

**STATE OF NORTH DAKOTA  
PUBLIC SERVICE COMMISSION  
STAFF RESPONSE**

**April 8, 2013**

**Otter Tail Power Company  
2013 Renewable Resource Cost Recovery  
Factor Adjustment  
Tariff**

**Case No. PU-13-16**

**Application Background Information**

The purpose of the renewable resource rider is to provide Otter Tail Power Company (Otter Tail) with cost recovery and a return on its renewable wind energy investments; namely the wind farms of Langdon, Ashtabula and Luverne. The annually adjusted rider was chosen by the commission to capture tax credits and accelerated tax depreciation in the early years of the investment rather than including the investments in rate base and locking in rates at first year cost levels. The year to year costs are beginning to level off as the wind farms mature and staff will argue to include these costs in rate base and remove the rider in Otter Tail's next rate case.

On December 28, 2012, Otter Tail filed its 2013 Renewable Resource Cost Recovery Adjustment Factor (RRA). The 2013 RRA became effective April 1, 2013, and replaced the 2012 RRA that had been in effect since April 1, 2012. The 2013 RRA includes estimated revenue requirements and estimated revenue recoveries for the twelve months ending March 31, 2014. In addition, the 2013 RRA includes a true-up provision for the differences between actual revenue requirements and actual cost recoveries of the past to ensure no more and no less than 100% recovery.

On March 15, 2013, Otter Tail filed an update to its application indicating that it had incorrectly included forecasted kWh's associated with a large general service customer in the All Other kWh Rate category in its initial application. The update did not change the overall revenue requirement but it did result in a rate change to the various customer classes. The final request by customer class is copied from Otter Tail's update below.

Rate Type	Current Rate	Original Proposed Rate from 12/28/12 Filing	Proposed Rate based on updated billing determinants
LGS kW Rate	\$0.705	\$0.774	<b>\$0.719</b>
LGS kWh Rate	\$0.00410	\$0.00369	<b>\$0.00343</b>
All Other kWh Rate	\$0.00556	\$0.00499	<b>\$0.00518</b>

### Staff's Analysis

The North Dakota revenue requirement for the 2013 RRA is \$9,155,979. The revenue requirement is calculated by using the same methodology as in previous filings and includes no new wind projects. Included in the revenue requirement calculation is a portion of the deferred amount of \$337,256 as approved by the Commission in Case Nos. PU-08-862 and PU-09-742. The deferred balance is being amortized over 48 months ending April 1, 2014.

In its application, Otter Tail uses the energy allocation factor approved for its most recent rate case (PU-08-862) of 41.018% to determine North Dakota's share of total revenue requirements. The following table depicts the difference between the energy allocation factor used for calculating the revenue requirement for the RRA since inception and the actual share of energy used by Otter Tail's North Dakota operations.

Energy Allocation Factor			
Year	Ordered	Actual	Difference
2008	38.830%	38.34%	0.49%
2009	38.830%	40.33%	-1.50%
2010	41.018%	40.95%	0.07%
2011	41.018%	42.22%	-1.20%
2012	41.018%	41.38%	-0.36%
2013 Estimate	41.018%	39.57%	1.45%

As can be seen above, the ordered rate has been a net benefit to North Dakota customers in comparison to North Dakota's actual share of energy used. However, Otter Tail has projected that North Dakota's energy share will decline in 2013. If this occurs and there are reasons to expect continued reductions in North Dakota's share of total company energy, staff will advocate updating the allocation factor or perhaps the true-up provision of the rider to reflect North Dakota's smaller share of total energy consumed.

Based on the Settlement Agreement in Case No. PU-08-742, Otter Tail proposes a rate of \$.719 per kW and \$.00343 per kWh for its large general service customers based on their share of capacity and energy. The capacity factor is based on MISO's weighted average wind capacity accreditation of 28.56% for Otter Tail's three wind farms. All other customers will be charged a straight energy charge of \$.00518 per kWh compared to the current rate of \$.00556 resulting in a 28¢ decrease per month for an average residential customer.

Otter Tail continues to market its Renewable Energy Credits from its wind units resulting in a reduction to North Dakota's cost of service of \$206,521 for the year ending 2012.

Please note that the chart on Page 9 of Otter Tail's original application depicts a column labeled "production percentage." These numbers indicate each farm's share of Otter Tail's total owned wind generation and therefore the three numbers add up to 100%. The next column "Capacity Credit" indicates MISO's determination of capacity available at each wind farm during peak use times. The accredited levels at peak times of 25% to 32% for these wind farms are quite remarkable when considering many wind farms in the U.S. would be glad to have these numbers for total production capacity.

Staff asked Otter Tail to respond to the Renewable Energy Foundation's study on the Performance of Wind Farms in the United Kingdom and Denmark because the renewable rider assumes 25 year lives for these wind farms while the study indicates lives of wind farms may only be 12-15 years. Rather than summarize the response, I have attached it for your review and is a good counter-balance to the views expressed in the study.

#### **Staff's Recommendation**

Staff has reviewed the trade secret information as well as the public information and concludes that the filing is in order and fairly represents the costs of the wind farms. We recommend that the Commission approve the application and will put a motion and order on the agenda for approval after the Notice of Opportunity for Hearing deadline expires on May 15, 2013.



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Mike Diller

OTTER TAIL POWER COMPANY  
Case No. PU-13-16

Response to: North Dakota Public Service Commission  
Analyst: Michael R. Diller  
Date Received: 03/06/2013  
Date Due: 03/18/2013  
Date of Response: 03/19/2013  
Responding Witness: Stuart Tommerdahl, Manager Regulatory Administration, 218 739-8279

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Information Request No: ND-PSC-01

I see that Otter Tail is using a 25 year life for these wind farms whereas a recent study by the Renewable Energy Foundation "The Performance of Wind Farms in the United Kingdom and Denmark" indicates useful wind farm lives are closer to 12-15 years. As you know, the UK and Denmark have a longer experience with wind farms than does the US. Provide an analysis of the report to include why 25 year lives are expected for your three wind farms and whether or not the modeling of wind for IRP purposes should be adjusted to reflect a more conservative useful life.

**RESPONSE:**

Otter Tail has reviewed "The Performance of Wind Farms in the United Kingdom and Denmark" ("The UK/Denmark Report") to assess whether or not the observations and conclusions drawn from this study are relevant to Otter Tail's three wind farms and their corresponding useful lives. In this response, Otter Tail will provide a number of observations from the UK/Denmark Report for consideration as well as highlight specific aspects of Otter Tail's wind farms which supports the useful lives Otter Tail has adopted. Finally, we offer some additional external reference material for consideration that also supports longer useful lives than is suggested in the UK/Denmark Report.

**Report Observations:**

The study in the UK/Denmark Report focused on wind farms developed and located in the United Kingdom and Denmark and included both on-shore and off-shore wind farms. While the study doesn't elaborate extensively on site conditions, coastal countries have more corrosive atmospheric conditions (higher air densities, humidity) that can directly impact component lives.

There is no mention of the specific types or models of wind generating technologies being used at the wind farms studied as part of the UK/Denmark Report, but it does acknowledge the mature (older) nature of technologies included within the study.

Others in the industry have raised questions regarding methodologies used in the UK/Denmark Report as noted in the following report:  
<http://www.inference.phy.cam.ac.uk/mackay/windDecline.pdf>

The author of the UK/Denmark Report makes no mention of any contact or investigation directly with facility owners to gather operational information that would support, refute, or clarify the results of the study.

Otter Tail noted that many charts and graphs included within the report cited the source of the data as: "Author's estimates".

#### **Otter Tail's Facilities**

A 25 year useful life for Otter Tail's wind farms is reasonable for a number of reasons.

Otter Tail's wind farm useful life estimates are based in part on the General Electric ("GE") 1.5 SLE and XLE model turbines which are the turbines used at OTP's three wind farms. Prior to construction, a Mechanical Load Test/Site Suitability Study is done by General Electric. This study evaluates historic wind data gathered at the site, wind turbulence intensity, extreme wind conditions, wind shear, air density and wind farm layout. This study yields the optimal design configuration of the facility to adequately space the units and minimize wind turbulence from other turbines. The extreme loads analysis portion of the study determines that the turbine with the heaviest mechanical fatigue loads at the chosen wind farm location are less than the loading level deemed acceptable based on the design loads envelope certified by Germanischer Lloyd. While these extreme loads tests are based on a 20 year life for the heaviest loaded turbine, meeting this minimum design life under extreme load tests indicates longer useful lives as a whole across the entire wind farm.

Proper maintenance can also have a significant impact on the life of a turbine and early detection of potential problems is critical to optimal performance maximizing useful life. Otter Tail has made significant investment in these facilities to provide energy to ratepayers and will operate them with a long term view in mind. Otter Tail has implemented a Condition Based Monitoring system which was first introduced to the GE turbine in 2010. This system allows OTP to constantly monitor the drive train of the turbine so that bearing failures can be detected early, thus changing a catastrophic failure that could cost hundreds of thousands of dollars into a \$15,000 replacement of bearings. This system will both help minimize costs and extend the lives of the generating units.

Wind farms include many different components. When evaluated from a composite site perspective, OTP has concluded that a minimum life expectancy for a wind farm of 25 years is reasonable. Components such as substation equipment and segments of transmission lines that are required to interconnect the wind farm into the transmission grid are included within the overall cost of the wind farms. These components typically have a 35 year or greater life. In addition, underground collection systems and underground transformers typically have a 30 year life. Buildings and access roads may have 30-50 year useful lives or longer.

The atmospheric conditions in North Dakota are much more favorable as compared to the coastal conditions that may increase the deterioration of exposed surfaces as those cited in the UK/Denmark Report. North Dakota wind farms should have longer blade life, less metal corrosion, and lower water particulate in oils and greases based on local climate.

**Other Reference Material**

Burns and McDonnell has done life expectancy evaluations<sup>1</sup> on other wind farms and has determined that a 30 year life is appropriate.

A Renewable Technology Solar and Wind Depreciable Lives presentation<sup>2</sup> at an EEI sponsored meeting in 2010 suggests that the composite lives of recent wind farms to be 25-30 years, and some as high as 40 years.

**IRP**

Otter Tail models wind resources within the IRP process from a 25 year purchased power agreement (PPA) perspective. PPA's are often structured over a 25 year life and these contractual lives also support 25 year useful lives of the facilities.

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<sup>1</sup> <http://www.burnsmcd.com/Projects/Detail/Wind-Farm-Life-Expectancy-Evaluation>

<sup>2</sup> [http://www.eei.org/meetings/Meeting%20Documents/2010\\_11\\_14\\_AccountingCommittteesFallMeeting\\_Prop\\_Clark\\_Watts\\_Renewable\\_Technology.pdf](http://www.eei.org/meetings/Meeting%20Documents/2010_11_14_AccountingCommittteesFallMeeting_Prop_Clark_Watts_Renewable_Technology.pdf)