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In the Matter of the 2010 Duke Energy)
Ohio Long-Term Forecast Report and) Case No. 10-503-EL-FOR PUCO
Resource Plan)

DIRECT TESTIMONY
OF
DYLAN SULLIVAN

ON BEHALF OF
THE NATURAL RESOURCES DEFENSE COUNCIL
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March 14, 2011

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Part 1: Introduction

Q: Please state your name, address, and position.

A: My name is Dylan Sullivan. My business address is 2 N Riverside Plaza, Suite 2250, Chicago, Illinois 60606. I am employed by the Natural Resources Defense Council ("NRDC") as an Energy Advocate.

Q: Please describe your educational background and professional experience.

A: I earned a Bachelor of Arts degree, magna cum laude, in Environmental Geology from the University of Missouri-Columbia in 2004. I was awarded a Masters of Science in Civil and Environmental Engineering from Stanford University in June 2008. My Masters degree was energy focused: I graduated from the Civil and Environmental Engineering Department's Atmosphere/Energy program and took classes on the economic analysis of natural resources and climate policy, air quality analysis, and energy efficiency and renewable energy technologies and practices. I joined NRDC in June 2008. At NRDC, I analyze and testify on energy efficiency policies that lower customer utility bills and cut pollution, and work collaboratively to ensure that electric utilities' energy efficiency portfolios are cost effective and address major end-uses of electricity and all customer classes. I also testify on changes in regulations that guide the utility business model to ensure that the interests of utilities and their customers are aligned in the promotion of energy efficiency. I represent NRDC on the Stakeholder Advisory Group assisting Illinois utilities in meeting the state's efficiency portfolio standard, and on groups that serve the same purpose at Duke Energy-Ohio, American Electric Power-Ohio ("AEP"), and FirstEnergy's Ohio operating

companies. I co-wrote NRDC's decoupling fact sheet, and have trained other NRDC staff members on decoupling. I have attended NRDC and Regulatory Assistance Project trainings on Integrated Resource Planning, and consulted numerous scholarly articles on resource planning.

Q: Have you previously submitted testimony before the Public Utilities Commission of Ohio ("PUCO" or "Commission")?

A: Yes. I have testified before the Commission on: (i) the design, implementation, and administration of energy efficiency programs, (ii) policies that remove utilities' current disincentive to support energy efficiency, and (iii) policies that reward a utility for performing well in saving customers money through energy efficiency programs.¹ I have testified before the Indiana Utility Regulatory Commission on decoupling² and before the Kansas Corporation Commission on energy efficiency program cost recovery, incentives, and decoupling.³

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to evaluate the treatment of energy efficiency as a resource in Duke Energy Ohio's ("Duke" or "Company") 2010 Resource Plan. I find that Duke's estimate of energy efficiency potential utilized a constrained universe of measures and applied an economic cost effectiveness screen not germane to this proceeding that artificially limits the amount of cost effective efficiency potential and increases the need for generation resources. Before I testify to this, I discuss what is regarded as the most robust resource planning

¹ Case No. 08-935-EL-SSO, Case No. 09-1947-EL-EEC, et al., and Case No. 10-388-EL-SSO.

² Cause No. 43839.

³ Docket No. 10-KCPE-795-TAR.

process in the country, the Northwest Power Conservation Council's 20-year Power Plans.

Q: What resources did you use in preparing your testimony?

A: I used the versions of the 2010 Resource Plan filed on February 11, 2011 and October 7, 2010, the "Ohio Market Potential for Demand Side Management Programs Final Report," filed in Case No. 09-1999-EL-POR, the 6th Northwest Power Plan, and other resources indicated in footnotes.

Part 2: Resource Planning

Q: Why is Duke filing its 2010 Resource Plan?

A: Duke is filing its plan to comply with Ohio Administrative Code Rule 4901:5-5-06.⁴

Q: What is the purpose of resource planning?

A: The purpose of resource planning is, generally, to plan for the future of the electricity system in a manner that values supply and demand side efficiency on an equal basis and produces a portfolio of resources that is the lowest cost possible over time, taking into account risk.

Q: How does the Ohio Administrative Code support these general purposes?

A: The Ohio Administrative Code defines Integrated Resource Planning as:

that plan or program, established by a person subject to the requirements of this chapter, to furnish electric energy services in a cost-effective and reasonable manner consistent with the provision of adequate and reliable service, which gives appropriate consideration to supply- and demand-side resources and transmission or distribution investments for meeting the person's projected demand and energy requirements.⁵

⁴ Duke Energy Ohio, Inc. 2010 Electric Long-Term Forecast Report and Resource Plan, Case No. 10-503-EL-FOR, Section IV - Duke Energy Ohio 2010 Resource Plan, Revised February 11, 2011, Page 1.

⁵ Ohio Administrative Code, Chapter 4901:5-5-01(L).

The Ohio Administrative Code also requires that the reporting person, in this case Duke Energy Ohio, when describing the process for determining the need for new electric resource options, to describe:

- (d) Forecast uncertainty.
- (e) Electricity resource option uncertainty with respect to cost, availability, commercial in-service dates, and performance.⁶

... and other factors that impact the need for new electric generating resources.

Q: Have experts or authorities recognized the general purposes you mention above?

A: Yes. In 1989, the National Association of Regulatory Utility Commissioners ("NARUC") stated:

Long-range planning has demonstrated that utility acquisition of end-use "efficiency, renewable resources, and cogeneration are often more responsible economically and environmentally than traditional generation expansion."⁷

Following the NARUC resolution, the Congress endorsed NARUC's objective of long-term planning in the National Energy Policy Act of 1992, which encouraged state regulators to consider Integrated Resource Planning and ensuring that the least cost plan is the most profitable course of action for utilities.⁸

Q: Earlier you stated that resource planning should produce a plan that is the lowest cost over time, taking into account risk. How do you define risk?

⁶ Id, Chapter 4901:5-5-06(B)(2)(d) and (e).

⁷ NARUC Resolution in Support of Incentives for Electric Utility Least-Cost Planning, July 27, 1989, <http://www.naruc.org/Resolutions/Incentives%20for%20Electric%20Utility%20Least%20Cost%20Plannin%20g.pdf>.

⁸ 16 U.S.C. § 2621(d)(7) and (8).

A: I define risk as the possibility of bad outcomes. In the electric system, a bad outcome would be service that is costly, unreliable, and/or environmentally destructive. The first definition of risk, according to the Merriam-Webster dictionary, is “the possibility of loss or injury.”

Q: Do you have an example of a resource plan that fulfills the purposes of resource planning you described above?

A: Yes. To my knowledge, the Northwest Power Conservation Council (the “Council” or “NWPPCC”) undertakes the most comprehensive resource planning exercise in the country, producing 20-year power plans every 5 years that value supply and demand-side resources on an equal basis and produce a least cost portfolio, taking into account risk. The Council was established by the U.S. Congress in the Pacific Northwest Electric Power Planning and Conservation Act⁹ and approved by the legislatures of Washington, Oregon, Montana, and Idaho. The Council is funded by wholesale power revenues from the Bonneville Power Administration, the federal agency that markets power produced by the federally-owned dams on the Columbia River. In February 2010, the Council published the 6th Northwest Power Plan. The Plan in its entirety is available at: <http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf>.

Q: What is the purpose of the 6th Power Plan?

A: The purpose of the 6th Power Plan, and all earlier power plans, is to “ensure an adequate, efficient, economical, and reliable power supply for the Pacific

⁹ 16 U.S.C. § 839-839h, December 5, 1980.

Northwest.”¹⁰ This objective is very similar to the definition of an Integrated Resource Plan in Ohio’s Administrative Code, quoted earlier in my testimony.

Q: Can you briefly describe the assumptions the Council uses in the 6th Power Plan?

A: Yes. The Council develops the plan in an open, public process and its assumptions are vetted by scientific and statistical advisory committees. The plan starts, as does Duke’s 2010 Resource Plan, from an assessment of electricity demand over the 20-year forecast period. Under the Council’s assumptions, demand will change based on population, the number of homes, the appliances within those homes, commercial square footage, and industrial output. The demand forecast includes 3 different economic scenarios: a medium-case scenario that projects a healthy regional economy, a low-case scenario that projects a future with slow economic growth, and a high-case scenario that projects a future with fast economic growth. The Council constructs a low, medium, and high forecast of natural gas prices to model long-term fuel price uncertainty. Because greenhouse gas emissions may soon be regulated and priced, the Council models a CO₂ price as a tax that varies randomly between \$0 and \$100 per ton of CO₂ emissions. The Council assumes that Renewable Portfolio Standards will be met with a mix of resources similar to the present mix. The Council produces 7 forecasts of future wholesale market electricity prices, based on varying fuel and CO₂ prices. The Council also assumes regional retail electricity prices.

Q: How does the Council evaluate demand side resources in the 6th Power Plan?

¹⁰ 6th Northwest Conservation and Electric Power Plan, Introduction, Northwest Power and Conservation Council, February 2010, page 1.

A: First, the Council's load forecast takes into account impact of federal appliance and device efficiency standards promulgated since the 5th Power Plan was released in 2005.¹¹ The Council then evaluates the cost and benefit of all demand side resources that are technically feasible, including distribution system voltage management and system optimization, and new applications for LEDs and ductless heat pumps. For the 6th Power Plan, the Council evaluated 1,400 separate efficiency measures. Once the net cost of conservation measures is determined, the technologies are ranked in cost in two supply curves: one recognizing retrofit opportunities (which can be deployed at any time) and another "lost opportunity" resources (which are only available in specific time periods and if not used are no longer available). To restrict the amount of conservation potential used by its resource planning model, the Council assumes that no more than 85% of the technically achievable and cost effective savings can be achieved over the plan's 20-year time horizon and applied an annual pace constraint on conservation deployment. Contrary to the idea that efficiency potential is quickly exhausted, the Council's analysis found 50% more achievable conservation in the 6th Power Plan than in the 5th, despite the Northwest's more than 2 decade record of substantial energy savings. Based on experience in the region, the plan assumes that the demand response potential is 5% of peak load over the 20-year plan horizon.

Q: How does the Council evaluate resource portfolios?

A: The Council evaluates possible resource portfolios under 750 different futures that include different combinations of CO₂ prices, demand growth, electricity and fuel

¹¹ Id, Chapter 4, Table 4-1.

prices, hydroelectric generation, and other sources of variability. The Council's model computes a net present value system cost for each combination of resource portfolio and future. The optimal resource portfolios are those that would likely have the lowest cost to implement of those portfolios that protect the region's consumers from the highest cost outcomes, while still producing an adequate and reliable electricity system. In other words, the optimal plans provide reasonably-priced insurance against highly expensive possible futures.

Q: How does the Council construct the resource portfolios that are tested against the 750 different futures?

A: Each resource portfolio has two parts: option dates for generating units of specific type and size, and a set of policies for energy efficiency and demand response.

The model:

“initially tries random portfolios, such as one where no resources can be added, one where all resources are available for construction at their maximum build rate, and so forth. For each of these, performance is simulated under the 750 futures, and the resulting average cost and risk are observed. After several hundred portfolios have been evaluated, the computer discovers which schedules of resources and policy choices tend to lower average cost and risk. By trying modifications of the more successful portfolios, it attempts to minimize the cost of the power system at different levels of risk.”¹²

Each portfolio includes energy efficiency resources from the earlier-produced conservation supply curve. In this way, the Council is able to determine the effect of different levels of energy savings on NPV portfolio cost across a wide range of potential futures.

¹² Id, Chapter 9, Page 9-7.

Q: What is the key insight of the 6th Power Plan, as it relates to the amount of energy efficiency that should be implemented?

A: The key insight of the 6th Power Plan is that those resource portfolios that best protect the region from high-priced outcomes all procure roughly the same amount of energy efficiency. That is, energy efficiency is a **risk mitigating** resource in the 6th Power Plan:

“The region should aggressively develop conservation with a goal of acquiring 1,200 average megawatts by 2014, and 5,900 average megawatts by 2030. Conservation is by far the least-expensive resource available to the region and it avoids risks of volatile fuel prices, financial risks associated with large-scale resources, and it mitigates the risk of potential carbon pricing policies to address climate-change concerns.”¹³

Part 3: Energy Efficiency in Duke’s 2010 Resource Plan

Q: How does Duke consider demand side resources in its 2010 Resource Plan?

A: According to the plan, Duke considers energy efficiency a “risk”¹⁴ or a source of “uncertainty,”¹⁵ and “customer adoption rates and costs to achieve new energy efficiency measures are uncertain.”¹⁶ A “key uncertainty,” according to Duke is:

“Can DSM [demand side management] and energy efficiency deliver the anticipated capacity and energy savings reliably? Are customers ready to embrace energy efficiency? Will an investment in DSM and energy efficiency be treated equally with investments in generating plant?”¹⁷

Q: How does Duke model demand side resources in its 2010 Resource Plan?

A: To model energy efficiency, Duke considers two levels of energy savings: the achievement of the energy savings targets in Ohio Revised Code 4928.66 (a

¹³ Id, Chapter 10, Page 10-2.

¹⁴ Duke Energy Ohio, Inc. 2010 Electric Long-Term Forecast Report and Resource Plan, Case No. 10-503-EL-FOR, Section IV - Duke Energy Ohio 2010 Resource Plan, Revised February 11, 2011, Page 1.

¹⁵ Id, Page 2.

¹⁶ Id.

¹⁷ Id. Page 7.

cumulative 22.5% savings by the end of 2025), and the achievement of a lower level of energy savings deemed achievable by a market potential study conducted by a third party (tracking SB 221 targets until Duke reaches 1% savings, and remaining at 1% until the economic potential of 13% cumulative savings is met¹⁸). Although Duke's plan evaluates *not achieving* the energy savings targets in O.R.C. 4928.66, Duke's plan does not evaluate *not achieving* Ohio's "advanced energy" targets, contained in the same legislation.¹⁹

Q: How much efficiency do Duke's "Optimized Plans" include?

A: In the revised resource plan, Duke assumes that "SB 221 energy efficiency and peak load reduction goals will be met over the next ten years."²⁰ However, the 4 optimized plans contained in earlier resource plans filed in this case, which had 20-year forecast horizons, had 2 optimized plans that included the amount of energy efficiency deemed "economic" in the potential study, and two optimized plans that included energy efficiency sufficient to meet the energy savings targets in O.R.C. 4928.66 over the 20-year forecast horizon.²¹ If the most recent version of the resource plan would have had a 20-year forecast horizon, Duke likely would have assumed two different levels of energy savings.

Q: How should the Commission view Duke's uncertainty regarding the ability of energy efficiency to deliver savings reliably and the willingness of customers to embrace energy efficiency?

¹⁸ Id, Page 2-3.

¹⁹ NRDC and SC-POD-01-35

²⁰ Id, Page 9.

²¹ Duke Energy Ohio, Inc. Revised 2010 Electric Long-Term Forecast Report and Resource Plan, Case No. 10-503-EL-FOR, October 7, 2010, Page 137.

A: In my opinion, the Commission should view these uncertainties as general nervousness on the Company's part, unsupported by recent or well-vetted analysis. The ability of energy efficiency to deliver energy savings reliably could be determined by first defining what the Company means by reliability and then analyzing the reliability of electricity systems in regions with a long history of energy efficiency achievement. The Company did neither of these tasks in the resource plan or potential study referenced. The willingness of customers to embrace energy efficiency should not be a major source of uncertainty: energy efficiency potential studies are conducted to determine the ability of energy efficiency to save energy in a service territory. After reviewing the existing stock of buildings and end-use applications of energy, and examining the technology available to reduce energy use and its cost, the Company should understand the efficiency opportunity. The amount of this opportunity that can be accessed can be estimated by looking at program performance elsewhere, if such information is not available in the region itself. This is exactly how the NWPCC determined the conservation supply curve for its resource plan. The Company attempts to define energy efficiency as a risk: properly analyzed, energy efficiency mitigates risk.

Q: How should the Commission view Duke's analysis of energy efficiency in the 2010 Resource Plan?

A: In my opinion, the Commission should view Duke's analysis with much skepticism. First, the energy efficiency potential study referenced by Duke has many methodological problems. Second, setting aside these problems, the Company improperly uses the study's assessment of energy efficiency potential.

Q: What are some of the methodological problems you found in Duke's potential study?

A: First, the consultant examines a small universe of the potential applications of energy efficiency, known as "measures." In the 6th Power Plan, the NWPCC reviewed 1400 such applications, while Duke's study only examined 32 non-residential measures and 42 residential measures.²² The consultant excluded potentially promising measures such as ductless heat pumps, efficient consumer electronics, continuous energy improvement at industrial facilities, server efficiency in small and medium sized businesses, and distribution system efficiency (other than Energy Star transformers) from the analysis. Second, the study includes no analysis of electric to gas fuel switching opportunities that may be available to reduce electric use and greenhouse gas emissions.²³ These opportunities may be especially attractive because Duke operates some of its service territory as a combined electric and natural gas utility.

Q: How does Duke improperly use the results of the potential study?

A: Duke inputted the "Economic Potential" found in its potential study, which assumed an avoided marginal cost of \$.06/kWh, into its resource plan, where avoided costs of new generation may be higher. The potential study, with its methodological imperfections, has supply curves for residential and non-residential energy efficiency that show the amount of energy efficiency available at a particular levelized cost. For the purposes of resource planning, Duke should have investigated the impact on revenue requirements of accessing a various

²² Case No. 09-1999-EL-POR, Forefront Economics Inc. and H. Gil Peach and Associates, LLC, Ohio Market Potential for Demand Side Management Programs Final Report. Page 27.

²³ Id, Page 27.

amounts of potential along this supply curve. Given that Duke forecasts the need for a nuclear plant when it looks 20 years into the future, it may be that energy savings *higher* than Ohio's requirements could produce lower revenue requirements and mitigate risk. Duke did not investigate this possibility, even though it had the tools to do so.

Part 4: Conclusions and Recommendations

Q: What do you conclude about Duke's Revised 2010 Resource Plan?

A: I conclude that Duke's Revised 2010 Resource Plan improperly evaluates the ability of energy efficiency to protect Duke's customers from bad outcomes, which could include energy service that is costly, unreliable, and/or environmentally destructive. I recommend the Commission reject the Company's 2010 Resource Plan and instruct the Company to file a Resource Plan that bases its discussion of energy efficiency on a potential study constructed in an open, collaborative process, that looks at the universe of potential technologies and practices that save energy, and that investigates the effect on revenue requirements of implementing energy efficiency above the levels mandated by O.R.C. 4928.66.

Q: Does this conclude your testimony?

A: Yes.

CERTIFICATE OF SERVICE

It is hereby certified that a true copy of the foregoing DIRECT TESTIMONY OF DYLAN SULLIVAN, was served upon the persons listed below via electronic mail on this 1st day of February, 2011.

Henry W Eckhart
Attorney for the Natural Resources Defense
Council

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