

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke)
Energy Ohio, Inc., for the Establishment)
of a Charge Pursuant to Revised Code) Case No. 12-2400-EL-UNC
Section 4909.18.)

In the Matter of the Application of Duke)
Energy Ohio, Inc., for Approval to) Case No. 12-2401-EL-AAM
Change Accounting Methods.)

In the Matter of the Application of Duke)
Energy Ohio, Inc., for the Approval of a) Case No. 12-2402-EL-ATA
Tariff for a New Service.)

DIRECT TESTIMONY OF

BEN ZHANG, PH.D.

ON BEHALF OF

DUKE ENERGY OHIO, INC.

_____ Management policies, practices, and organization

_____ Operating income

_____ Rate base

_____ Allocations

_____ Rate of return

_____ Rates and tariffs

 X Other: Projected energy and ancillary services margins and capacity revenues

March 1, 2013

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I. INTRODUCTION AND PURPOSE

1 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is Ben Zhang, Ph.D., and my business address is 139 E. Fourth Street,
3 Cincinnati, Ohio 45202.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. I am employed by the Duke Energy Commercial Enterprises, Inc., (DECES) as Vice
6 President, Commercial Analytics. DECES provides various administrative and other
7 services to Duke Energy Ohio, Inc., (Duke Energy Ohio or Company) and other affiliated
8 companies of Duke Energy Corporation (Duke Energy).

9 **Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND**
10 **PROFESSIONAL EXPERIENCE.**

11 A. I received my Ph.D. in Financial Economics and Econometrics from Duke University in
12 1999, and received a Masters degree in investment management in 1989 and B.S. in
13 Mathematics in 1986, both from Dongbei University of Finance & Economics in China.

14 I joined Cinergy Corp. (Cinergy) in May 1999 as a Senior Researcher/Senior
15 Financial Economist in its energy merchant business. I was promoted to Director of Risk
16 Analytics in October 2000, became Managing Director of Pricing & Quantitative
17 Analysis in September 2001 and Vice President in November 2003. I was named to my
18 current position after the merger between Duke Energy and Cinergy in April 2006.

19 I am the architect of the Commercial Business Model (CBM) which is now used
20 throughout Duke. My accomplishments have also included assisting the build-out of Duke's
21 retail business in 2009 and 2010, developing of the Market Fundamentals function,
22 integrating the DENA assets into the CBM, and assisting global risk management to

1 establish risk management metrics.

2 **Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AS VICE PRESIDENT,**
3 **COMMERCIAL ANALYTICS.**

4 A. As Vice President, Commercial Analytics, I am responsible for leading the functional
5 areas of pricing and structuring, modeling, market fundamentals, asset valuations, and
6 financial analysis in support of Midwest Commercial Generation. I am also actively
7 involved in business optimization initiatives and interacting with executive management
8 on issues of commercial value optimization, risk mitigation, and best business practices.

9 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITIES**
10 **COMMISSION OF OHIO?**

11 A. No, I have not.

12 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THESE PROCEEDINGS?**

13 A. The purpose of my testimony is to support the projected margins from the sales of
14 energy and ancillary services derived from the Company's generating assets, which
15 margins are included as an offset to the overall revenue requirement set forth in the
16 Application. I also discuss the projected capacity revenues that are relevant to the
17 calculation of the revenue requirement.

18 **II. DISCUSSION**

19 **Q. PLEASE IDENTIFY THE COMPANY'S GENERATING ASSETS TO WHICH**
20 **YOU REFER IN YOUR PRIOR ANSWER AND THAT ARE RELEVANT TO**
21 **THE COMPANY'S APPLICATION.**

22 A. The Company currently has an ownership share in six coal-fired generating stations:
Beckjord (units 1-6), Conesville (unit 4), Killen (unit 2), Miami Fort (units 7 and 8),

1 Stuart (units 1-4), and Zimmer (unit 1). The Company is responsible for the operation of
2 the Beckjord, Miami Fort, and Zimmer stations.

3 In addition, Duke Energy Ohio owns, either in whole or in part, other generation
4 facilities. Other generation facilities include Beckjord CTs (units 1, 2, 3, 4), Dicks Creek
5 CTs (units 1, 3, 4, 5), Killen CT, Miami Fort CTs (units 3, 4, 5, 6), and Stuart Diesels.
6 The Company is responsible for the operation of the Beckjord, Dicks Creek and Miami
7 Fort CTs. Attachment A of the Company's Application in these proceedings includes a
8 list of the units and the Company's ownership share in each unit.

9 Duke Energy Ohio is a Fixed Resource Requirement (FRR) entity and is
10 providing noncompetitive capacity service pursuant to an FRR plan that will terminate on
11 May 31, 2015. Duke Energy Ohio has committed its owned, legacy generating assets
12 identified in Attachment A to the Application to its FRR plan and capacity from these
13 resources is used to meet the Company's self-supply obligations.

14 **Q. PLEASE GENERALLY DESCRIBE THE CBM.**

15 A. The CBM is a Monte Carlo simulation based system that uses inputs such as operating
16 parameters for the units (*e.g.*, heat rates, EFOR rates); historical weather patterns; fuel
17 prices; emission allowances; power prices; and various other assumptions to generate a
18 probabilistic projection of unit output, costs, and revenues.

19 **Q. WAS THE CBM USED TO DETERMINE THE PROJECTED ENERGY**
20 **MARGINS FROM THE COMPANY'S GENERATING ASSETS FOR THE**
21 **PERIOD OF TIME AT ISSUE IN THESE PROCEEDINGS?**

22 A. Yes. Duke Energy Ohio relied upon its internally developed CBM to project margins
23 from the sale of energy. The difference between the projected revenue and the cost of

1 generation is the projected energy margin that was included in the revenue offset that
2 Duke Energy Ohio witness William Don Wathen Jr. discusses in his testimony.

3 **Q. PLEASE DEFINE THE ANCILLARY SERVICES THAT ARE ALSO**
4 **INCORPORATED INTO THE OFFSET TO THE COMPANY'S OVERALL**
5 **REVENUE REQUIREMENT.**

6 A. PJM Interconnection, L.L.C. (PJM), ancillary services products that are included in the
7 revenue offset are reactive power and black start. These ancillary services are approved
8 by the Federal Energy Regulatory Commission and incorporated into PJM's approved
9 tariffs.

10 **Q. HOW WERE THE PROJECTED ANCILLARY SERVICES MARGINS FROM**
11 **THE COMPANY'S GENERATING ASSETS DETERMINED?**

12 A. In addition to the energy margins, we also calculate the projected revenues from reactive
13 power and black starts attributable to Duke Energy Ohio's legacy generation that were
14 included in the revenue offset described by Mr. Wathen. These ancillary services are
15 approved by the Federal Energy Regulatory Commission and incorporated into PJM's
16 approved tariffs.

17 **Q. IS DUKE ENERGY OHIO REQUIRED TO SHARE ANY OF THE MARGINS ON**
18 **SALES OF ENERGY OR ANCILLARY SERVICES?**

19 A. No. Duke Energy Ohio is not part of any sharing agreement and, therefore, all of the
20 margins on the sales of energy and ancillary services derived from its legacy generation
21 are attributable exclusively to Duke Energy Ohio.

22 **Q. IS THE CBM SIMILAR TO OTHER PRODUCTION COST MODELS USED IN**
23 **THE INDUSTRY?**

1 A. Yes, in the sense that it captures the operational and engineering features, just as any
2 production cost model does. In addition, the CBM builds upon the traditional approaches
3 of stochastic modeling and incorporates market-based financial valuation theory with
4 essential operational constraints. The CBM achieves the same fundamental goals as any
5 other cost model used throughout the electric utility industry. Generally, these
6 sophisticated computer models forecast the economic results of operating the units using
7 simulation and optimization. Utilities and regulatory agencies have used such models for
8 many years to project fuel costs and for integrated resource planning. As I have been
9 informed, the Commission recently relied on similar production cost models to evaluate
10 the projected energy and ancillary service margins for another similar utility in Case No.
11 10-2929-EL-UNC.

12 **Q. HOW WERE CAPACITY REVENUES FOR THE PERIOD AT ISSUE IN THESE**
13 **PROCEEDINGS CALCULATED?**

14 A. The capacity revenues, which are also included in the overall revenue requirement, were
15 determined using known information. As such, there was no need to employ the CBM for
16 purposes of calculating these revenues. Rather, for the period in question – August 1,
17 2012, through May 31, 2015 – we multiplied the Company’s load obligations as an FRR
18 entity by the PJM market prices for capacity. The product of this multiplication yields the
19 capacity revenues.

III. CONCLUSION

20 **Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

21 A. Yes.