

## Information Request No. 1

# Company-Owned LED Street Lighting System Service Rate Design

Rate Code E30

### Monthly LED Street Lighting Rate Design Summary

	NSP-SD			
	Per HPS/LED Street Light Equivalent			
	100W/30-40W	150W/50-75W	250W/110-165W	400W/200-245W
<b>Current HPS Street Lighting Overhead Rates</b>	<b>\$14.06</b>	<b>\$16.00</b>	<b>\$20.68</b>	<b>\$25.45</b>
Maintenance Expense Impact (Savings)	(\$0.91)	(\$0.91)	(\$0.91)	(\$0.91)
System Allocation Expense Savings	(\$0.58)	(\$0.78)	(\$1.12)	(\$1.75)
Incremental Capital Revenue Requirement	\$1.68	\$1.85	\$2.76	\$4.05
Net LED SL Fixture Rate Impact - Company Owned Street Lights <sup>1</sup>	\$0.19	\$0.16	\$0.73	\$1.39
<b>Proposed Monthly LED SL Overhead Rates</b>	<b>\$14.25</b>	<b>\$16.16</b>	<b>\$21.41</b>	<b>\$26.84</b>
<b>Current HPS Monthly Average Bill Per Street Light - Overhead</b>	<b>\$15.08</b>	<b>\$17.49</b>	<b>\$23.36</b>	<b>\$29.66</b>
LED Fixture Impact on HPS Street Lighting Rate	\$0.19	\$0.16	\$0.73	\$1.39
Fuel & Rider Savings Estimate	(\$0.69)	(\$0.92)	(\$1.33)	(\$2.08)
Total Monthly Bill Impact (savings)	(\$0.50)	(\$0.76)	(\$0.60)	(\$0.69)
<b>Proposed LED Monthly Average Bill Per Street Light - Overhead</b>	<b>\$14.59</b>	<b>\$16.74</b>	<b>\$22.76</b>	<b>\$28.97</b>
<i>Percentage Savings (increase)</i>	3.3%	4.3%	2.6%	2.3%

<sup>1</sup> Overhead rates are used in the illustration, but the same adjustment will be applied to underground lighting rates

### Annual Impact of LED Fixtures on the A30 Street Lighting System Service Rate

	NSP-SD			
	Per HPS/LED Street Light Equivalent			
	100W/30-40W	150W/50-75W	250W/110-165W	400W/200-245W
<b>Maintenance Savings</b>				
Relamp Expense Savings	\$4.57	\$4.57	\$4.57	\$4.57
Service Order Expense Savings	\$6.36	\$6.36	\$6.36	\$6.36
Total Maintenance Savings	\$10.93	\$10.93	\$10.93	\$10.93
<i>Monthly Savings (increase)</i>	\$0.91	\$0.91	\$0.91	\$0.91
<b>System Allocation Cost Savings</b>				
Base Rate Energy Charge Savings	\$2.34	\$3.16	\$4.55	\$7.11
Demand Related Expense Savings	\$4.59	\$6.19	\$8.93	\$13.94
Total System Allocation Savings	\$6.93	\$9.35	\$13.48	\$21.05
<i>Monthly Savings (increase)</i>	\$0.58	\$0.78	\$1.12	\$1.75
<b>Incremental Capital Revenue Requirement</b>	(\$20.10)	(\$22.20)	(\$33.13)	(\$48.62)
<i>Monthly Savings (increase)</i>	(\$1.68)	(\$1.85)	(\$2.76)	(\$4.05)
<b>Sub-Total LED SL Base Rate Savings (Increase)</b>	<b>(\$2.24)</b>	<b>(\$1.92)</b>	<b>(\$8.72)</b>	<b>(\$16.64)</b>
<i>Monthly Savings (increase)</i>	(\$0.19)	(\$0.16)	(\$0.73)	(\$1.39)
<b>Fuel &amp; Rider Savings Estimate</b>	<b>\$8.22</b>	<b>\$11.07</b>	<b>\$15.99</b>	<b>\$24.97</b>
<i>Monthly Savings (increase)</i>	\$0.69	\$0.92	\$1.33	\$2.08
<b>Annual Bill Savings - LED Street Lights</b>	<b>\$5.98</b>	<b>\$9.15</b>	<b>\$7.27</b>	<b>\$8.33</b>
<i>Monthly Savings (increase)</i>	\$0.50	\$0.76	\$0.60	\$0.69

## Company-Owned LED Street Lighting System Service Rate Design

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Maintenance Savings - Annual	NSP-SD				
		Per HPS/LED Street Light Equivalent			
	Total	100W/30-40W	150W/50-75W	250W/110-165W	400W/200-245W
<b>Relamp Expense</b>					
Relamp Exp Forecast	\$502,344				
No. of Rate Code A30 Street Lights	109,872				
<b>Relamp Expense Savings per StreetLight</b>	<b>\$4.57</b>	<b>\$4.57</b>	<b>\$4.57</b>	<b>\$4.57</b>	<b>\$4.57</b>
<b>Service Order Expense</b>					
Annual HPS Fixture Related Service Order Expense	\$698,703				
No. of Rate Code A30 Street Lights	109,872				
<b>Service Order Expense Savings per StreetLight</b>	<b>\$6.36</b>	<b>\$6.36</b>	<b>\$6.36</b>	<b>\$6.36</b>	<b>\$6.36</b>
<b>Incremental Fixture &amp; Installation Cost</b>					
LED Integrated Fixture		\$144.62	\$165.78	\$275.94	\$432.12
Photo Control		\$18.00	\$18.00	\$18.00	\$18.00
Labor		\$42.07	\$42.07	\$42.07	\$42.07
Total Installed Retrofit Cost		\$204.69	\$225.85	\$336.01	\$492.19
HPS Salvage		(\$2.00)	(\$2.00)	(\$2.00)	(\$2.00)
Net LED Installed Cost		\$202.69	\$223.85	\$334.01	\$490.19
29-Year LARR %		9.92%	9.92%	9.92%	9.92%
LED Fixture Incremental Annual Revenue Requirement		\$20.10	\$22.20	\$33.13	\$48.62
Incremental Monthly Capital Related Revenue Requirement		\$1.68	\$1.85	\$2.76	\$4.05

# Company-Owned LED Street Lighting System Service Rate Design

Rate Code E30

Base Rate Energy Related Expense	Per KWh	NSP-SD Per HPS/LED Street Light Equivalent			
		100W/30-40W	150W/50-75W	250W/110-165W	400W/200-245W
Energy Related Expense Rate (Cents/kWh)	3.565¢				
Test Year 2013 Average Fuel Cost (SD Average)	2.847¢				
Non-Fuel Base Rate Energy Related Expense Rate (Cents/kWh)	0.718¢				
HPS Annual Energy Usage (kWh)		487	711	1,277	2,005
Base Rate Energy Related Expense Rate (Cents/kWh)		0.718¢	0.718¢	0.718¢	0.718¢
HPS Base Rate Energy Related Expense		\$3.50	\$5.11	\$9.17	\$14.40
LED Annual Energy Usage (kWh)		161	272	643	1,015
Base Rate Energy Related Expense Rate (Cents/kWh)		0.718¢	0.718¢	0.718¢	0.718¢
LED Base Rate Energy Related Expense		\$1.16	\$1.95	\$4.62	\$7.29
<b>Base Rate Energy Related Expense Saving</b>		<b>\$2.34</b>	<b>\$3.16</b>	<b>\$4.55</b>	<b>\$7.11</b>
<b>Demand Related Expense Savings</b>					
HPS Demand (Watts)		117	171	307	482
Estimated Demand Expense Rate (\$/kW)		\$58.55	\$58.55	\$58.55	\$58.55
HPS Demand Expense (\$/kW)		\$6.85	\$10.01	\$17.98	\$28.22
LED Annual Demand (Watts)		39	65	155	244
Estimated Demand Expense Rate (\$/kW)		\$58.55	\$58.55	\$58.55	\$58.55
LED Demand Expense (\$/kW)		\$2.26	\$3.83	\$9.05	\$14.29
<b>Demand Related Expense Savings</b>		<b>\$4.59</b>	<b>\$6.19</b>	<b>\$8.93</b>	<b>\$13.94</b>
<b>Based Cost of Energy Estimated Savings (FCC)</b>					
HPS Annual Energy Usage (kWh)		487	711	1,277	2,005
Current Fuel Clause Street Lighting Rate (Cents/kWh)		1.576¢	1.576¢	1.576¢	1.576¢
Base Cost of Energy Related Expense		\$7.68	\$11.21	\$20.13	\$31.60
Monthly Base Cost of Energy Related Expense		\$0.64	\$0.93	\$1.68	\$2.63
LED Annual Energy Usage (kWh)		161	272	643	1,015
Current Fuel Clause Street Lighting Rate (Cents/kWh)		1.576¢	1.576¢	1.576¢	1.576¢
Base Cost of Energy Related Expense		\$2.54	\$4.29	\$10.13	\$16.00
Monthly Base Cost of Energy Related Expense		\$0.21	\$0.36	\$0.84	\$1.33
<b>Base Cost of Energy Related Expense Savings</b>		<b>\$5.14</b>	<b>\$6.92</b>	<b>\$9.99</b>	<b>\$15.60</b>
<b>Resource Adjustment Estimated Savings</b>					
HPS Annual Energy Usage (kWh)		487	711	1,277	2,005
Resource Adjustment Street Lighting Rate (Cents/kWh)		0.946¢	0.946¢	0.946¢	0.946¢
Resource Adjustment Expense		\$4.61	\$6.73	\$12.08	\$18.97
Monthly Base Cost of Energy Related Expense		\$0.38	\$0.56	\$1.01	\$1.58
LED Annual Energy Usage (kWh)		161	272	643	1,015
Resource Adjustment Street Lighting Rate (Cents/kWh)		0.946¢	0.946¢	0.946¢	0.946¢
Resource Adjustment Expense		\$1.52	\$2.57	\$6.08	\$9.60
Monthly Base Cost of Energy Related Expense		\$0.13	\$0.21	\$0.51	\$0.80
<b>Resource Adjustment Expense Savings</b>		<b>\$3.08</b>	<b>\$4.15</b>	<b>\$6.00</b>	<b>\$9.37</b>

## Information Request No. 1a

### Estimated Service Orders Savings

A30 Service Orders	13,261	2012-14 Average
Percentage of Service Orders that are Fixture Related	91.4%	A30 Fixture SOs as a % of all A30 SOs
No. of Fixture Related Service Orders	12,116	Expected level of fixture driven Service Orders
Percentage of Fixture Related Service Orders Expected to be Eliminated	95.81%	Based on LED Service Orders in West St. Paul Pilot
Reduction in Fixture Related Service Orders	11,608	
Estimated Cost per Fixture Related Service Orders	\$60.19	3-YR Average
Service Order Savings	698,703	

### No. of A30 Streetlights

	2012 Average	2013 Average	2014 Average	2012-14 Average
70W	314	313	314	314
100W	81,533	81,988	81,731	81,751
150W	21,797	22,044	21,934	21,925
250W	5,537	5,524	5,523	5,528
400W	268	267	266	267
175W	88	88	88	88
Total	109,537	110,225	109,855	109,872

## Information Request No. 1a

	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2012-14 Average</b>
<b>Relamp Expense</b>				
Total Relamps	\$525,104	\$669,760	\$473,817	556,227
Customer Owned SL Relamps (A-32)	\$47,075	\$56,161	\$58,415	53,883
Company Owned SL Relamps (A-30)	\$478,030	\$613,599	\$415,402	<b>502,344</b>

	<b>2012 Average</b>	<b>2013 Average</b>	<b>2014 Average</b>	<b>2012-14 Average</b>
<b>No. of A30 Streetlights</b>				
70W	314	313	314	314
100W	81,533	81,988	81,731	81,751
150W	21,797	22,044	21,934	21,925
250W	5,537	5,524	5,523	5,528
400W	268	267	266	267
175W	88	88	88	88
Total	109,537	110,225	109,855	<b>109,872</b>

## Information Request No. 1b

NSP(M) - Electric Utility - State of North Dakota

### Street Lighting Power Costs

Test Year	2015	
	Non-APL LTG	Notes
1 Peak Cost	\$79	From CCOSS
2 Transmission Cost	\$74	From CCOSS
3 Distribution Cost	<u>\$76</u>	From CCOSS
4 Demand Cost Total	\$229	
5 Unit Demand Cost per kWh	<u>1.407¢</u>	
6 Unit Demand Cost per kW	<b>\$58.55</b>	
7 MWH	16,279	From CCOSS

## Information Request No. 1b

NSP(M) - Electric Utility - State of South Dakota

### Street Lighting Power Costs

Test Year	2013		Notes
	Non-APL	LTG	
1 Energy Cost	\$315		From CCOSS
2 Baseload Cost	<u>\$132</u>		
3 Energy + BL	\$447		
4 MWH	12,524		From CCOSS
5 Energy + BL per kWh	<b>3.565¢</b>		
6 Fuel Assumption in CCOSS	<b>2.847¢</b>		
7 Non-Fuel Related Energy Cost	<b>0.718¢</b>		
8 Peak Cost	\$96		From CCOSS
9 Transmission Cost	\$71		From CCOSS
10 Distribution Cost	<u>\$106</u>		From CCOSS
11 Demand Cost Total	\$274		
12 Unit Demand Cost per kWh	<b>2.185¢</b>		
13 Unit Demand Cost per kW	<b>\$90.91</b>		

**Information Request No. 1b**

Northern States Power Company, a Minnesota Corporation  
Electric Operation - State of South Dakota  
Actual NSP System Fuel Cost with Production Tax Credits and REC Sales Credits  
Test Year Ending December 2013

Docket No. EL14-058  
Page 1 of 1

Line No.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1. FERC 151 Fossil Fuel	\$45,930,917	\$36,174,662	\$39,664,107	\$35,714,843	\$29,187,911	\$30,055,242	\$45,631,501	\$45,410,138	\$36,507,594	\$31,219,451	\$35,144,174	\$52,485,969	463,126,509.0
2. FERC 518 Nuclear	\$11,120,517	\$10,604,158	\$8,129,429	\$7,928,444	\$7,881,823	\$7,625,738	\$8,175,496	\$11,242,069	\$9,639,647	\$7,811,889	\$7,744,058	\$7,801,662	105,704,930.0
3. FERC 555 Purchased Energy	\$35,027,255	\$29,234,114	\$32,608,013	\$36,915,144	\$40,825,865	\$39,781,933	\$37,842,727	\$37,604,844	\$39,236,352	\$37,388,155	\$47,321,898	\$39,793,736	453,580,035.8
4a. FERC 555 MISO Day 2 Charges	\$8,366,319	\$10,165,928	\$23,699,289	\$20,200,320	\$20,346,311	\$32,197,013	\$32,118,523	\$24,320,465	\$23,044,198	\$23,751,689	\$19,456,194	\$17,180,234	254,846,481.1
4b. FERC 555 MISO ASM Charges	\$2,463,279	\$2,987,340	\$1,107,837	\$2,993,845	\$4,308,216	\$2,731,861	\$2,176,112	\$1,760,793	\$2,440,355	\$1,154,328	\$4,994,935	\$4,994,935	31,714,480.5
5. Total System Costs [1]+[2]+[3]+[4a]+[4b]	\$102,908,287	\$89,166,202	\$105,208,675	\$103,752,595	\$102,550,126	\$112,391,786	\$125,944,359	\$120,338,309	\$110,868,146	\$102,766,764	\$110,820,653	\$122,256,536	\$1,308,972,436
6. Fuel Cost of Intersystem Sales	\$5,272,759	\$5,459,934	\$162,610	\$2,189,732	\$2,927,370	\$4,659,393	\$4,726,025	\$3,716,520	\$2,716,704	\$2,690,921	\$4,636,470	\$5,361,131	44,519,569.2
7. Net System Costs [5]-[6]	\$97,635,528	\$83,706,267	\$105,046,064	\$101,562,864	\$99,622,756	\$107,732,393	\$121,218,334	\$116,621,789	\$108,151,442	\$100,075,843	\$106,184,183	\$116,895,405	\$1,264,452,867
8. Total System Retail MWh Sales	3,563,112	3,159,377	3,448,324	3,157,203	3,225,574	3,493,391	4,038,901	4,020,210	3,523,186	3,318,269	3,325,584	3,600,312	41,873,443.0
9. South Dakota Retail MWh Sales	168,002	149,538	164,831	143,761	155,530	172,322	208,484	206,962	177,083	159,644	160,695	173,874	2,040,726
10. South Dakota % of System Retail [9]/[8]*100%	4.72%	4.73%	4.78%	4.55%	4.82%	4.93%	5.16%	5.15%	5.03%	4.81%	4.83%	4.83%	4.87%
11. Net System Cost of Fuel Per KWh [7]/[8]/1000	\$0.02740	\$0.02650	\$0.03046	\$0.03217	\$0.03089	\$0.03084	\$0.03001	\$0.02901	\$0.03070	\$0.03016	\$0.03193	\$0.03247	\$0.03020
12. South Dakota Monthly Fuel Costs [11]*[8]*1000	\$4,603,591	\$3,962,009	\$5,021,247	\$4,624,648	\$4,803,544	\$5,314,238	\$6,257,230	\$6,003,761	\$5,435,917	\$4,814,703	\$5,130,831	\$5,645,341	\$61,617,060
13. Asset Based Margin Sharing	(\$100,680)	(\$49,845)	(\$46,314)	(\$90,835)	(\$46,837)	(\$45,112)	(\$24,623)	(\$94,567)	(\$111,596)	\$21,222	(\$52,384)	(\$6,887)	(\$648,458)
14. Non-Asset Based Margin Sharing		(\$90,881)											(\$90,881)
15. Production Tax Credits	(\$164,092)	(\$118,589)	(\$118,541)	(\$148,926)	(\$169,526)	(\$120,186)	(\$89,012)	(\$105,672)	(\$139,824)	(\$149,302)	(\$141,898)	(\$222,136)	(1,687,704.0)
16. RECs Sales Credits	(\$507,281)	(\$7,113)	\$0	\$0	\$2,360	\$0	(\$111,667)	(\$100,595)	(\$32,767)	(\$38,534)	(\$287,654)	\$0	(1,083,250.6)
17. SD Fuel Costs with Margins Sharing, PTC and REC Sales Credits [12]+[13]+[14]+[15]+[16]	\$3,831,538	\$3,695,582	\$4,856,392	\$4,384,887	\$4,589,541	\$5,148,940	\$6,031,928	\$5,702,927	\$5,151,730	\$4,648,089	\$4,648,895	\$5,416,318	\$58,106,766
18. In Dollars per KWh [15]/[11]*1000	\$0.02281	\$0.02471	\$0.02946	\$0.03050	\$0.02951	\$0.02988	\$0.02893	\$0.02756	\$0.02909	\$0.02912	\$0.02893	\$0.03115	\$0.02847

Pursuant to Commission authorization in the Company's rate case (Docket No. EL-09-009), the Fuel Clause Mechanism is now recovering the entire fuel and purchased energy costs through the monthly Fuel Clause Charge. Unlike the previously used Fuel Cost Adj





# Information Request No. 1d

## Northern States Power Company South Dakota Retail Electric Fuel Clause Charges & Riders Report

FUEL COST CHARGE (\$/kWh)							System True-Up of Prior Months Costs
Residential	C&I Non-Demand	C&I Demand			Outdoor Lighting		
		Non-TOD	TOD				
			On-Peak	Off-Peak			

2017							
FAF Ratio *	1.0124	1.0199	1.0033	1.2090	0.8304	0.7621	
January **	\$0.02093	\$0.02109	\$0.02075	\$0.02500	\$0.01717	\$0.01576	(\$0.00160)
February **	\$0.02093	\$0.02109	\$0.02075	\$0.02500	\$0.01717	\$0.01576	(\$0.00160)
<b>March</b>	<b>\$0.02093</b>	<b>\$0.02109</b>	<b>\$0.02075</b>	<b>\$0.02500</b>	<b>\$0.01717</b>	<b>\$0.01576</b>	<b>(\$0.00160)</b>
April							
May							
June							
July							
August							
September							
October							
November							
<b>December</b>							
YTD Average	\$0.02093	\$0.02109	\$0.02075	\$0.02500	\$0.01717	\$0.01576	(\$0.00160)

\* The FAF Ratio has been in effect since July 1, 2015

\*\* Pursuant to the Commission's action on December 6, 2016 in Docket No. EL16-037, Company's monthly fuel clause adjustment has been suspended for 180 days and the charges listed are the same as those that were in effect in December 2016.

2016							
January	\$0.02729	\$0.02749	\$0.02704	\$0.03259	\$0.02238	\$0.02054	\$0.00114
February	\$0.02293	\$0.02310	\$0.02272	\$0.02738	\$0.01881	\$0.01726	(\$0.00292)
March	\$0.02372	\$0.02390	\$0.02351	\$0.02833	\$0.01946	\$0.01786	\$0.00128
April	\$0.01935	\$0.01950	\$0.01918	\$0.02311	\$0.01587	\$0.01457	(\$0.00370)
May	\$0.01868	\$0.01881	\$0.01851	\$0.02230	\$0.01532	\$0.01406	(\$0.00035)
June	\$0.01652	\$0.01665	\$0.01638	\$0.01973	\$0.01355	\$0.01244	(\$0.00415)
July	\$0.02277	\$0.02294	\$0.02257	\$0.02719	\$0.01868	\$0.01714	\$0.00077
August	\$0.02290	\$0.02307	\$0.02269	\$0.02735	\$0.01878	\$0.01724	(\$0.00144)
September	\$0.02798	\$0.02819	\$0.02773	\$0.03342	\$0.02295	\$0.02106	\$0.00332
October	\$0.02492	\$0.02510	\$0.02469	\$0.02976	\$0.02044	\$0.01876	(\$0.00103)
November	\$0.02329	\$0.02346	\$0.02308	\$0.02781	\$0.01910	\$0.01753	\$0.00232
December	\$0.02093	\$0.02109	\$0.02075	\$0.02500	\$0.01717	\$0.01576	(\$0.00160)
YTD Average	\$0.02261	\$0.02278	\$0.02240	\$0.02700	\$0.01854	\$0.01702	(\$0.00053)

OTHER RIDERS		
	Effective Since	\$ / kWh
TCR - Transmission Cost Recovery Rider	1/1/2017	\$0.003627
ECR - Environmental Cost Recovery Rider Factor	8/1/2012	\$0.000000
DSM - Demand Side Management Cost Adjustment Factor	1/1/2017	\$0.000504
Infrastructure Rider Factor	1/1/2017	\$0.005332
IRA - Interim Rate Surcharge	7/1/2015	0.00%
	Previous	
TCR - Transmission Cost Recovery Rider	1/1/2016	\$0.002688
ECR - Environmental Cost Recovery Rider Factor	1/2/2012	\$0.000000
IRA - Interim Rate Surcharge	1/1/2015	19.23%
Infrastructure Rider Factor	1/1/2016	\$0.004806
DSM - Demand Side Management Cost Adjustment Factor	1/1/2016	\$0.000448