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BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the 2010
Long Term Forecast Report of
Duke Energy Ohio, Inc.

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Case No. 10-503-EL-FOR

DIRECT TESTIMONY OF

JAMES S. NORTHRUP

ON BEHALF OF

DUKE ENERGY OHIO, INC.

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TABLE OF CONTENTS

| | <u>PAGE</u> |
|--|--------------------|
| I. INTRODUCTION..... | 1 |
| II. DISCUSSION..... | 2 |
| III. DUKE ENERGY OHIO'S RESOURCE PLANNING PROCESS | 3 |
| IV. REVIEW OF LONG-TERM FORECAST REPORT | 11 |
| V. CONCLUSION | 13 |

I. INTRODUCTION

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

2 A. My name is James S. Northrup, and my business address is 526 S. Church Street,
3 Charlotte, North Carolina, 28202.

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

5 A. I am employed by Duke Energy Business Services, Inc. (DEBS) as Director,
6 Regulated Economic Analysis. DEBS provides various administrative and other
7 services to Duke Energy Ohio, Inc. (Duke Energy Ohio or Company) and other
8 affiliated companies of Duke Energy Corporation (Duke Energy).

9 **Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATION AND**
10 **PROFESSIONAL EXPERIENCE.**

11 A. I am a registered professional engineer in the state of North Carolina, having
12 received a Bachelor of Science in Civil Engineering from North Carolina State
13 University and a Master in Business Administration from Queens University. I
14 began my career at Duke Power Company in 1979 and have held a variety of
15 responsibilities across the Company in the areas of electric system distribution
16 engineering, customer marketing, demand-side management program design and
17 implementation, generation business planning, generation expansion planning,
18 energy risk management, and integrated resource planning. After coordinating
19 the development of demand-side customer programs, I joined the Generation
20 System Planning Group in 1994 and coordinated the development of the
21 integrated resource plan filings for state regulatory agencies. I was promoted to
22 Manager, Generation Business Support in the Power Generation Group in 2000 to

1 lead the business case development and asset strategy for fossil/hydro generation.
2 In 2003, I was promoted to Director, System and Power Planning Group to guide
3 major investments for generation assets and develop expansion plans to maintain
4 system reliability. In 2006, I was promoted to Director, Project Analysis and
5 Special Projects where I continue work in integrated resource planning, new
6 generation investments, and maintaining system reliability. In 2010, my title was
7 changed to Director, Regulated Economic Analysis.

8 **Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AS DIRECTOR,**
9 **PROJECT ANALYSIS AND SPECIAL PROJECTS.**

10 A. As Director, Regulated Economic Analysis, I am responsible for developing the
11 strategy for Duke Energy's operating utilities, including commercial support for
12 utility activities such as requests for proposal for renewable and supply side
13 resources and major project/initiative business case analysis. Recently, I was
14 responsible for the development of the Duke Energy Ohio Resource Plan filed in
15 the Company's 2010 Long Term Forecast Report.

16 **II. DISCUSSION**

17 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC**
18 **UTILITIES COMMISSION OF OHIO?**

19 A. Yes. I submitted written testimony in Duke Energy Ohio's Electric Security Plan
20 (ESP), Case No. 08-920-EL-SSO, *et al.* and Duke Energy Ohio's Market Rate
21 Offer (MRO), Case No. 10-2586-EL-SSO and I testified in the latter case.

22 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS**
PROCEEDING?

1 A. The purpose of my testimony is to discuss the Resource Plan that was filed in this
2 case on February 11, 2011, and the underlying analyses conducted in order to
3 identify the best options by which to serve Duke Energy Ohio customers in the
4 future.

III. DUKE ENERGY OHIO'S RESOURCE PLANNING PROCESS

5 Q. PLEASE DESCRIBE THE COMPANY'S RESOURCE PLANNING
6 PROCESS.

7 A. A resource plan is a formal plan for meeting future utility load requirements.
8 This Commission defines a resource plan as a "plan or program, established by a
9 person subject to the the requirements of this chapter, to furnish electric energy
10 service in a cost-effective and reasonable manner consistent with the provision of
11 adequate and reliable service, which give appropriate consideration to supply and
12 demand-side resources and transmission or distribution investments for meeting
13 the person's projected demand and energy requirements."

14 The goal of the resource plan process is to determine an optimal combination of
15 resources that can be used to reliably and cost-effectively meet customers' future
16 electric service requirements.

17 The resource plan process involves taking a myriad of resource options, and
18 through screening and analysis, methodically funneling down until an optimal
19 combination of feasible and economic alternatives that will reliably meet the
20 anticipated future customer loads is reached. This process involves a number of
21 steps: (1) development of planning objectives and assumptions; (2) preparation of
22 an electric load forecast; (3) identification and screening of potential electric

1 energy efficiency and renewable energy resource options; (4) identification of,
2 screening of, and performing sensitivity analysis around the cost-effectiveness of
3 potential electric supply-side resources; (5) identification of, screening, and
4 performing analysis around the cost-effectiveness of potential environmental
5 compliance options; (6) integration of the energy efficiency, renewable energy,
6 supply-side and environmental compliance options; (7) performing final
7 sensitivity and scenario analyses on the resource alternatives; and (8) selecting an
8 optimal plan based on quantitative and qualitative factors (such as risk, reliability,
9 and technical feasibility, among others).

10 **Q. WHY DID DUKE ENERGY OHIO FILE A LONG TERM FORECAST**
11 **AND RESOURCE PLAN AND A REVISED LONG TERM FORECAST**
12 **RESOURCE PLAN AND THEN A REVISED FEBRUARY 11, 2011**
13 **RESOURCE PLAN?**

14 **A.** After the Company filed its Long Term Forecast and Resource Plan on June 15,
15 2010, it was discovered that certain errors and omissions inadvertently occurred
16 during the assembly of the filed document. As a result, the Company filed a
17 revised version of the Long-Term Forecast and Resource Plan on October 7,
18 2010. After that time, however, despite the Company's filing of a letter
19 indicating that it was not requesting recovery of any costs related to construction
20 of nuclear generation and was not seeking an establishment of need for the
21 construction of any nuclear generation in this case, the Parties in this matter
22 indicated that the record was unclear in regard to the Company's intentions. As a
23 result, the Company submitted its SECTION IV – DUKE ENERGY OHIO 2010

1 RESOURCE PLAN, revised as of February 11, 2011. For purposes of this
2 testimony, my reference to the Resource Plan will be to this February 11, 2011
3 document. This document differs from the original filed Resource Plan and the
4 Revised Resource Plan in that Duke Energy Ohio is not proposing the
5 consideration of cost recovery for any new nuclear generation in this Resource
6 Plan.

7 **Q. WHY DID THE COMPANY ELECT TO OMIT REFERENCE TO THE**
8 **POTENTIAL FOR NEED OF NUCLEAR GENERATION FROM THIS**
9 **RESOURCE PLAN?**

10 A. On November 15, 2010, Duke Energy Ohio submitted an application to the
11 Commission for approval of a market rate offer and to conduct a competitive bid
12 plan. A standard service offer based upon a competitive bid plan does not provide
13 a mechanism for cost recovery for new generation. At the present time, and
14 based upon the current law and regulations in Ohio, it is not feasible for Duke
15 Energy Ohio to consider construction of any new generation.

16 **Q. PLEASE DESCRIBE THE PROCESS THE COMPANY USED TO**
17 **PERFORM THE ANALYSES FOR THIS PROCEEDING?**

18 A. The Company's planning encompasses a diverse range of resources including
19 renewables, coal, natural gas, demand-side management (DSM) and energy
20 efficiency resources. In addition, the resource plan incorporates both quantitative
21 analyses and qualitative analyses as set forth above.

22 **Q. WHAT UNIQUE CIRCUMSTANCES IN OHIO MAKE RESOURCE**
23 **PLANNING MORE OF A CHALLENGE?**

1 A. There is a great deal of uncertainty in Ohio with respect to load forecasting.
2 Amended Substitute Senate Bill 221 (SB 221) has facilitated the creation of an
3 environment in Duke Energy Ohio's service territory where a significant number
4 of customers have switched to other competitive retail electric generation
5 suppliers, thus making load forecasting difficult. Duke Energy Ohio rates with
6 respect to 2012 and beyond are not presently known. Accordingly, for purposes
7 of this resource plan, the Company assumed that all distribution customers will be
8 served by Duke Energy Ohio as of January 1, 2012.

9 Also, there is uncertainty with respect to whether or not the Company can meet
10 the aggressive energy efficiency and advanced energy resource requirements
11 established in SB 221. While the Company intends to make every effort to do so,
12 it remains unclear how customers will respond to opportunities to reduce energy
13 usage.

14 **Q. WHAT ASSUMPTIONS WERE INCLUDED IN FORMULATING THIS**
15 **RESOURCE PLAN WITH RESPECT TO ENERGY EFFICIENCY AND**
16 **ADVANCED ENERGY AND RENEWABLES.**

17 A. The assumption included in the Resource Plan is that Duke Energy Ohio will
18 meet all requirements for energy efficiency and peak demand reduction and
19 renewable energy to achieve compliance with the requirements set forth in
20 Amended Substitute Senate Bill 221 (SB 221).

21 **Q. WHAT ASSUMPTIONS WERE INCLUDED IN FORMULATING THIS**
22 **RESOURCE PLAN WITH RESPECT TO FEDERAL CARBON**
23 **REGULATION?**

1 A. In developing this plan, Duke Energy Ohio assumes that carbon legislation will be
2 in place and carbon emissions will be priced beginning in 2015 via a cap-and-
3 trade mechanism similar to SO2 and NOx emission trading systems that have
4 been very successful since the 1990s.

5 **Q. GIVEN THE UNCERTAINTIES DESCRIBED ABOVE, PLEASE**
6 **DESCRIBE THE COMPANY'S APPROACH TO THE PLANNING**
7 **PROCESS.**

8 A. Uncertainty with regard to such elements as energy efficiency, renewable energy,
9 and carbon legislation, among others, lead us to identify two scenarios that could
10 ensure reliable service in an optimized manner to meet the Alternative Energy
11 requirements of SB 221 and potential carbon pricing. These scenarios were
12 designed to include a low carbon assumption and a high carbon assumption. Duke
13 Energy Ohio witness Richard G. Stevie will address energy efficiency and peak
14 demand reduction in his testimony and Andrew S. Ritch will discuss the
15 Company's compliance with the renewable mandates of SB 221.

16 **Q. WHAT WAS ASSUMED WITH REGARD TO CUSTOMER SWITCHING**
17 **IN DUKE ENERGY OHIO'S SERVICE AREA?**

18 A. At the time the planning process was undertaken for purposes of this Resource
19 Plan, it was unclear what the path forward for the Company would look like after
20 the end of the existing ESP. It was assumed that the Company would, through
21 either another ESP or a market rate offer, implement prices much closer to market
22 beginning in 2012. In order to take the more conservative approach, the

1 Resource Plan therefore assumes all customers would return to Duke Energy Ohio
2 in 2012.

3 **Q. PLEASE DESCRIBE THE ANALYSIS USED TO DEVELOP THE**
4 **RESOURCE PLAN**

5 A. The development of the Plan combines the customer load forecast, energy
6 efficiency programs, DSM programs, renewable resources, existing supply-side
7 generation, and potential new supply-side resources into the planning process.
8 Computer models used to perform this integration process are System Optimizer
9 (SO) and Planning & Risk (PAR) owned by Ventyx (recently purchased by
10 ABB).

11 System Optimizer is an expansion planning model that dynamically
12 analyzes the cost-effectiveness of a multitude of combinations of resource
13 alternatives to meet the reliability criteria of a minimum reserve margin. The
14 model performs an economic dispatch of numerous potential combinations of
15 resource plans to determine the lowest cost or Net Present Value (NPV) plan,
16 considering capital, operations and maintenance costs, and total production costs.
17 Using SO to identify the lowest cost expansion plans for alternative planning
18 environments allows Duke Energy to examine the performance of the "best"
19 resource plans against many different possible futures.

20 The various resource plans generated through SO are examined to identify
21 potential alternative resource plans that will be tested in the detailed production
22 costing simulations with the PAR model. The PAR model is similar to the
23 detailed PROMOD production costing model (another Ventyx production costing

1 model) in that both models perform detailed generating resource hourly dispatch
2 to simulate total production costs of every modeled resource plan. After each
3 alternative resource plan is modeled in PAR, the production costing results are
4 compared along with total capital costs to compare the total cost to customers for
5 each plan. The resource plan that performs cost effectively across multiple
6 different planning environments is selected as the most "robust" resource plan for
7 its ability to operate cost effectively in multiple future environments.

8 **Q. PLEASE DESCRIBE THE OUTCOMES RESULTING FROM THE**
9 **MODELING RUNS PERFORMED.**

10 A. Four resource portfolios were developed based upon the SO analyses for further
11 evaluation with the PAR model. The four resource portfolios that were included
12 were:

- 13 1. Peaking Resource only (CT PPAs)
- 14 2. Peaking and Intermediate Resources (CT & CC PPAs)
- 15 3. Peaking Resources and Renewable Resources above the SB 221 minimum
16 renewable requirements (CT PPAs and Renewable AER)
- 17 4. Peaking and Intermediate Resources and Renewable Resources above SB 221
18 minimum renewable requirements (CT and CC PPAs and Renewable AER)

19 **Q. PLEASE DESCRIBE THE OPTIMAL RESULTS THAT EMERGED**
20 **FROM THIS ANALYSIS.**

21 A. After the development of the alternative resource portfolios in SO, the PAR
22 model was used to perform detailed production costing analysis on the four
23 portfolios in the two different future planning environments explained above

1 (High/Low Carbon Legislation). The detailed production costing analysis
2 indicated that the optimal plan for Ohio consists of peaking capacity over the next
3 ten years. Peaking capacity resource options include the MISO/PJM capacity
4 markets and short term purchase power agreements in the near term. Peaking
5 resources could also include building of or purchasing power from peaking assets
6 (such as combustion turbines) at the appropriate time taking into consideration,
7 construction lead times, customer switching and prevailing market prices as well
8 as a regulatory environment that supports new generation development. Duke
9 Energy will regularly assess its future near-term resource needs and make
10 decisions on MISO/PJM capacity purchases, short-term PPAs or new build
11 options in line with the strategic direction selected in the Plan.

12 **Q. DOES DUKE ENERGY OHIO'S RESOURCE PLAN MEET THE**
13 **REQUIREMENTS SET FORTH IN OHIO REVISED CODE 4935.04?**

14 **A.** Yes. Although I am not a lawyer, I have experience with resource planning and I
15 am well aware of the elements of our submitted Resource Plan. Our plan
16 contains a year-by-year, ten-year forecast of annual energy demand, peak load,
17 and a description of how Duke Energy Ohio intends to meet its demand.
18 Also, the plan contains a range of projected loads and a description of any major
19 utility facilities to be added or taken out of service in the next ten years.
20 Additionally, the plan includes a description of proposed changes in the
21 transmission system planned for the next five years.

IV. REVIEW OF LONG-TERM FORECAST REPORT

1 **Q. WHAT DETERMINATIONS MUST THE COMMISSION MAKE**
2 **REGARDING DEO'S LONG-TERM FORECAST REPORT?**

3 **A. As I understand it, under Ohio Revised Code, Section 4935.04 F, the Commission**
4 **must review the Long-Term Forecast Report and determine if:**

- 5 (1) All information relating to current activities, facilities agreements, and
6 published energy policies of the State have been completely and
7 accurately represented;
- 8 (2) The load requirements are based on substantially accurate historical
9 information and adequate methodology;
- 10 (3) The forecasting methods consider the relationships between price and
11 energy consumption;
- 12 (4) The report identifies and projects reductions in energy demands due to
13 energy conservation measures in the industrial, commercial, residential,
14 transportation, and energy production sectors in the service area;
- 15 (5) Utility company forecasts of loads and resources are reasonable in relation
16 to population growth estimates made by State and Federal agencies,
17 transportation, and economic development plans and forecasts, and make
18 recommendations where possible, for necessary, and reasonable
19 alternatives to meet forecasted electric power demand;
- 20 (6) The report considers plans for expansion of the regional power grid and
21 the planned facilities of other utilities in the State; and

1 (7) All assumptions in the forecast are reasonable and adequately
2 documented.

3 **Q. DOES THE RESOURCE PLAN SUBMITTED BY DUKE ENERGY OHIO**
4 **COMPLY WITH ALL OF THE REQUIREMENTS SET FORTH ABOVE?**

5 A. Yes. Duke Energy Ohio witness Richard G. Stevie has addressed these
6 requirements in his testimony but I would like to explain how the Resource Plan
7 responds to (6) above.

8 The resource plan was developed from the perspective of serving Duke Energy
9 Ohio customers with Duke Energy Ohio generating assets for capacity reliability.
10 The planning methodology did not include specific non-Duke Energy Ohio owned
11 generating assets. However, the analysis points to the need for near-term peaking
12 resource options included in the Midwest ISO and PJM Interconnection capacity
13 markets and short-term purchased power agreements. These factors are included
14 in response to this regulatory requirement. Duke Energy Ohio will take
15 advantage of those markets as appropriate. Additionally, the analysis as described
16 in the Resource Plan includes spot economic purchases in the market which again,
17 would take advantage of facilities in the market from other utilities in other states.

18 **Q. WHAT IS THE ATTACHMENT FOR WHICH YOU ARE**
19 **RESPONSIBLE?**

20 A. I am responsible for the Resource Plan itself which was submitted on February
21 11th, 2011.

V. CONCLUSION

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

2 **A. Yes.**