

**Montana-Dakota Utilities Co.
Electric Utility - South Dakota
Lambda and Capacity Costs
July 2016 through June 2017**

Month		Lambda		
		On-Peak \$/MWh	Off-Peak \$/MWh	Total \$/MWh
July	2016	\$29.86	\$29.85	\$29.85
August	2016	28.09	28.06	28.07
September	2016	22.08	21.98	22.00
October	2016		22.48	22.48
November	2016		22.98	22.98
December	2016		28.54	28.54
January	2017		31.03	31.03
February	2017		30.70	30.70
March	2017		25.21	25.21
April	2017		21.61	21.61
May	2017		23.05	23.05
June	2017	24.16	24.16	24.16
Average		\$26.05	\$25.80	\$25.81

Monthly Capacity Payments

Rate 96	\$7.189	\$/kW-Month	(Cost of an installed peaking combustion turbine)
Rate 97	\$30.512	\$/kW-Month	(Cost of an installed baseload unit)

**Montana-Dakota Utilities Co.
Electric Utility - South Dakota
Calculation of Capacity Payments
July 2016 through June 2017**

Rate 96

Monthly Capacity Payments: \$7.189 \$/kW-Month Cost of an installed peaking combustion turbine

Capital cost of combustion turbine	\$874	
Escalation rate	3%	
Levelized Fixed Charge	9.583%	1/

Rate 96 Capacity Payment formula: = \$874 x 1.03^(2017-2016) x .09583 / 12

Rate 97

Monthly Capacity Payments: \$30.512 \$/kW-Month Cost of an installed baseload unit

Capital cost of installed baseload unit	\$3,882	
Escalation rate	3%	
Levelized Fixed Charge	9.157%	2/

Rate 96 Capacity Payment formula: = \$3,882 x 1.03^(2017-2016) x .09157 / 12

1/ See Attachment A pages 3-5. Turbine with 35-year book life.

2/ See Attachment A pages 6-8. Base load unit with 50-year book life.

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Levelized Fixed Charge Rate - CT**

Summary of Results

Sum of Present Values 1/	1.212066
Capital Recovery Factor 2/	0.079060
Levelized Fixed Charge 3/	<u>9.583%</u>

Assumptions

ROR	7.216%
ROR with taxes	9.713%
Federal Tax Rate	35.000%
State Tax Rate	
Combined Federal/State Tax Rate	35.0000%
1 - Tax Rate	65.0000%
Service Life of Asset (in years)	35
Tax Life (in years - 5, 7, 10, 15, 20 , or 39)	15

1/ Sum of annual net present values.

2/ $((+ROR*(1+ROR)^{book\ life})/((1+ROR)^{book\ life}-1))$.

3/ Product of annual present value x capital recovery factor.

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Levelized Fixed Charge Rate - CT**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Rev. Requ. As % (Net Investment)	Return	Book Depr.	O&M	Ad Valorem Tax	Total Charge	Present Value Factor	Present Value	Accum. Present Value	LFCR	Tax Depr. Accel.	Deferred Income Tax	
1	1	1.000	0.09713	0.02857	0.00000	0.00846	0.13416	0.93270	0.12513	0.12513	0.13416	0.05000	0.00750
2	2	0.964	0.09363	0.02857	0.00000	0.00846	0.13066	0.86992	0.11366	0.23879	0.13247	0.09500	0.02325
3	3	0.912	0.08859	0.02857	0.00000	0.00846	0.12562	0.81137	0.10193	0.34072	0.13035	0.08550	0.01993
4	4	0.864	0.08388	0.02857	0.00000	0.00846	0.12091	0.75677	0.09150	0.43223	0.12823	0.07700	0.01695
5	5	0.818	0.07946	0.02857	0.00000	0.00846	0.11649	0.70583	0.08222	0.51445	0.12620	0.06930	0.01426
6	6	0.775	0.07530	0.02857	0.00000	0.00846	0.11233	0.65833	0.07395	0.58840	0.12427	0.06230	0.01181
7	7	0.735	0.07138	0.02857	0.00000	0.00846	0.10841	0.61402	0.06657	0.65497	0.12245	0.05900	0.01065
8	8	0.696	0.06757	0.02857	0.00000	0.00846	0.10460	0.57269	0.05990	0.71487	0.12072	0.05900	0.01065
9	9	0.656	0.06376	0.02857	0.00000	0.00846	0.10079	0.53415	0.05384	0.76871	0.11907	0.05910	0.01069
10	10	0.617	0.05995	0.02857	0.00000	0.00846	0.09698	0.49820	0.04831	0.81703	0.11749	0.05900	0.01065
11	11	0.578	0.05614	0.02857	0.00000	0.00846	0.09317	0.46467	0.04329	0.86032	0.11597	0.05910	0.01069
12	12	0.539	0.05232	0.02857	0.00000	0.00846	0.08936	0.43340	0.03873	0.89905	0.11450	0.05900	0.01065
13	13	0.499	0.04852	0.02857	0.00000	0.00846	0.08555	0.40423	0.03458	0.93363	0.11308	0.05910	0.01069
14	14	0.460	0.04470	0.02857	0.00000	0.00846	0.08173	0.37702	0.03082	0.96444	0.11171	0.05900	0.01065
15	15	0.421	0.04089	0.02857	0.00000	0.00846	0.07792	0.35165	0.02740	0.99184	0.11039	0.05910	0.01069
16	16	0.382	0.03708	0.02857	0.00000	0.00846	0.07411	0.32798	0.02431	1.01615	0.10911	0.02950	0.00033
17	17	0.353	0.03427	0.02857	0.00000	0.00846	0.07130	0.30591	0.02181	1.03796	0.10791	0.00000	(0.01000)
18	18	0.334	0.03247	0.02857	0.00000	0.00846	0.06950	0.28532	0.01983	1.05779	0.10680	0.00000	(0.01000)
19	19	0.316	0.03067	0.02857	0.00000	0.00846	0.06770	0.26611	0.01802	1.07581	0.10578	0.00000	(0.01000)
20	20	0.297	0.02886	0.02857	0.00000	0.00846	0.06589	0.24820	0.01635	1.09216	0.10483	0.00000	(0.01000)
21	21	0.279	0.02706	0.02857	0.00000	0.00846	0.06409	0.23150	0.01484	1.10700	0.10394	0.00000	(0.01000)
22	22	0.260	0.02525	0.02857	0.00000	0.00846	0.06229	0.21592	0.01345	1.12045	0.10312	0.00000	(0.01000)
23	23	0.241	0.02345	0.02857	0.00000	0.00846	0.06048	0.20139	0.01218	1.13263	0.10234	0.00000	(0.01000)

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Levelized Fixed Charge Rate - CT**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Rev. Requ. As % (Net Investment)	Return	Book Depr.	O&M	Ad Valorem Tax	Total Charge	Present Value Factor	Present Value	Accum. Present Value	LFCR	Tax Depr. Accel.	Deferred Income Tax	
Year	Year												
24	24	0.223	0.02165	0.02857	0.00000	0.00846	0.05868	0.18783	0.01102	1.14365	0.10161	0.00000	(0.01000)
25	25	0.204	0.01984	0.02857	0.00000	0.00846	0.05687	0.17519	0.00996	1.15361	0.10093	0.00000	(0.01000)
26	26	0.186	0.01804	0.02857	0.00000	0.00846	0.05507	0.16340	0.00900	1.16261	0.10028	0.00000	(0.01000)
27	27	0.167	0.01623	0.02857	0.00000	0.00846	0.05327	0.15240	0.00812	1.17073	0.09967	0.00000	(0.01000)
28	28	0.149	0.01443	0.02857	0.00000	0.00846	0.05146	0.14214	0.00732	1.17804	0.09909	0.00000	(0.01000)
29	29	0.130	0.01263	0.02857	0.00000	0.00846	0.04966	0.13258	0.00658	1.18463	0.09855	0.00000	(0.01000)
30	30	0.111	0.01082	0.02857	0.00000	0.00846	0.04785	0.12366	0.00592	1.19054	0.09803	0.00000	(0.01000)
31	31	0.093	0.00902	0.02857	0.00000	0.00846	0.04605	0.11533	0.00531	1.19586	0.09754	0.00000	(0.01000)
32	32	0.074	0.00722	0.02857	0.00000	0.00846	0.04425	0.10757	0.00476	1.20062	0.09708	0.00000	(0.01000)
33	33	0.056	0.00541	0.02857	0.00000	0.00846	0.04244	0.10033	0.00426	1.20487	0.09664	0.00000	(0.01000)
34	34	0.037	0.00361	0.02857	0.00000	0.00846	0.04064	0.09358	0.00380	1.20868	0.09622	0.00000	(0.01000)
35	35	0.019	0.00180	0.02857	0.00000	0.00846	0.03884	0.08728	0.00339	1.21207	0.09583	0.00000	(0.01000)

- (1) Prior year's Net investment - Book Depreciation - Deferred Income Tax.
- (2) Return (adjusted for taxes) x Net Investment.
- (3) Depreciation rate based on the life of the investment.
- (4) Distribution O&M expense as percent of distribution plant.
- (5) Ad valorem tax rate on distribution plant.
- (6) Sum of return, depreciation, O&M and ad valorem taxes.
- (7) Present value factor reflecting overall rate of return.
- (8) Present value factor x total charge.
- (9) Accumulated present value.

**Montana-Dakota Utilities Co.
 Electric Utility- South Dakota
 2016 Avoided Cost Rate Update
 Levelized Fixed Charge Rate - CT**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Rev. Requ.		Book		Ad Valorem	Total	Present	Present	Accum.		Tax	Deferred
Year	As % (Net	Return	Depr.	O&M	Tax	Charge	Value	Value	Present	LFCR	Depr.	Income
	Investment)						Factor		Value		Accel.	Tax
(10)	Levelized fixed charge rate = accumulated present value x $((+ROR*(1+ROR)^{book\ life})/((1+ROR)^{book\ life}-1))$											
(11)	Tax depreciation rates for a CT uses a 15 year tax life.											
(12)	(Tax life - book life) x tax rate.											

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Levelized Fixed Charge Rate - Baseload**

Summary of Results

Sum of Present Values 1/	1.230011
Capital Recovery Factor 2/	0.074445
Levelized Fixed Charge 3/	<u>9.157%</u>

Assumptions

ROR	7.216%
ROR with taxes	9.713%
Federal Tax Rate	35.000%
State Tax Rate	
Combined Federal/State Tax Rate	35.0000%
1 - Tax Rate	65.0000%
Service Life of Asset (in years)	50
Tax Life (in years - 5, 7, 10, 15, 20 , or 39)	20

1/ Sum of annual net present values.

2/ $((+ROR*(1+ROR)^{book\ life})/((1+ROR)^{book\ life}-1))$.

3/ Product of annual present value x capital recovery factor.

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Calculation of Levelized Fixed Charge Rate - Baseload**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Rev. Requ. As % (Net Investment)	Return	Book Depr.	O&M	Ad Valorem Tax	Total Charge	Present Value Factor	Present Value	Accum. Present Value	LFCR	Tax Depr. Accel.	Deferred Income Tax	
Year													
1	1	1.000	0.09713	0.02000	0.00000	0.00846	0.12559	0.93270	0.11714	0.11714	0.12559	0.03750	0.00613
2	2	0.974	0.09459	0.02000	0.00000	0.00846	0.12305	0.86992	0.10705	0.22418	0.12437	0.07219	0.01827
3	3	0.936	0.09088	0.02000	0.00000	0.00846	0.11934	0.81137	0.09683	0.32101	0.12280	0.06677	0.01637
4	4	0.899	0.08734	0.02000	0.00000	0.00846	0.11580	0.75677	0.08764	0.40865	0.12123	0.06177	0.01462
5	5	0.865	0.08398	0.02000	0.00000	0.00846	0.11244	0.70583	0.07936	0.48801	0.11971	0.05713	0.01300
6	6	0.832	0.08078	0.02000	0.00000	0.00846	0.10924	0.65833	0.07191	0.55992	0.11825	0.05285	0.01150
7	7	0.800	0.07772	0.02000	0.00000	0.00846	0.10618	0.61402	0.06519	0.62512	0.11687	0.04888	0.01011
8	8	0.770	0.07479	0.02000	0.00000	0.00846	0.10325	0.57269	0.05913	0.68425	0.11555	0.04522	0.00883
9	9	0.741	0.07199	0.02000	0.00000	0.00846	0.10045	0.53415	0.05366	0.73791	0.11430	0.04462	0.00862
10	10	0.713	0.06921	0.02000	0.00000	0.00846	0.09767	0.49820	0.04866	0.78657	0.11311	0.04461	0.00861
11	11	0.684	0.06643	0.02000	0.00000	0.00846	0.09489	0.46467	0.04409	0.83066	0.11197	0.04462	0.00862
12	12	0.655	0.06365	0.02000	0.00000	0.00846	0.09211	0.43340	0.03992	0.87058	0.11087	0.04461	0.00861
13	13	0.627	0.06087	0.02000	0.00000	0.00846	0.08933	0.40423	0.03611	0.90669	0.10982	0.04462	0.00862
14	14	0.598	0.05809	0.02000	0.00000	0.00846	0.08655	0.37702	0.03263	0.93933	0.10880	0.04461	0.00861
15	15	0.569	0.05532	0.02000	0.00000	0.00846	0.08378	0.35165	0.02946	0.96878	0.10782	0.04462	0.00862
16	16	0.541	0.05254	0.02000	0.00000	0.00846	0.08100	0.32798	0.02656	0.99535	0.10688	0.04461	0.00861
17	17	0.512	0.04976	0.02000	0.00000	0.00846	0.07822	0.30591	0.02393	1.01928	0.10597	0.04462	0.00862
18	18	0.484	0.04698	0.02000	0.00000	0.00846	0.07544	0.28532	0.02152	1.04080	0.10509	0.04461	0.00861
19	19	0.455	0.04420	0.02000	0.00000	0.00846	0.07266	0.26611	0.01934	1.06014	0.10424	0.04462	0.00862
20	20	0.426	0.04142	0.02000	0.00000	0.00846	0.06988	0.24820	0.01734	1.07748	0.10342	0.04461	0.00861
21	21	0.398	0.03864	0.02000	0.00000	0.00846	0.06710	0.23150	0.01553	1.09301	0.10263	0.02231	0.00081
22	22	0.377	0.03662	0.02000	0.00000	0.00846	0.06508	0.21592	0.01405	1.10706	0.10188	0.00000	(0.00700)
23	23	0.364	0.03536	0.02000	0.00000	0.00846	0.06382	0.20139	0.01285	1.11992	0.10119	0.00000	(0.00700)

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Calculation of Levelized Fixed Charge Rate - Baseload**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Rev. Requ. As % (Net Investment)	Return	Book Depr.	O&M	Ad Valorem Tax	Total Charge	Present Value Factor	Present Value	Accum. Present Value	LFCR	Tax Depr. Accel.	Deferred Income Tax	
Year													
24	24	0.351	0.03409	0.02000	0.00000	0.00846	0.06255	0.18783	0.01175	1.13167	0.10055	0.00000	(0.00700)
25	25	0.338	0.03283	0.02000	0.00000	0.00846	0.06129	0.17519	0.01074	1.14240	0.09995	0.00000	(0.00700)
26	26	0.325	0.03157	0.02000	0.00000	0.00846	0.06003	0.16340	0.00981	1.15221	0.09938	0.00000	(0.00700)
27	27	0.312	0.03030	0.02000	0.00000	0.00846	0.05876	0.15240	0.00896	1.16117	0.09886	0.00000	(0.00700)
28	28	0.299	0.02904	0.02000	0.00000	0.00846	0.05750	0.14214	0.00817	1.16934	0.09836	0.00000	(0.00700)
29	29	0.286	0.02778	0.02000	0.00000	0.00846	0.05624	0.13258	0.00746	1.17680	0.09790	0.00000	(0.00700)
30	30	0.273	0.02652	0.02000	0.00000	0.00846	0.05498	0.12366	0.00680	1.18359	0.09746	0.00000	(0.00700)
31	31	0.260	0.02525	0.02000	0.00000	0.00846	0.05371	0.11533	0.00619	1.18979	0.09705	0.00000	(0.00700)
32	32	0.247	0.02399	0.02000	0.00000	0.00846	0.05245	0.10757	0.00564	1.19543	0.09666	0.00000	(0.00700)
33	33	0.234	0.02273	0.02000	0.00000	0.00846	0.05119	0.10033	0.00514	1.20057	0.09629	0.00000	(0.00700)
34	34	0.221	0.02147	0.02000	0.00000	0.00846	0.04993	0.09358	0.00467	1.20524	0.09595	0.00000	(0.00700)
35	35	0.208	0.02020	0.02000	0.00000	0.00846	0.04866	0.08728	0.00425	1.20949	0.09562	0.00000	(0.00700)
36	36	0.195	0.01894	0.02000	0.00000	0.00846	0.04740	0.08141	0.00386	1.21335	0.09531	0.00000	(0.00700)
37	37	0.182	0.01768	0.02000	0.00000	0.00846	0.04614	0.07593	0.00350	1.21685	0.09502	0.00000	(0.00700)
38	38	0.169	0.01641	0.02000	0.00000	0.00846	0.04487	0.07082	0.00318	1.22003	0.09475	0.00000	(0.00700)
39	39	0.156	0.01515	0.02000	0.00000	0.00846	0.04361	0.06605	0.00288	1.22291	0.09449	0.00000	(0.00700)
40	40	0.143	0.01389	0.02000	0.00000	0.00846	0.04235	0.06161	0.00261	1.22552	0.09424	0.00000	(0.00700)
41	41	0.130	0.01263	0.02000	0.00000	0.00846	0.04109	0.05746	0.00236	1.22788	0.09401	0.00000	(0.00700)
42	42	0.117	0.01136	0.02000	0.00000	0.00846	0.03982	0.05359	0.00213	1.23001	0.09378	0.00000	(0.00700)
43	43	0.104	0.01010	0.02860	0.00000	0.00846	0.04716	0.04998	0.00236	1.23237	0.09361	0.00000	(0.01001)
44	44	0.085	0.00830	0.02860	0.00000	0.00846	0.04536	0.04662	0.00211	1.23448	0.09344	0.00000	(0.01001)
45	45	0.067	0.00649	0.02860	0.00000	0.00846	0.04355	0.04348	0.00189	1.23638	0.09327	0.00000	(0.01001)
46	46	0.048	0.00468	0.02860	0.00000	0.00846	0.04174	0.04056	0.00169	1.23807	0.09312	0.00000	(0.01001)

**Montana-Dakota Utilities Co.
Electric Utility- South Dakota
2016 Avoided Cost Rate Update
Calculation of Levelized Fixed Charge Rate - Baseload**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Rev. Requ. As % (Net Investment)	Return	Book Depr.	O&M	Ad Valorem Tax	Total Charge	Present Value Factor	Present Value	Accum. Present Value	LFCR	Tax Depr. Accel.	Deferred Income Tax	
Year													
47	47	0.030	0.00288	0.02860	0.00000	0.00846	0.03994	0.03783	0.00151	1.23958	0.09296	0.00000	(0.01001)
48	48	0.011	0.00107	0.02860	0.00000	0.00846	0.03813	0.03528	0.00135	1.24093	0.09282	0.00000	(0.01001)
49	49	-0.008	(0.00073)	0.02860	0.00000	0.00846	0.03633	0.03291	0.00120	1.24212	0.09268	0.00000	(0.01001)
50	50	-0.026	(0.00254)	0.02860	0.00000	0.00846	0.03452	0.03069	0.00106	1.24318	0.09255	0.00000	(0.01001)

- (1) Prior year's Net investment - Book Depreciation - Deferred Income Tax.
- (2) Return (adjusted for taxes) x Net Investment.
- (3) Depreciation rate based on the life of the investment.
- (4) Distribution O&M expense as percent of distribution plant.
- (5) Ad valorem tax rate on distribution plant.
- (6) Sum of return, depreciation, O&M and ad valorem taxes.
- (7) Present value factor reflecting overall rate of return.
- (8) Present value factor x total charge.
- (9) Accumulated present value.
- (10) Levelized fixed charge rate = accumulated present value x $((+ROR*(1+ROR)^{book\ life})/((1+ROR)^{book\ life}-1))$
- (11) Tax depreciation rates for distribution plant uses 20 year tax life.
- (12) (Tax life - book life) x tax rate.