*OCC EXHIBIT NO. \_\_\_\_\_\_*

**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 Purchase Agreement for Inclusion in the Power Purchase Agreement Rider  In the Matter of the Application of Ohio Power Company for Approval of Certain Accounting Authority | )  )  )  )  )  )  )  )  ) | Case No. 14-1693-EL-RDR  Case No. 14-1694-EL-AAM |

**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

# INTRODUCTION

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

***A1.*** My name is Noah C. Dormady. My business address is 1810 College Rd, Columbus OH 43210.

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

***A2.*** I am employed by The John Glenn College of Public Affairs at The Ohio State University. I am an Assistant Professor of Public Policy. My teaching and research areas at Ohio State are in two main substantive areas: 1) energy and environmental economics and policy, and 2) the economics of terrorism and natural hazards. Public policy is a field of study that deals with the application of economics and other tools to address applied societal issues.

***Q3. WOULD YOU PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?***

***A3.*** Yes. I earned a Ph.D. in Public Policy, Planning and Development from the Price School of Public Policy at the University of Southern California in 2012. I have published in highly-ranked peer reviewed scholarly journals on the subject of energy and environmental economics and policy, as well as the economic costs of terrorism. I am the co-recipient of the 2012 national REMI Award for Outstanding Economic Analysis from Regional Economic Models, Inc. (“REMI”), the maker of a leading economic impact analysis and forecasting software. My research has been supported through competitive peer-reviewed grants from a variety of sources, including the National Science Foundation, GE Capital, and the Department of Homeland Security (“DHS”). Prior to joining the faculty at Ohio State University in 2012, I was employed as a researcher at the DHS Center for Risk and the Economic Analysis of Terrorism Events (“CREATE”), a DHS National Center of Excellence. There I was tasked with estimating the regional economic impacts of terrorism events, and was the lead author on one of DHS’s largest research projects at the time in estimating the economic impacts of a joint DOD-DHS terrorism scenario.

***Q4. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN ANY REGULATORY PROCEEDING?***

***A4.*** No. Thus far I have devoted my career to teaching and research, and consulting on economic impacts of environmental and energy policies. I have consulted for NGO’s, state governments, regional governments, and the federal government.

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

***A5.*** The purpose of my testimony is to evaluate the economic modeling approach provided by Ohio Power Company (“Utility”) witness Allen in this case.

# EVALUATION OF ECONOMIC ANALYSIS

***Q6. UTILITY WITNESS ALLEN’S TESTIMONY PROVIDES THE CORE ECONOMIC IMPACT ANALYSIS TO SUPPORT THE UTILITY’S AMENDED APPLICATION. DOES THE ANALYSIS THOROUGHLY ADDRESS THE COMMISSION’S FACTOR PERTAINING TO ECONOMIC IMPACTS OF THE POWER PURCHASE AGREEMENT (“PPA”) RIDER?***

***A6.*** No. According to the amended application, the Public Utilities Commission of Ohio (“Commission”) tasked the Utility with providing “[t]he impact that a closure of the generating plant would have on electric prices and the resulting effect on economic development within Ohio.” Utility witness Allen’s testimony, on the other hand, provides an analysis of the purported economic impacts of closure of the generating plants and associated regional coal production on the regional economy.

I did not find analysis contained within Utility witness Allen’s testimony, or discovery documents provided in relation thereto, of the impacts on electric prices or of the economic impacts of potential electricity price changes on the regional or statewide economy, with one exception. On page 13 of Allen’s testimony, the following statement is provided: “Based on the forecasted revenues and expenses provided by Utility witness Pearce, customers would see an initial rate under the PPA rider of $1.75/MWh. The PPA Rider along with the avoided transmission costs is projected to provide an incremental customer benefit exceeding $1 billion through the forecast period (2024).” From reviewing the analysis contained within Allen’s testimony, it is not clear how that $1 billion figure was estimated.

I also reviewed testimony by Utility witness Bradish, who finds a similar but different cost estimate of $1.6 billion. Whereas witness Pearce’s testimony provides a range of forecasted electricity price changes, the total economic analysis of those forecasted estimates is not provided in any documents or testimony that I reviewed. And the total economic impacts of the proposed transmission upgrades are not provided. Moreover, it is not clear how Allen estimated that $1 billion benefit.

***Q7. DOES THE MODELING APPROACH PROVIDED BY UTILITY WITNESS ALLEN ALLOW FOR ESTIMATING THE ECONOMIC IMPACTS OF FORECASTED CREDITS/CHARGES ON THE UTILTY’S CUSTOMERS?***

***A7.*** No. From my review, the modeling approach utilized in Utility witness Allen’s testimony is static (i.e., based on historic, non-forecasted data of a single point in time), rather than dynamic (i.e., across time).

The forecasted values that witness Pearce provides through 2024 cannot be soundly incorporated into the economic analysis provided by Utility witness Allen utilizing the approach that he utilized. This is important because appropriately-developed long run models allow for inputs (e.g., labor and capital) to be adjusted in response to economic changes, and over time can mitigate some of the results that a static model would otherwise identify as large economic impacts.

Further, the appropriate method to accomplish this macroeconomic analysis would be to take future charges/credits as provided by witness Pearce and evaluate the macroeconomic impacts that would result from that range of charges/credits. It should be noted that the economic base model as utilized by Utility witness Allen cannot account for price changes -- such technical details cannot be modeled in an economic base model. Simply put, the modeling approach used by Utility witness Allen cannot, and did not, estimate the macroeconomic impact (employment, personal income, gross state product, etc.) of the forecasted charges/credits. Thus, the model used by Utility witness Allen cannot, and did not, estimate the macroeconomic impact of PPA Rider charges/credits flowing from low/high wholesale electric prices, respectively, on AEP Ohio’s customers.

***Q8. WHAT APPROACH DOES UTILITY WITNESS ALLEN UTILIZE IN THE ANALYSIS PROVIDED?***

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

***Q9. IS THIS MODELING APPROACH HIGHLY REGARDED AMONG CONTEMPORARY ECONOMISTS OR POLICY ANALYSTS?***

***A9.*** No. The Utility’s economic base modeling approach is not highly regarded and I know of no credible analysts or economists who utilize the approach. The approach was used for simple analyses from the 1920’s onward, and throughout the 1950s and 1960s it was sharply criticized. Since the 1970’s it has gone largely forgotten.

The following two retrospective excerpts from leading economists on the subject are illustrative:

1) “Economic base models suffer from old age: they have been built by so many analysts with varying levels of quality and they have been criticized so often that little remains except the concept.”[[1]](#footnote-1)

2) “Economic base models have had a long and checkered history, going back to the 1940’s and even earlier. They have never been quite academically respectable…”[[2]](#footnote-2)

***Q10. WHAT ARE SOME OF THE MAIN PROBLEMS WITH THE ECONOMIC BASE MODELING APPROACH AND HOW MIGHT THEY AFFECT THE ANALYSIS PROVIDED IN UTILITY WITNESS ALLEN’S TESTIMONY?***

***A10.*** Many of the core simplifications and assumptions of the economic base model can lead to estimation errors if they are violated. Many of these were likely violated in the analysis provided by Utility witness Allen. Measures can be taken to remedy some of these as I describe below, but I see no evidence that any remedial measures were taken. It is incumbent upon anyone running an economic impact model to provide details of the remedial measures taken so that credibility of approach can be ascertained. However, given that economic base models are the least sophisticated and most error prone regional economic model possible, even if all of these details were provided, many of these assumptions would still be inherently violated because of the rudimentary modeling approach utilized.

Below, I provide a list of some of the core simplifications and assumptions of the economic base model and the effect that they likely had on modeling results in Utility witness Allen’s testimony:

1. The approach is quite simplistic in that it relegates all economic activity to one of two main sectors -- basic and non-basic. Basic sectors are those sectors that provide the core of the regional economic base and export products or services to outside the region and thus generate an inflow of money to the region. Non-basic sectors are those sectors that provide products and services within the region to the basic sector and its employees. At this high level of aggregation, much detail on economic transactions, as well as stocks and flows of capital and labor, are absent from analysis. This will result in aggregation bias that will almost certainly result in erroneous findings.
2. Similarly, the approach has been widely criticized by scholars for the clumsy and inaccurate method by which industries are assigned to each of these two highly aggregated sectors, which ultimately result in misspecified results. The most basic approach, and the one provided in Utility witness Allen’s testimony, assigns all industries that have a location quotient larger than one (1) to the basic sector. A location quotient larger than one (1) indicates that the industry employs a greater share of the local workforce in a particular industry than it does nationally, and produces more goods or services than are consumed within the region, which are exported. This is important because it is from this that the employment and income multipliers are derived, which drive the resultant total economic impact analysis. This is problematic for three main reasons.

a. First, the location quotient method as utilized likely results in misassignment of industries into sectors, basic or non-basic. Commonly misassigned sectors include construction industries and education, among others. This misassignment occurs because the economic base approach simplistically assigns sectors based on employment ratios. Those industries that are employed at a greater proportion locally than nationally are assigned entirely to the basic sector when these industries are not entirely basic. This is a major problem because it is the sectoral ratio that generates the ultimate economic multiplier that produces the total economic impact assessment.

b. Second, the approach as utilized, relegates all industries entirely, 100%, to either basic or non-basic. In reality, many of these industries are partially basic and partially non-basic. Historical corrections to this misspecification have relied upon share parameters to allow for proportions of industries to be assigned to basic and non-basic to avoid extreme results. I saw no such parameterization correction approach taken in Utility witness Allen’s analysis.

c. The error inherent in determining which industries are considered basic versus non-basic is heavily dependent upon the level of industrial classification disaggregation utilized. The North American Industrial Classification System (NAICS) is often utilized for determining the aggregation scheme for regional modeling. These classification systems range from thousands of sectors (highly disaggregated and relatively precise) to only a handful of sectors (highly disaggregated and generally imprecise). The greater the degree of aggregation that was utilized for determining the assignment of basic and non-basic, the greater the potential for error in the modeling approach provided. From the testimony provided and accompanying documents that I reviewed, I see no mention of the aggregation scheme utilized to determine the assignment of industries into basic and non-basic sectors for this analysis.

1. The economic base modeling approach utilized violates the “cross-hauling” assumption, which can lead to overstated impacts. The economic base model assumes no cross-hauling—this is the simultaneous import and export of commodities, which can frequently occur in regions for commodities such as electricity or coal. This means that the model assumes that all consumption in the basic sector is locally produced (from within the county or multi-county region modeled). This assumption would otherwise mean that the model assumes 100% of the labor and capital inputs to the plants and to the associated mining operations (as well as any other industries that may have been specified [or misspecified] as basic) are provided for completely from within the region. If any employees of the plants being analyzed live in neighboring Kentucky or West Virginia, for example, their income supports non-basic industries outside of the region and thus the magnitude of the model as employed would misstate the economic impacts. If the plant itself purchases parts or materials, computer equipment, etc., from anywhere outside of the county (or multi-county region of analysis) the magnitude of the indirect labor and income effects as provided would be overestimated. The economic base model cannot account for these details, and thus misspecifies economic impacts.
2. Similarly, the approach assumes that all basic sector employee wages stay in the local area and are spent on the consumption of local goods and services. Any violations of this assumption would result in misspecification of the economic impacts, and likely over specification. To the extent that portions of employee wages are not spent within the region (either because they are taxed at the state or federal level or because they are placed into savings accounts or retirement accounts etc.) the model misspecifies economic impacts.
3. Oftentimes economic base models use employment multipliers to determine income impacts. This is a common problem of measuring income from employment. From my review of the analysis provided in Utility witness Allen’s testimony it appears that is the approach taken there as well. This is problematic because it is based upon the assumption that employment and per capita income are perfectly correlated. This would only be the case in a pure case economy with perfectly elastic supplies of labor. Such an assumption can vastly misstate income effects. This is another error inherent to the approach utilized.
4. The economic base modeling approach assumes that economic growth is determined solely by the basic (exporting) sector. More modern production function approaches to estimating economic growth account for a variety of other factors that can contribute to economic growth besides export-led development. These include parameters such as technology, labor and capital productivity, etc., which increase the marginal product of production inputs. These can also include savings ratios and return on capital. Economic base models do not account for features of economic growth beyond exports of the basic sector, and as a result, grossly simplify macroeconomic effects of the analysis.
5. The economic base modeling approach assumes that labor and capital productivities in the region being analyzed are the same as they are for the nation. To the extent that this assumption does not hold, the economic base model will misspecify macroeconomic impacts.
6. The economic base modeling approach does not account for general equilibrium effects. These are the effects of the economy balancing itself due to price changes and changes in supply and demand. Because each industry requires a different production mix of inputs (e.g., labor, capital, land, energy), changes that occur in one sector can be mitigated by corresponding changes in other sectors through various linkages in upstream and downstream supply chains and through economic substitution. Models that do not account for these effects misspecify macroeconomic impacts.
7. Economic base models assume that consumption ratios of non-basic sector goods and services is the same in the region as it is nationally. This assumption is often violated in rural areas or “company towns” in which many of the workers in the town do not purchase consumer goods and services at the same proportion as do consumers on average nationally or in which a relatively small proportion of employment is in the non-basic sector. To the extent that this assumption is violated, the model can misspecify the macroeconomic impacts. For example, if employees in the basic sector do not purchase local consumer goods in the same proportion as employees on average nationally, the reliance upon local non-basic sector inputs is overstated in the model, and thus the modeling results will overstate the macroeconomic impacts.
8. Similarly, economic base models do not account for government expenditures on consumption. By assuming that all non-basic employment is generated by demand from consumption by the basic sector, one ignores the very likely possibility that some consumption can also be driven by government expenditures. Examples of these can include state or federal employees not supported directly by the basic sector, capital projects (e.g., bridges, tunnels, roads) funded by the federal government, among many others. This assumption will tend to overstate the reliance of the local economy on the basic sector and overstate the magnitude of macroeconomic impacts.

***Q11. ARE THERE ANY OTHER MACROECONOMIC MODELING ASSUMPTIONS PROVIDED IN UTILITY WITNESS ALLEN’S TESTIMONY THAT LIKELY RESULT IN ERRONEOUS FINDINGS?***

***A11.*** Yes. From my review of Utility witness Allen’s analysis, all coal workers in Ohio that supply coal to these plants are assumed to be unemployed by the hypothetical modeled plant closures. It is not immediately clear to me why some, if not many, of the coal workers would not continue to produce coal if coal was sold competitively to other plants in Ohio and/or elsewhere in the nation. Given that coal markets allow for the sale and transport of coal across state lines, etc., I see no discussion in the analysis of the likelihood, at the very least, of the coal plants remaining in partial/reduced operation following the plant retirements. If any of those coal workers continued to produce coal for other plants, either in Ohio or in other states, they would not be accounted for in the economic impact model provided. In this way, the provided analysis represents a worst case scenario for coal worker unemployment and associated indirect economic consequences.

***Q12. GIVEN ALL OF THE ISSUES WITH THE ECONOMIC BASE MODEL THAT YOU HAVE JUST DESCRIBED, IS IT LIKELY THAT UTILITY WITNESS ALLEN ACCURATELY PORTRAYS THE ECONOMIC IMPACTS OF THE PLANT CLOSURES?***

***A12.***No. The macroeconomic results provided by Utility witness Allen are likely larger than the actual macroeconomic impacts that would result from the plant closures. However, I cannot guarantee that this would be the case without seeing the results of a more accurate, modern, regional economic model.

***Q13. UTILITY WITNESS PEARCE PROVIDES FOUR COST SCENARIOS FOR THE IMPACTS OF THE PPA RIDER ON CUSTOMER CHARGES OR CREDITS—WEATHER NORMALIZED LOAD, FIVE % HIGHER LOAD, FIVE % LOWER LOAD AND AVERAGE. DOES THE ECONOMIC ANALYSIS PROVIDED BY UTILITY WITNESS ALLEN ASSESS THE MACROECONOMIC/ECONOMIC DEVELOPMENT IMPACTS OF THESE PRICE SCENARIOS?***

***A13.*** No. It does not. Utility witness Allen’s study addresses only the economic impacts of the plant closures and the unemployement of the associated coal workers who provide coal to those plants. As I said above, the modeling approach utilized by Allen cannot estimate the macroeconomic/economic development impacts of electric price changes. Because of the limited nature of the model, it is not able to accomplish the Commission’s task, as I understand it, of estimating the economic impacts of electric price changes resulting from plant closures. The model just cannot handle that kind of analysis.

***Q14. THESE COST SCENARIOS SEEM TO DECLINE (I.E., RESULT IN MORE LIKELY CONSUMER CHARGES) BEGINNING IN FORECASTED YEAR 2022. WHAT MIGHT ACCOUNT FOR THE CHANGE IN COSTS?***

***A14.*** It seems most likely that those costs are due to the integration of greenhouse gas costs associated with the implementation of the Clean Power Plan, and the associated declines in price-based dispatch into PJM Interconnection, L.L.C. (“PJM”) when those costs are internalized into the units’ marginal costs. As stated on page 20 of Utility witness Pearce’s testimony, “The results are reasonably conservative in that they include a ‘double whammy’ of both the carbon expense and the resulting reduced dispatch due to the higher cost basis.” The analysis contained in Utility witness Pearce’s testimony includes more than three quarters of a billion dollars of carbon costs associated with the PPA Rider for the last three forecasted years that will be passed on to customers.

***Q15. THESE COST SCENARIOS PROVIDED END IN 2024. COULD CUSTOMERS BE RESPONSIBLE FOR ADDITIONAL GREENHOUSE GAS COSTS IF THE PLANTS CONTINUE TO OPERATE UNDER THE RIDER BEYOND 2024?***

***A15.*** It is not immediately clear to me why the forecasting provided by Utility witness Pearce ends in year 2024. If these plants continue to operate beyond 2024, the stringency of required carbon reductions will likely increase under the Clean Power Plan. In existing tradeable carbon permit programs, fewer emissions permits are auctioned each year to force the stringency of the cap gradually across time. This has the effect of creating permit scarcity and, depending upon abatement and/or fuel switching, demand and other market conditions, is likely to result in higher carbon costs in later years. However, the compliance route selected by Ohio is not yet determined, and may or may not include tradeable permits or direct carbon taxes. In any event, by ending the forecast in 2024 it is likely that the Commission is not being provided the full range of negative impacts associated with the PPA Rider and resultant negative economic impacts on customers or economic development.

***Q16. WOULD THERE BE OTHER ECONOMIC IMPACTS (AND COSTS TO CONSUMERS) ASSOCIATED WITH ADDITIONAL GREENHOUSE GAS COSTS ON THESE PLANTS IN FUTURE YEARS?***

***A16.*** That is highly likely under the Clean Power Plan. If the carbon costs that are assumed in Utility witness Pearce’s testimony continue in future years and these plants remain in operation, these carbon costs will likely be factored into the plants’ marginal cost bids into PJM, and will likely result in reduced economic dispatch of the plants due to their lack of competitiveness with other generation units that do not incur similar carbon costs. Under the PPA Rider calculation scheme provided, this would result in the plants incurring higher operating costs and lower energy revenues, thus incurring additional financial liabilities on captive retail customers. Moreover, Utility witness Allen’s analysis does not model the potential impact that these additional carbon costs, if incurred by ratepayers, would have on the statewide economy.

***Q17. WHAT CARBON COSTS DOES UTILITY WITNESS PEARCE’S ANALYSIS INCLUDE AND ARE THEY MODELED IN A ROBUST MANNER?***

***A17.*** Utility witness Pearce’s analysis includes a $15 per ton of carbon dioxide equivalent costs, which is modeled as a tax on production from these plants. While the cost estimate is not unreasonable, actual costs could be much higher or much lower depending upon a range of market forces (e.g., abatement, demand for energy and regional growth, power imports) and therefore modeling sensitivity analysis is generally good form when this type of scenario is being modeled. Sensitivity analysis would allow the Commission to evaluate the degree to which a valid range of carbon costs, that the PPA Rider would impose on customers, would affect the range of likely cost/credit scenarios. Sensitivity analyses typically consist of modeling the same scenarios with both higher and lower parameters to measure the degree to which the results are sensitive (i.e., not robust) to higher or lower carbon prices. For example, in this case that might include modeling the results with a $5/ton carbon cost as well as a $25/ton cost.

Based on a routine calculation with the values provided in Table 1 of Utility witness Pearce’s testimony, a $25/ton carbon cost would result in $1.28 billion of carbon costs being passed on to customers in the last three forecasted years alone, whereas with $15/ton that figure is $768 million. This was derived simply by dividing 768 million by 15 and multiplying that by 25 to adjust the ratio. Given that wide variability in customer liability due to a change in one key parameter, sensitivity analyses would be a more appropriate method for presenting these consumer cost liability results.

It should also be noted that these costs are direct costs and the Commission, to my knowledge, has not been provided by the Utility a macroeconomic impact analysis (i.e., direct + indirect costs) of the effect that these costs would have on Ohio. Utility witness Allen’s analysis certainly does not include this detail. Under the PPA rider, these carbon costs would be incurred by customers non-bypassable (i.e., they could not avoid them through customer choice by selecting a CRES). $1.28 billion of additional costs on AEP Ohio customers for 2022-2024, and an undisclosed amount beyond 2024, without any recourse for avoiding those costs, would likely offset any potential benefit that the PPA rider might deliver to customers. These macroeconomic effects would provide for a more accurate assessment of the economic development implications of these cost liabilities and any resultant regional decline stemming from manufacturing flight (e.g., Honda leaving central Ohio).

Another modeling concern with regard to the future carbon costs is also worth mentioning. From my review of Utility witness Pearce’s testimony, the carbon costs and dollar values of the PPA Rider cost estimates are in nominal, rather than in real dollars. Because the supply of money changes across time due to inflation and other factors, it is customary to utilize Consumer Price Index (“CPI”) adjustment (i.e., based on the CPI for electricity prices) to a base year currency so that the analysis can be more easily evaluated for future years. Using nominal dollar figures for the assumed carbon cost is tantamount to assuming that compliance costs for these plants (holding all else constant) will decline annually by the rate of inflation. That is because $15 nominal dollars in 2024 is less in real (purchasing power/inflation adjusted) terms than $15 nominal dollars in 2022. Given that the compliance costs of these plants will likely increase as the stringency of required carbon reductions (under whatever compliance plan the State of Ohio puts forward), the analysis put forward by Utility witness Pearce likely understates the carbon cost burden that would be imposed on customers by the PPA Rider.

# CONCLUSION

***Q18. DOES THIS COMPLETE YOUR DIRECT TESTIMONY***

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

Assistant Consumers’ Counsel

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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

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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

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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.

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*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:

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*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*

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* + *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.

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. [↑](#footnote-ref-1)
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. [↑](#footnote-ref-2)