BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application Seeking	)	
Approval of Ohio Power Company's	)	
Proposal to Enter into an Affiliate Power	)	Case No. 14-1693-EL-RDR
Purchase Agreement for Inclusion in the	)	
Power Purchase Agreement Rider	)	
	)	
In the Matter of the Application of Ohio	)	
Power Company for Approval of Certain	)	Case No. 14-1694-EL-AAM
Accounting Authority	)	

DIRECT TESTIMONY
OF
NOAH C. DORMADY

On Behalf of the
The Office of the Ohio Consumers' Counsel
10 West Broad Street, Suite 1800
Columbus, Ohio 43215-3485

September 11, 2015

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ATTACHMENTS

Attachment NCD-1

Direct Testimony of Noah C. Dormady
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PUCO Case No. 14-1693-EL-RDR, et al.

1   **I.**   **INTRODUCTION**

2

3   *Q1.*   ***PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.***

4   *A1.*   My name is Noah C. Dormady. My business address is 1810 College Rd,

5   Columbus OH 43210.

6

7   *Q2.*   ***BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?***

8   *A2.*   I am employed by The John Glenn College of Public Affairs at The Ohio State

9   University. I am an Assistant Professor of Public Policy. My teaching and

10   research areas at Ohio State are in two main substantive areas: 1) energy and

11   environmental economics and policy, and 2) the economics of terrorism and

12   natural hazards. Public policy is a field of study that deals with the application of

13   economics and other tools to address applied societal issues.

14

15   *Q3.*   ***WOULD YOU PLEASE DESCRIBE YOUR EDUCATIONAL AND***

16   ***PROFESSIONAL BACKGROUND?***

17   *A3.*   Yes. I earned a Ph.D. in Public Policy, Planning and Development from the Price

18   School of Public Policy at the University of Southern California in 2012. I have

19   published in highly-ranked peer reviewed scholarly journals on the subject of

20   energy and environmental economics and policy, as well as the economic costs of

21   terrorism. I am the co-recipient of the 2012 national REMI Award for

22   Outstanding Economic Analysis from Regional Economic Models, Inc.

23   ("REMI"), the maker of a leading economic impact analysis and forecasting

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1   software. My research has been supported through competitive peer-reviewed

2   grants from a variety of sources, including the National Science Foundation, GE

3   Capital, and the Department of Homeland Security ("DHS"). Prior to joining the

4   faculty at Ohio State University in 2012, I was employed as a researcher at the

5   DHS Center for Risk and the Economic Analysis of Terrorism Events

6   ("CREATE"), a DHS National Center of Excellence. There I was tasked with

7   estimating the regional economic impacts of terrorism events, and was the lead

8   author on one of DHS's largest research projects at the time in estimating the

9   economic impacts of a joint DOD-DHS terrorism scenario.

10

11   *Q4.*   *HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN ANY*

12   *REGULATORY PROCEEDING?*

13   *A4.*   No. Thus far I have devoted my career to teaching and research, and consulting

14   on economic impacts of environmental and energy policies. I have consulted for

15   NGO's, state governments, regional governments, and the federal government.

16

17   *Q5.*   *WHAT IS THE PURPOSE OF YOUR TESTIMONY?*

18   *A5.*   The purpose of my testimony is to evaluate the economic modeling approach

19   provided by Ohio Power Company ("Utility") witness Allen in this case.

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1   **II.   EVALUATION OF ECONOMIC ANALYSIS**

2

3   *Q6.   UTILITY WITNESS ALLEN'S TESTIMONY PROVIDES THE CORE*

4   *ECONOMIC IMPACT ANALYSIS TO SUPPORT THE UTILITY'S*

5   *AMENDED APPLICATION. DOES THE ANALYSIS THOROUGHLY*

6   *ADDRESS THE COMMISSION'S FACTOR PERTAINING TO ECONOMIC*

7   *IMPACTS OF THE POWER PURCHASE AGREEMENT ("PPA") RIDER?*

8   *A6.*   No. According to the amended application, the Public Utilities Commission of

9   Ohio ("Commission") tasked the Utility with providing "[t]he impact that a

10   closure of the generating plant would have on electric prices and the resulting

11   effect on economic development within Ohio." Utility witness Allen's testimony,

12   on the other hand, provides an analysis of the purported economic impacts of

13   closure of the generating plants and associated regional coal production on the

14   regional economy.

15

16   I did not find analysis contained within Utility witness Allen's testimony, or

17   discovery documents provided in relation thereto, of the impacts on electric prices

18   or of the economic impacts of potential electricity price changes on the regional

19   or statewide economy, with one exception. On page 13 of Allen's testimony, the

20   following statement is provided: "Based on the forecasted revenues and expenses

21   provided by Utility witness Pearce, customers would see an initial rate under the

22   PPA rider of $1.75/MWh. The PPA Rider along with the avoided transmission

23   costs is projected to provide an incremental customer benefit exceeding $1 billion

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1   through the forecast period (2024)." From reviewing the analysis contained

2   within Allen's testimony, it is not clear how that $1 billion figure was estimated.

3

4   I also reviewed testimony by Utility witness Bradish, who finds a similar but

5   different cost estimate of $1.6 billion. Whereas witness Pearce's testimony

6   provides a range of forecasted electricity price changes, the total economic

7   analysis of those forecasted estimates is not provided in any documents or

8   testimony that I reviewed. And the total economic impacts of the proposed

9   transmission upgrades are not provided. Moreover, it is not clear how Allen

10   estimated that $1 billion benefit.

11

12   **Q7.** **DOES THE MODELING APPROACH PROVIDED BY UTILITY WITNESS**

13   **ALLEN ALLOW FOR ESTIMATING THE ECONOMIC IMPACTS OF**

14   **FORECASTED CREDITS/CHARGES ON THE UTILTY'S CUSTOMERS?**

15   **A7.** No. From my review, the modeling approach utilized in Utility witness Allen's

16   testimony is static (i.e., based on historic, non-forecasted data of a single point in

17   time), rather than dynamic (i.e., across time).

18

19   The forecasted values that witness Pearce provides through 2024 cannot be

20   soundly incorporated into the economic analysis provided by Utility witness Allen

21   utilizing the approach that he utilized. This is important because appropriately-

22   developed long run models allow for inputs (e.g., labor and capital) to be adjusted

23   in response to economic changes, and over time can mitigate some of the results

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1   that a static model would otherwise identify as large economic impacts.

2   Further, the appropriate method to accomplish this macroeconomic analysis

3   would be to take future charges/credits as provided by witness Pearce and

4   evaluate the macroeconomic impacts that would result from that range of

5   charges/credits. It should be noted that the economic base model as utilized by

6   Utility witness Allen cannot account for price changes -- such technical details

7   cannot be modeled in an economic base model. Simply put, the modeling

8   approach used by Utility witness Allen cannot, and did not, estimate the

9   macroeconomic impact (employment, personal income, gross state product, etc.)

10   of the forecasted charges/credits. Thus, the model used by Utility witness Allen

11   cannot, and did not, estimate the macroeconomic impact of PPA Rider

12   charges/credits flowing from low/high wholesale electric prices, respectively, on

13   AEP Ohio's customers.

14

15   *Q8.*   *WHAT APPROACH DOES UTILITY WITNESS ALLEN UTILIZE IN THE*

16   *ANALYSIS PROVIDED?*

17   *A8.*   A two-sector economic base multiplier model using the location quotient

18   estimation approach.

19

20   *Q9.*   *IS THIS MODELING APPROACH HIGHLY REGARDED AMONG*

21   *CONTEMPORARY ECONOMISTS OR POLICY ANALYSTS?*

22   *A9.*   No. The Utility's economic base modeling approach is not highly regarded and I

23   know of no credible analysts or economists who utilize the approach. The

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1   approach was used for simple analyses from the 1920's onward, and throughout

2   the 1950s and 1960s it was sharply criticized. Since the 1970's it has gone largely

3   forgotten.

4

5   The following two retrospective excerpts from leading economists on the subject

6   are illustrative:

7   1)   "Economic base models suffer from old age: they have

8   been built by so many analysts with varying levels of

9   quality and they have been criticized so often that little

10   remains except the concept."[1]

11   2)   "Economic base models have had a long and checkered

12   history, going back to the 1940's and even earlier. They

13   have never been quite academically respectable..."[2]

14

15 **Q10.**   ***WHAT ARE SOME OF THE MAIN PROBLEMS WITH THE ECONOMIC***

16   ***BASE MODELING APPROACH AND HOW MIGHT THEY AFFECT THE***

17   ***ANALYSIS PROVIDED IN UTILITY WITNESS ALLEN'S TESTIMONY?***

18 **A10.**   Many of the core simplifications and assumptions of the economic base model

19   can lead to estimation errors if they are violated. Many of these were likely

20   violated in the analysis provided by Utility witness Allen. Measures can be taken

---

[1] Excerpt from Schaffer, William A. 2010. "Regional Impact Models" in *The Web Book of Regional Science*, West Virginia University, 1999, Revised 2010, Chapter 2. Available at: http://rri.wvu.edu/WebBook/Schaffer/index.html. William Schaffer is Professor Emeritus of Economics at Georgia Institute of Technology.

[2] Excerpt from Richardson, Harry W. 1985. "Input-Output and Economic Base Multipliers: Looking Backward and Forward." *Journal of Regional Science, 25*(4): 607-661, pp.608. Harry Richardson is Professor of Public Policy and Economics at the University of Southern California.

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1   to remedy some of these as I describe below, but I see no evidence that any

2   remedial measures were taken. It is incumbent upon anyone running an economic

3   impact model to provide details of the remedial measures taken so that credibility

4   of approach can be ascertained. However, given that economic base models are

5   the least sophisticated and most error prone regional economic model possible,

6   even if all of these details were provided, many of these assumptions would still

7   be inherently violated because of the rudimentary modeling approach utilized.

8

9   Below, I provide a list of some of the core simplifications and assumptions of the

10   economic base model and the effect that they likely had on modeling results in

11   Utility witness Allen's testimony:

12   1)   The approach is quite simplistic in that it relegates all

13   economic activity to one of two main sectors -- basic and

14   non-basic. Basic sectors are those sectors that provide the

15   core of the regional economic base and export products or

16   services to outside the region and thus generate an inflow

17   of money to the region. Non-basic sectors are those sectors

18   that provide products and services within the region to the

19   basic sector and its employees. At this high level of

20   aggregation, much detail on economic transactions, as well

21   as stocks and flows of capital and labor, are absent from

22   analysis. This will result in aggregation bias that will

23   almost certainly result in erroneous findings.

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1	2)	Similarly, the approach has been widely criticized by
2		scholars for the clumsy and inaccurate method by which
3		industries are assigned to each of these two highly
4		aggregated sectors, which ultimately result in misspecified
5		results. The most basic approach, and the one provided in
6		Utility witness Allen's testimony, assigns all industries that
7		have a location quotient larger than one (1) to the basic
8		sector. A location quotient larger than one (1) indicates
9		that the industry employs a greater share of the local
10		workforce in a particular industry than it does nationally,
11		and produces more goods or services than are consumed
12		within the region, which are exported. This is important
13		because it is from this that the employment and income
14		multipliers are derived, which drive the resultant total
15		economic impact analysis. This is problematic for three
16		main reasons.
17	a.	First, the location quotient method as utilized likely
18		results in misassignment of industries into sectors,
19		basic or non-basic. Commonly misassigned sectors
20		include construction industries and education,
21		among others. This misassignment occurs because
22		the economic base approach simplistically assigns
23		sectors based on employment ratios. Those

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1		industries that are employed at a greater proportion
2		locally than nationally are assigned entirely to the
3		basic sector when these industries are not entirely
4		basic. This is a major problem because it is the
5		sectoral ratio that generates the ultimate economic
6		multiplier that produces the total economic impact
7		assessment.
8	b.	Second, the approach as utilized, relegates all
9		industries entirely, 100%, to either basic or non-
10		basic. In reality, many of these industries are
11		partially basic and partially non-basic. Historical
12		corrections to this misspecification have relied upon
13		share parameters to allow for proportions of
14		industries to be assigned to basic and non-basic to
15		avoid extreme results. I saw no such
16		parameterization correction approach taken in
17		Utility witness Allen's analysis.
18	c.	The error inherent in determining which industries
19		are considered basic versus non-basic is heavily
20		dependent upon the level of industrial classification
21		disaggregation utilized. The North American
22		Industrial Classification System (NAICS) is often
23		utilized for determining the aggregation scheme for

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1		regional modeling. These classification systems
2		range from thousands of sectors (highly
3		disaggregated and relatively precise) to only a
4		handful of sectors (highly disaggregated and
5		generally imprecise). The greater the degree of
6		aggregation that was utilized for determining the
7		assignment of basic and non-basic, the greater the
8		potential for error in the modeling approach
9		provided. From the testimony provided and
10		accompanying documents that I reviewed, I see no
11		mention of the aggregation scheme utilized to
12		determine the assignment of industries into basic
13		and non-basic sectors for this analysis.
14	3)	The economic base modeling approach utilized violates the
15		"cross-hauling" assumption, which can lead to overstated
16		impacts. The economic base model assumes no cross-
17		hauling—this is the simultaneous import and export of
18		commodities, which can frequently occur in regions for
19		commodities such as electricity or coal. This means that
20		the model assumes that all consumption in the basic sector
21		is locally produced (from within the county or multi-county
22		region modeled). This assumption would otherwise mean
23		that the model assumes 100% of the labor and capital

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1		inputs to the plants and to the associated mining operations
2		(as well as any other industries that may have been
3		specified [or misspecified] as basic) are provided for
4		completely from within the region. If any employees of the
5		plants being analyzed live in neighboring Kentucky or
6		West Virginia, for example, their income supports non-
7		basic industries outside of the region and thus the
8		magnitude of the model as employed would misstate the
9		economic impacts. If the plant itself purchases parts or
10		materials, computer equipment, etc., from anywhere
11		outside of the county (or multi-county region of analysis)
12		the magnitude of the indirect labor and income effects as
13		provided would be overestimated. The economic base
14		model cannot account for these details, and thus
15		misspecifies economic impacts.
16	4)	Similarly, the approach assumes that all basic sector
17		employee wages stay in the local area and are spent on the
18		consumption of local goods and services. Any violations of
19		this assumption would result in misspecification of the
20		economic impacts, and likely over specification. To the
21		extent that portions of employee wages are not spent within
22		the region (either because they are taxed at the state or
23		federal level or because they are placed into savings

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1   accounts or retirement accounts etc.) the model

2   misspecifies economic impacts.

3   5)   Oftentimes economic base models use employment

4   multipliers to determine income impacts. This is a

5   common problem of measuring income from employment.

6   From my review of the analysis provided in Utility witness

7   Allen's testimony it appears that is the approach taken there

8   as well. This is problematic because it is based upon the

9   assumption that employment and per capita income are

10   perfectly correlated. This would only be the case in a pure

11   case economy with perfectly elastic supplies of labor. Such

12   an assumption can vastly misstate income effects. This is

13   another error inherent to the approach utilized.

14   6)   The economic base modeling approach assumes that

15   economic growth is determined solely by the basic

16   (exporting) sector. More modern production function

17   approaches to estimating economic growth account for a

18   variety of other factors that can contribute to economic

19   growth besides export-led development. These include

20   parameters such as technology, labor and capital

21   productivity, etc., which increase the marginal product of

22   production inputs. These can also include savings ratios

23   and return on capital. Economic base models do not

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1   account for features of economic growth beyond exports of

2   the basic sector, and as a result, grossly simplify

3   macroeconomic effects of the analysis.

4   7) The economic base modeling approach assumes that labor

5   and capital productivities in the region being analyzed are

6   the same as they are for the nation. To the extent that this

7   assumption does not hold, the economic base model will

8   misspecify macroeconomic impacts.

9   8) The economic base modeling approach does not account

10   for general equilibrium effects. These are the effects of the

11   economy balancing itself due to price changes and changes

12   in supply and demand. Because each industry requires a

13   different production mix of inputs (e.g., labor, capital, land,

14   energy), changes that occur in one sector can be mitigated

15   by corresponding changes in other sectors through various

16   linkages in upstream and downstream supply chains and

17   through economic substitution. Models that do not account

18   for these effects misspecify macroeconomic impacts.

19 9) Economic base models assume that consumption ratios of

20   non-basic sector goods and services is the same in the

21   region as it is nationally. This assumption is often violated

22   in rural areas or "company towns" in which many of the

23   workers in the town do not purchase consumer goods and

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1   services at the same proportion as do consumers on average

2   nationally or in which a relatively small proportion of

3   employment is in the non-basic sector. To the extent that

4   this assumption is violated, the model can misspecify the

5   macroeconomic impacts. For example, if employees in the

6   basic sector do not purchase local consumer goods in the

7   same proportion as employees on average nationally, the

8   reliance upon local non-basic sector inputs is overstated in

9   the model, and thus the modeling results will overstate the

10   macroeconomic impacts.

11   10)   Similarly, economic base models do not account for

12   government expenditures on consumption. By assuming

13   that all non-basic employment is generated by demand

14   from consumption by the basic sector, one ignores the very

15   likely possibility that some consumption can also be driven

16   by government expenditures. Examples of these can

17   include state or federal employees not supported directly by

18   the basic sector, capital projects (e.g., bridges, tunnels,

19   roads) funded by the federal government, among many

20   others. This assumption will tend to overstate the reliance

21   of the local economy on the basic sector and overstate the

22   magnitude of macroeconomic impacts.

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1   *Q11.*   *ARE THERE ANY OTHER MACROECONOMIC MODELING*

2   *ASSUMPTIONS PROVIDED IN UTILITY WITNESS ALLEN'S*

3   *TESTIMONY THAT LIKELY RESULT IN ERRONEOUS FINDINGS?*

4   *A11.*   Yes. From my review of Utility witness Allen's analysis, all coal workers in Ohio

5   that supply coal to these plants are assumed to be unemployed by the hypothetical

6   modeled plant closures. It is not immediately clear to me why some, if not many,

7   of the coal workers would not continue to produce coal if coal was sold

8   competitively to other plants in Ohio and/or elsewhere in the nation. Given that

9   coal markets allow for the sale and transport of coal across state lines, etc., I see

10   no discussion in the analysis of the likelihood, at the very least, of the coal plants

11   remaining in partial/reduced operation following the plant retirements. If any of

12   those coal workers continued to produce coal for other plants, either in Ohio or in

13   other states, they would not be accounted for in the economic impact model

14   provided. In this way, the provided analysis represents a worst case scenario for

15   coal worker unemployment and associated indirect economic consequences.

16

17   *Q12.*   *GIVEN ALL OF THE ISSUES WITH THE ECONOMIC BASE MODEL*

18   *THAT YOU HAVE JUST DESCRIBED, IS IT LIKELY THAT UTILITY*

19   *WITNESS ALLEN ACCURATELY PORTRAYS THE ECONOMIC IMPACTS*

20   *OF THE PLANT CLOSURES?*

21   *A12.*   No. The macroeconomic results provided by Utility witness Allen are likely

22   larger than the actual macroeconomic impacts that would result from the plant

23   closures. However, I cannot guarantee that this would be the case without seeing

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1   the results of a more accurate, modern, regional economic model.

2

3   *Q13.*   *UTILITY WITNESS PEARCE PROVIDES FOUR COST SCENARIOS FOR*

4   *THE IMPACTS OF THE PPA RIDER ON CUSTOMER CHARGES OR*

5   *CREDITS—WEATHER NORMALIZED LOAD, FIVE % HIGHER LOAD,*

6   *FIVE % LOWER LOAD AND AVERAGE. DOES THE ECONOMIC*

7   *ANALYSIS PROVIDED BY UTILITY WITNESS ALLEN ASSESS THE*

8   *MACROECONOMIC/ECONOMIC DEVELOPMENT IMPACTS OF THESE*

9   *PRICE SCENARIOS?*

10   *A13.*   No. It does not. Utility witness Allen's study addresses only the economic

11   impacts of the plant closures and the unemployement of the associated coal

12   workers who provide coal to those plants. As I said above, the modeling

13   approach utilized by Allen cannot estimate the macroeconomic/economic

14   development impacts of electric price changes. Because of the limited nature of

15   the model, it is not able to accomplish the Commission's task, as I understand it,

16   of estimating the economic impacts of electric price changes resulting from plant

17   closures. The model just cannot handle that kind of analysis.

18

19   *Q14.*   *THESE COST SCENARIOS SEEM TO DECLINE (I.E., RESULT IN MORE*

20   *LIKELY CONSUMER CHARGES) BEGINNING IN FORECASTED YEAR*

21   *2022. WHAT MIGHT ACCOUNT FOR THE CHANGE IN COSTS?*

22   *A14.*   It seems most likely that those costs are due to the integration of greenhouse gas

23   costs associated with the implementation of the Clean Power Plan, and the

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1   associated declines in price-based dispatch into PJM Interconnection, L.L.C.

2   ("PJM") when those costs are internalized into the units' marginal costs. As

3   stated on page 20 of Utility witness Pearce's testimony, "The results are

4   reasonably conservative in that they include a 'double whammy' of both the

5   carbon expense and the resulting reduced dispatch due to the higher cost basis."

6   The analysis contained in Utility witness Pearce's testimony includes more than

7   three quarters of a billion dollars of carbon costs associated with the PPA Rider

8   for the last three forecasted years that will be passed on to customers.

9

10   *Q15.*   **THESE COST SCENARIOS PROVIDED END IN 2024. COULD**

11   **CUSTOMERS BE RESPONSIBLE FOR ADDITIONAL GREENHOUSE GAS**

12   **COSTS IF THE PLANTS CONTINUE TO OPERATE UNDER THE RIDER**

13   **BEYOND 2024?**

14   *A15.*   It is not immediately clear to me why the forecasting provided by Utility witness

15   Pearce ends in year 2024. If these plants continue to operate beyond 2024, the

16   stringency of required carbon reductions will likely increase under the Clean

17   Power Plan. In existing tradeable carbon permit programs, fewer emissions

18   permits are auctioned each year to force the stringency of the cap gradually across

19   time. This has the effect of creating permit scarcity and, depending upon

20   abatement and/or fuel switching, demand and other market conditions, is likely to

21   result in higher carbon costs in later years. However, the compliance route

22   selected by Ohio is not yet determined, and may or may not include tradeable

23   permits or direct carbon taxes. In any event, by ending the forecast in 2024 it is

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1   likely that the Commission is not being provided the full range of negative

2   impacts associated with the PPA Rider and resultant negative economic impacts

3   on customers or economic development.

4

5   **Q16.**   **WOULD THERE BE OTHER ECONOMIC IMPACTS (AND COSTS TO**

6   **CONSUMERS) ASSOCIATED WITH ADDITIONAL GREENHOUSE GAS**

7   **COSTS ON THESE PLANTS IN FUTURE YEARS?**

8   **A16.**   That is highly likely under the Clean Power Plan. If the carbon costs that are

9   assumed in Utility witness Pearce's testimony continue in future years and these

10   plants remain in operation, these carbon costs will likely be factored into the

11   plants' marginal cost bids into PJM, and will likely result in reduced economic

12   dispatch of the plants due to their lack of competitiveness with other generation

13   units that do not incur similar carbon costs. Under the PPA Rider calculation

14   scheme provided, this would result in the plants incurring higher operating costs

15   and lower energy revenues, thus incurring additional financial liabilities on

16   captive retail customers. Moreover, Utility witness Allen's analysis does not

17   model the potential impact that these additional carbon costs, if incurred by

18   ratepayers, would have on the statewide economy.

19

20   **Q17.**   **WHAT CARBON COSTS DOES UTILITY WITNESS PEARCE'S ANALYSIS**

21   **INCLUDE AND ARE THEY MODELED IN A ROBUST MANNER?**

22   **A17.**   Utility witness Pearce's analysis includes a $15 per ton of carbon dioxide

23   equivalent costs, which is modeled as a tax on production from these plants.

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1   While the cost estimate is not unreasonable, actual costs could be much higher or

2   much lower depending upon a range of market forces (e.g., abatement, demand

3   for energy and regional growth, power imports) and therefore modeling

4   sensitivity analysis is generally good form when this type of scenario is being

5   modeled. Sensitivity analysis would allow the Commission to evaluate the degree

6   to which a valid range of carbon costs, that the PPA Rider would impose on

7   customers, would affect the range of likely cost/credit scenarios. Sensitivity

8   analyses typically consist of modeling the same scenarios with both higher and

9   lower parameters to measure the degree to which the results are sensitive (i.e., not

10   robust) to higher or lower carbon prices. For example, in this case that might

11   include modeling the results with a $5/ton carbon cost as well as a $25/ton cost.

12

13   Based on a routine calculation with the values provided in Table 1 of Utility

14   witness Pearce's testimony, a $25/ton carbon cost would result in $1.28 billion of

15   carbon costs being passed on to customers in the last three forecasted years alone,

16   whereas with $15/ton that figure is $768 million. This was derived simply by

17   dividing 768 million by 15 and multiplying that by 25 to adjust the ratio. Given

18   that wide variability in customer liability due to a change in one key parameter,

19   sensitivity analyses would be a more appropriate method for presenting these

20   consumer cost liability results.

21

22   It should also be noted that these costs are direct costs and the Commission, to my

23   knowledge, has not been provided by the Utility a macroeconomic impact

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1   analysis (i.e., direct + indirect costs) of the effect that these costs would have on

2   Ohio. Utility witness Allen's analysis certainly does not include this detail.

3   Under the PPA rider, these carbon costs would be incurred by customers non-

4   bypassable (i.e., they could not avoid them through customer choice by selecting

5   a CRES). $1.28 billion of additional costs on AEP Ohio customers for 2022-

6   2024, and an undisclosed amount beyond 2024, without any recourse for avoiding

7   those costs, would likely offset any potential benefit that the PPA rider might

8   deliver to customers. These macroeconomic effects would provide for a more

9   accurate assessment of the economic development implications of these cost

10   liabilities and any resultant regional decline stemming from manufacturing flight

11   (e.g., Honda leaving central Ohio).

12

13   Another modeling concern with regard to the future carbon costs is also worth

14   mentioning. From my review of Utility witness Pearce's testimony, the carbon

15   costs and dollar values of the PPA Rider cost estimates are in nominal, rather than

16   in real dollars. Because the supply of money changes across time due to inflation

17   and other factors, it is customary to utilize Consumer Price Index ("CPI")

18   adjustment (i.e., based on the CPI for electricity prices) to a base year currency so

19   that the analysis can be more easily evaluated for future years. Using nominal

20   dollar figures for the assumed carbon cost is tantamount to assuming that

21   compliance costs for these plants (holding all else constant) will decline annually

22   by the rate of inflation. That is because $15 nominal dollars in 2024 is less in real

23   (purchasing power/inflation adjusted) terms than $15 nominal dollars in 2022.

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1   Given that the compliance costs of these plants will likely increase as the

2   stringency of required carbon reductions (under whatever compliance plan the

3   State of Ohio puts forward), the analysis put forward by Utility witness Pearce

4   likely understates the carbon cost burden that would be imposed on customers by

5   the PPA Rider.

6

7   **III.   CONCLUSION**

8

9   *Q18.   DOES THIS COMPLETE YOUR DIRECT TESTIMONY*

10   *A18.*   Yes. I reserve the right to supplement it if and when additional information

11   becomes available.

CERTIFICATE OF SERVICE

It is hereby certified that a true copy of the foregoing *Direct Testimony of Noah C.*

Dormady on Behalf of the Office of the Ohio Consumers' Counsel was served via

electronic transmission to the persons listed below this 11th day of September, 2015.

/s/ *William J. Michael*
William J. Michael
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Research & Teaching Fields

Energy Policy | Environmental Policy | Emissions Markets (Cap & Trade) | Electricity Markets
Auctions & Strategic Behavior | Terrorism & Natural Hazards | Economic Resilience

Education

Ph.D., Public Policy, Planning and Development   2012
    Price School of Public Policy
    University of Southern California (USC)
    Henry Reining Jr. Award for Best Dissertation in Public Policy, USC Price

M.A., Political Science   2006
    University of California, Riverside

B.A., Political Science (*Cum Laude*)   2004
    University of California, Riverside

Appointments

Assistant Professor (tenure-track)   2012–Present
    John Glenn School of Public Affairs
    The Ohio State University

Doctoral Research Assistant   2010–2011
    National Center for Risk and the Economic Analysis of Terrorism Events (CREATE)
    U.S. Department of Homeland Security

Doctoral Research Assistant   2008–2012
    Price School of Public Policy
    University of Southern California

Associate/Adjunct Faculty   2008
    Department of Political Science
    Chaffey College

Associate/Adjunct Faculty   2008
    Department of Political Science
    Mt. San Jacinto College

Staff Member   2004–2008
    United States Senate
    Office of U.S. Senator Barbara Boxer

Peer-Reviewed Publications

Wei, D., Dormady, N. & Rose, A. Forthcoming. Development of Reduced-Form Models to Evaluate Macroeconomic Impacts of Greenhouse Gas Mitigation. *Journal of Sustainable Energy Engineering.*

Dormady, N. & Englander, A.G. Forthcoming. Carbon Allowances and the Demand for Offsets: A Comprehensive Assessment of Imperfect Substitutes. *Journal of Public Policy.*

Dormady, N. 2014. Carbon Auctions, Energy Markets & Market Power: An Experimental Analysis, *Energy Economics,44:* 468-482.

Dormady, N., Szelazek, T. & Rose, A. 2014. The Potential Impact of an Anthrax Attack on Real Estate Prices and Foreclosures in Seattle, *Risk Analysis, 34*(1): 187-201.

Dormady, N. 2013. Market Power in Cap-and-Trade Auctions: A Monte Carlo Approach, *Energy Policy, 62:* 788-797.

Dormady, N. 2013. The Political Economy of Collaborative Organization, *Administration and Society, 45*(6): 748-772.

Rose, A., Wei, D. & Dormady, N. 2011. Macroeconomic Assessment of the Pennsylvania Climate Action Plan, *Regional Science Policy and Practice, 3*(4): 357-379.
　　　　2012 Economic Analysis Award Winner: Regional Economic Models Inc. (REMI)

Rose, A., & Dormady, N. 2011. A Meta-Analysis of the Economic Impacts of Climate Change Policy in the United States, *The Energy Journal, 32*(2): 143-166.

Current Research Support

- GE Capital. 2014-2015. *An Experimental Analysis of Middle Market Resilience: Gender, Frequency & Information.* $68k. (PIs Noah Dormady and Robert Greenbaum).
- National Science Foundation (NSF). 2014-2016. *An Integrated Approach to Measuring Dynamic Economic Resilience Following Disasters.* $493k. (Co-I) (PIs: Adam Rose and Kathleen Tierney).
- Department of Homeland Security (DHS). 2016-2017. *Analyzing and Measuring Economic Resilience to Disasters.* $500K. (PIs: Adam Rose, Noah Dormady and Kathleen Tierney).

Research Reports & Policy Papers

The Costs of Inefficiency: Ignoring Ohio's Energy Efficiency Potential (With Cheryl Roberto [currently VP of Environmental Defense Fund]). *John Glenn School of Public Affairs Policy Brief.* March, 2013.

Three-State Regression Analysis of the Macroeconomic Impacts of Climate Mitigation Options: Report to the State of Maryland. *The Center for Climate Strategies.* August, 2011.

Economic Analysis of the Consequences of a Potential Anthrax Terrorist Attack in the Pacific Northwest: Business Income Losses and Real Estate Price Declines. *Center for Risk and the Economic Analysis of Terrorism Events (CREATE),* University of Southern California. Final Report to the United States Department of Homeland Security. August, 2011.

Aggregate and Distributional Impacts of AB32 on the California Economy: Alternative Allocation Strategies for Cap and Trade. *The Next 10 Foundation.* December, 2010.

Impacts of Comprehensive Climate and Energy Policy Options on the U.S. Economy. *The Center for Climate Strategies.* July, 2010.

Southern Regional Economic Assessment of Climate Policy Options and Review of Economic Studies of Climate Policy: A White Paper Report. Prepared for The Southern Governors' Association. *The Center for Climate Strategies.* October, 2009.

Conference Papers

Pollution Permit Consignment Auctions: Theory and Experiments (With Paul Healy). *American Economic Association,* Boston, January 2-5, 2015.

Pollution Permit Consignment Auctions: Theory and Experiments (With Paul Healy). *International Association for Energy Economics,* New York, June 18-18, 2014.

Emissions Markets, Power Markets and Market Power: An Experimental Approach, *Association of Environmental and Resource Economists: Western Economic Association International,* San Francisco, June 29 – July 3, 2012.

Emissions Markets, Power Markets and Market Power: Regulatory Mechanisms and Policy Approaches, *Association for Environmental Studies and Sciences,* Santa Clara, June 21-24, 2012.

Anthrax Outbreak in Downtown Seattle: A Spatial and Longitudinal Assessment of Terrorism's Impact on Real Estate Prices, *Second International Conference on Integrated Disaster Risk Management,* Los Angeles, July 15-18, 2011.

Market Power in Cap and Trade Auctions: A Monte Carlo Approach, *Western Economics Association International,* San Diego, July 1-3, 2011.

The Exercise of Market Power in Contemporary Transferable Property Rights Markets, *Southern Political Science Association,* Atlanta, Georgia, January 6-9, 2010.

Global Economic Impacts of an International Climate Change Treaty. (With Adam Rose), *CENTRA Technologies National Security Impacts of a Prospective Climate Change Treaty Workshop.* Washington, D.C., 2010.

Climate Change Mitigation Policy and Energy Markets: Cooperation and Competition in Integrating Renewables into Deregulated Markets (With Elena Maggioni), *Forging Closer Ties: Transatlantic Relations, Climate and Energy,* Freie University Berlin, (Germany), November 29 – December 5, 2009.

Invited Presentations & Expert Interviews

Dialogue: Ohio's Algae Crisis. John Glenn School of Public Affairs Dialogue Policy Forum Series, The Ohio State University, April, 2015.

Carbon Allowances and the Demand for Offsets: A Comprehensive Assessment of Imperfect Substitutes. John Glenn School of Public Affairs Seminar Series, The Ohio State University, March, 2015.

Pollution Permit Consignment Auctions: Theory and Experiments, Knowlton School of Architecture Seminar Series, The Ohio State University, February, 2015.

Climate Change, Public Policy and the Economy, (Keynote Panelist) American Lung Association, Columbus Public Health, Ohio Sea Grant, Byrd Polar Research Center, *et al.,* Climate Explorations Series. *A Matter of Dollars and Sense: Climate Change, Carbon Standards and Public Health*, October 30, 2014

Pollution Permit Consignment Auctions: Theory and Experiments, John Glenn School of Public Affairs Seminar Series, The Ohio State University, December, 2013.

Energy and the Environment, Battelle Center for Science and Technology Policy, The Ohio State University, January, 2013.

Emissions Markets, Power Markets, and Market Power: An Experimental Approach, The Ohio State University, Department of Agricultural, Environmental and Development Economics, Seminar Series, November, 2012.

Energy and Environmental Policy: An Introduction, John Glenn School of Public Affairs, The Ohio State University, Guest lecture, October, 2012.

Anthrax Outbreak in Downtown Seattle: A Spatial and Longitudinal Assessment of Terrorism's Impact on Real Estate Prices, USC Center for Risk and the Economic Analysis of Terrorism Events (CREATE) Fall Seminar Series, October, 2011.

Transferable Property Rights Markets (Cap and Trade), School of Policy, Planning and Development (SPPD), University of Southern California, November, 2010.

California's Perspective on Progressive Electricity and Feed-In Tariffs, University of Meunster, (Germany), August, 2010.

Succeeding on the PhD Qualifying Examination, School of Policy, Planning and Development (SPPD), University of Southern California, May, 2010.

Teaching
_____

The Ohio State University
    Graduate Courses:
        Risk Analysis (in development for Spring 2016)
        Energy and Environmental Policy Capstone (Public Affairs 7910)
        Public Sector Economics (Public Affairs 6030)
        Environmental & Energy Policy (Public Affairs 5800)

    Undergraduate Courses:
        Environmental & Energy Policy (Public Affairs 5800)
        Public Policy Analysis (Public Affairs 3000)

Chaffey College
    Undergraduate Courses:
        American Government (Political Science 1)

Mt. San Jacinto College
    Undergraduate Courses:
        American Government (Political Science 100)

Software Packages

Pollution Permit Consignment Auction Human Experiment Software
    Utility: Zurich Toolbox for Readymade Economics Experiments (Z-TREE) application for conducting Coasian auction market experiments utilizing a consignment mechanism.

Oligopsony 1.0
    Utility: Windows-based (C# .NET 3.0) stochastic Monte Carlo simulation environment for simulating market power in uniform price auctions.

Simultaneous Energy-Emissions Market Experiment Software
    Utility: Zurich Toolbox for Readymade Economics Experiments (Z-TREE) application for conducting energy-emissions market experiments, Control and Experimental Treatments.

Awards

2012 Economic Analysis Award (National) (First Winner of Annual Award)
    Regional Economic Models Inc. (REMI)

2012 Henry Reining Jr. Award, Best Dissertation in Public Policy
    University of Southern California
    Sol Price School of Public Policy

2012 Excellence in Publication Award
    University of Southern California
    Sol Price School of Public Policy

Past Research Support

- The John Randolph & Dora Haynes Foundation
- The Southern Governors' Association
- The Center for Climate Strategies
- The Pennsylvania Department of Environmental Protection
- The Next 10 Foundation
- The University of Southern California
- The University of California

Journal Referee

The Energy Journal | Energy Policy | Journal of Public Policy | Risk Analysis | Canadian Journal of Economics | Journal of Regional Science | Eastern European Economics | Energy Economics

Professional Affiliations

- *Association of Environmental and Resource Economists*

- *Association of Public Policy and Management*
- *Canadian Economics Association*
- *International Association of Energy Economics*
- *Southern Political Science Association*
- *Western Economic Association International*

Recent Media Coverage

- TBS eFM (Radio)—National (Korea) (2015)
- NBC News (Print)—National (2014)
- NBC News (Television)—Columbus, Ohio (2014)
- NBC News (Television)—Columbus, Ohio (2014)
- Seattle PI (Print)—Seattle, Washington (2013)

Recent Committee Service & University Leadership

University—Energy Management Faculty Advisory Committee (2014-Present)
Duties: Consult on the university's potential to meaningfully contract with private provider(s) for all of the university's energy, water, heating, steam, utility and facilities management operations, and engage in affinity agreements with external firms.

University—Sustainability Curriculum Committee (2014-Present)
Duties: Develop, promote and evaluate curriculum and curricular opportunities for students at all levels in topics related to sustainability.

College—Curriculum Development Committee: Program Evaluation and Public Policy Analysis (2013)
Duties: Develop a new program curriculum for an undergraduate degree track in program evaluation and public policy analysis.

College—Robert Backoff Research Award Committee (2012-Present)
Duties: Evaluate PhD student published and pre-published research papers to award the annual Robert Backoff research stipend.

College—(Ad hoc) Appointment, Promotion & Tenure (APT) Review (2014-2015)
Duties: Co-author revised Appointment, Promotion & Tenure (APT) document for the John Glenn College of Public affairs.

College—Search Committee for School of Environment and Natural Resources, Ohio State University (2014-2015)
Duties: Serve as external member on public policy search for the Ohio State School of Environment and Natural Resources faculty hire.

College—Masters Examination Review Committee (2014-Present)
Duties: Review MA student comprehensive examinations.

College—Discovery Themes Committee (2014-Present)
Duties: Consult on proposals for faculty hiring, educational and outreach opportunities under the university's Discovery Themes initiatives.

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