

CASE NOS. PU-06-481 & PU-06-482
BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION
IN THE MATTER OF THE APPLICATION BY OTTER TAIL POWER CORPORATION D/B/A
OTTER TAIL POWER COMPANY
AND
MONTANA-DAKOTA UTILITIES CO., A DIVISION OF MDU RESOURCES GROUP, INC.
FOR AN ADVANCED DETERMINATION OF PRUDENCE
FOR THE BIG STONE II GENERATING PLANT

PREFILED REBUTTAL TESTIMONY

OF

BRYAN MORLOCK

MANAGER OF RESOURCE PLANNING

OTTER TAIL POWER COMPANY

APRIL 23, 2008



PREFILED REBUTTAL TESTIMONY OF BRYAN MORLOCK

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1 **BEFORE THE NORTH DAKOTA SERVICE COMMISSION**

2 **PREFILED REBUTTAL TESTIMONY OF BRYAN MORLOCK**

3 **I. INTRODUCTION**

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

5 A: Bryan Morlock, 215 South Cascade Street, Fergus Falls, Minnesota 56538-0496.

6 **Q: Did you previously submit testimony in this proceeding?**

7 A: Yes. I submitted direct testimony on March 10, 2008 (OTP Exhibit 117).

8 **Q: Did you testify before the Commission in June 2007?**

9 A: Yes, I appeared before the Commission at the hearing on June 26, 2007. I also submitted
10 written testimony in that proceeding (OTP Exhibit _____).

11 **Q: Have you reviewed the testimony of Public Service Commission Advocacy staff**
12 **witness Terry Deason?**

13 A: Yes, I have.

14 **Q: Have you reviewed the testimony of witness David Schlissel, who filed testimony on**
15 **behalf of Intervenors Mark Trechock and Dakota Resource Council?**

16 A: Yes, I have reviewed his testimony, too.

17 **II. PURPOSE AND SUMMARY OF TESTIMONY**

18 **Q: What is the purpose of your rebuttal testimony?**

19 A: The purpose of this testimony is to respond to certain points raised by Mr. Schlissel and
20 to provide further explanation of the modeling analysis I performed and testified to in my Direct
21 Testimony filed on March 10, 2008. Also, Mr. Deason has requested that Otter Tail respond to
22 certain issues that he raised, and I provide additional information on his points directed at Otter
23 Tail's resource planning.

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

1 A: Contrary to statements by Mr. Schlissel, there is nothing objectionable about the IRP-
 2 Manager resource planning model. The IRP-Manager model is an acceptable capacity expansion
 3 model. Resource planning involves making many assumptions regarding what might happen in
 4 the future. The assumptions that went into our modeling efforts reflect the realities of the
 5 situation and represent a reasonable analysis of Otter Tail’s future needs. Many of the
 6 assumptions we made are conservative, and would tend to favor a resource other than pulverized
 7 coal, and I do not believe it is necessary to conduct additional modeling runs using assumptions
 8 suggested by Mr. Schlissel that disfavor coal to an even larger extent.

9 I also explain in response to Mr. Deason that Otter Tail assumed that the Production Tax
 10 Credit for wind was in existence through 2013 to make a favorable assumption for wind through
 11 the timeframe when Otter Tail must obtain additional generating resources.

12 **III. RESOURCE PLANNING**

13 **Q: Can you describe how you conduct your resource planning?**

14 A: Yes, certainly. Resource planning involves using data and forecasts about a large number
 15 of factors that could affect the selection of a new generating resource. In most cases we use
 16 information provided from a variety of sources including expert consultants, government
 17 statistics, legislative offices, research reports, conference presentations, publications, and
 18 discussions with regulatory staff; we also rely on our own experience, expertise, and knowledge.
 19 The effort is targeted at using information that represents what appears to be the most likely
 20 situation at some future point in time. A computer program known as a capacity expansion
 21 model is used that compares various alternatives based on the information that is inputted into
 22 the model and determines which combination of resources are most cost-effective at certain
 23 points in time to meet a forecasted demand and energy requirements. The key is that the model

1 generally does not select one single resource but identifies a combination of various alternatives
 2 for differing amounts of generating capacity at staggered time periods.

3 **Q: Are all types of generating resources affected by the forecasts that are made?**

4 A: Yes, of course. Every type of resource – coal, gas, wind – is affected by factors that
 5 influence the ultimate cost of energy from each facility. Obviously, not all factors affect all
 6 potential resources and certainly not all potential resources are affected in the same manner or to
 7 the same degree.

8 **Q: What does it mean to say that an assumption, data, or forecast is “biased?”**

9 A: In general when something is considered biased it means that some aspect of an analysis
 10 or a certain data point was either prejudged in a manner that altered the results, or that the
 11 process itself may have inadvertently favored a particular outcome. Any factor can be
 12 considered “biased” in the sense that it unfairly or unreasonably pushes the result in one
 13 direction or another. For example, an unrealistically high wind capacity factor would bias the
 14 results in favor of wind resources by reducing the cost of wind energy, while conversely, an
 15 unrealistically low capacity factor biases results against wind by driving the costs upward.
 16 Similarly, a higher coal price would drive up the cost of a pulverized coal plant like Big Stone II
 17 and make it potentially less economic compared to other alternatives. An analysis may be
 18 intentionally biased slightly to make sure that the results are on the conservative side just to
 19 provide an increased margin of comfort in the analysis.

20 **Q: Does running a capacity expansion model require expertise?**

21 A: Yes, it does. It is more than just making assumptions and forecasts, and plugging them
 22 into the model. It requires experience and operational understanding to make the model most
 23 applicable to a particular utility’s situation. A resource planner must be able to figure out how to

1 get a computer model to respond to the specific utility’s reality. Planning models are not capable
 2 of exactly handling every piece of information or alternative, and sometimes may be able to
 3 handle a specific circumstance in several different ways. The resource planner must be able to
 4 determine a method for handling each piece of data, and then be able to verify that the model is
 5 interpreting the data in the manner intended. Most critical, however, is that the modeler must be
 6 intimately familiar with the utility’s characteristics and all of the technical requirements which
 7 the utility must meet, and then be able to verify that the modeling results are valid.

8 **Q: How long have you been conducting resource planning and performing computer**
 9 **modeling at Otter Tail Power?**

10 A: I have been engaged in resource planning at Otter Tail Power since 1986. In that
 11 experience I have tested, worked with, and used a number of capacity expansion models and
 12 other production costing models. Otter Tail worked with the vendor on the initial development
 13 of the IRP-Manager model in the early 1990’s and on subsequent upgrades and updates since
 14 that time.

15 **Q: What is the difference between the work you did as a resource planner and the**
 16 **levelized busbar analysis conducted by Burns & McDonnell?**

17 A: Resource planning – the work I did – is designed to evaluate and identify various
 18 resource options for meeting a forecasted need. The capacity expansion model evaluates
 19 alternatives with varying characteristics, technologies, and operating parameters to determine the
 20 best combination of alternatives to meet a forecasted need. The Burns & McDonnell work, as
 21 Mr. Greig explained in his testimony (Exhibit 326 at pp. 5-6), is a different exercise that
 22 compares the costs of generating electricity from various types of generating technologies,
 23 without respect to need. A levelized busbar cost analysis does not attempt to select an optimized

1 resource plan to fit the need; it merely calculates the cost of electricity generation under an
 2 assumed level of operation at the point where the energy would be injected into the transmission
 3 grid. Both exercises are important tools that can be used to assist utilities in selecting the most
 4 appropriate resources to meet future energy needs.

5 **IV. IRP-MANAGER CAPACITY EXPANSION MODEL**

6 **Q: Mr. Schlissel calls the IRP-Manager Capacity Expansion Model an out-of-date and**
 7 **severely limited model? Do you agree?**

8 A: No, I certainly do not agree. Mr. Schlissel has been making that claim throughout the
 9 Minnesota and North Dakota proceedings, even though the model has been used successfully by
 10 Otter Tail for more than 15 years. The results of Otter Tail’s modeling have been accepted by
 11 the North Dakota Public Service Commission and the Minnesota Public Utilities Commission in
 12 the company’s resource planning efforts over that same period.

13 Let me repeat some of the reasons I’ve given before why the IRP-Manager model is
 14 sometimes not a preferred model, even though it is a capable tool for resource planning purposes.
 15 Those issues include the fact that the model is not easily compatible with EXCEL spreadsheets,
 16 so data input and output is cumbersome. The model is also designed to run on older computers
 17 that were designed to use memory in a different manner, so the software will not run on a newer
 18 computer due to memory management issues. But the heart of the model, - its methodology and
 19 process – is nonetheless current and is being used today by state-of-the-art capacity expansion
 20 models such as EnerPrise.

21 Some of the same individuals that were involved in the development of IRP-Manager
 22 model are now part of the EnerPrise product team. After the original IRP-Manager vendor
 23 company was purchased by another firm and support from the developer became unavailable,

1 Otter Tail on several occasions hired the personnel involved in the development of the IRP-
 2 Manager model to provide model updates. The most recent time was in 2005, shortly before
 3 completing the initial work on Otter Tail's resource plan filing in Minnesota.

4 **Q: Mr. Schlissel suggests we should be using the Strategist model instead. Is Otter Tail**
 5 **planning to switch to the Strategist model?**

6 A: Yes, we are in the process of switching to the Strategist model. We expect to be using
 7 the Strategist model in our 2008 resource planning.

8 **Q: Why is Otter Tail switching to the Strategist model?**

9 A: The Otter Tail migration to Strategist is being driven partly by efficiency to be able to
 10 input and output data quicker and easier and to have the capability to run the model on several
 11 PC's simultaneously. Also, Otter Tail is being driven to the Strategist software so Otter Tail can
 12 split its resource plans into a Minnesota plan and a non-Minnesota plan. The Minnesota statutes
 13 require a resource plan to be developed in a manner that is prohibited by North Dakota law. The
 14 latest version of Strategist is capable of modeling Otter Tail as two separate regions, Minnesota
 15 and non-Minnesota, with each region subject to its own renewable energy and environmental
 16 cost value requirements.

17 The Strategist model is a good model, but it is not the great planning panacea that Mr.
 18 Schlissel indicates. As Otter Tail has learned from its transition to the Strategist model, there are
 19 many things that Strategist will not handle directly or properly for Otter Tail's situation. It is
 20 also important to point out that IRP-Manager performs some functions that Strategist will not.
 21 When Otter Tail completes the switch to Strategist, we will be losing some very essential
 22 functionality and capability that will require us to develop separate and new processes. The IRP-

1 Manager analysis remains a valid model for resource planning and selection, but there are also
 2 valid reasons for making a switch to another model.

3 **V. SENSITIVITY ANALYSES**

4 **Q: Mr. Schlissel asserts that Otter Tail has not conducted sufficient sensitivity analyses**
 5 **to know whether Big Stone remains the least cost alternative under certain scenarios. Did**
 6 **you run any sensitivity analyses?**

7 A: Yes, I did. I ran a capital cost sensitivity analysis using a 10% higher capital cost for the
 8 Big Stone II project. That sensitivity analysis is also directly transferable into an estimated fuel
 9 cost sensitivity analysis.

10 **Q: What were the results of that sensitivity analysis?**

11 A: The results were exactly the same – nothing was changed in the optimized plan.

12 **Q: Did you complete any other sensitivity analysis?**

13 A: Yes, we did in Minnesota, where we combined a \$9/ton CO₂ tax with high environmental
 14 cost values established by the Minnesota PUC for other air contaminants such as SO₂ and NO_x.
 15 This sensitivity picked more wind and different natural gas technologies than the analysis
 16 completed for North Dakota purposes, but it again picked the same 170 MW of the Big Stone II
 17 proposal.

18 **Q: Do you think it is necessary to run any additional sensitivity analyses?**

19 A: No.

20 **Q: Why not?**

21 A: I don't think that additional sensitivity analyses are required for several reasons. Not
 22 only have the sensitivity analyses Otter Tail has conducted continued to support Big Stone II, but
 23 we have conducted a significant number of modeling runs looking at a wide range of variables,

1 and they all continue to show that Big Stone II is a part of every resource mix. Also, we think
 2 that the assumptions we have developed for input into our computer model are reasonable and
 3 realistic, and conducting additional sensitivity runs using assumptions that favor wind and
 4 natural gas will not give use results that are as reliable. In fact, many of our assumptions were
 5 conservative and favored wind and natural gas, and still the model selected pulverized coal as
 6 part of our future resources. Further, each of the utilities involved in the Big Stone II project has
 7 determined from its own modeling and its own assumptions that Big Stone II is part of its future
 8 generation scenario.

9 I have also explained before that computer modeling results are only one piece of
 10 information that is relied on by utility executives in deciding how to proceed. Regardless of how
 11 many modeling runs are made, all kinds of other information are taken into account in making a
 12 management decision. The range of assumptions is infinite; the conducting of modeling results
 13 could be endless. Otter Tail Power believes that it, and thus the Commission, has enough
 14 modeling results and other information to make a prudent decision in this matter, and, in fact,
 15 time is crucial here in order to have new generating resources available in 2013.

16 **Q: Can you provide a brief overview of the extent of the computer modeling runs you**
 17 **have conducted?**

18 A: Otter Tail (and the other utilities involved in the Big Stone II project) have been
 19 conducting resource planning and running capacity expansion models for several years now as
 20 part of the process leading to the selection of Big Stone II. We have modeled a 500 MW plant
 21 and a 630 MW plant, including capital cost sensitivities; we have conducted modeling without
 22 carbon costs; we have inputted a range of carbon costs; we have combined the Minnesota
 23 environmental externality costs with carbon costs; we have let the model choose how much

1 conservation to select; we have forced the model to accept more conservation than it would
 2 otherwise find cost effective in order to meet state conservation goals; we have let the model
 3 select more wind even after complying with state renewable energy requirements; we have
 4 updated cost estimates – the models consistently pick various amounts of coal-fired generation.

5 **Q: Can you comment further on the conservative assumptions you included in your**
 6 **modeling?**

7 A: We made a number of conservative assumptions in our modeling that have the effect of
 8 favoring resources other than Big Stone II. Our assumptions regarding natural gas prices, wind
 9 capacity factors, necessary transmission infrastructure, conservation, renewables, the existence
 10 of the Production Tax Credit, to name some major examples, were intended to give the benefit of
 11 the doubt to alternatives to pulverized coal. We had to force the models to accept certain
 12 conservation levels that would not have been selected if the model was not so constrained, and
 13 we built in a significant amount of wind. Still, our modeling continued to pick Big Stone II.

14 **VI. PRODUCTION TAX CREDIT FOR WIND**

15 **Q: Mr. Deason asks for clarification about assumptions made regarding the existence**
 16 **of the Production Tax Credit for wind. Can you describe the assumptions that you**
 17 **inputted into your modeling regarding the existence of the PTC?**

18 A: As I testified in my March 10, 2008, testimony, we assumed that the Production Tax
 19 Credit (PTC), which currently expires at the end of 2008, would be extended by Congress for
 20 five years through 2013, but not be available beyond that. And just to clarify, we assumed that
 21 the PTC would apply for a period of ten years to all wind facilities that generated energy prior to
 22 January 1, 2014. So even though the PTC eligibility would expire at that time, any facilities that

1 were PTC qualified prior to the end of 2013 would continue to receive PTC benefits through the
2 end of the 10-year period.

3 **Q: Can you explain the basis for that assumption?**

4 A: We understand that no one knows for sure whether the PTC will be available in 2013 and
5 beyond. Congress has acted to extend the credit every time it has expired, although it has been
6 extended for only relatively short periods of time on those occasions. The American Wind
7 Energy Association has written that it expects the PTC to be extended for five years. For those
8 reasons, and because we wanted to be conservative in our evaluation of the wind option, we
9 assumed the PTC would be in place through 2013. The year 2013 is crucial because that is when
10 Otter Tail needs additional generating capacity and the new Big Stone Unit II will be brought
11 online.

12 **VII. CAPITAL COST ASSUMPTIONS**

13 **Q: Would you address Mr. Deason's observation that Otter Tail used a cost of**
14 **\$674/kW for a CCGT while Montana-Dakota uses a cost of \$1,795/kW for the capital cost**
15 **of a combined cycle natural gas plant?**

16 A: Yes. I need to clarify at the outset that Otter Tail did not use a cost of \$674/kW for a 500
17 MW CCGT. Those assumptions were used by Burns & McDonnell in its levelized busbar cost
18 analysis (*see* OTP/MDU Exhibit 327 at page 2), but they are not the figures I used in my
19 modeling.

20 Otter Tail provided the IRP-Manager model with four CCGT alternatives. These
21 alternatives included different sizes from a winter rating of 59.25 MW to 141.3 MW. The
22 alternatives also included consideration of both heavy-duty and aeroderivative technologies in
23 the CCGT. The costs of these alternatives, including associated transmission, ranged from

1 \$1,297/kW to \$1,540/kW based on a winter rating. If the summer rating is used, the costs varied
 2 from \$1,571/kW to \$2,032/kW. These values do not include AFUDC for Otter Tail as the IRP-
 3 Manager model calculates the AFUDC within the model.

4 **Q: Mr. Deason requests that Otter Tail provide additional information regarding its**
 5 **consideration of AFUDC. Can you explain how you took AFUDC into account in**
 6 **conducting your resource planning?**

7 A: IRP-Manager has a very substantial financial submodel provided by M.S. Gerber and
 8 Associates, a firm that has extensive experience over several decades in providing regulated
 9 utility financial analysis to regulatory commissions and utilities. This is one area where Otter
 10 Tail will lose some functionality in the transition to Strategist. AFUDC is calculated internally
 11 by the model on all project alternatives. The inputs to the model include all financial
 12 information on each alternative such as book life, tax life, capital cost, fixed and variable O&M
 13 costs, and the construction expenditure pattern. As part of its analysis, the model calculates the
 14 AFUDC based on the AFUDC rate applied to the capital expenditure pattern of a project.
 15 AFUDC on new projects impacts the utility financial statements and IRP-Manager automatically
 16 flows those impacts through to the financial outputs.

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

18 A: Yes it does.