

BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF SOUTH DAKOTA

*In the Matter of the Complaint by Oak Tree Energy LLC against  
NorthWestern Energy for refusing to enter into a Purchase Power Agreement*

EL11-006

---

Testimony of

**Richard J. Green**

On behalf of NorthWestern Energy

---

Submitted: November 21, 2012

Hearing Date: December 5, 2012

## Table of Contents

Introduction and Qualifications .....	1
Purpose and Summary of Testimony.....	1
NorthWestern’s Blend Rate Model.....	2
Inputs .....	2
Methodology.....	3

## Exhibits

None

# 1 Testimony

## 2 Introduction and Qualifications

3 **Q: Please state your name and business address.**

4 A: My name is Richard J. Green. I am an independent operations consultant contracted to provide  
5 services for NorthWestern Energy. My business address is 165 S. Circle Drive in Huron, South  
6 Dakota 57350.

7 **Q: Are you the same Richard J. Green that previously filed testimony in this docket?**

8 A: Yes. My education and employment history are summarized in the Prefiled Direct and Rebuttal  
9 Testimony of Richard J. Green that was filed on January 13, 2012, in this docket.

## 10 Purpose and Summary of Testimony

11 **Q: What is the purpose of your testimony?**

12 A: The purpose of my testimony is to provide information related to blend rate model  
13 enhancements, base load generation costs, system load growth factors, and capacity credit  
14 calculation methodology used as inputs to develop a long-term (20-year) forecast of avoided  
15 costs.

16 **Q: Please summarize your testimony.**

17 A: My testimony includes:

- 18 • A review of the enhancements made to NorthWestern's avoided cost blend rate model in  
19 order to incorporate long-term impacts of base load unit availability and system load  
20 growth.
- 21 • A review of forecasted base load unit availability used as input to the blend rate model to  
22 estimate the generation contribution portion of avoided costs.
- 23 • A review of forecasted system load growth used as input to the blend rate model in order to  
24 reflect the impact of long-term changes in energy resource requirements.
- 25 • A review of the variable generation costs used as the initial input to the generation cost  
26 portion of the avoided cost calculation.

- A review of the capacity credit calculation methodology used by NorthWestern for the Titan I (aka Rolling Thunder) wind farm and recommended application for Oak Tree.

### NorthWestern's Blend Rate Model

**Q: What enhancements have been made to the blend rate model?**

A: The original model (from March 2012) was designed to develop generation/market blend rates only for a relatively short term of five years. The blend rates for a given QF level were fixed at the average historical values experienced during 2008–2011.

A fixed blend rate relationship is not appropriate for the longer term of a 20-year forecast due to the combined effects of (a) relatively flat existing base load energy resources and (b) moderate system load growth. The model has been modified in order to incorporate consideration of these factors over the 20-year forecast period.

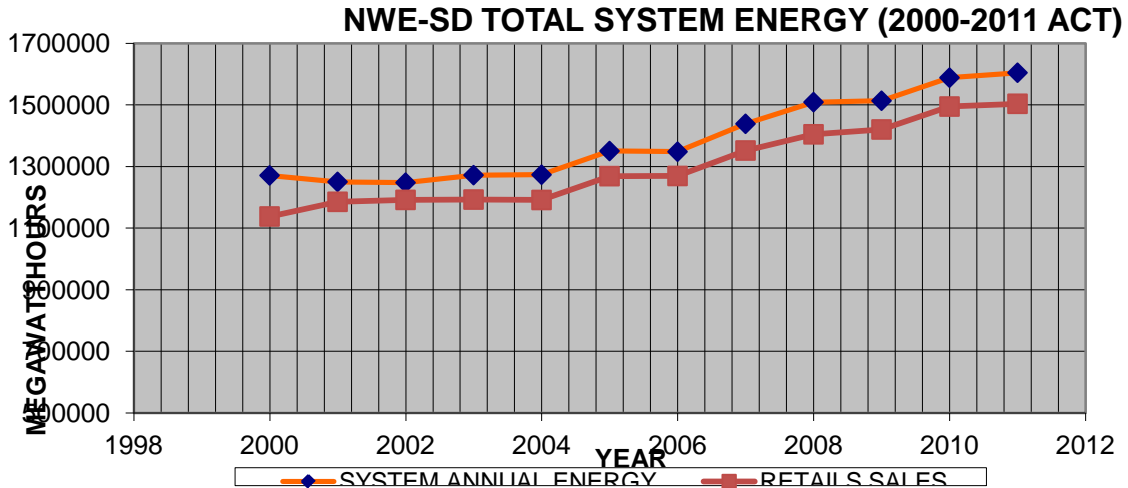
### Inputs

**Q: What level of generating unit availability is used in the forecast?**

A: The base load energy contribution expected to be available from existing steam units during the 20-year forecast period is based on average historical values experienced during the ten-year period of 2001–2010. On average, the steam units were capable of providing 1,590,520 MWHs per year (or approximately 182 MW average hourly output) during that period. The existing Titan I wind farm contributed 82,443 MWHs during its first year (2010) of commercial operation. Therefore, when combined, these resources can be reasonably expected to contribute an average of 1,672,963 MWHs per year toward system energy requirements. These are the values that have been incorporated into the model in the computation of blend rates for the 20-year forecast period.

**Q: What level of system load growth is used in the forecast?**

A: The growth of system load in terms of total annual energy requirements is expected to be similar to the relatively steady average rate experienced during the 2000–2010 period. During that period, the compound load growth rate was approximately 2.25% per year (2000 base year). This is the value that has been incorporated into the model in the computation of blend rates for the 20-year forecast period. The chart shown here demonstrates historical system load growth during the 2000–2011 time period.



1  
2 **Q: What is the base value for avoidable generation costs used as the initial input in the**  
3 **computation of the 20-year avoided cost forecast?**

4 A: The base value for avoidable generation costs used in the model is the incremental cost of fuel  
5 (in dollars per MWH) experienced during the year 2010 at the Big Stone Plant. The year 2010  
6 was the most recent full-year period for which data was available prior to February 25, 2011.  
7 The Big Stone Plant is the highest fuel cost unit (in dollars per MWH) among the three  
8 economically dispatchable base load resources available to NorthWestern in South Dakota.  
9 Therefore, for the energy generation portion of a QF purchase, Big Stone costs represent those  
10 costs that could be avoided. For the year 2010, the annual average avoidable generation cost at  
11 Big Stone was \$18.54 per MWH with monthly averages ranging from \$17.50 to \$19.95 per  
12 MWH. The annual average value of \$18.54 per MWH is the value used as the base value in the  
13 computation of the 20-year avoided cost forecast.

## 14 Methodology

15 **Q: What methodology does NorthWestern use to calculate the capacity credit of energy-limited**  
16 **resources such as wind generation?**

17 A: For energy-limited resources such as wind, NorthWestern uses a simplified form of the method  
18 used by the Midwest Independent System Operator (MISO). MISO is a Transmission System  
19 Operator member of the Midwest Reliability Organization (MRO) and represents the single  
20 largest group, in terms of end-use load, of all MRO members. NorthWestern is an Investor  
21 Owned Utility (< 3000 MW) member of the MRO.

22 MISO uses a National Renewable Energy Laboratory and stakeholder-endorsed probability-  
23 based method to calculate the projected Effective Load Carrying Capacity of wind generation  
24 resources. The method uses historical wind generation data starting with 2005 and is updated  
25 each year to develop the projected value for the next planning year.

1 The basic approach is to determine the total output of the entire wind generation fleet at the  
2 time of the eight highest system daily peak loads during each year within the historical period  
3 (currently includes eight years of data for 2005–2012). For each year in the historical period, the  
4 median value of the eight data points is compared to the combined maximum potential output  
5 (also known as Maximum Registered Capability or RMax) of the fleet to determine a percentage  
6 capacity credit that can be expected to be available during times when capacity is most needed.  
7 The results for all historical years are then averaged to determine the raw capacity credit value.  
8 MISO also makes a “penetration level” adjustment to compensate for the historically indicated  
9 tendency of the raw capacity credit value to become increasingly overstated with increased  
10 levels of installed wind generation relative to total system generation. Thus far, these  
11 adjustments have been relatively small on the MISO system.

12 NorthWestern’s application of the MISO method to wind generation (i.e., Titan I, aka Rolling  
13 Thunder) is the same as outlined above with the exception that it is simplified by making no  
14 adjustment for penetration level at this time.

15 **Q: What methodology does NorthWestern propose to use for Oak Tree?**

16 NorthWestern proposes to calculate the capacity credit for Oak Tree in the same manner as for  
17 Titan I. However, for the first five years, due to limited historical data, NorthWestern proposes  
18 to base the capacity credit on a combination of the then-current MISO capacity credit and any  
19 available Oak Tree historical data. For example, for Planning Year 1 (PY1), the Oak Tree capacity  
20 credit would be based solely on the MISO value set for that year. For each ensuing year,  
21 available historical Oak Tree data would be averaged with the next MISO planning year value  
22 until five years of Oak Tree data is available. For example, for Planning Year 3 (PY3), the Oak  
23 Tree capacity credit would be the average of the MISO value set for PY3 and the historical Oak  
24 Tree data from PY1 and PY2. Once five years of Oak Tree data is available, starting with PY6, the  
25 capacity credit for each ensuing planning year would be based solely on the most recent five  
26 years of Oak Tree data.

27 **Q: Does this conclude your testimony?**

28 A: Yes, it does.

Affidavit of Richard J. Green

STATE OF SOUTH DAKOTA)

COUNTY OF BEADLE ) : ss )

Richard J. Green, being first duly sworn upon oath, states and alleges as follows:

1) I am an independent operations consultant working for NorthWestern Corporation d/b/a NorthWestern Energy.

2) I have read this document and am familiar with its contents, and the same are true to the best of my knowledge and belief.

Further affiant sayeth naught.

Dated at Huron, South Dakota, this 20<sup>th</sup> day of November, 2012.

*Richard J. Green*  
Richard J. Green

SUBSCRIBED AND SWORN to before me this 20<sup>th</sup> day of November, 2012.

*JoAnne H Peterson*  
Notary Public, South Dakota  
My commission expires: June 10, 2016

