

BEFORE THE
NORTH DAKOTA PUBLIC SERVICE COMMISSION

In the Matter of Montana-Dakota Utilities Co.,
a Division of MDU Resources Group, Inc.
2016 Electric Rate Increase Application

Case No. PU-16-666

DIRECT TESTIMONY
OF
JACOB M. THOMAS, P.E.

ON BEHALF OF THE
NORTH DAKOTA PUBLIC SERVICE COMMISSION
ADVOCACY STAFF

February 24, 2017

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1 **Q. Please state your name and place of employment.**

2 A. My name is Jacob M. Thomas. I am employed by GDS Associates, Inc.
3 (“GDS”), and my office is located at 1850 Parkway Place, Suite 800,
4 Marietta, Georgia 30067.

5 **Q. What position do you hold?**

6 A. I hold the position of Senior Project Manager.

7 **Q. On whose behalf are you submitting this testimony?**

8 A. I am submitting this testimony on behalf of North Dakota Public Service
9 Commission Advocacy Staff (“Staff”).

10 **Q. What is your educational background?**

11 A. I graduated from the Georgia Institute of Technology with a Bachelor of
12 Science in Industrial Engineering in 2000. I received a Master’s in
13 Business Administration with a concentration in Finance from Auburn
14 University in 2006.

15 **Q. Please describe your work experience.**

16 A. I began working with GDS in June 1996 as a cooperative student while
17 attending the Georgia Institute of Technology. After graduation in
18 December 2000, I accepted a full-time position in GDS’ Distribution
19 Services department and have risen to my current position of Senior
20 Project Manager in that department. In the past 20 years, I have provided
21 statistical, financial, and economic consulting to utilities and regulatory
22 agencies nationwide.

1 In the area of statistics, I have provided services to clients with
2 respect to load forecasting, market research, sample design, load
3 research, measurement and verification, and other statistical modeling. I
4 have produced dozens of load forecasts, managed multiple customer
5 survey processes, and performed impact evaluations of demand response
6 and energy efficiency programs for several clients. I have also evaluated
7 short-term and long-term price elasticity of demand for forecasting
8 purposes.

9 In the areas of finance and economics, I specialize in retail and
10 wholesale cost of service development and design, retail and wholesale
11 rate design, financial forecasting, economic impact analysis, and benefit-
12 cost analysis of demand response programs. In the past three years, I
13 have managed or had significant input into cost of service, rate design,
14 and financial forecasting projects for twenty different clients. I have
15 performed benefit-cost analyses for an additional eight clients in that time.

16 My resume is provided as exhibit PSC-8.

17 **Q. Do you have any professional registrations and memberships?**

18 A. Yes, I am a registered Professional Engineer in Georgia. I am a member
19 of the Institute of Industrial Engineers and the American Statistical
20 Association.

1 **Q. Have you testified in North Dakota in the past?**

2 A. I have not.

3 **Q. Have you testified in any other regulatory proceedings?**

4 A. I have testified as an expert witness in several other states and been a co-
5 author of joint reports filed in cases as well. I testified as an expert before
6 the Vermont Public Service board, providing testimony regarding the
7 economic impacts of continued operations of the Vermont Yankee nuclear
8 power plant. I testified in the area of weather normalization of gas sales
9 before the Michigan Public Service Commission. I also testified before the
10 North Carolina Utilities Commission, providing testimony supporting cost
11 of service computations for an intervenor. I have also been a co-author of
12 reports in connection to cases before the Delaware Public Service
13 Commission, the Kentucky Public Service Commission, and the Utah
14 Public Service Commission. In those joint reports, prepared in
15 coordination with other GDS experts, I was tasked with focusing on
16 demand response, load research, and load forecasting issues.

17

18 **TESTIMONY PURPOSE AND SUMMARY**

19 **Q. What is the purpose of your testimony?**

20 A. My testimony introduces revised cost of service results and revenue
21 allocations to rate classes reflecting the revenue requirement

1 recommended by Staff witness Richard A. Polich. Furthermore, I discuss
2 the load research study used by Montana-Dakota Utilities, Co. (“MDU”) to
3 estimate class contributions to demands used to allocated demand-related
4 costs in the cost of service study. Finally, I recommend changes to
5 several components of MDU’s proposed rate designs.

6 **Q. How is your testimony organized?**

7 A. I have organized my testimony into the following sections:

8 1. **Cost of Service** – Calculation of Cost of Service results that reflect all
9 adjustments to the revenue requirement recommended by Staff witness
10 Richard A. Polich.

11 2. **Recommended Revenue Allocation to Classes** – Allocation of the
12 revenue requirement to classes reflecting Staff witness Richard A.
13 Polich’s recommended revenue requirement.

14 3. **Load Research** – Review of and recommendations related to load
15 research supporting estimates for class demand allocators.

16 4. **Rate Design** – Recommendations related to rate design irrespective of
17 class revenue requirements.

18 5. **Conclusions** – Summary of testimony and recommendations.
19

20 **Q. Have you prepared any Exhibits?**

21 A. Yes, the following is a list of Exhibits included with my testimony:
22

| 1 | <u>EXHIBIT</u> | <u>DESCRIPTION</u> |
|---|-----------------------|---|
| 2 | PSC-8 | Jacob M. Thomas Resume |
| 3 | PSC-9 | Adjusted Cost of Service Results |
| 4 | PSC-10 | Adjusted Revenue Allocation to Customer Classes |
| 5 | PSC-11 | General Winter Bill Rate Comparisons |

6

7 **COST OF SERVICE**

8 **Q. What have you prepared with respect to cost of service?**

9 A. I have prepared a cost of service study that reflects all recommended
10 adjustments to the revenue requirement, including changes to
11 investments, and expenses made by Staff witness Richard A. Polich. The
12 resultant study outputs are shown in Exhibit PSC-9.

13 **Q. Please summarize how you prepared the Staff adjusted cost of
14 service study.**

15 A. I used MDU's electronic spreadsheet version of their cost of service
16 model provided in response to Staff Data Request 1 question 2. First,
17 I computed an updated version of the Cost of Service to reflect new
18 projected income statements and rate base for 2017. Then, I created
19 a second version of that model and adjusted certain inputs to reflect
20 the changes recommended by Mr. Polich.

1 **Q. Please describe how you prepared the Cost of Service that reflects**
2 **new projected information.**

3 A. I used revised projected income and rate base information provided
4 by MDU in their response to Staff Data Request Set 1, Question 1 to
5 obtain updated 2017 projections¹. I then input that data into the Cost
6 of Service model provided by MDU in response to Staff Data Request
7 Set 1, Question 2². I then checked to ensure that the resultant North
8 Dakota income statement and Rate of Return from my Cost of Service
9 model matched that in the data supplied by MDU in response to Staff
10 Data Request Set 1 Question 1.

11 **Q. Please describe how you prepared the Cost of Service that reflects**
12 **Mr. Polich's recommended adjustments.**

13 A. I started with the Cost of Service model that reflects the updated 2017
14 projections, described above. Then, I adjusted certain inputs in the
15 Cost of Service model to reflect those adjustments recommended by
16 Staff witness Mr. Polich. The following list describes each of the
17 adjustments I made to produce the adjusted study.

¹ Two Excel files as provided by MDU were used to update all inputs into the Cost of Service model: "ND Elec Rate Base 16 – Excl Wind.xlsm" and "ND Electric Income Statement (2016).xlsx".

² The Cost of Service Model was provided in Excel format and is called "Response No. 1.2 Statement M.xlsx"

- 1 • Production plant in service and accumulated depreciation
- 2 rate base adjustments and an adjustment to production
- 3 plant depreciation expense to reflect Mr. Polich's
- 4 recommendations with respect to the Lewis & Clark RICE
- 5 units.
- 6 • Working capital adjustments in rate base to reflect Mr.
- 7 Polich's recommendations with respect to the loss on the
- 8 sale of housing and plant decommissioning.
- 9 • Adjustment to operating expenses to reflect recommended
- 10 adjustment to bonus and incentive compensation expenses.
- 11 • Adjustments to accumulated deferred income tax in working
- 12 capital and income tax expenses to reflect the tax
- 13 implications of the all adjustments recommended by Mr.
- 14 Polich.

15 **Q. Please summarize the resultant adjusted cost of service results.**

16 A. Table JMT 1 provides the North Dakota system and class rates of
17 return for the MDU cost of service as filed and for the Cost of Service
18 model that reflects the updated 2017 projections. Furthermore, I
19 show the relative rate of return, which is the class rate of return
20 divided by the North Dakota system rate of return.

21 Table JMT 2 provides the rates of return and relative rates of
22 return for the Cost of Service that reflects the updated 2017

1 projections and the model adjusted to reflect Staff's recommended
 2 adjustments.

3 **TABLE JMT-1**
Comparison of North Dakota Class Cost of Service Rates of Return
As Filed COS versus COS Adjusted to Reflect Updated 2017 Projections

| Line No. | Class | As Filed MDU ROR ¹ | As Filed Relative ROR ² | Updated 2017 ROR | Updated 2017 Relative ROR ³ |
|----------|---------------------------------------|----------------------------------|---------------------------------------|---------------------|---|
| (a) | (b) | (c) | (d) | (e) | (f) |
| 1 | Residential Rate 10 | 3.818% | 0.654 | 4.027% | 0.665 |
| 2 | Small General Rate 20 | 5.395% | 0.924 | 5.638% | 0.931 |
| 3 | Irrigation Rate 25 | -1.195% | (0.205) | -1.012% | (0.167) |
| 4 | Large General Primary Rate 30 | 7.580% | 1.298 | 7.781% | 1.284 |
| 5 | Large General Secondary Rate 30 | 8.416% | 1.441 | 8.636% | 1.426 |
| 6 | TOD Large General Rate 31 Primary | 4.198% | 0.719 | 4.010% | 0.662 |
| 7 | TOD Large General Rate 31 Secondary | 5.844% | 1.001 | 6.060% | 1.000 |
| 8 | Space Heating Rate 32 | 6.077% | 1.041 | 6.233% | 1.029 |
| 9 | Small Municipal Rate 40 | 2.701% | 0.463 | 3.135% | 0.517 |
| 10 | Municipal Lighting Rate Primary 41 | 13.080% | 2.240 | 13.420% | 2.215 |
| 11 | Municipal Lighting Rate Secondary 41 | 10.847% | 1.858 | 11.516% | 1.901 |
| 12 | Municipal Pumping Primary Rate 48 | 2.020% | 0.346 | 2.261% | 0.373 |
| 13 | Municipal Pumping Secondary Rate 48 | 4.070% | 0.697 | 4.349% | 0.718 |
| 14 | Outdoor Lighting Rate 52 | 11.879% | 2.034 | 12.011% | 1.983 |
| 15 | Interruptible Demand Response Rate 38 | 6.616% | 1.133 | 6.844% | 1.130 |
| 16 | Total North Dakota | 5.839% | 1.000 | 6.058% | 1.000 |

12 1 - From Statement M, Pages 1-15.

2 - Column C in each row divided by column C, line 16, Total North Dakota, 5.839%.

3 - Column E in each row divided by column E, line 16, Total North Dakota, 6.058%.

13 **TABLE JMT-2**
Comparison of North Dakota Class Cost of Service Rates of Return
COS Adjusted to Reflect Updated 2017 Projections versus COS Adjusted to Reflect Staff Recommendations

| Line No. | Class | Updated 2017 ROR | Updated 2017 Relative ROR ¹ | Staff Adjusted ROR | Staff Adjusted Relative ROR ² |
|----------|---------------------------------------|---------------------|---|-----------------------|---|
| (a) | (b) | (c) | (d) | (e) | (f) |
| 1 | Residential Rate 10 | 4.027% | 0.665 | 4.643% | 0.690 |
| 2 | Small General Rate 20 | 5.638% | 0.931 | 6.273% | 0.933 |
| 3 | Irrigation Rate 25 | -1.012% | (0.167) | -0.407% | (0.061) |
| 4 | Large General Primary Rate 30 | 7.781% | 1.284 | 8.525% | 1.267 |
| 5 | Large General Secondary Rate 30 | 8.636% | 1.426 | 9.396% | 1.397 |
| 6 | TOD Large General Rate 31 Primary | 4.010% | 0.662 | 4.910% | 0.730 |
| 7 | TOD Large General Rate 31 Secondary | 6.060% | 1.000 | 6.729% | 1.000 |
| 8 | Space Heating Rate 32 | 6.233% | 1.029 | 6.940% | 1.032 |
| 9 | Small Municipal Rate 40 | 3.135% | 0.517 | 3.588% | 0.533 |
| 10 | Municipal Lighting Rate Primary 41 | 13.420% | 2.215 | 14.978% | 2.227 |
| 11 | Municipal Lighting Rate Secondary 41 | 11.516% | 1.901 | 11.918% | 1.772 |
| 12 | Municipal Pumping Primary Rate 48 | 2.261% | 0.373 | 2.797% | 0.416 |
| 13 | Municipal Pumping Secondary Rate 48 | 4.349% | 0.718 | 4.937% | 0.734 |
| 14 | Outdoor Lighting Rate 52 | 12.011% | 1.983 | 13.004% | 1.933 |
| 15 | Interruptible Demand Response Rate 38 | 6.844% | 1.130 | 7.486% | 1.113 |
| 16 | Total North Dakota | 6.058% | 1.000 | 6.727% | 1.000 |

17 1 - Column C in each row divided by column C, line 16, Total North Dakota, 6.058%.

18 2 - Column E in each row divided by column E, line 16, Total North Dakota, 6.727%.

1 Although the class-by-class rates of return are similar in all
2 three versions of the Cost of Service, the Staff recommended
3 adjustments do narrow the range of outcomes. By observing the
4 relative ROR statistic, one can see that the range of class returns as a
5 ratio of the overall North Dakota system return narrows under the
6 Staff recommended version. Relative rates of return range from
7 -0.205 to 2.240 under the MDU filed Cost of Service. Under the Staff
8 adjusted Cost of Service, relative rates of return range from -0.061 to
9 2.227.

10

11 REVENUE ALLOCATION TO CLASSES

12 **Q. Please describe your recommended revenue allocation.**

13 A. I started with the overall revenue requirement as recommended by Staff
14 witness Richard A. Polich. Mr. Polich recommends a base rate revenue
15 increase of \$513,316. Then, I evaluated the rates of return by class from
16 the Staff adjusted cost of service, as shown in Table JMT 2 above.
17 Finally, I prepared an allocation of the Staff recommended rate increase to
18 the classes as shown in Table JMT 3 below:

TABLE JMT-3
Staff Recommended Base Rate Revenue Increases by Customer Class

| Customer Class | Recommended Rate Increase* | |
|-----------------------------|----------------------------|-------|
| | Amount (\$000) | % |
| Residential Service | \$316 | 0.43% |
| Small General Service | \$45 | 0.35% |
| Large General Service | \$136 | 0.15% |
| Lighting | \$3 | 0.15% |
| Municipal Pumping | \$15 | 0.55% |
| Total North Dakota Electric | \$515 | 0.28% |

*Exclusive of Renewable Rider and Transmission Cost Adjustment Rider.

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Q. Please describe how you allocated Mr. Polich's recommended revenue increase to the various customer classes.

A. MDU witness Tamie Aberle describes the method by which the Company allocated their requested revenue increase to the classes. On page 6 of her direct testimony in lines 8-14, she describes a two-step process used to determine the maximum and minimum increases to be placed on any one class because "It was determined that mitigation was necessary in order to balance the fair return standard with the recognition of customer impacts." I employed a similar two-step process to Ms. Aberle, although I modified it to reflect the lower overall percent increase recommended by Staff witness Polich. I set a maximum percent increase of 2.0 times the

1 overall North Dakota recommended increase and a minimum of 0.5 times
2 the overall increase. The resultant maximum increase is 0.56% and
3 minimum increase is 0.14%. Exhibit PSC-10, page 1 shows the revenue
4 allocation I recommend.

5 Next, I looked at the class rates of return prior to the revenue
6 increase, and assigned minimum and near minimum increases to the two
7 classes earning higher than system rates of return. Total Lighting and
8 Total General Service received a 0.15% increase.

9 Total Municipal Pumping, which currently has a rate of return below
10 the North Dakota system was then assigned the highest rate increase of
11 0.55%. Next, the Total General Service increase was set at 0.35% to
12 recognize it has a lower than system return but higher return than
13 Residential and Municipal Pumping. The Residential increase was then
14 computed to recover the remaining revenue increase, which results in an
15 increase of 0.43%.

16 My recommended revenue allocation provides for reasonable
17 increases on all classes and moves all classes closer to equitable rates of
18 return, as shown in Table JMT 4.

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TABLE JMT-4
Resultant Rates of Return After Staff Recommended Revenue Increases

| Customer Class | Prior to Rate Increase | | After Rate Increase | |
|-------------------------------|------------------------|--------------|---------------------|--------------|
| | Rate of Return | Relative ROR | Rate of Return | Relative ROR |
| Residential Service | 4.643% | 0.690 | 4.724% | 0.696 |
| Small General Service | 6.103% | 0.907 | 6.174% | 0.909 |
| Large General Service | 9.050% | 1.345 | 9.088% | 1.339 |
| Lighting | 12.314% | 1.831 | 12.344% | 1.818 |
| Municipal Pumping | 4.252% | 0.632 | 4.357% | 0.642 |
| 1 Total North Dakota Electric | 6.727% | 1.000 | 6.789% | 1.000 |

2

3 **LOAD RESEARCH**

4 **Q. What did you review with respect to MDU's load research?**

5 A. In response to Staff data request Set 2, Question 30, MDU provided
6 several spreadsheets and responses describing the load research used in
7 their cost of service study allocator development. I reviewed this
8 information to ascertain if industry standard techniques were used by
9 MDU. The load research information is used to compute the 12-CP
10 demands for each class and is therefore an important aspect of MDU's
11 cost of service model.

1 **Q. Do you have any recommended adjustments to the load research**
2 **study?**

3 A. Yes, I do. I recommend MDU use a different methodology for sample
4 selection. I also recommend MDU use a different methodology to
5 perform the data expansion to expand sample demands to class
6 demands. I will discuss each in more detail below.

7 **Q. How does MDU select its load research samples?**

8 A. According to MDU's response to Staff data request Set 2, Question
9 30.c: "Montana-Dakota prepared random samples for rate classes
10 having sufficient numbers of customers to make a census impractical
11 and for which interval data were available." In load research, when
12 interval data is used for every customer in a class, it is called a
13 census. The sample size was designed to achieve a 90% confidence
14 level with a 10% error tolerance. For the sampled classes, the
15 Company randomly selected accounts that had 12 months of 2015
16 billing data. Data for all customers on Rate class 130 were included
17 so this class was not sampled. Very small sample sizes were used in
18 some cases including class 250 (2 out of 40 accounts), class 300 (2
19 out of 36 accounts), class 323 (2 out of 536 accounts), and class 400
20 (8 out of 39 accounts).

21

1 **Q. What changes do you recommend for sample design and selection?**

2 A. I recommend that MDU generally employ a stratified random sampling
3 scheme for its load research program. With a stratified random
4 sample, the class is divided into strata and a random sample of
5 customers from each stratum are drawn. If the individual strata of
6 customers are more homogenous than the overall population, then
7 stratification can increase the precision of sample estimates and/or
8 reduce the overall sample size required. For those classes that have
9 demand charges and demands are recorded in MDU's billing system,
10 then the demand can be a natural stratification variable. For other
11 classes, stratifying based on energy is often employed in the industry.
12 For classes with very few customers (less than 50) or classes with
13 highly homogenous load characteristics, a simple random sample is
14 likely to be equally representative and provide similar precision to a
15 stratified approach. For classes with fewer than 50 accounts, using
16 interval data for all customers is preferable to either a stratified or
17 simple random sample.

18 **Q. What changes do you recommend for the data expansion?**

19 A. Data expansion is the process by which a load researcher uses the
20 sample data to expand it to represent the entire rate class. Based on
21 MDU's response to Staff data request 2, question 30, I conclude that
22 MDU uses a mean-per unit ("MPU") expansion approach. In an MPU

1 expansion, the load research data is used to calculate a variable of
2 interest (for instance, a CP demand for a given month) on a per-
3 customer basis. That variable per customer ratio is then multiplied by
4 the total number of customers in the class to estimate the variable of
5 interest for the entire class.

6 I recommend MDU change to a ratio expansion technique. In
7 ratio expansion, correlation of the variable of interest with another
8 variable that is available for the sample customers and the population
9 is used to obtain increased precision in the expanded estimate. As
10 described in the *Load Research Manual*, produced by the Association
11 of Edison Illuminating Companies:

12 “Ratio estimation is a technique that can take advantage of the
13 correlation of the variable of interest y with another variable x to obtain
14 increased precision. Class demand estimates for rate classes and
15 other populations with ‘known’ total energy use X are adjusted by the
16 ratio of demand y to energy use x for the sample. When x and y are
17 sufficiently correlated, the relative variance of the estimated ratio is
18 less than the relative variance of either x or y alone. That is,
19 knowledge of x provides information about y . As a result, the ratio
20 estimator has better precision than the mean-per-unit estimator, which
21 ignores the information about x .”³

22
23 This paragraph concludes that, if there is positive correlation
24 between class energy and class demand, then the ratio estimation
25 technique will improve precision. Given the high likelihood that such a

³ Association of Edison Illuminating Companies. *Load Research Manual*. 2nd ed. 2001. Page 7-8.

1 positive correlation exists for MDU's rate classes, I recommend use of
2 the ratio estimation technique to improve the precision of demand
3 estimates.

4 **Q. Do you recommend these adjustments to the load research be**
5 **incorporated into MDU's cost of service and rate design for Case PU-**
6 **16-666?**

7 A. I do not recommend that these changes be made in this case.
8 Changing the sample requires starting the load research process from
9 step 1 and could not be accomplished in a timely manner for the
10 purposes of this case. Rather, I recommend MDU make these
11 changes to its load research program for future rate case and other
12 load research needs.

13

14 **RATE DESIGN**

15 **Q. Please summarize the issues you will discuss with respect to rate**
16 **design.**

17 A. I make recommendations with respect to the rate design for three rates:
18 Residential Service Rate 10, Optional Residential ETS Rate 13, and SGS
19 Rate 20. I also discuss the concept of a residential demand rate as a
20 future concept for MDU to consider.

1 **Q. What do you recommend regarding rate design for Residential**
2 **Service Rate 10?**

3 A. I recommend MDU eliminate the declining block rate for the energy charge
4 in winter months. A declining block rate design is typically one that
5 incorporates customer-related fixed costs into the first energy block when
6 the basic service charge does not recover full customer-related costs.
7 With MDU's proposed basic service charge of \$0.65 per day, the full
8 customer-related cost is being recovered through the basic service
9 charge, eliminating the need to recover additional customer costs in the
10 first 750 kWh per month in winter months.

11 Furthermore, the long-run marginal cost of energy produced is
12 increasing and not decreasing, as utilities rely on newer and more
13 emission-efficient units to produce marginal energy in the future. A
14 declining block rate does not reflect the fact that marginal costs will
15 increase over the long-run.

16 **Q. How does moving from a declining block rate to a flat rate in the**
17 **winter impact residential consumers?**

18 A. Changing the rate structure in winter months to a flat energy charge will
19 help ease the impacts on low usage customers associated with the
20 increasing Basic Service Charge. In Exhibit PSC-11, I provide general
21 winter bill rate comparisons that demonstrate that fact. On page 1, I show
22 a comparison of the present Rate 10 for winter months versus MDU's

1 proposed rate with the declining block rate. On page 2, I show a
2 comparison of the present Rate 10 for winter months versus a flat rate
3 energy charge designed to recover the same revenue for those kWh as
4 MDU's proposed design. When comparing the bills at lower usage levels,
5 it is clear that the flat energy charge helps lower usage customers absorb
6 the impact of increasing the Basic Service Charge. For instance, looking
7 at line 7 on pages 1 and 2 of Exhibit PSC-11, a customer that uses 500
8 kWh in a given winter month will see an increase of \$8.14, or 13.7%, on
9 that bill under MDU's proposed rates with a declining energy block. Under
10 the flat energy charge, that customer would see a \$2.31, or 3.9%,
11 increase on that bill.

12 Q. **How did you compute the flat energy charge you used in Exhibit**
13 **PSC-11, Page 2?**

14 A. I used the rate design statements provided by MDU to compute a flat
15 energy charge in winter months of \$0.04900 per kWh. In Statement N,
16 page 7, MDU shows that the winter energy charges are designed to
17 recover \$25,688,615 in revenue over 524,290,825 kWh. That results in an
18 average rate of \$0.04900 per kWh, which is what I used for the rate
19 comparison in Exhibit PSC-11 page 2.

1 **Q. What recommendations do you have for Residential Electric Thermal**
2 **Storage Service Rate 13?**

3 A. To be consistent with the design of the Residential Service Rate 10, I
4 recommend MDU eliminate the declining block energy charge in the winter
5 on-peak energy component of the rate. The same reasoning with respect
6 to recovery of customer-related fixed costs and reflecting that marginal
7 costs will increase over the long-run apply to the Residential Electric
8 Thermal Storage customers during their on-peak period.

9 **Q. What recommendations do you have for Small General Service Rate**
10 **20?**

11 A. To be consistent with the design of the Residential Service Rate 10, I
12 recommend MDU eliminate the declining block energy charge in the winter
13 on-peak energy component of the rate. The same reasoning with respect
14 to recovery of customer-related fixed costs and reflecting that marginal
15 costs will increase over the long-run apply to the Small General Service
16 class of customers.

17 **Q. Have you prepared rate comparisons that demonstrate the**
18 **comparative impacts of this change on Rate 20?**

19 A. I have, they are shown in Exhibit PSC-11 pages 3 and 4. The flat energy
20 charge was computed in a manner consistent with the approach I
21 described for Rate 10, using Schedule N page 10.

22

1 **CONCLUSION**

2 **Q. Can you summarize the recommendations you make in your**
3 **testimony?**

4 A. Yes. First, I have prepared and presented adjusted cost of service results
5 that reflect the adjustments recommended by Staff witness Richard A.
6 Polich. Second, I have developed a recommended schedule of revenue
7 increase allocations to the rate classes that reflect the total North Dakota
8 system revenue requirements recommended by Mr. Polich.

9 I also reviewed MDU's load research information provided in this
10 case and have made two recommendations for future load research
11 studies. I recommend using a stratified random sampling technique for
12 selecting samples in the next load research study. I also recommend
13 using a ratio estimation technique to expand the sample data into class
14 demand estimates.

15 Finally, I have recommended elimination of the declining block
16 energy charge structure for Rate 10, Rate 13, and Rate 20 winter months.
17 I prepared rate comparisons that demonstrate eliminating the declining
18 block structure helps lower usage customers absorb the bill increases
19 associated with increasing the Basic Service Charges on those rates.

20 **Q. Does this conclude your testimony?**

21 A. Yes, it does.

STATE OF NORTH DAKOTA

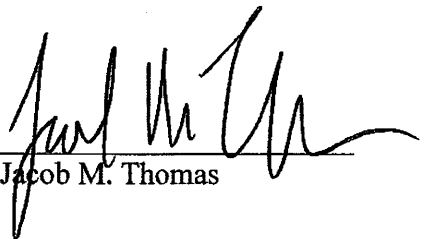
BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

In the Matter of the Application of
MONTANA-DAKOTA UTILITIES CO.,
A Division of MDU Resources Group, Inc.
for authority to Increase Rates for Electric Service in North Dakota

Case No. PU-16-666

AFFIDAVIT OF
Jacob M. Thomas

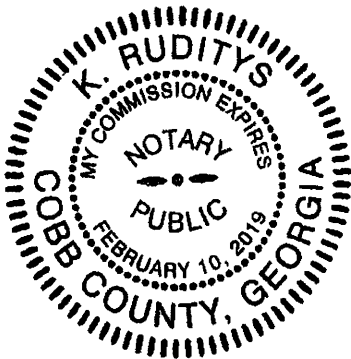
I, the undersigned, being duly sworn, depose and say that the foregoing is the Direct Testimony of the undersigned, and that such Direct Testimony and the exhibits or schedules sponsored by me to the best of my knowledge, information and belief, are true, correct, accurate and complete, and I hereby adopt said testimony as if given by me in formal hearing, under oath.


Jacob M. Thomas

Subscribed and sworn to before me
this 24th day of February, 2017.


Notary Public

SEAL





JACOB M. THOMAS, P.E.
Senior Project Manager

EDUCATION

Master of Business Administration, Finance, Auburn University, 2006

Bachelor of Science in Industrial Engineering, Cooperative Program, With Highest Honors, Georgia Institute of Technology, 2000

PROFESSIONAL REGISTRATION

Registered Professional Engineer in the State of Georgia

PROFESSIONAL MEMBERSHIPS

National Society of Professional Engineers (NSPE)
American Statistical Association (ASA)
Institute of Industrial Engineers (IIE)

PROFESSIONAL EXPERIENCE

GDS Associates, Inc., June 1996 to Present

Employed as cooperative student and began full time employment in 2000. During his career at GDS, Mr. Thomas has developed expertise and experience in many areas of utility practice including load & financial forecasting, residential consumer surveys, load research, cost of service studies, retail and wholesale rate design, economic impact analysis, benefit-cost analyses, load management evaluation, statistical impact analysis, and market research.

PROJECT EXPERIENCE

General Experience Includes:

- Designed cost of service models and performed retail rate analysis for municipals and cooperatives in Alabama, Alaska, Arkansas, Florida, Georgia, Indiana, Massachusetts, Ohio, Pennsylvania, South Carolina, Texas, and Virginia. Specific work has included development of cost allocation factors in various areas of operation, calculation of impacts of rate changes to customers, determination of the company's financial competitive position, classification of plant investment and operating expenses, development of pro forma financial statements, and alternative rate design calculations.
- Designed a cost of service model template for use by Hoosier Energy. Developed a functional

- spreadsheet-based model and performed a training seminar with Hoosier staff.
- Prepared financial forecasts for electric cooperatives in South Carolina, Virginia, Tennessee and Georgia, and for municipals in Arkansas and Pennsylvania. Work included regression analysis, review of current long-term debt situation, customer and demand forecasts, plant forecasts, and sensitivity analysis.
 - Completed an economic impact analysis of instituting a Renewable Portfolio Standard in the state of North Carolina. Direct, indirect, and induced job impacts were measured for construction, operations and maintenance, and pertinent fuel supplies for various conventional and renewable resources, as well as effects of electricity price increases on residential and commercial consumers.
 - Economic impact analysis of continued operation of nuclear power plant in Vermont. Analysis included impacts to Vermont economy in general, Vermont government, and in-state utility ratepayers. Prepared testimony as an expert witness on economic analysis on behalf of the Department of Public Service.
 - Expert witness in a natural gas retail rate study in Michigan. Subject of testimony was weather normalization methodologies in forecasting.
 - Developed state-wide energy supply and consumption projections by major customer classification and type of fuel for Vermont Department of Public Service and Virginia Department of Mines, Minerals, and Energy. Utilized Energy Information Administration data and econometric and trending techniques to complete projections.
 - Assisted in development of wholesale rates for G&Ts in Indiana, Minnesota and Wisconsin. Work involved projections of cost pools and billing units, development of pro forma rates and impacts on member systems, evaluation of rate alternatives and riders, and considering the implications of an aggressive load management program.
 - Instructor at Institute of Public Utilities Forecasting Workshop held in 2012. Taught on the subject of Statistically Adjusted End-Use models.

REGULATORY EXPERIENCE

- Delaware Public Service Commission (Co-Author of Joint Report – Evaluation of Delmarva Power & Light Integrated Resource Plan)
- Kentucky Public Service Commission (Panel Representative in Big Rivers Electric Corporation Integrated Resource Plan)
- Michigan Public Service Commission (Expert Witness – Weather Normalization)
- North Carolina Utilities Commission (Expert Witness – Cost of Service Modeling)
- Utah Public Service Commission (Co-Author of Joint Report – Evaluation of PacifiCorp Load Forecast)
- Vermont Public Service Board (Expert Witness – Economic Impact Analysis of Vermont Yankee)