31 | - TOD Large General Service Primary | 1 | 1 | 1 | 100.00% | 1 | 1 | 100.00% | 1 |
| 31 | - TOD Large General Service Secondary | 41 | 68 | 34 | 82.93% | 56 | 67 | 163.41% | 111 |
| 32 | - Space Heating | 547 | 623 | 31 | 5.67% | 35 | 558 | 102.01% | 636 |
| 38 | - IT Demand Response - DSU | 2 | 2 | 2 | 100.00% | 2 | 2 | 100.00% | 2 |
| | - IT Demand Response - State Capitol | 1 | 1 | 1 | 100.00% | 1 | 1 | 100.00% | 1 |
| | - IT Demand Response - Matheson | 0 | 0 | 0 | | | 0 | | 0 |
| | Total Rate 38 | 3 | 3 | 3 | | 3 | 3 | | 3 |
| 39 | - Interruptible Power Service - Primary | 1 | 1 | 0 | 0.00% | 0 | 0 | 0.00% | 0 |
| | Total General | 4,591 | 5,326 | 3,655 | | 4,248 | 4,774 | | 5,552 |
| 41 | - Municipal Lighting Service - Primary Metered | 49 | 49 | 49 | 100.00% | 49 | 49 | 100.00% | 49 |
| | - Municipal Lighting Service - Secondary Metered | 362 | 362 | 356 | 98.34% | 356 | 398 | 109.94% | 398 |
| | - Municipal Lighting Service - Non-Metered | 150 | 150 | 0 | 0.00% | 0 | 0 | 0.00% | 0 |
| | Total Municipal Lighting | 561 | 561 | 405 | | 405 | 447 | | 447 |
| 48 | - Municipal Pumping - Primary | 4 | 4 | 4 | 100.00% | 4 | 5 | 125.00% | 5 |
| | - Municipal Pumping - Secondary | 319 | 319 | 283 | 88.71% | 283 | 315 | 98.75% | 315 |
| | Total Municipal Pumping | 323 | 323 | 287 | | 287 | 320 | | 320 |
| 52 | - Outdoor Lighting Metered | 168 | 168 | 151 | 89.88% | 151 | 179 | 106.55% | 179 |
| | - Outdoor Lighting Non-Metered | 2,436 | 2,436 | 0 | 0.00% | 0 | 0 | 0.00% | 0 |
| | Total Outdoor Lighting | 2,604 | 2,604 | 151 | | 151 | 179 | | 179 |
| | TOTAL NORTH DAKOTA ELECTRIC | 95,472 | 100,684 | 90,841 | | 95,832 | 95,556 | | 100,944 |

M21

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
LOSS ADJUSTMENT CALCULATION - ENERGY

| VSL | VSL Definition | Input | Losses | Sales | Adj. Input | VSL adjustment | LEF* | CLEF* |
|-----|--------------------------|---------------|-------------|---------------|---------------|----------------|--------|--------|
| | | | | | | 0 | | |
| | | | | | | Adj. Losses | | |
| 1 | Production | 3,263,271,000 | - | - | 3,263,271,000 | - | 1.0000 | 1.0000 |
| 2 | Transmission | 3,263,271,000 | 187,997,042 | - | 3,263,271,000 | 186,737,459 | 1.0607 | 1.0607 |
| 3 | Substation Transformer | 3,075,273,958 | 10,148,404 | 339,582,240 | 3,076,533,541 | 10,148,404 | 1.0033 | 1.0642 |
| 4 | Primary Lines | 2,725,543,314 | 5,178,532 | 302,703,074 | 2,726,802,897 | 5,178,532 | 1.0019 | 1.0662 |
| 5 | Distribution Transformer | 2,417,661,707 | 17,165,398 | - | 2,418,921,291 | 17,165,398 | 1.0071 | 1.0739 |
| 6 | Service Drop | 2,400,496,309 | 7,441,539 | 2,394,314,354 | 2,401,755,893 | 7,441,539 | 1.0031 | 1.0772 |
| | Net Energy | (1,259,583) | | | | | | |
| | Total | | 227,930,915 | 3,036,599,668 | | 226,671,332 | | |
| | Total Losses at all VSLs | | 226,671,332 | | | | | |
| | Discrepancy | | 1,259,583 | | | | | |

| VSL Adjustment Values/Definitions | |
|-----------------------------------|----------------------------------|
| 1 | proportional scaling at all VSLs |
| 0 | adjustment of VSL 2 only |

L6 to L4
1.01028 1.01028

2,394,314,354

| Loss % of Gen | |
|---------------|-------|
| Initial | 6.98% |
| Final | 6.95% |

* Heading Labels:
LEF: Loss Expansion Factor
CLEF: Cumulative LEF

| VSL | VSL Definition | Loss Factors | | | Sales |
|-----|--------------------------|--------------|----------|-------------|---------------|
| | | Initial | Adjusted | To Loss Adj | |
| 1 | Production | 0.000% | 0.000% | 0.000% | - |
| 2 | Transmission | 5.761% | 5.722% | 5.722% | - |
| 3 | Substation Transformer | 0.330% | 0.330% | 0.330% | 339,582,240 |
| 4 | Primary Lines | 0.190% | 0.190% | 0.190% | 302,703,074 |
| 5 | Distribution Transformer | 0.710% | 0.710% | 1.017% | - |
| 6 | Service Drop | 0.310% | 0.310% | NA | 2,394,314,354 |
| | Total | | | | 3,036,599,668 |
| | Distribution losses sum | 1.540% | 1.539% | | |

| | Adj. Tran. LF | 5-yr. avg. exp. fctr. | |
|--|---------------|-----------------------|---------------|
| 2015 production (kWh) | | | 3,263,271,000 |
| 2015 production adj. by 5-year average loss factor | 5.933% | 1.078756382 | 3,275,751,630 |
| | | 0.078756382 | |

Values for North Dakota

| VSL | VSL Definition | Input | Losses | Sales |
|-----|--------------------------|---------------|-------------|---------------|
| 1 | Production | 2,230,263,475 | - | - |
| 2 | Transmission | 2,230,263,475 | 127,624,624 | - |
| 3 | Substation Transformer | 2,102,638,851 | 6,935,867 | 108,774,560 |
| 4 | Primary Lines | 1,986,928,423 | 3,773,420 | 223,087,888 |
| 5 | Distribution Transformer | 1,760,057,115 | 12,489,969 | - |
| 6 | Service Drop | 1,747,577,146 | 5,414,648 | 1,742,162,498 |
| | Total | | 156,238,529 | 2,074,024,946 |

| VSL | VSL Definition | ND Sales |
|-----|--------------------------|---------------|
| 1 | Production | - |
| 2 | Transmission | - |
| 3 | Substation Transformer | 108,774,560 |
| 4 | Primary Lines | 223,087,888 |
| 5 | Distribution Transformer | - |
| 6 | Service Drop | 1,742,162,498 |
| | Total | 2,074,024,946 |

M22

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Development of Energy and Demand Data for Allocators

| Rate Class | FN Data | VSL | 2-D. Rate | kWh - P (2015) | kWh | 12CP | 1NCP | 1CP | Rate Description | Holds | In | Inferred From | Inferred | Notes |
|------------|---------|----------|------------|----------------|-------------|---------|---------|--|--|----------|---------|---------------|---|---|
| 100 | 1 | 6 | 10 | 767,509,312 | 767,554,267 | 140,918 | 217,795 | 204,893 | Residential Electric Service Rate 10 | 106 | | | | |
| 105 | | 6 | 10 | - | | | | | Residential Electric Service Rate 10 (Net Billing Rate 95) | | | | | No customers or kWh in this rate class. |
| 106 | | 6 | 10 | 44,955 | | | | | Residential Electric Rate 10 and 95 | | 100 | | | |
| 130 | 1 | 6 | 10 | 126,509 | 126,509 | 22 | 39 | 33 | Residential Electric Thermal Energy Storage Rate 13 | | | | | |
| 160 | 1 | 6 | 10 | 127,382 | 127,382 | 22 | 41 | 40 | TOD Residential Electric Service Rate 16 | | | | | |
| 200 | 1 | 6 | 20 | 111,004,415 | 111,091,214 | 20,361 | 28,069 | 25,257 | General Electric Rate 20 Non Demand | 201, 205 | | | | |
| 201 | | 6 | 20 | 22,104 | | | | | General Electric Rate 20 (WiFi-No Meter) | | | | 200 | |
| 205 | 1 | 6 | 20 | 64,695 | | | | | General Electric Rate 20 Non Demand (Net Billing Rate 95) | | | | 200 | |
| 250 | 1 | 6 | 25 | 1,247,542 | 1,247,542 | 88 | 1,529 | 478 | Irrigation Power Service Rate 25 | | | | | |
| 260 | | 6 | 20 | 26,375 | 26,375 | 5 | 7 | 6 | Optional TOD Small General Electric Service Rate 26 | | | 200+201+250 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 300 | 1 | 4 | 30 Pri | 183,165,735 | 183,212,651 | 25,641 | 46,196 | 35,386 | General Primary Service Rate 30 | 305 | | | | |
| 301 | 1 | 6 | 30 Sec | 736,834,728 | 736,834,728 | 121,637 | 169,375 | 169,039 | General Secondary Service Rate 30 | | | | | |
| 302 | 1 | 3 | Contract | 1,338,000 | 1,338,000 | 1,026 | 1,848 | 1,416 | General Primary Rate 30 Tesoro 1806 Substation | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 303 | 1 | 3 | Contract | 71,448,000 | 71,448,000 | 6,627 | 11,940 | 9,146 | General Primary Rate 30 Tesoro Internal Substation | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 304 | 3 | Contract | 22,260,560 | 22,260,560 | 2,817 | 5,075 | 3,887 | General Electric Service Rate 30 (Sabin Metal) | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. | |
| 305 | 4 | 30 Pri | 46,916 | | | | | | General Primary Rate 30 (Special Sub Metered) | | 300 | | | |
| 310 | 4 | 31 Pri | 2,010,800 | 2,010,800 | 281 | 507 | 388 | Optional TOD Primary Electric Service Rate 31 | | | 300+305 | 1 | No interval data. NCP and CP Inferred. | |
| 311 | 1 | 6 | 31 Sec | 15,470,165 | 15,470,165 | 2,554 | 3,556 | 3,549 | Optional TOD Secondary Electric Service Rate 31 | | | 301 | 1 | No interval data. NCP and CP Inferred. |
| 320 | | 4 | 32 | 562 | 562 | 0 | 0 | 0 | General Space Heating Primary Rate 32 | | | 324 | 1 | No interval data. NCP and CP Inferred. |
| 321 | 1 | 6 | 32 | 584,696 | | | | | General Space Heating Secondary Rate 32 | | | 323 | | |
| 322 | 1 | 6 | 32 | 117,388 | | | | | General Space Heating Secondary Rate 32 Non Demand | | | 323 | | |
| 323 | 1 | 6 | 32 | 54,272,603 | 54,974,687 | 6,542 | 17,902 | 15,186 | General Space Heat Secondary (Seasonal Meter)Rate 32 | 321, 322 | | | | |
| 324 | | 4 | 32 | 8,239 | 8,239 | 1 | 3 | 2 | General Space Heat Primary (Seasonal Meter)Rate 32 | | | 323 | 1 | No interval data. NCP and CP Inferred. |
| 335 | | 6 | | - | | | | | General Primary Rate 30 (Net Billing Rate 95) | | | | | No customers or kWh in this rate class. |
| 380 | 1 | 4 | 38 | 17,123,400 | 17,123,400 | 3,088 | 5,564 | 4,262 | IT Large Power Demand Response Rate 38 | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 381 | 3 | 38 | | 13,728,000 | 13,728,000 | 1,630 | 2,938 | 2,250 | IT Lg Power Demand Response (State Capitol)Rate 38 | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 390 | 4 | 39 | | 5,106,600 | 5,106,600 | 574 | 1,035 | 793 | IT Large Power Service Rate 39 (American Colloid) | | | 300 | 1 | No interval data. Billing data determined NCP. CP Inferred. |
| 400 | 1 | 6 | 40 | 2,150,699 | 2,150,699 | 394 | 701 | 546 | Small Municipal Rate 40 Demand (Closed) | | | | | |
| 401 | 1 | 6 | 40 | 1,924,986 | 1,924,986 | 296 | 431 | 386 | Small Municipal Rate 40 NonDemand (Closed) | | | | | |
| 410 | 1 | 4 | 41 Pri | 1,719,274 | 1,719,274 | 113 | 616 | 452 | Municipal Lighting Primary Rate 41 (Metered) | | | | | |
| 412 | 1 | 6 | 41 Sec | 6,854,776 | 18,127,035 | 1,106 | 8,208 | 3,867 | Municipal Lighting Secondary Rate 41 (Metered) | 413 | | | | |
| 413 | | 6 | 41 Sec | 11,272,259 | | | | | Municipal Lighting Secondary Service Rate 41 (Unmetered) | | | 412 | | |
| 414 | | 6 | | - | | | | | Municipal Light Rate 41 (Rentals) | | | | | No summary information specific to this rate |
| 480 | 1 | 6 | 48 Sec | 786,285 | 786,285 | 104 | 200 | 164 | Municipal Pumping Secondary 48 (Connected HP) | | | | | Rate 48 Secondary Projected kWh same for 480 and 481 |
| 481 | 1 | 6 | 48 Sec | 24,381,761 | 24,381,761 | 3,588 | 8,479 | 5,771 | Municipal Pumping Secondary 48 (KW Billed) | | | | | Rate 48 Secondary Projected kWh same for 480 and 481 |
| 482 | 1 | 4 | 48 Pri | 9,861,600 | 9,861,600 | 1,451 | 3,429 | 2,334 | Municipal Pumping Primary 48 (KW Billed) | | | 481 | 1 | No interval data. NCP and CP Inferred. |
| 484 | 4 | 48 Pri | 4,032,000 | 4,032,000 | 593 | 1,402 | 954 | Municipal Pumping Primary 48 (Special Metered) - Williston Treatment Plant | | | 481 | 1 | No interval data. NCP and CP Inferred. | |
| 520 | 4 | 52 | | 11,944 | 11,944 | 1 | 4 | 3 | Outdoor Lighting Primary Rate 52 (Metered) | | | 522 | 1 | No interval data. Loads added to 522 at primary. |
| 521 | 4 | 52 | | 818 | 818 | 0 | 0 | 0 | Outdoor Lighting Primary Rate 52 (Unmetered) | | | 522 | 1 | No interval data. Loads added to 522 at primary. |
| 522 | 1 | 6 | 52 | 7,338,863 | 7,338,863 | 716 | 2,471 | 2,054 | Outdoor Lighting Secondary Rate 52 (Metered) | 523, 524 | | | | |
| 523 | | 6 | 52 | | | | | | Outdoor Lighting Secondary Rate 52 (Unmetered) | | | 522 | | No summary information specific to this rate |
| 524 | | 6 | 52 | | | | | | Outdoor Light Rate 52 (Rentals) | | | 522 | | No summary information specific to this rate |

Total 2,074,024,946 2,074,024,946 342,198 539,362 492,543
Source total 2,074,024,946
Discrepancy 1,911,597,883 from LR data
92% share from LR data

Variable Source/Definition
FN Data Fixed network data (i.e. interval data available and received)
VSL Voltage Service Level
2-D. Rate 2-digit rate class
kWh - P (2015) From: 12 mos end 2015 Integrated by rate brv.xlsx ; and Preliminary Projected 2017 ND Billing Units.xlsx
kWh, CP, NCP Data are from Summary sheet tabs of Rate Summary Files
Inferred data
3-digit rate code combined with other 3-digit rate code. See "Holds" and "In" columns

Totals by VSL

| Substation | 3 | 108,774,560 | 12,100 | 21,801 | 16,699 |
|------------|---|---------------|---------|---------|---------|
| Primary | 4 | 223,087,888 | 31,745 | 58,757 | 44,576 |
| Secondary | 5 | 1,742,162,498 | 298,352 | 458,804 | 431,269 |
| Total | | 2,074,024,946 | 342,198 | 539,362 | 492,543 |

Amounts by VSL of classes whose demand is inferred

| Substation | 3 | 108,774,560 | 12,100 | 21,801 | 16,699 |
|------------|---|-------------|--------|--------|--------|
| Primary | 4 | 38,155,863 | 5,991 | 11,944 | 8,738 |

M23

MONTANA-DAKOTA UTILITIES CO.
 ELECTRIC UTILITY - NORTH DAKOTA
 Development of Energy and Demand Data for Allocators

| | | | | | |
|-----------|---|-------------|--------|--------|--------|
| Secondary | 6 | 15,496,540 | 2,559 | 3,563 | 3,555 |
| Total | | 162,427,063 | 20,650 | 37,308 | 28,992 |

Inferred Share of Total by VSL

| | | | | | |
|------------|---|---------|---------|---------|---------|
| Substation | 3 | 100.00% | 100.00% | 100.00% | 100.00% |
| Primary | 4 | 17.10% | 18.87% | 20.33% | 19.60% |
| Secondary | 6 | 0.89% | 0.86% | 0.78% | 0.82% |
| Total | | 7.83% | 6.03% | 6.92% | 5.89% |

2-Digit Allocation of Energy and Demand

| 2-Digit Code | Rate Codes | KWh | 12CP | 1NCP | 1CP |
|--------------|-----------------|---------------|---------|---------|---------|
| 10 | 6 105, 130, 160 | 767,808,158 | 140,961 | 217,876 | 204,966 |
| 20 | 6 00, 205, 260 | 111,117,589 | 20,366 | 28,076 | 25,263 |
| 25 | 6 250 | 1,247,542 | 88 | 1,529 | 478 |
| 30 Pri | 4 300, 305 | 183,212,651 | 25,641 | 46,196 | 35,386 |
| 30 Sec | 6 301 | 736,834,728 | 121,637 | 169,375 | 169,039 |
| 31 Pri | 4 310 | 2,010,800 | 281 | 507 | 388 |
| 31 Sec | 6 311 | 15,470,165 | 2,554 | 3,556 | 3,549 |
| 32 pri | 4 320, 324 | 8,801 | 1 | 3 | 2 |
| 32 sec | 6 323 | 54,974,687 | 6,542 | 17,902 | 15,186 |
| 38 pri | 4 380 | 17,123,400 | 3,088 | 5,564 | 4,262 |
| 38 sub | 3 381 | 13,728,000 | 1,630 | 2,938 | 2,250 |
| 39 | 4 390 | 5,106,600 | 574 | 1,035 | 793 |
| C | 3 02, 303, 304 | 95,046,560 | 10,470 | 18,863 | 14,449 |
| 40 | 6 400, 401 | 4,075,685 | 689 | 1,132 | 932 |
| 41 Pri | 4 410 | 1,719,274 | 113 | 616 | 452 |
| 41 Sec | 6 412, 413 | 18,127,035 | 1,106 | 8,208 | 3,867 |
| 48 Pri | 4 482, 484 | 13,893,600 | 2,045 | 4,831 | 3,288 |
| 48 Sec | 6 480, 481 | 25,168,046 | 3,692 | 8,679 | 5,935 |
| 52 Pri | 4 520, 521 | 12,762 | 1 | 4 | 4 |
| 52 Sec | 6 522 | 7,338,863 | 716 | 2,471 | 2,054 |
| Total | | 2,074,024,946 | 342,198 | 539,362 | 492,543 |
| Substation | 3 | 108,774,560 | 12,100 | 21,801 | 16,699 |
| Primary | 4 | 223,087,888 | 31,745 | 58,757 | 44,576 |
| Secondary | 6 | 1,742,162,498 | 298,352 | 458,804 | 431,269 |
| Total | | 2,074,024,946 | 342,198 | 539,362 | 492,543 |

To loss adjustment file, allocator development file

M24

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Allocator Development

| Class | 2015 | | | | | 2017 | | | | | Allocator Share: (Less Contracts, 39) | | |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------------------------|----------------|----------------|
| | kWh @ Secondary | kWh @ Primary | kWh @ Substation | kWh @ Transmission | kWh @ Generation | kWh @ Secondary | kWh @ Primary | kWh @ Substation | kWh @ Transmission | kWh @ Generation | 2017 | 2017 | 2015 |
| 10_sec | 767,808,158 | 775,699,105 | 777,175,055 | 779,747,167 | 827,075,761 | 770,939,000 | 778,852,123 | 780,344,092 | 782,926,692 | 830,448,274 | 36.40% | 38.32% | 37.1% |
| 20_sec | 111,117,589 | 112,259,571 | 112,473,171 | 112,845,409 | 119,694,827 | 112,526,000 | 113,692,456 | 113,898,764 | 114,275,720 | 121,211,954 | 5.31% | 5.59% | 5.4% |
| 25_sec | 1,247,942 | 1,260,363 | 1,262,761 | 1,266,941 | 1,343,841 | 1,267,000 | 1,280,021 | 1,282,457 | 1,286,701 | 1,364,801 | 0.06% | 0.06% | 0.1% |
| 30_prim | | 183,212,651 | 183,561,256 | 184,168,764 | 195,347,322 | | 195,765,000 | 196,137,489 | 196,786,619 | 208,731,047 | 9.15% | 9.63% | 8.8% |
| 30_sec | 736,834,728 | 744,407,353 | 745,823,764 | 748,292,117 | 793,711,472 | 755,983,226 | 763,752,645 | 765,205,865 | 767,738,364 | 814,338,054 | 35.69% | 37.57% | 35.6% |
| 31_prim | | 2,010,800 | 2,014,676 | 2,021,294 | 2,143,981 | | 2,081,000 | 2,084,960 | 2,091,860 | 2,218,030 | 0.10% | 0.10% | 0.1% |
| 31_sec | 15,470,165 | 15,629,156 | 15,658,894 | 15,710,718 | 16,664,317 | 17,694,774 | 17,876,627 | 17,910,642 | 17,969,918 | 19,060,645 | 0.84% | 0.88% | 0.7% |
| 40_sec | 4,075,685 | 4,117,572 | 4,125,406 | 4,139,060 | 4,390,290 | 4,076,000 | 4,117,890 | 4,125,725 | 4,139,380 | 4,390,629 | 0.19% | 0.20% | 0.2% |
| 41_prim | | 1,719,274 | 1,722,545 | 1,728,246 | 1,833,146 | | 1,719,000 | 1,722,271 | 1,727,971 | 1,832,854 | 0.08% | 0.08% | 0.1% |
| 41_sec | 18,127,095 | 18,313,331 | 18,348,176 | 18,408,901 | 19,526,272 | 18,127,000 | 18,313,295 | 18,348,141 | 18,408,665 | 19,526,235 | 0.86% | 0.90% | 0.9% |
| 48_prim | | 13,893,600 | 13,920,036 | 13,966,105 | 14,813,811 | | 13,894,000 | 13,920,437 | 13,966,507 | 14,814,237 | 0.65% | 0.68% | 0.7% |
| 48_sec | 25,168,046 | 25,426,704 | 25,475,084 | 25,559,396 | 27,110,784 | 25,168,000 | 25,426,658 | 25,475,038 | 25,559,349 | 27,110,734 | 1.19% | 1.25% | 1.2% |
| 38_prim** | | 17,123,400 | 30,883,981 | 30,986,194 | 32,866,974 | | 17,711,000 | 31,944,699 | 32,050,422 | 33,995,798 | 1.49% | 1.57% | 1.5% |
| 38_sec | | 17,123,400 | 17,155,981 | 17,212,760 | 18,257,529 | | 17,711,000 | 17,744,699 | 17,803,427 | 18,884,048 | 0.83% | 0.87% | 0.8% |
| 38_t | | | 13,728,000 | 13,773,434 | 14,609,445 | | | 14,200,000 | 14,246,956 | 15,111,751 | 0.66% | 0.70% | 0.7% |
| 32 | 54,974,687 | 55,548,476 | 55,654,170 | 55,838,361 | 59,227,602 | 55,941,000 | 56,515,919 | 56,623,454 | 56,810,853 | 60,259,122 | 2.64% | 2.78% | 2.7% |
| 32 - 100 | | 8,801 | 8,818 | 8,847 | 9,384 | | 0 | 0 | 0 | 0 | 0.00% | 0.00% | 0.0% |
| 32 - 200 | 54,974,687 | 55,539,675 | 55,645,352 | 55,829,514 | 59,218,218 | 55,941,000 | 56,515,919 | 56,623,454 | 56,810,853 | 60,259,122 | 2.64% | 2.78% | 2.7% |
| 52 | 7,338,863 | 7,427,048 | 7,441,180 | 7,465,807 | 7,918,962 | 7,424,000 | 7,513,298 | 7,527,594 | 7,552,507 | 8,010,924 | 0.35% | 0.37% | 0.4% |
| 52 - 100 | | 12,762 | 12,786 | 12,829 | 13,607 | | 13,000 | 13,025 | 13,068 | 13,861 | 0.00% | 0.00% | 0.0% |
| 52 - 200 | 7,338,863 | 7,414,286 | 7,428,394 | 7,452,978 | 7,905,355 | 7,424,000 | 7,500,298 | 7,514,569 | 7,539,439 | 7,997,063 | 0.35% | 0.37% | 0.4% |
| 6000024 | | | 10,032,086 | 10,061,203 | 10,146,291 | | | 102,241,000 | 102,579,373 | 108,805,670 | 4.77% | | 4.5% |
| 601 - Transmission | | | | | | | | 75,560,000 | 75,810,071 | 80,411,542 | | | |
| 601 - Substation | | | | | | | | 26,681,000 | 26,769,303 | 28,394,128 | | | |
| 601 - Allocation | | | | | | | | 1,769,000 | 1,797,000 | 1,997,000 | | | |
| 60 - 200 | | 1,100,000 | 1,110,000 | 1,120,000 | 1,130,000 | | 1,100,000 | 1,110,000 | 1,120,000 | 1,130,000 | 0.25% | | 0.2% |
| Total | 1,742,162,498 | 1,983,155,003 | 2,095,702,983 | 2,102,638,851 | 2,230,263,475 | 1,769,146,000 | 2,023,790,933 | 2,144,082,673 | 2,151,178,656 | 2,281,749,518 | 100.00% | 100.00% | 100.00% |
| Total (less contracts & 39) | 1,742,162,498 | 1,978,048,403 | 2,095,540,107 | 2,002,144,479 | 2,125,669,360 | 1,769,146,000 | 2,018,510,933 | 2,036,551,626 | 2,043,291,728 | 2,167,314,139 | ALT | STD | ALT |
| Check | | | | | | | | | | | | | |
| Sales at VSL | 1,742,162,498 | 223,087,888 | 108,774,560 | - | - | | | | | | | | |
| Sales & Losses from below | - | 1,760,067,115 | 1,986,928,423 | 2,102,638,851 | 2,230,263,475 | | | | | | | | |
| Total | 1,742,162,498 | 1,983,155,003 | 2,095,702,983 | 2,102,638,851 | 2,230,263,475 | | | | | | | | |
| losses | 17,904,617 | 3,773,420 | 6,935,867 | 127,624,624 | - | | | | | | | | |
| total for level (check) | 1,760,067,115 | 1,986,928,423 | 2,102,638,851 | 2,230,263,475 | 2,230,263,475 | | | | | | | | |

M25

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Allocator Development

| Class | 2015 | | | | | 2017 | | | | | % | % | % |
|--|----------------------|-----------------|-----------------------|-------------------------|-----------------------|----------------------|-----------------|-----------------------|-------------------------|-----------------------|----------------|----------------|---------------|
| | 12 CP @ Secondary | 12 CP @ Primary | 12 CP @ Substation | 12 CP @ Transmission | 12 CP @ Generation | 12 CP @ Secondary | 12 CP @ Primary | 12 CP @ Substation | 12 CP @ Transmission | 12 CP @ Generation | | | |
| 10_sec | 140,961 | 144,350 | 145,265 | 145,951 | 159,812 | 141,536 | 144,939 | 145,858 | 146,546 | 160,464 | 40.77% | 42.15% | 41.5% |
| 20_sec | 20,366 | 20,855 | 20,988 | 21,087 | 23,089 | 20,624 | 21,120 | 21,254 | 21,354 | 23,382 | 5.94% | 6.14% | 6.0% |
| 25_sec | 88 | 90 | 91 | 91 | 100 | 89 | 91 | 92 | 92 | 101 | 0.03% | 0.03% | 0.0% |
| 30_prim | | 25,641 | 25,804 | 25,925 | 28,388 | | 27,398 | 27,571 | 27,702 | 30,332 | 7.71% | 7.97% | 7.4% |
| 30_sec | 121,637 | 124,561 | 125,351 | 125,943 | 137,904 | 124,798 | 127,798 | 128,609 | 129,216 | 141,488 | 35.95% | 37.17% | 35.8% |
| 31_prim | | 281 | 283 | 285 | 312 | | 291 | 293 | 294 | 322 | 0.08% | 0.08% | 0.1% |
| 31_sec | 2,554 | 2,554 | 2,570 | 2,582 | 2,827 | 2,921 | 2,991 | 3,010 | 3,024 | 3,312 | 0.84% | 0.87% | 0.7% |
| 40_sec | 689 | 706 | 711 | 714 | 782 | 690 | 706 | 711 | 714 | 782 | 0.20% | 0.21% | 0.2% |
| 41_prim | | 113 | 114 | 115 | 126 | | 113 | 114 | 115 | 126 | 0.03% | 0.03% | 0.0% |
| 41_sec | 1,106 | 1,133 | 1,140 | 1,145 | 1,254 | 1,106 | 1,133 | 1,140 | 1,145 | 1,254 | 0.32% | 0.33% | 0.3% |
| 48_prim | | 2,045 | 2,058 | 2,067 | 2,264 | | 2,045 | 2,058 | 2,067 | 2,264 | 0.56% | 0.59% | 0.6% |
| 48_sec | 3,692 | 3,781 | 3,805 | 3,823 | 4,186 | 3,692 | 3,781 | 3,805 | 3,823 | 4,186 | 1.06% | 1.10% | 1.1% |
| 38_prim** | | 2,471 | 2,471 | 2,471 | 2,735 | | 2,471 | 2,471 | 2,471 | 2,735 | 1.10% | 1.13% | 1.1% |
| 38_1 | | | 2,466 | 2,466 | 2,735 | | 2,466 | 2,466 | 2,466 | 2,735 | 0.72% | 0.74% | 0.7% |
| 38_2 | | | 1,004 | 1,311 | 1,425 | | 1,004 | 1,349 | 1,356 | 1,484 | 0.38% | 0.39% | 0.4% |
| 32 | 6,542 | 6,701 | 6,743 | 6,775 | 7,418 | 6,657 | 6,817 | 6,860 | 6,893 | 7,547 | 1.92% | 1.98% | 1.9% |
| 32_1 | | 1 | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 0.00% | 0.00% | 0.0% |
| 32_2 | 6,542 | 6,699 | 6,742 | 6,774 | 7,417 | 6,657 | 6,817 | 6,860 | 6,893 | 7,547 | 1.92% | 1.98% | 1.9% |
| 52 | 716 | 734 | 739 | 742 | 813 | 724 | 743 | 747 | 751 | 822 | 0.21% | 0.22% | 0.2% |
| 52_1 | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 0.00% | 0.00% | 0.0% |
| 52_2 | 716 | 733 | 737 | 741 | 811 | 724 | 741 | 746 | 750 | 821 | 0.21% | 0.22% | 0.2% |
| Contracts | | | 11,434 | 11,434 | 11,434 | | | 11,434 | 11,434 | 11,434 | 3.15% | 0.22% | 3.0% |
| 100% Transmission | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| 100% Substation | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| 100% Generation | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| Total | 298,352 | 336,476 | 350,383 | 352,037 | 385,471 | 302,838 | 342,997 | 357,783 | 359,472 | 393,612 | 100.00% | 100.00% | 100.0% |
| Total (less contracts & 39) | 298,352 | 336,016 | 339,451 | 341,054 | 373,444 | 302,838 | 342,521 | 346,042 | 347,676 | 380,695 | | | |

Interruptibility factor 0.80
2: Per 12/3/2013 email and attached memo from Mike O'Grady, equals (Projected 2017 12CP @ Gen) (Rate 38 Adjustment)
NOTE TAKEN FROM CGS MODEL SHEET ALLOCATION FACTOR WORKSHEET; CODE MOVED HERE

| Class | 2015 | | | | | 2017 | | | | | % | % | % |
|--|----------------------|-----------------|-----------------------|-------------------------|-----------------------|----------------------|-----------------|-----------------------|-------------------------|-----------------------|----------------|----------------|---------------|
| | 1 NCP @ Secondary | 1 NCP @ Primary | 1 NCP @ Substation | 1 NCP @ Transmission | 1 NCP @ Generation | 1 NCP @ Secondary | 1 NCP @ Primary | 1 NCP @ Substation | 1 NCP @ Transmission | 1 NCP @ Generation | | | |
| 10_sec | 217,876 | 223,113 | 224,528 | 225,588 | 247,012 | 218,764 | 224,023 | 225,443 | 226,508 | 248,019 | 39.86% | 41.43% | 40.5% |
| 20_sec | 28,076 | 28,751 | 28,933 | 29,070 | 31,830 | 28,432 | 29,115 | 29,300 | 29,438 | 32,234 | 5.18% | 5.38% | 5.2% |
| 25_sec | 1,529 | 1,566 | 1,576 | 1,583 | 1,734 | 1,553 | 1,590 | 1,600 | 1,608 | 1,761 | 0.26% | 0.29% | 0.3% |
| 30_prim | | 46,196 | 46,489 | 46,709 | 51,145 | | 49,362 | 49,674 | 49,909 | 54,649 | 8.78% | 9.13% | 8.4% |
| 30_sec | 169,375 | 173,447 | 174,545 | 175,371 | 192,026 | 173,777 | 177,954 | 179,082 | 179,928 | 197,016 | 31.67% | 32.91% | 31.5% |
| 31_prim | | 616 | 620 | 623 | 683 | | 638 | 642 | 645 | 706 | 0.11% | 0.12% | 0.1% |
| 31_sec | 3,556 | 3,642 | 3,665 | 3,682 | 4,032 | 4,067 | 4,165 | 4,192 | 4,211 | 4,611 | 0.74% | 0.77% | 0.7% |
| 40_sec | 1,132 | 1,159 | 1,167 | 1,172 | 1,284 | 1,132 | 1,159 | 1,167 | 1,172 | 1,284 | 0.21% | 0.21% | 0.2% |
| 41_prim | | 616 | 620 | 623 | 683 | | 616 | 620 | 623 | 682 | 0.11% | 0.11% | 0.1% |
| 41_sec | 8,208 | 8,405 | 8,459 | 8,498 | 9,306 | 8,208 | 8,405 | 8,459 | 8,498 | 9,306 | 1.50% | 1.55% | 1.5% |
| 48_prim | | 4,831 | 4,862 | 4,885 | 5,349 | | 4,832 | 4,862 | 4,885 | 5,349 | 0.86% | 0.89% | 0.9% |
| 48_sec | 8,679 | 8,887 | 8,944 | 8,986 | 9,839 | 8,679 | 8,887 | 8,944 | 8,986 | 9,839 | 1.58% | 1.64% | 1.6% |
| 38_prim** | | 5,564 | 5,537 | 5,577 | 6,330 | | 5,755 | 5,755 | 5,755 | 6,514 | 1.56% | 1.62% | 1.5% |
| 38_1 | | 5,564 | 5,599 | 5,626 | 6,160 | | 5,755 | 5,791 | 5,819 | 6,371 | 1.02% | 1.06% | 1.0% |
| 38_2 | | | 2,938 | 2,951 | 3,232 | | | 3,039 | 3,053 | 3,343 | 0.54% | 0.56% | 0.5% |
| 32 | 17,902 | 18,335 | 18,451 | 18,539 | 20,299 | 18,217 | 18,655 | 18,773 | 18,861 | 20,653 | 3.32% | 3.45% | 3.3% |
| 32_1 | | 3 | 3 | 3 | 3 | | 0 | 0 | 0 | 0 | 0.00% | 0.00% | 0.0% |
| 32_2 | 17,902 | 18,332 | 18,448 | 18,536 | 20,296 | 18,217 | 18,655 | 18,773 | 18,861 | 20,653 | 3.32% | 3.45% | 3.3% |
| 52 | 2,471 | 2,535 | 2,551 | 2,563 | 2,806 | 2,500 | 2,564 | 2,581 | 2,593 | 2,839 | 0.46% | 0.47% | 0.5% |
| 52_1 | | 4 | 4 | 4 | 5 | | 4 | 4 | 4 | 5 | 0.00% | 0.00% | 0.0% |
| 52_2 | 2,471 | 2,531 | 2,547 | 2,559 | 2,802 | 2,000 | 2,560 | 2,576 | 2,588 | 2,834 | 0.46% | 0.47% | 0.5% |
| Contracts | | | 11,434 | 11,434 | 11,434 | | | 11,434 | 11,434 | 11,434 | 3.59% | 0.47% | 3.4% |
| 100% Transmission | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| 100% Substation | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| 100% Generation | | | 480 | 480 | 480 | | | 480 | 480 | 480 | 0.13% | | 0.1% |
| Total | 458,804 | 528,700 | 553,852 | 556,468 | 609,316 | 465,328 | 538,791 | 565,536 | 568,207 | 622,170 | 100.00% | 100.00% | 100.0% |
| Total (less contracts & 39) | 458,804 | 527,665 | 533,948 | 536,469 | 587,418 | 465,328 | 537,721 | 544,169 | 546,738 | 598,662 | | | |

Interruptibility factor 1.00

M26

MONTANA-DAKOTA UTILITIES CO.
ELECTRIC UTILITY - NORTH DAKOTA
Allocator Development

Loss Factors

| | Average Losses | Peak Losses | |
|------------------------------------|----------------|---------------|----------------------------|
| Production and Transmission | 5.72% | 8.67% | Transmission to Generation |
| Substation Transformers Losses | 0.33% | 0.47% | Substation to Transmission |
| Distribution Primary Lines | 0.19% | 0.63% | Primary to Substation |
| Distribution Transformers | 0.71% | 1.55% | Secondary to Primary |
| Service Lines | 0.31% | 0.81% | Secondary to Primary |
| Total Distribution Losses | 1.54% | 3.50% | |
| 5-Year Average Total Losses | 7.30% | 12.13% | |

| Average Losses | Losses |
|----------------------------|--------|
| Transmission to Generation | 1.0607 |
| Substation to Transmission | 1.0033 |
| Primary to Substation | 1.0019 |
| Secondary to Primary | 1.0071 |
| Secondary to Primary | 1.0031 |

| | Energy @ Generation Level | CF Joi | NCP KW @ Gen | NCP KW @ Supply Secondary |
|---|---------------------------------|-----------|------------------------|---------------------------------|
| Residential Electric Service | 10 | | 830,448,274 # | 248,010 218,764 |
| Small General Electric Service | 20 | | 121,211,954 # | 32,234 28,432 |
| Irrigation Power Service | 25 | | 1,364,801 # | 1,761 1,553 |
| Large General Service - Primary | 30 | | 208,731,047 # | 54,649 0 |
| Large General Service - Secondary | | | 814,338,054 # | 197,016 173,777 |
| Space Heating - Billed @ Rate 30 | | | 0 | 0 0 |
| Total Large General Service - Secondary | | | 814,338,054 # | 197,016 173,777 |
| Total Large General Service | | | 1,023,069,101 # | 251,665 173,777 |
| Contracts - Primary | | | 0 0 | 0 0 |
| TOD Large General Service Primary | 31 | | 2,218,830 # | 706 0 |
| TOD Large General Service Secondary | 31 | | 19,060,645 # | 4,611 4,067 |
| Space Heating - Secondary 1/ | 32 | | 60,259,122 # | 20,653 18,217 |
| TOTAL LARGE GENERAL | | | 1,104,607,698 # | 277,635 196,061 |
| Small Municipal Electric Service | 40 | | 4,390,629 # | 1,284 1,132 |
| Municipal Lighting - Primary | 41 | | 1,832,854 # | 602 0 |
| Municipal Lighting - Secondary | | | 19,526,235 # | 9,306 8,208 |
| TOTAL MUNICIPAL LIGHTING | | | 21,359,089 # | 9,908 8,208 |
| Municipal Pumping - Primary | 48 | | 14,814,237 # | 5,349 0 |
| Municipal Pumping - Secondary | | | 27,110,734 # | 9,839 8,679 |
| TOTAL MUNICIPAL PUMPING | | | 41,924,971 # | 15,189 8,679 |
| Outdoor Lighting | 52 | | 8,030,924 # | 2,839 2,500 |
| Interruptible Power Service | 39 | | 0 0 | 0 0 |
| IT Demand Response - 381 | 38 | | | 0 |
| IT Demand Response - 382 | | | | 0 |
| IT Demand Response - 380 | | | | 0 |
| | | | 33,995,798 # | 9,733 0 |
| TOTAL NORTH DAKOTA ELECTRIC | | | 2,167,314,139 # | 598,681 465,328 |

M27