

**BEFORE THE
ARKANSAS PUBLIC SERVICE COMMISSION**

**IN THE MATTER OF THE APPLICATION OF)
OKLAHOMA GAS AND ELECTRIC COMPANY) DOCKET NO. 06-070-U
FOR APPROVAL OF A GENERAL CHANGE IN)
RATES AND TARIFFS)**

DIRECT TESTIMONY

OF

**EZRA D. HAUSMAN, PH.D.
SYNAPSE ENERGY ECONOMICS, INC.**

**ON BEHALF OF THE GENERAL STAFF OF THE
ARKANSAS PUBLIC SERVICE COMMISSION**

October 19, 2006

1

INTRODUCTION

2 **Q. Please state your name, position and business address.**

3 A. My name is Ezra D. Hausman, Ph.D. I am a Senior Associate at Synapse Energy
4 Economics, Inc., 22 Pearl Street, Cambridge, MA 02139.

5 **Q. On whose behalf are you testifying in this case?**

6 A. I am testifying on behalf of the General Staff (Staff) of the Arkansas Public
7 Service Commission (Commission).

8 **Q. Please describe Synapse Energy Economics.**

9 A. Synapse Energy Economics (Synapse) is a research and consulting firm
10 specializing in energy and environmental issues, including electric generation,
11 transmission and distribution system reliability, market power, electricity market
12 prices, stranded costs, energy efficiency, renewable energy, environmental
13 quality, and nuclear power.

14 **Q. Dr. Hausman, please summarize your educational background and recent
15 work experience.**

16 A. I hold a B.A. from Wesleyan University, a M.S. in civil engineering from Tufts
17 University, a S.M. in applied physics from Harvard University and a Ph.D. in
18 atmospheric chemistry from Harvard University.

19 I have been employed by Synapse since July of 2005, serving as an analyst and
20 expert witness in areas including electricity and electric generating capacity
21 market structure and design; price forecasting and asset valuation; environmental
22 regulation in the electric sector; global climate change and carbon dioxide
23 emissions; and resource planning.

24 Prior to joining Synapse, I was employed as a Senior Associate with Tabors
25 Caramanis & Associates (TCA, now part of CRA International) since 1997,
26 performing a wide range of electricity market and economic analyses and price

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1 forecast modeling studies, including asset valuation studies, market transition
2 cost/benefit studies, market power analyses, and litigation support studies.

3 A copy of my current resume is attached as Exhibit EDH-1.

4 **Q. Have you previously submitted testimony before state and federal regulatory**
5 **Commissions?**

6 A. Yes. I have submitted written and/or live testimony before the Iowa Utility Board,
7 the Illinois Pollution Control Board, and the South Dakota Public Utilities
8 Commission. In addition, I have offered written and live testimony before the
9 Federal Energy Regulatory Commission as a member of a technical panel on
10 generating capacity market structure issues.

11 **PURPOSE OF TESTIMONY**

12 **Q. What is the purpose of your testimony in this proceeding?**

13 A. Staff retained Larkin and Associates PLLC and Synapse to evaluate whether the
14 Commission should allow Oklahoma Gas and Electric Company (OG&E or
15 Company) to include two additions to their generation mix in its cost of service.
16 The two resources are the Centennial Wind Facility (Centennial), a 120-megawatt
17 (MW) wind facility being built by OG&E in northwestern Oklahoma, and a 77%
18 interest in the 520 MW McClain Generating Station (McClain), a natural gas-fired
19 combined cycle generating station near Oklahoma City, Oklahoma previously
20 owned by NRG McClain, LLC.

21 **CENTENNIAL WIND FACILITY**

22 **Q. Please summarize the process by which the decision to build Centennial was**
23 **made.**

24 A. According to the Direct Testimony of OG&E witness Langston¹, OG&E was
25 interested in purchasing additional wind generating capacity in response to

¹ Langston Direct Testimony, Docket No. 06-079-U pp. 4-5.

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1 customer desires and satisfactory experience with wind energy purchased from
2 the 50 MW Sooner Wind facility, owned by FPL Energy LLC. OG&E entered a
3 competitive solicitation process to procure this additional wind energy. Although
4 a number of bids were received, all were ultimately rejected as too costly. OG&E
5 concluded that it could produce its own wind generation at a considerably lower
6 cost, and proceeded to hire Invenergy Oklahoma Wind, LLC (Invenergy) to
7 construct the project.

8 **Q. Have you reviewed the information OG&E filed in support of the Company's**
9 **request to include the Centennial facility in cost of service?**

10 A. Yes.

11 **Q. In your opinion, were the submittals in response to the Request For Proposal**
12 **(RFP) and the self-build option evaluated on a comparable basis?**

13 A. Not entirely. There were at least three differences which tended to favor the self-
14 build option. The first was that for the self-build option a 25-year service life was
15 assumed, while the RFP responses all had shorter lifetimes, either 15 or 20 years².
16 Because most of the costs of a wind project are up-front construction costs, the
17 choice of a longer design lifetime means that the calculated costs would be lower
18 on a per-megawatt-hour (MWh) of output basis. Second, OG&E and Invenergy
19 project that the self-built facility will have a capacity factor of 44.5%, meaning
20 that it will produce, averaged over time, at a level which is 44.5% of its rated
21 capacity. This is quite high compared to any existing facility that I know of; in
22 general, because of the inherent variability of wind strength, wind power facilities
23 produce power at closer to 30% of their rated capacity, averaged over time. Even
24 if the wind resource is extremely favorable at this location, it is unlikely that any
25 of the outside bidders used a capacity factor as high as 44.5% in assembling their
26 bids. Again, because the vast bulk of the costs of a wind facility are fixed costs, a
27 higher capacity factor suggests a much lower per-MWh cost for the output of the

² *Id.* p. 8.

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1 facility. Third, the self-build option means that OG&E and its customers assume
2 all risk for non-performance of the facility, ranging from a less-than-expected
3 capacity factor to total failure of the resource. Presumably the bidders in the RFP
4 process took these risks into account in pricing their offers.

5 **Q. Is it your opinion that the 25-year design life for the Centennial turbines is**
6 **realistic?**

7 A. That is quite difficult to say. Although a 25-year lifetime is longer than the term
8 generally used in such projects, the industry has much more experience and
9 expertise in building wind turbines than it had even a few years ago. On the other
10 hand, it is possible that wind turbines built today will be obsolete within 25 years,
11 even if they are still functional, so that the useful life of the facility would be
12 shorter. However, if these turbines are still operating, economic, and producing
13 electricity two decades from now and beyond, Arkansas consumers presumably
14 will retain the benefit of this emissions-free, very low-cost energy under the self-
15 build plan.

16 **Q. Does the performance Capacity Factor Warranty³ offered by Invenergy**
17 **protect Arkansas consumers in case the capacity factor estimate used in the**
18 **analysis is too high?**

19 A. Only to a very limited extent. First of all, the warranty is based on a capacity
20 factor of 40%, not 44.5%. Also, the maximum liquidated damages associated with
21 the warranty amount to 2.5% of the project price, which would come into effect if
22 the capacity factor were 37% or below. If the capacity factor is above 37%, the
23 damages are reduced linearly, to zero, at a capacity factor of 40%. If the capacity
24 factor falls below 37%, there is no additional protection afforded by this warranty.

³ The Capacity Factor Warranty was negotiated in the Engineering, Procurement and Construction Contract with Invenergy. The language of this Warranty was provided in response to Staff Data Request APSC-1 of this Docket, Question 1-30.

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1 Finally, the warranty is limited to the first three years of the project's life, over
2 which the capacity factor will be measured in the aggregate.⁴

3 In my opinion, to call this a warranty is somewhat inaccurate. An alternative,
4 equivalent description of this arrangement is that the facility is expected to have a
5 capacity factor of 37%, which is still high by industry standards, for a purchase
6 price which is actually 2.5% lower than the reported price. From this perspective
7 there is no warranty whatsoever related to the capacity factor. Instead, if the
8 facility attains a higher capacity factor (up to 40%) during the first three years,
9 there is a bonus payment to Invenergy, sliding up to approximately 2.5% of the
10 project price. Above that level, OG&E gets any additional benefit for no
11 additional charge.

12 **Q. If the capacity factor estimate turns out to have been overly optimistic, what**
13 **would be the effect on the overall per-MWh cost of the project?**

14 A. If the capacity factor is 37% instead of 44.5%, then the project will produce about
15 17% less energy. To a first approximation, this means that the cost per unit of
16 output will be about 20% higher. According to Mr. Langston, the levelized cost of
17 Centennial is expected to be \$34.61 per MWh⁵. If the capacity factor is only 37%,
18 this presumably would be closer to \$41.50 per MWh. This would put it squarely
19 within the range of bids offered by respondents to the RFP⁶. If the capacity factor
20 is lower than 37% the per-MWh cost would be still higher accordingly. As I
21 mentioned, even 37% would be a high capacity factor compared to industry
22 standards.

⁴ OG&E Response to Staff Data Request APSC 1-30.

⁵ *Id.* p. 7.

⁶ *Id.* p. 6.

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1 **Q. Did OG&E take risk into account when evaluating the self-build option for**
2 **Centennial?**

3 A. Only to a very limited extent. OG&E did perform limited uncertainty analyses
4 around certain project variables, including the capacity factor. However, I have
5 not seen any evidence that OG&E tried to weigh the assumption of all risks
6 associated with the facility in choosing to self-build rather than to purchase the
7 wind power.

8 **Q. Are there any other disadvantages to the self-build approach taken by**
9 **OG&E in this process?**

10 A. Yes there are. By soliciting offers through an RFP and then accepting none of
11 them, OG&E weakened its credibility for future RFPs. Bidders put a great deal of
12 effort and resources into responding to RFPs, and they are less likely to do so in
13 the future if they do not sense that OG&E is a serious buyer. In the long run, this
14 could hurt competition and harm consumers.

15 **Q. What factors support including Centennial in OG&E's cost of service?**

16 First and foremost, even at a lower capacity factor, the overall cost of energy from
17 the facility should compare favorably with the cost of OG&E's purchased power
18 contracts. Second, the cost of power produced at a wind facility is largely immune
19 to any increases in fuel and emissions costs; for example, if there is a cost
20 associated with carbon dioxide emissions in the future, the cost of producing
21 power from Centennial will not be affected. Finally, there is a recognized value to
22 society in producing energy in a way that does not produce any pollution, does
23 not rely on fossil fuels and does not contribute to global warming. OG&E may
24 even be able to earn additional revenue from selling the environmental attributes
25 of this power in nationwide or regional voluntary "green power" markets, even
26 though the power itself will be delivered locally. If so, this would provide an
27 additional economic benefit of the project.

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1 **Q. Given all this, what is your recommendation regarding the inclusion of**
2 **Centennial in OG&E’s cost of service in Arkansas?**

3 A. My judgment is that this project will be beneficial to Arkansas consumers if the
4 key assumptions in the Company’s analysis materialize. A key element of
5 Centennial’s value is the estimated fuel savings that should more than offset the
6 estimated cost of the generation project⁷. However, because of OG&E’s
7 decisions, the value achieved by Arkansas customers will depend entirely on
8 Centennial’s actual operations. To protect consumers from this risk, the
9 Commission should conditionally accept the Centennial facility in cost of service
10 and order OG&E to:

11 (1) monitor the performance of Centennial and report to the Commission annually
12 the fuel savings associated with the operation of this facility. The report should
13 show, at a minimum, Centennial’s monthly generation, the resources displaced,
14 and the resulting fuel savings.

15 (2) refund to ratepayers through the Energy Cost Recovery Rider (ECRR) any
16 delay damages, liquidated damages, warranty or other payments made to OG&E
17 under the Invenergy contract.

18 (3) pursue any opportunities to sell “green credits” or other products resulting
19 from the environmental benefits of wind generation at Centennial, and refund to
20 Arkansas ratepayers through the ECRR a share of the value of these credits equal
21 to the portion of the resource dedicated to serving Arkansas ratepayers.

22 The Commission should reserve the right to initiate a proceeding to address
23 measures necessary to protect Arkansas ratepayers if there is a material variance
24 from expected operations. Such measures could include, but would not be limited
25 to, the disallowance of recovery in rates of some or all costs associated with
26 Centennial or disallowance of recovery through the ECRR of all or some of the

⁷ Rowlett Direct Testimony, Docket No. 06-070-U, page 45.

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1 additional costs related to purchasing replacement power. A disallowance of all
2 or part of Centennial costs in the Oklahoma jurisdiction would automatically
3 trigger a re-evaluation in Arkansas.

4 **MCCLAIN**

5 **Q. Please describe the McClain project and summarize the process by which the**
6 **decision to purchase this facility was made.**

7 A. McClain is a gas-fired, 520 MW rated combined cycle unit located near
8 Newcastle, Oklahoma, previously jointly owned by NRG McClain LLC (NRG)
9 and the Oklahoma Municipal Power Authority. OG&E purchased NRG's 77%
10 interest (400 MW capacity) in this plant in 2004 through direct negotiation with
11 NRG, after reviewing and comparing a number of potential alternative resources
12 to meet their capacity needs.

13 **Q. Have you reviewed the information OG&E has filed in this case in support of**
14 **the company's application to include the McClain facility in the cost of**
15 **service?**

16 A. Yes.

17 **Q. Do you agree with OG&E's assessment of the need for this additional**
18 **capacity?**

19 A. Based upon the information provided by OG&E, yes. An additional 400 MW is a
20 reasonable acquisition given the load growth in their service territory and the
21 recent expiration of purchase contracts related to the Public Utility Regulatory
22 Policy Act and other power purchase agreements.

23 **Q. Was the selection of the McClain plant over the alternatives considered by**
24 **OG&E justified by the information the Company has provided in this**
25 **Docket?**

26 A. Yes. Based on the technology, age, location, and purchase price of the facility, I
27 agree that this purchased was the best of the alternatives considered by OG&E.

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1 **Q. Was the purchase price of the McClain plant reasonable, in your judgment?**

2 A. Yes. OG&E acquired its share of the plant at an attractive price. I base this
3 judgment on the recent vintage and efficient technology of the facility, the
4 original cost of the facility to NRG, and the sales prices of other, comparable
5 facilities as described in Mr. Langston's testimony⁸ and exhibits.

6 **Q. Do you agree that the McClain plant acquisition will result in significant fuel
7 cost savings?**

8 A. Yes. McClain is a more efficient plant than many of the gas-fired resources
9 currently in OG&E's portfolio, and thus will generate energy using significantly
10 less fuel per MWh produced than would these other units. This should result in
11 fuel cost savings. In addition, this greater efficiency will result in lower emissions
12 of pollutants from OG&E's production of electricity, including emissions of
13 carbon dioxide. This will result in even greater savings in the likely event that
14 carbon emissions are priced in the future.

15 **Q. What is your overall recommendation with regard to the inclusion of the
16 McClain plant in OG&E's cost of service in Arkansas?**

17 A. I conclude that the plant will be used and useful and that it will generate
18 electricity at a reasonable cost to consumers. I recommend that it be included in
19 OG&E's Arkansas cost of service.

20 **SUMMARY OF RECOMMENDATIONS**

21 **Q. Please summarize your recommendations.**

22 A. I recommend that McClain be included in OG&E's Arkansas cost of service. I
23 also recommend that Centennial conditionally be included in OG&E's Arkansas
24 cost of service subject to the Commission's right to initiate a proceeding to

⁸ Langston Direct Testimony, Docket No. 06-070-U pp. 15-17.

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1 address measures necessary to protect Arkansas ratepayers, if there is a material
2 variance from expected operations. Furthermore, OG&E should be directed to:

3 (1) monitor the performance of Centennial and report to the Commission annually
4 the fuel savings associated with the operation of this facility. The report should
5 show, at a minimum, Centennial's monthly generation, the resources displaced,
6 and the resulting fuel savings.

7 (2) refund to ratepayers through the Energy Cost Recovery Rider (ECRR) any
8 delay damages, liquidated damages, warranty or other payments made to OG&E
9 under the Invenergy contract.

10 (3) pursue any opportunities to sell "green credits" or other products resulting
11 from the environmental benefits of wind generation at Centennial, and refund to
12 Arkansas ratepayers through the ECRR a share of the value of these credits equal
13 to the portion of the resource dedicated to serving Arkansas ratepayers.

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

15 **A. Yes.**