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September 20, 2004

FILED²

SEP 20 2004

Dale Hardy Roberts
Secretary/Chief Regulatory Law Judge
Public Service Commission
Governor's Office Building
Madison & E. Capitol
Jefferson City, MO 65101

Missouri Public
Service Commission

RE: *In the Matter of Empire District Electric Company's Application for Authority to File Tariffs Increasing Electric Rates for the Service Provided to Customers*, Case No. ER-2004-0570

Dear Judge Roberts:

Enclosed for filing in the above-referenced case are the original and 8 copies of the direct testimony of Rick Anderson, Anita Randolph and Ronald Wyse, each with affidavit, submitted on behalf of the Missouri Department of Natural Resources' Outreach and Assistance Center, Missouri Energy Center. Thank you for your attention to this matter.

Sincerely,

JEREMIAH W. (JAY) NIXON
Attorney General

Ronald Molteni
Assistant Attorney General

Enclosures

cc: All Parties on the Service List

Exhibit No.:
Issues: Commitment to Complete Wind Energy
Assessments in Missouri
Witness: Rick Anderson
Sponsoring Party: Missouri Department of Natural
Resources' Outreach and Assistance
Center, Missouri Energy Center
Type of Exhibit: Testimony
Case No.: ER-2004-0570

EMPIRE DISTRICT ELECTRIC COMPANY ELECTRIC RATE CASE

DIRECT TESTIMONY

OF

RICK ANDERSON

MISSOURI DEPARTMENT OF NATURAL RESOURCES

ENERGY CENTER

September 20, 2004

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**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI
TESTIMONY OF
RICK ANDERSON**

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER**

CASE NO. ER-2004-0570

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1 **Q. Please state your name and address.**

2 A. My name is Rick Anderson. My business address is Missouri Department of Natural
3 Resources, Energy Center, 1659 East Elm Street, P.O. Box 176, Jefferson City, Missouri
4 65102-0176.

5 **Q. By whom and in what capacity are you employed?**

6 A. I am employed by the Missouri Department of Natural Resources as an energy policy analyst
7 for the Missouri Energy Center, a division of state government with its executive office
8 located in Jefferson City, Missouri.

9 **Q. On whose behalf are you testifying?**

10 A. I am testifying on behalf of the Missouri Department of Natural Resources, an intervenor in
11 these proceedings.

12 **Q. Please describe your educational background and business experience.**

13 A. My post-secondary education has focused on Natural Resources Management, resulting in a
14 Bachelor of Science in Forestry from Michigan State University in 1974 and a Masters of
15 Science in Water Resources Management from the University of Wisconsin-Madison in
16 1980. Since 1980, I have been employed by the Missouri Department of Natural Resources
17 (hereafter referred as DNR). After serving two years as staff in DNR's Public Information
18 Office, I served as DNR's Budget Officer from 1982 until 1994 when I moved to the
19 Missouri Energy Center within DNR. At the Energy Center my work has focused on energy
20 policy issues. Current duties focus on renewable energy, with specific emphasis on wind
21 energy.

22 **Q. What is the purpose of your direct testimony in these proceedings?**

1 A. The purpose of my testimony is to focus on the development of wind energy resources in the
2 Empire District Electric Company (hereafter referred as Empire) service territory.

3 The Energy Center is seeking commitment by Empire to provide funding for wind resource
4 assessments to determine the feasibility of building and operating wind powered electric
5 generation systems in Missouri.

6 **Q. Please describe the relationship between Empire's current commitment to wind-based**
7 **electric generation and the proposed rate increase.**

8 A. Empire is proposing an electric rate increase seeking a \$38.2 million annual revenue
9 increase, a majority of which is directed toward residential and commercial customers. Of the
10 \$38.2 million annual revenue increase proposed by Empire, \$30.7 million or over 80 percent
11 of the revenue increase is targeted towards residential and commercial customers. And a
12 substantial component of this rate increase is the cost of natural gas as a fuel to generate
13 electricity by Empire's current generation system. Economical alternative forms of electric
14 generation, including wind energy, should be fully considered by Empire to diversify their
15 generation mix. To rely on coal and natural gas as the sole source of generation into the
16 future may lead to substantially higher utility costs due to price volatility.

17 **Q. What are the benefits to consumers from renewable energy sources?**

18 A. The Missouri Governor's Energy Policy Council cited economic and environmental benefits
19 of renewable resources and recommended that Missouri aggressively pursue their production
20 and use. I served as staff support to the Council. The Council's June 1, 2003 report stated:
21 "Renewable energy sources in the Midwest are playing an increasing role in providing
22 energy needs. Diversifying energy sources in Missouri will provide numerous benefits by:

- 23 • reducing our vulnerability to volatile oil markets,

- 1 • improving grid reliability through on-site generation,
- 2 • increasing the competitiveness and reliability of businesses and energy systems,
- 3 • offering economic benefits from the development of renewable energy industries and
- 4 keeping more of our energy dollars in the local economy, and
- 5 • improving the environment from reduced emissions that harm public health.”

6 Clean domestic energy choices for power generation, including solar, wind and biomass, can
7 improve efficiencies and reduce expenditures on transmission and distribution equipment by
8 siting these technologies close to the point of consumption, where possible.

9 Other Midwest states have begun to realize the economic benefits from the development of
10 renewable energy industries.

11 **Q. Does Missouri have renewable energy resources?**

12 A. Yes. As an agriculturally productive state, Missouri has substantial land area available for
13 energy crops and crop waste that can be used for bioenergy production. If one-half of the
14 energy content of these available biomass resources were used in technology that is as
15 efficient as the average American electric generation plant, the Energy Center estimates that
16 the net energy produced would be 15.2 million megawatt hours (MWh). This assumes that
17 biomass fuel can be economically transported to plants capable of burning such fuel. This
18 compares to 76.6 million MWh generated in Missouri in 2000, or 20% of our current
19 generation.

20 Also, the Governor’s Energy Policy Council in its June 2003 report, which the Energy Center
21 helped staff and prepare, noted that Missouri has an average daily summer solar radiation
22 comparable to the vast majority of the United States including the state of Florida, making
23 solar energy in Missouri an untapped opportunity. As the cost of traditional fossil fuels

1 increases and the cost of solar energy declines, solar energy for electrical power generation
2 and water heating continue to become more cost-effective as a means to help meet peak
3 electrical demand.

4 **Q. Does Missouri have wind energy resources?**

5 A. Yes. To help assess Missouri's wind energy potential, the Energy Center contracted with the
6 firm TrueWind Solutions, Inc. for the development of new high-resolution wind energy maps
7 of Missouri. At a resolution of 25 kilometers x 25 kilometers, the 1987 national wind maps
8 provided only a gross indication of general areas with potentially productive wind sites.

9 Advances in weather forecasting have resulted in substantial improvement in computerized
10 models of the atmosphere. Not only has this affected weather forecasting, it has also resulted
11 in new ways to predict wind energy patterns that result in a new generation of maps that are
12 much more detailed.

13 The maps that are currently available are interim-final work products of TrueWind Solutions
14 and are subject to independent validation by the National Renewable Energy Laboratory
15 (NREL) and consulting meteorologists. Validation is scheduled to be completed in the fall of
16 2004. According to TrueWind Solutions staff, the validation process usually results in only
17 minor changes to interim wind maps.

18 The maps apply new atmospheric modeling methods that result in new insights into
19 Missouri's wind energy resources. Building on the capability of the new modeling methods is
20 a major improvement in resolution with each cell in the model set at 0.2 kilometers x 0.2
21 kilometers, there are over 15,000 data cells on the new map for each cell on the wind maps
22 prepared in the 1980s. These changes result in maps that are able to more precisely predict
23 the wind resource.

1 The maps prepared in the 1980s predicted that Missouri's best wind energy resources were
2 likely to be found on well-exposed ridges in southern Missouri. The new maps predict that
3 the largest areas with the highest average wind speeds are to be found in northwest Missouri.
4 While in general, similarly exposed locations to the south and east have progressively lower
5 average wind speeds, the map indicates there are numerous smaller areas with utility-scale
6 potential in the Empire District's service territory.

7 Throughout the Midwest, wind power substantially increases as the distance from the
8 ground increases. For example, the wind power density measured at 100 meters is much
9 better than at 50 meters. While Missouri's wind resources are not as robust as what is found
10 in some states, we do have the potential for development at some locations in the state. The
11 wind maps can be viewed on the Department of Natural Resources' web page at
12 <http://www.dnr.mo.gov/energy/renewables/wind-energy.htm#maps>.

13 **Q. How are these maps used?**

14 A. These new high-resolution wind maps can be used by Missouri utilities and property owners
15 to guide 'prospecting' for useful wind resource levels. To make site-specific measurements
16 that can be used to guide wind resource development, the Energy Center proposes to have
17 wind energy instruments installed on existing communication towers that are located on or
18 near land in the Empire District's service territory that the wind resource maps predict to
19 have a substantial wind resource. Instrumentation at three levels, typically 50, 100 and 120 –
20 150 meters will provide information on the wind patterns found across the range of distances
21 above ground level where a utility-scale wind turbine's rotors would be in operation.
22 The Energy Center requests that Empire provide funding in the amount of \$80,000 to
23 contract with a consulting wind energy meteorologist to conduct wind energy assessments at

1 a minimum of 2 sites in the Empire service territory. Wind energy assessments should be
2 consistent with the American Wind Energy Association's Standard Procedures for
3 Meteorological Measurements at a Potential Wind Turbine Site (AWEA Standard 8.1 – 1986
4 or successor standards). Selection of the sites should be consistent with the best wind energy
5 resources identified in the Department of Natural Resources' recently published wind map of
6 the state of Missouri. The cost for each site assessment is estimated to be approximately
7 \$40,000. Costs would include the wind measuring equipment, installation costs, lease
8 payments for the use of existing tall towers (such as communication towers when located on
9 or near sites predicted to have a strong wind resource) and consultant analysis of the data.

10 **Q. Is wind energy economically viable?**

11 A. Yes. Because of the improved efficiency of wind turbines and government policies
12 encouraging wind energy investments, wind-driven electrical generation is the fastest
13 growing source of new electrical generation capacity in the United States. Recent
14 technological improvements have made it possible to generate energy from wind levels
15 previously considered insufficient.
16 The federal production tax credit for renewable energy was 1.9 cents/kWh (1.5 cents/kWh
17 adjusted for inflation). This tax credit expired on December 31, 2003. Federal legislation
18 under consideration at the time of this filed direct testimony (S. 1637), would extend the
19 production tax credit until January 1, 2007. Unlike some other electric generation
20 technologies, wind energy contracts are often for 10 or more years, resulting in a known
21 price for energy that can serve as a hedge against price volatility. As a result of these factors,
22 utility companies are deciding to build, or contract for the energy from wind farms, because
23 it is consistent with their business objectives.

1 **Q. Does Empire currently invest in wind energy?**

2 A. No. As of December 31, 2003, Empire reports that they do not currently generate electricity
3 from wind energy resources. (Data Request, MDNR-24, Todd Tarter, Empire District
4 Electric Company, August 10, 2004)

5 **Q. Does Empire currently invest in any alternative form of electric generation?**

6 A. Yes. Empire reports that as of December 31, 2003, the company generated a total of
7 2,345,470 MWH of base load electricity of which 58,118 or 1.3 percent of total generation
8 was produced from its Ozark Beach hydro-electric facility (MDNR-24, Kristi Tackett, Empire
9 District Electric Company, August 10, 2004).

10 **Q. Has Empire examined the potential for wind energy generation in Missouri?**

11 A. No. Empire states that they have not conducted or have had conducted on their behalf, any
12 formal evaluations or studies of wind energy potential in Missouri as of December 31, 2003.
13 Empire has expressed an interest in wind energy development, but this has been restricted to
14 discussions with wind energy developers in Kansas (MDNR-26, Blake Mertens, Empire
15 District Electric Company, August 10, 2004). In the absence of any formal evaluation of
16 wind energy potential in Missouri, Empire should fully examine the potential for alternative
17 energy development to meet future supply and demand needs within their Missouri service
18 area.

19 **Q. Are there Missouri utilities that currently invest in wind energy?**

20 A. Yes. Aquila Networks, Inc. is diversifying their energy resource mix by including wind
21 energy. Aquila has a 16 percent ownership share (0.12 MW) of the Jeffrey Energy Center
22 wind turbines and purchases power on long term contract from the 110 MW Gray County
23 Wind Farm. Both sources are located in Kansas. Aquila provides the wind energy that

1 Springfield City Utilities and Boone County Electric Cooperative make available to their
2 customers.

3 **Q. Is Aquila Networks, Inc. assessing wind energy potential in their Missouri service**
4 **territory?**

5 A. Yes. In PSC case number ER-2004-0034, Aquila, Inc. agreed in the Unanimous Stipulation
6 and Agreement to commit \$75,000 to evaluate the potential development of wind energy
7 generation in its Missouri service territory.

8 **Q. Has the State of Missouri supported the wind assessment project by Aquila Networks,**
9 **Inc.?**

10 A. Yes. On August 9, 2004, the U.S. Department of Energy announced its intent to award
11 \$37,500 to the Missouri Department of Natural Resources, Energy Center to conduct a wind
12 energy assessment project with Aquila, Inc. and Ameren Services.

13 **Q. What funding level would be required to adequately support wind energy assessment**
14 **by Empire presented by your testimony?**

15 A. As noted earlier in my testimony, Empire is targeting the largest proportion of this rate
16 increase to its residential and small commercial electric customers. In order to help Empire
17 and its residential and commercial electric customers face these rising energy costs relating
18 to higher fuel costs, Empire should conduct a comprehensive examination of the wind energy
19 resources in its Missouri service territory.

20 Empire provides electric service to approximately 156,918 customers in Missouri;
21 approximately 131,914 are residential customers and 23,324 are commercial customers. The
22 Energy Center requests that Empire provide a one-time funding amount of \$80,000 to
23 conduct the wind energy assessment project.

1 **Q. Please explain the estimated cost per customer to implement the wind energy**
2 **assessment project.**

3 A. If the cost to complete the wind energy assessment were allocated to all Missouri electric
4 customers with the exception industrial customers served by Empire, the estimated cost per
5 customer per month would be approximately \$0.04 presuming the cost of the project were
6 allocated over a 12-month period.

7 **Q. Does this conclude your testimony?**

8 A. Yes. Thank you.

In the Matter of Empire District Electric
Company and Its Tariff Filing to Implement
A General Rate Increase for Electric Service

STATE OF MISSOURI)
) SS.
COUNTY OF COLE)

Rick Anderson
Rick Anderson

Subscribed and sworn before me this 17th day of September, 2004.