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May 16, 2011

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PUBLIC SERVICE COMMISSION

Darrell Nitschke  
Executive Secretary/Director of Administration  
North Dakota Public Service Commission  
State Capitol - 600 East Boulevard  
Bismarck, ND 58505-0480

**RE: Otter Tail Power Company's Annual Report**

Dear Mr. Nitschke:

Enclosed is Otter Tail Power Company's ("Otter Tail's") 2010 Annual Report for North Dakota. As in past years, I am also enclosing a copy of Otter Tail Corporation's 2010 Annual Report to Shareholders and FERC 1. I am also forwarding an electronic copy of the North Dakota Annual Report in pdf format by email to you at [dnitschk@nd.gov](mailto:dnitschk@nd.gov) and to [ndpsc@nd.gov](mailto:ndpsc@nd.gov).

As part of Otter Tail's general rate case (Case No. PU-08-862) concluded in 2009, Otter Tail and the North Dakota Public Service Commission advocacy staff entered into a Partial Settlement dated February 20, 2009, regarding rate of return and return on equity. That Partial Settlement was later included in a comprehensive Settlement Agreement signed in early October. The Public Service Commission issued its Order on Settlement on November 25, 2009. The settlement included an earnings sharing provision, as follows:

*If the Company earns in excess of 10.75 percent ROE as reflected in the annual report of jurisdictional regulated electric earnings for any fiscal year prior to either: (i) 2011; or (ii) the test year included in the Company's next electric general rate case (whichever occurs sooner), the Company will refund to customers revenues corresponding to earnings as shown below:*

- 50 percent of earnings above 10.75 percent ROE up to and including 11.25 percent ROE
- 75 percent of earnings above 11.25 percent ROE

1      **PU-11-159**      Filed: 5/16/2011      Pages: 16  
**2010 Annual Report for North Dakota**

Darrell Nitschke  
May 16, 2011  
Page 2

*Earnings sharing credits would be applied to customer accounts as soon as practical after July 1, after the annual report of electric earnings for the given fiscal year has been filed with the Commission (typically on May 1). A refund would be administered as a one-time bill credit.*

Otter Tail's return for 2010 calculated on revenue and expenses recovered through base rates was 10.44 percent and does not result in an earnings sharing credit.

The calculation of the earnings sharing credit is found on page 1 of Otter Tail's Annual Report. Pages 2-4 provide supporting financial information in the customary format. Pages 5 and 6 show financial information that includes revenue and costs related to Otter Tail's wind generation. The information on pages 5 and 6 is provided for reference and for comparative purposes only since the revenue requirements for wind are determined through a separate cost recovery process, which includes its own true-up mechanism for prior period under- and over-collections.

If you have questions on the information provided, don't hesitate to contact me at (218) 739-8607 or [pbeithon@otpeco.com](mailto:pbeithon@otpeco.com).

Very truly yours,



Pete Beithon  
Manager, Regulatory Economics

wao  
Enclosures  
By electronic service and overnight mail

ANNUAL REPORT  
OF  
**OTTER TAIL POWER COMPANY**  
TO THE  
PUBLIC SERVICE COMMISSION OF NORTH DAKOTA  
FOR THE  
YEAR ENDED DECEMBER 31, 2010

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**Shared Earnings Calculation Based on the Order in Docket No. PU-08-862**

<u>Line</u>	<u>Item and Report Reference</u>			
1	Unadjusted earnings from base electric operations (page 2, line 24):			\$15,683,351
2	Debt expense and preferred equity dividends:			
	a. Regulated average rate base (page 3, line 13):	\$182,550,197		
	b. Weighted cost of debt (page 3, line 15):	3.19%		
	c. Weighted preferred equity cost (page 3, line 16):	0.00%		
	d. Debt & pref. equity costs (line 2a X {line 2b+line 2c}):			5,823,351
3	Actual common equity earnings (line 1 - line 2d):			\$9,860,000
4	Baseline ROE common equity earnings:			
	a. Regulated average rate base (page 3, line 13):	\$182,550,197		
	b. Equity ratio (page 4, line 5):	51.71%		
	c. Equity portion of average rate base (line 4a X line 4b):	\$94,402,161		
	d. Starting point for 50% sharing of earnings (line 4c X starting ROE limit):	10.44%		\$9,859,999
	e. Upper limit ROE for 50% sharing (line 4c X upper ROE sharing):	11.25%		\$10,620,243
5	Actual common equity earnings subject to ROE 50% sharing (line 3 - line 4d):			\$0
6	Pre-tax multiplier (1 / {1-tax rate}):	Tax rate: 39.16%	1.643655	
7	Pre-tax amount to share (line 5 X line 6):			0
	a. Customer refund (50% of line 7):		\$0	
	b. Retained by company (line 7 - line 7a):		\$0	
8	Actual common equity earnings subject to ROE 75% sharing (line 3 - line 4e):			\$0
9	Pre-tax multiplier (1 / {1-tax rate}):	Tax rate: 39.16%	1.643655	
10	Pre-tax amount to share (line 8 X line 9):			\$0
	a. Customer refund (75% of line 10):		\$0	
	b. Retained by company (line 10 - line 10a):		\$0	
10	Total Pre-tax amount to refund (line 7a.+ line 10 a.)			\$0

## Operating Statement - Base Rates

	(A)	(B)	(C)	
Line No.	2010 Total Company	2010 North Dakota	N. D. % (B / A)	
	<b>Operating Revenues:</b>			
1	Residential	\$95,160,217	\$42,220,459	44.4%
2	Small Commercial and Industrial	50,763,149	21,872,403	43.1%
3	Large Commercial and Industrial	126,665,776	48,602,333	38.4%
4	Other Retail	5,744,280	2,507,864	43.7%
5	Total Retail Revenue	<u>\$278,333,422</u>	<u>\$115,203,059</u>	41.4%
6	Other Electric Revenue	15,236,366	6,102,343	40.1%
7	Total Revenue	<u>\$293,569,788</u>	<u>\$121,305,402</u>	41.3%
	<b>Operating Expenses:</b>			
8	Production Expenses	126,807,005	51,680,060	40.8%
9	Transmission Expenses	11,838,439	4,838,305	40.9%
10	Distribution Expenses	15,688,219	7,055,780	45.0%
11	Customer Accounting Expenses	11,745,059	5,100,856	43.4%
12	Customer Service and Information Expenses	7,062,320	998,245	14.1%
13	Sales Expenses	1,009,885	542,195	53.7%
14	Administration and General Expenses	32,861,982	13,388,321	40.7%
15	Charitable Contributions	171,160	0	0.0%
16	Depreciation Expense	28,292,595	11,893,274	42.0%
17	General Taxes	8,469,106	3,586,486	42.3%
18	Total Operating Expenses	<u>\$243,945,770</u>	<u>\$99,083,521</u>	40.6%
19	Net Operating Income Before Income Taxes	\$49,624,018	\$22,221,881	44.8%
	<b>Income Tax Expense:</b>			
20	Investment Tax Credit	(926,174)	(389,501)	42.1%
21	Deferred Income Taxes	1,843,967	869,875	47.2%
22	Income Taxes	13,285,888	6,058,157	45.6%
23	Total Income Tax Expense	<u>\$14,203,681</u>	<u>\$6,538,530</u>	46.0%
24	Net Regulated Earnings	<u>\$35,420,336</u>	<u>\$15,683,351</u>	44.3%

## Rate Base and Return on Equity - Base Rates

		(A)	(B)	(C)
Line No.	Description	2010 Total Company	2010 North Dakota	N. D. % (B / A)
1	Plant in Service	\$1,054,437,840	\$443,442,131	42.05%
2	Net Capitalized Items - Big Stone Plant	4,264	3,911	91.72%
3	Accumulated Depreciation	(504,272,829)	(210,461,101)	41.74%
4	Net Plant in Service	\$550,169,275	\$232,984,940	42.35%
5	Plant Held for Future Use	29,657	13,047	43.99%
6	Construction Work in Progress	19,270,435	1,595,409	8.28%
7	Materials and Supplies	15,354,708	6,530,302	42.53%
8	Fuel Stocks	8,159,324	3,233,046	39.62%
9	Prepayments	(29,174,483)	(12,354,771)	42.35%
10	Customer Advances	(437,329)	(185,199)	42.35%
11	Cash Working Capital	5,313,624	1,381,576	26.00%
12	Accumulated Deferred Income Taxes	(122,692,418)	(50,648,153)	41.28%
13	Total Average Rate Base	\$445,992,794	\$182,550,197	40.93%
<b>ACTUAL</b>				
14	Rate of Return on Average Rate Base (page 1, Line 24 /line 13)	7.94%	8.59%	
15	Less: Weighted Cost of Ltd (Page 3, line 1 (D))	3.19%	3.19%	
16	Weighted Cost of Pref. Stock (Page 3 line 2 (D))	0.00%	0.00%	
17	Weighted Return on Equity	4.75%	5.40%	
18	% of Equity to Capital Structure (Page 3, line 3 (B))	51.71%	51.71%	
19	Return on Equity (Page 3, line 4 (D))	9.19%	10.44%	

**Average Weighted Cost of Capital - Base Rates**

		(A)	(B)	(C)	(D)
Line No.	Description	Average Balance	Ratio	Cost	Weighted Cost
1	Long Term Debt	\$310,594,109	48.29%	6.62%	3.19%
2	Preferred Equity	-	0.00%	0.00%	0.00%
3	Common Equity	332,630,839	51.71%	10.44%	5.40%
4	Total	\$643,224,948	100.00%		8.59%

**Source:** Actual year COSS, p. 17-a

**Source:** Normalized Actual year COSS, p. 17-a

## Operating Statement - With Wind

	(A)	(B)	(C)	(D)	(E)	
Line No.	2010 Total Company	2010 North Dakota	N. D. % (B / A)	2009 North Dakota	Annual Change (B-D / D)	
	<b>Operating Revenues:</b>					
1	Residential	\$100,607,237	\$44,712,612	44.4%	\$45,574,088	-1.9%
2	Small Commercial and Industrial	\$53,659,657	\$23,163,735	43.2%	25,520,269	-9.2%
3	Large Commercial and Industrial	\$136,435,884	\$52,109,049	38.2%	49,593,623	5.1%
4	Other Retail	\$6,033,232	\$2,641,038	43.8%	2,445,490	8.0%
5	Total Retail Revenue	<u>\$296,736,010</u>	<u>\$122,626,434</u>	41.3%	<u>\$123,133,470</u>	-0.4%
6	Other Electric Revenue	15,236,366	6,045,316	39.7%	5,148,668	17.4%
7	Total Revenue	<u>\$311,972,376</u>	<u>\$128,671,750</u>	41.2%	<u>\$128,282,138</u>	0.3%
	<b>Operating Expenses:</b>					
8	Production Expenses	128,861,151	52,493,516	40.7%	52,449,537	0.1%
9	Transmission Expenses	11,838,439	4,838,305	40.9%	4,413,930	9.6%
10	Distribution Expenses	15,688,219	7,055,780	45.0%	6,395,105	10.3%
11	Customer Accounting Expenses	11,745,059	5,100,856	43.4%	4,873,168	4.7%
12	Customer Service and Information Expenses	7,062,320	998,245	14.1%	999,167	-0.1%
13	Sales Expenses	1,009,885	542,195	53.7%	486,317	11.5%
14	Administration and General Expenses	33,273,695	13,550,326	40.7%	13,100,321	3.4%
15	Charitable Contributions	171,160	0	0.0%	0	N/A
16	Depreciation Expense	38,794,659	16,202,197	41.8%	14,645,116	10.6%
17	General Taxes	9,359,106	3,924,184	41.9%	3,652,475	7.4%
18	Total Operating Expenses	<u>\$257,803,693</u>	<u>\$104,705,604</u>	40.6%	<u>\$101,015,136</u>	3.7%
19	Net Operating Income Before Income Taxes	\$54,168,683	\$23,966,147	44.2%	\$27,267,002	-12.1%
	<b>Income Tax Expense:</b>					
20	Investment Tax Credit	(9,156,300)	(3,831,722)	41.8%	(3,851,083)	-0.5%
21	Deferred Income Taxes	12,531,858	4,979,402	39.7%	20,283,411	-75.5%
22	Income Taxes	2,554,993	1,738,217	68.0%	(13,474,894)	-112.9%
23	Total Income Tax Expense	<u>\$5,930,551</u>	<u>\$2,885,897</u>	48.7%	<u>\$2,957,434</u>	-2.4%
24	Net Regulated Earnings	<u>\$48,238,132</u>	<u>\$21,080,250</u>	43.7%	<u>\$24,309,568</u>	-13.3%

## Rate Base - With Wind

Line No.	Description	(A)	(B)	(C)	(D)	(E)
		2010 Total Company	2010 North Dakota	N. D. % (B / A)	2009 North Dakota	Annual Change (B-D / D)
1	Plant in Service	\$1,322,965,036	\$553,633,467	41.85%	\$520,855,934	6.29%
2	Net Capitalized Items - Big Stone Plant	4,264	3,911	91.72%	57,623	-93.21%
3	Accumulated Depreciation	(521,480,318)	(217,580,698)	41.72%	(202,327,550)	7.54%
4	Net Plant in Service	\$801,488,982	\$336,056,680	41.93%	\$318,586,007	5.48%
5	Plant Held for Future Use	29,657	13,047	43.99%	13,038	0.07%
6	Construction Work in Progress	19,270,435	1,602,393	8.32%	811,747	97.40%
7	Materials and Supplies	16,447,300	6,994,026	42.52%	6,897,649	1.40%
8	Fuel Stocks	8,159,324	3,233,046	39.62%	3,366,508	-3.96%
9	Prepayments	(29,174,483)	(12,232,582)	41.93%	(14,457,151)	-15.39%
10	Customer Advances	(437,329)	(183,368)	41.93%	(163,763)	11.97%
11	Cash Working Capital	3,876,293	886,569	22.87%	15,582,567	-94.31%
12	Accumulated Deferred Income Taxes	(210,991,721)	(87,789,433)	41.61%	(65,893,347)	33.23%
13	Total Average Rate Base	\$608,668,458	\$248,580,378	40.84%	\$264,743,255	-6.11%

## MISCELLANEOUS

Line No.	Description	2010	2009	2008	2007	2006	2005
	Customer Related (ND):						
	Year End # of Customers						
1	Residential	44,424	44,340	44,222	44,319	44,343	44,261
2	Commercial	11,170	11,194	11,277	11,271	11,211	11,195
3	Industrial	896	878	843	826	815	787
4	Other	509	532	536	520	525	517
5	Total	56,999	56,944	56,878	56,936	56,894	56,760
	KWH's Sold						
6	Residential	588,526,166	600,554,154	568,278,543	553,508,219	534,576,036	536,382,178
7	Commercial	301,965,143	318,238,797	301,585,437	298,698,198	285,337,128	288,908,102
8	Industrial	823,343,090	751,574,603	709,550,579	709,886,478	686,826,359	677,680,888
9	Other	31,276,297	31,552,451	30,499,320	30,727,584	30,850,754	31,231,684
10	Subtotal	1,745,110,696	1,701,920,005	1,609,913,879	1,592,820,479	1,537,590,277	1,534,202,852
11	Unbilled	1,283,596	4,072,195	9,168,347	4,191,000	1,872,000	(6,429,000)
12	Total	1,746,394,292	1,705,992,200	1,619,082,226	1,597,011,479	1,539,462,277	1,527,773,852
13	Reliability Indices (1)						
14	SAIDI (total minutes)	92.9	62.1	68.1	65.8	59.8	186.4
15	SAIFI (frequency)	1.6	1.1	1.2	1.2	1.4	20.9
16	CAIDI (duration)	57.0	56.9	58.4	54.4	43.2	8.9

(1) Beginning in 2006, Otter Tail began using a new interruption monitoring system. The new IMS allows use of the more common definition of a service interruption (longer than 5 minutes). With the changed definition, the frequency of measured interruptions decreases while the length of recorded interruptions increases. Total minutes of interruptions is generally comparable with historic measures.

## Otter Tail Power Company May 2011 Annual Report to North Dakota

### Report on Status of Smart Metering

In its Order dated August 8, 2007, Case No. PU-06-290, the North Dakota Public Service Commission, at ordering paragraph no. 2, required that:

"Each jurisdictional electric utility shall include in its annual reports to the Commission, beginning with reports filed for 2007, a discussion of progress towards the feasibility of making smart metering available for all customers."

"Smart Grid" and "Smart Metering" terms have been used interchangeably as the utility industry moves to adopt changes that make sense for each of the utilities service areas. Otter Tail's response to this Commission's order in May 2008 and May 2009 has been to review the status of technology available for "Smart Metering". This year we will update our "Smart Grid" applications that we provided in May of 2010 as our response to this requirement.

Otter Tail has used technology to improve employee productivity and customer service for many years. "Smart Grid" investments occur in many aspects of our work and our mission, which is to produce and deliver electricity as reliably, economically, and environmentally responsibly as possible to the balanced benefit of customers, shareholders, and employees and to improve the quality of life in the area in which we do business.

The following is a description of some of the "Smart Grid" type applications that are in use at Otter Tail.

- Peak-Shaving Technologies
- Energy Storage Systems
- Time-varying Rates
- Electricity Metering
- Protective Relaying
- Power Profiler
- Interruption Monitoring System
- Mobile Data Pilot Project
- Bill Analyzer
- Home Energy Monitoring
- O Power Energy Reporting

#### **Peak-Shaving Technologies**

Otter Tail has a long history of installing peak-shaving technologies at customer premises. This legacy started with electric water heaters back in the 1940s that were controlled with time-clocks set to avoid energy usage during the morning and evening highest load periods each day. In the 1980's this legacy system was updated with a radio control system. Beginning in 2003, Otter Tail began to replace the radio control system with an updated radio control system. This update was completed in 2007. This system allows Otter Tail to send a signal out to groups of customers during periods of high demand which includes capacity constraints or high energy prices. When the signal is received by a radio typically near the customer's meter socket, the customer's system automatically reduces their controllable load.

The tariffs and related loads that are part of the peak-shaving technologies applied by our customers and controlled by Otter Tail include: electric water heaters, dual fuel systems, thermal storage systems, air conditioning, residential demand control, commercial demand control, and irrigation systems. We have approximately 42,000 load management receivers installed and have demonstrated over 100 MW of control during the coldest days in the winter, or approximately 12-15 percent of our on peak capacity needs. During some of the warmest days of summer, we have approximately 10 MW of control.

The system and supporting tariff that allows the most flexibility for the customer is the Residential Demand Controller (RDC). A radio receiver mounted near the customer meter socket receives the signal when our system demand is high. A demand controller installed in the home reacts to this signal by reducing the customer demand to a level preselected by the customer that meets their individual energy usage needs. A set station installed in the living area identifies that the customer is being controlled, shows the demand level that is being

maintained by the demand controller, and in cases where the connected load does not reduce home demand to the preselected level, the set stations signals to the customer that further action is required to reduce non-controlled load. At this point the customer has the choice to either increase their preselected demand or reduce demand by turning off lights, electric appliances or any heating equipment that may not be connected to the demand controller. In exchange for controlling their demand, the customer receives a rate that is up to 30 percent lower than the firm residential service rate.

### **Energy Storage System**

As noted above, our Peak-Shaving Technologies include Energy Storage Systems which are known at Otter Tail as "Thermal Storage" or "Deferred Load" systems. These include under-floor heating, brick storage furnaces, and brick room heaters. These systems are sized before installation to store adequate thermal energy to allow the home or business to be comfortable during long period of load control by Otter Tail (up to 14-16 hours continuous depending on the tariff used). These systems store energy by charging during off-peak periods and heat is available for discharge into the home or business as needed. In this instance energy is not called for from the grid during peak periods.

Otter Tail serves a region rich in wind resources. In 2009, we had discussions with a vendor of brick furnaces to modify their smart control package to allow multiple steps of energy storage in these systems while maintaining comfort in the home. These systems need to be able to receive signals to store energy at multiple temperature levels and disperse energy as needed for home comfort. We have identified options for a pilot project to model and dispatch wind in real time or by a day ahead forecast. The Company has not determined if resources will be made available for the pilot.

### **Time-varying rates**

Otter Tail's definition of time-varying rates include, any tariff that charges a customer based on when electricity is used and or controlled.

Thus time-varying rates go beyond the standard of Time of Day ("TOD") or Time of Use ("TOU") metered loads to include demand response. Demand response tariffs require the customers to limit or stop usage during peaking periods in response to automated control system signal provided by Otter Tail. Thus the summary below is divided into two sections; tariffs with TOU or TOD meters installed and demand response tariffs with load management receivers installed.

Otter Tail has the following tariffs where we were have installed TOD or TOU style meters, which consist of approximately 930 meters installed on these tariffs.

- Section 10.04 – Commercial Service – Time of Use
- Section 10.05 – Large General Service Time of Day
- Section 11.01 – Standby Service
- Section 11.02 – Irrigation TOD
- Section 14.02 – Real Time Pricing Rider
- Section 14.07 – Fixed Time of Delivery Rider

The following tariffs are part of Otter Tail's demand response, which consist of approximately 42,000 installed load management receivers.

- Section 9.02 – Residential Demand Control
- Section 14.01 – Water Heating Control Rider
- Section 14.08 – Air Conditioning Control Rider
- Section 14.04 – Controlled Service – Interruptible Load – CT Metering Rider – (Commonly identified as Large Dual Fuel)
- Section 14.05 – Controlled Service – Interruptible Load – Self Contained Metering Rider – (Commonly identified as Small Dual Fuel)
- Section 14.06 – Controlled Service Deferred Load Rider – (Commonly identified as Thermal Storage)

## **Electricity Meters**

Otter Tail has approximately 173,500 electricity meters across a three state area that includes Minnesota, North Dakota and South Dakota. The majority of the meter readings are collected by field personnel entering meter readings into a handheld meter reading processor. The handheld processor also has a probe which allows the meter reader to collect time of day meter readings electronically by attaching the probe to a port on the face of the meter.

We have installed 60 meters with an encoder receiver transmitter "ERT" register which allows the handhelds with a special transmitter receiver module to read meters as the meter reader walks by the area, which is an example of a mobile AMR application. These special meters have been installed in areas where access to the customers meter was difficult and time consuming.

The largest group of AMR type metering, are the meters where we collect fifteen minute kWh and demand meter information (interval data) using cell phones or land line phones. This allows Otter Tail to contact the meter and download meter interval data on a daily, weekly or monthly basis. For example; each Tuesday we call approximately 370 meters and download the most recent seven day meter data from each meter. Of the approximate 370 meters, 91 meters are billed using the interval data that we collect remotely.

Approximately 0.25 percent of Otter Tail electricity metering is operating in a way that Otter Tail would describe as AMR.

## **Protective Relaying**

The first "smart" protective relays were developed and installed in the mid 1980's. Otter Tail was involved with the first installation on high voltage transmission lines of the devices designed by SEL (Schweitzer Engineering Labs). These devices provided system data during faults, giving engineers information to determine fault location. This information was used by our System Operations area to isolate the faulted line section quickly and reduce outage duration on our transmission system.

Before the use of the SEL fault locating relays, each time a line tripped, it required a long process of switching and re-energizing the line section by section to determine which section of the transmission line experienced the fault.

The technology used for remote communication to protective relays in our substations has improved greatly since the mid 1980's, allowing advance monitoring of the transmission grid by Otter Tail and the Midwest Independent System Operator ("MISO").

Otter Tail is participating in the North American SynchroPhasor initiative by installing special relays and related communications in one substation in 2010 and a few more substations in 2011. This reliability project is being coordinated by MISO for our region.

Synchrophasors are precise grid measurements now available from monitors called Phasor Measurement Units (PMUs). PMU measurements are taken at high speed. Typically 30 observations per second compared to one every 4 seconds using conventional technology. Each measurement is time-stamped according to a common time reference. Time stamping allows synchrophasors from different utilities to be time-aligned (or "synchronized") and combined together providing a precise and comprehensive view of the entire interconnection. Synchrophasors enable a better indication of grid stress, and can be used to trigger corrective actions to maintain reliability.

## **Power Profiler**

The Power Profiler is a fee based on-line program offered to customers with interval metering. Commercial or industrial customers are the main users of this program.

The program allows "day after" or "month after" 15 minutes energy and demand usage to be displayed in a variety of graphical formats. Our larger customers have found this data to be valuable to find and eliminate costly demand peaks by fine-tuning equipment operation and altering work schedules.

The Power Profiler has nine detailed reports as bar graphs, line graph or data output.

- Peak day demand
- 24 hour profile
- kVA / power factor
- Daily peaks
- Detail profile
- Daily totals
- Peaks report
- Statistics report
- Comparison graph

This software program was used to monitor individual building usage and evaluate energy savings as a key part of our "Campus Energy Challenge" at the University of Minnesota Crookston campus. Initial results from the Campus Challenge program indicate significant energy savings have been achieved. In addition, other customers using Power Profiler are learning how to manage their energy and demand profiles based on information from this online tool.

### **Interruption Monitoring System**

In order to monitor and improve the reliability of our electrical system an Interruption Monitoring System (IMS) was installed. Voltage and outage monitoring devices manufactured by Telemetric have been installed on each of the 725 distribution feeders in the Otter Tail system. These intelligent field devices report power interruptions, over/under voltage alarms and power reliability status using the commercial cellular networks (GPRS and 1XRTT).

Web based analysis and application tools allow reporting, alarm notifications and graphical status updates. Our reliability engineer uses the IMS for reporting reliability indices and for further analysis as he works with our Area Engineers to propose projects to improve reliability.

In 2009 we added a graphical mapping tool which integrates IMS data with Google mapping on which each feeder is shown as a black dot. The dot changes to red when an interruption occurs, yellow for a momentary interruption that has been restored, and green for a sustained interruption that has been restored. This tool provides an overall view of the status of the Otter Tail system in real time.

The Google mapping is available for use by our front line customer service employees along with management and engineering employees who have found this information helpful in response to customer interruption questions and for restoration of service.

In 2010 we began work on a project that would provide interruption information to all customers on Otter Tail's web site. This is an expansion of our current capabilities. After working closely with the vendor to finalize details necessary to ensure the product operates as intended, Otter Tail made the interruption information available to customers in the first quarter of 2011.

### **Mobile Data Pilot Project**

In mid 2008, Otter Tail began a Mobile Data Pilot Project to a few field Service Representatives in our Milbank CSC and in 2009 this pilot was expanded to a few Service Representatives in the Morris CSC. In 2010 we are planning to roll out the Mobile Data System to across our service territory to allow Service Representatives to directly access needed information in ways that they have not the opportunity before.

The goal of this project is to improve productivity and efficiency while enhancing customer satisfaction by providing Service Representatives with "real time" information with the use of a mobile computer in Company vehicles.

Data available to from the Mobile Data System will include:

- Company email
- Customer Information Systems (the Company's billing system)
- Customer Service Guide
- Load management real time control information
- Interruption monitoring system

Ability to display and update maps and prints of Otter Tail's electrical system  
 Otter Tail website  
 Bill Analyzer, and other on-line tools

These systems assist the Service Representatives as they provide customer service in areas such as supporting rates, handling customer's questions, and meeting conservation and demand side management objectives and restoration of service.

### **Bill Analyzer**

Bill Analyzer is program that is available to our customer through the Otter Tail website, which allows our customers to analyze their energy usage and billing, input home profile data, and compare their usage with other comparable customers. The purpose of this tool is to help our customers, who have the desire to better understand their energy bill, to understand what steps they could take to reduce energy use and manage cost.

After a simple registration process a customer can review 25 months of billing history, provide personal information about their home, appliances, and living habits, and review payment information. The analytic engine uses weather data and customer provided information to calculate probable reasons for changes in usage. By entering their home profile, the customer can determine how their usage is broken out by applications and see how their usage compares to other customers with comparable size homes. Bill analyzer features include:

Bill center - Customer account with amount due, due date, last payment, and graphs to compare energy use.

Bill highlights - Factors that may have contributed to a change in the electric bill. If customers need more details they can dig deeper with bill analysis.

Bill history and analysis - Provides 25 months of history and allows customers to compare statements from any two billing cycles.

Home energy center - Includes an energy audit for the home. After the audit is complete, customers can create a plan to save energy.

A counterpart to the Bill Analyzer web self-service tool is a version used by Customer Service employees to answer customer questions about energy use and billing.

In 2010 we contracted with Integral Analytics to conduct measurement and verification of energy savings associated with Bill Analyzer usage. The evaluation indicates that Bill Analyzer saves an average 296 kWh's per year per participant overall, or approximately 1.5 to 2 percent of their energy usage. Some customers achieved even greater savings.

The website link: <http://www.otpc.com/YourElectricAccount/BillAnalyzer.asp>

### **Home Energy Monitoring**

Our "Community Energy Challenge" in Rothsay, Minnesota, includes the installation of 24 in-home energy monitoring devices for a portion of residential customers who also received a home energy audit. These devices display in real time the estimated dollar amount of electricity the household is consuming. A wireless sensor is attached to our meter and transmits information to the portable receiver in the customer's home. The portable wireless receiver displays energy usage on a LCD screen. It can be set to display in dollars and cents based on Otter Tail rates, or in kilowatt hours. We are interested to see how this information can help customers reduce usage and if the reduction is sustainable.

Integral Analytics was hired to conduct an evaluation of energy savings associated with the Community Energy Challenge. Customers who had the Home Energy Monitor were included in the evaluation. Average residential savings per customer based on assessment of all residential customers is roughly 1,145 kWh or 7.2 percent of average annual energy usage. Roughly 2/3 of the customers who received a power cost monitor had electric heat and all but one customer had electric water heating. Three of the customers also had residential demand

controllers in the home to monitor demand use. Comparison shows that those customers who received a home energy audit and the in-home energy monitors saved roughly 2-3 percent more than those customers who did not. Customers who did not have an in-home energy audit, but did receive a Home Energy Monitor saved 1-2 percent more than customers without a monitor.

### **O Power Energy Reporting**

Otter Tail has contracted with OPOWER to procure its patented Home Energy Reporting System. The Home Energy Reporting System is a proven energy efficiency program that leverages large-scale consumer engagement to drive measurable, predictable, and sustainable demand reduction.

The Home Energy Reporting System is based on a software platform that combines energy usage data with customer demographic, housing, and geographic information (GIS) data to develop specific, targeted recommendations that educate and motivate consumers to reduce their energy consumption.

Home Energy Reports are targeted through a direct mailer to customers. The reports provide specific, personalized, recommendation and incentives to motivate recipients to reduce their energy consumption. Our initial launch will utilize only the paper reports, but an online tool suite may be employed at a later date.

The analytics behind the reporting tool involve sophisticated data-mining techniques that are used to analyze historical energy use patterns, demographic and housing data to identify residential customers most likely to respond to each set of messages, rebate programs, and efficiency recommendations. This "smart information" includes:

- Regular, automatic importing of multiple data streams from multiple data sources
- Sophisticated matching and cleansing routines for demographic, housing and energy data
- Geo-coding module for latitude and longitude positioning of addresses
- Customizable data calculation engine for neighborhood normative comparisons

Otter Tail plans to send out the first reports to customers in May of 2011.