

**BEFORE  
THE PUBLIC UTILITIES COMMISSION OF OHIO**

In the Matter of the Application of )  
Ohio Power Company for Authority to ) Case No. 23-23-EL-SSO  
Establish a Standard Service Offer )  
Pursuant to Section 4928.143, Revised )  
Code, in the Form of an Electric Security )  
Plan )

In the Matter of the Application of Energy )  
Ohio Power Company for Approval of ) Case No. 23-24-EL-AAM  
Certain Accounting Authority )

**DIRECT TESTIMONY  
OF  
RAMTEEN SIOSHANSI**

**On Behalf of**  
**Office of the Ohio Consumers' Counsel**  
*65 East State Street, Suite 700*  
*Columbus, Ohio 43215*

**June 9, 2023**

## **TABLE OF CONTENTS**

	<b>PAGE</b>
I. INTRODUCTION AND PURPOSE OF TESTIMONY .....	1
II. FINDINGS AND RECOMMENDATIONS.....	4
III. ELECTRIC TRANSPORTATION PLAN .....	7
IV. FIBER-OPTIC INFRASTRUCTURE .....	13
V. CONCLUSION.....	17

## **LIST OF ATTACHMENTS**

Attachment RMS-1

1    **I.        INTRODUCTION AND PURPOSE OF TESTIMONY**

2

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

4    ***A1.***    My name is Ramteen Sioshansi. I am an operations researcher, industrial  
5            engineer, and energy economist who focuses on issues that are related to  
6            electricity-industry economics, market design, regulation, operations, planning,  
7            and policy. I am president of Enerlytics, LLC. My business address is 60 East  
8            Spring Street, Columbus, OH 43215.

9

10   ***Q2.    PLEASE DESCRIBE YOUR EXPERIENCE AND QUALIFICATIONS, AS***  
11   ***THEY PERTAIN TO THIS CASE.***

12

13   ***A2.***    I have over two decades of academic, research, advisory, and consulting  
14            experience within the energy and electric-power sectors. My academic research is  
15            focused on techno-economic modeling and analysis of energy and electricity  
16            systems, including the planning, operation, and economics of electricity systems.  
17            My primary academic appointment is as a professor in Department of Engineering  
18            and Public Policy and Department of Electrical and Computer Engineering at  
19            Carnegie Mellon University, which I joined as of 1 January 2023. In addition, I  
20            hold an appointment as an adjunct professor in Department of Integrated Systems  
21            Engineering at The Ohio State University, with which I have been affiliated since  
22            2008.

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 Through my work, I am familiar with how short-term operations and long-term  
2 planning of electricity systems are optimized. My consulting work includes  
3 analyses of electricity-market designs for market participants and advising  
4 counterparties on structuring power-purchase agreements. My previous work  
5 experience includes an internship for the then chief economist of Federal Energy  
6 Regulatory Commission ("FERC"). In addition, I served three two-year terms as a  
7 member of Electricity Advisory Committee ("EAC"), which is a federal advisory  
8 committee to the leadership of U.S. Department of Energy. As part of my service  
9 to EAC, I chaired its Energy Storage (Technologies) subcommittee.

10  
11 I hold a B.A. in economics and applied mathematics and an M.S. and Ph.D. in  
12 industrial engineering and operations research from University of California,  
13 Berkeley. I hold also an M.Sc. in econometrics and mathematical economics from  
14 London School of Economics and Political Science. I am a fellow of Institute of  
15 Electrical and Electronics Engineers ("IEEE") and a senior member of Institute of  
16 Industrial and Systems Engineers ("IISE"). IEEE and IISE are major professional  
17 associations for electrical and industrial engineering, respectively. My curriculum  
18 vitae, which provides further details regarding my professional experience, is  
19 attached hereto as Attachment RMS-1.

20  
21 ***Q3. ON WHOSE BEHALF ARE YOU TESTIFYING?***

22 ***A3.*** I am providing testimony on behalf of Office of the Ohio Consumers' Counsel  
23 ("OCC").

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 **Q4. HAVE YOU TESTIFIED PREVIOUSLY BEFORE A REGULATORY**  
2 **AGENCY?**

3  
4 **A4.** Yes. I have submitted testimony to the Public Utilities Commission of Ohio  
5 (“PUCO”) on behalf of OCC, most recently in Case No. 14-1693-EL-RDR *et al.*  
6 Moreover, my academic research has been referenced and has appeared in other  
7 regulatory proceedings.

8  
9 **Q5. WHAT IS THE PURPOSE AND SCOPE OF YOUR TESTIMONY?**

10 **A5.** In this proceeding Ohio Power Company (“the Utility” or “AEP Ohio”) proposes  
11 approval of a standard service offer (“SSO”) in the form of an electric security  
12 plan (“ESP”) with multiple components. One of the components is an electric  
13 transportation plan (“ETP”), which is focused on electric-vehicle (“EV”)   
14 integration into the Utility’s electricity system. Another component is a proposal  
15 to install fiber-optic infrastructure alongside AEP Ohio’s distribution system in  
16 nine counties. These components of the ESP are accompanied by proposed cost-  
17 recovery mechanisms, including tariff adjustments to collect the costs from  
18 consumers.

19  
20 I was retained by OCC to review the Utility's application, supporting testimony,  
21 and supporting exhibits that pertain to these components of the ESP. I was asked  
22 to identify consumer-protection issues and regulatory and market-efficiency  
23 concerns that are raised by these components of the ESP.

**II. FINDINGS AND RECOMMENDATIONS**

**Q6. WHAT ARE YOUR SPECIFIC RECOMMENDATIONS AND FINDINGS?**

**A6.** I recommend that the PUCO deny AEP Ohio's proposal to charge residential electricity consumers, over the next six years, \$38 million (\$6.3 million annually)<sup>1</sup> for the ETP and \$116 million<sup>2</sup> for the installation, operation, and maintenance of fiber-optic infrastructure. As I outline in the testimony that follows, there are numerous aspects of the proposed ETP and fiber-optic-infrastructure installation that make these costs unjust and unreasonable for AEP Ohio's electricity consumers. As such, the Utility's proposal should be denied, due to the following three major concerns.

- 1) The Utility's proposal includes a cost-benefit analysis that is fundamentally flawed. As I detail in my responses to Q8, Q9, Q10, and Q13 below, a proper cost-benefit analysis should examine marginal cost and marginal benefit. To the best of my knowledge, the Utility has not conducted such an analysis, meaning that the programs, as designed and proposed, are unlikely to maximize net benefits to consumers.
- 2) Consumers should not pay for the ETP, because a large portion of it represents a perverse cross subsidy. Over half of the estimated cost of the ETP funds subsidies are for EV-charging stations and ports. As I detail in

---

<sup>1</sup> Direct testimony of Andriane Jaynes (Exhibit 1, Figure 3).

<sup>2</sup> Direct testimony of Scott Osterholt at page 28 (Figures SSO 3 and SSO 4).

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 my response to Q11, there is a high likelihood that the primary  
2 beneficiaries of the proposed subsidies would be consumers with above-  
3 average incomes. The Utility proposes to socialize the cost of the subsidies  
4 to all AEP Ohio electricity consumers, including AEP consumers that are  
5 considered low-income consumers, who are unable to afford to purchase  
6 EVs. Thus, the ETP will create perverse cross subsidies to individuals  
7 with above-average incomes. To avoid such a perverse cross subsidy, the  
8 ETP should be denied by PUCO.

9  
10 In addition to perverse cross subsidies, the ETP includes retail-tariff  
11 proposals that will be detrimental to AEP Ohio electricity consumers and  
12 the electricity system at large. These negative impacts stem from the lack  
13 of price-based incentives to help EV owners develop good habits  
14 surrounding the timing of EV charging. Under the Utility's current  
15 proposal, EV charging stations that receive consumer-funded subsidies  
16 would not be required to participate in a time-of-use ("TOU") tariff or  
17 other form of demand-response program. Thus, EV owners who use such  
18 charging stations may not have incentives to shift their charging to time  
19 periods with relatively low electricity demand.

20  
21 The lack of such incentives can result in substantially higher costs for all  
22 AEP Ohio electricity consumers. It should be a goal to ensure that EV  
23 chargers are available for use at all times. However, EV owners should be

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 provided with incentives to shift their charging demand (to the extent that  
2 it is feasible) to time periods of low electricity demand.

- 3 3) There is no rationale for captive AEP Ohio electricity consumers who  
4 receive no benefits from fiber-optic infrastructure to pay for the  
5 deployment, operation, or maintenance of such infrastructure. As I detail  
6 in my response to Q15, the Utility acknowledges that there is a suitable  
7 lower-cost alternative to fiber-optic infrastructure for the operation of its  
8 electricity system that is used widely by the electricity industry. Moreover,  
9 as I detail in my response to Q14, the Utility's initial filing in this case  
10 does not appear to include a cost-benefit analysis. As such, the Utility has  
11 not demonstrated that the proposed fiber-optic infrastructure maximizes  
12 net benefits to AEP Ohio electricity consumers (or even that it delivers  
13 positive net benefits). The Utility has proposed to fund some fiber-optic-  
14 infrastructure costs using federal and other funding. The Utility should be  
15 encouraged to do so. However, AEP Ohio electricity consumers should  
16 not be made to bear the costs of infrastructure that is not demonstrated to  
17 be in their best interests.



1    **III.    ELECTRIC TRANSPORTATION PLAN**

2  
3    ***Q7.    THE UTILITY CLAIMS THAT THE COSTS OF THE PROPOSED ETP ARE***  
4    ***REASONABLE. DO YOU AGREE WITH THIS ASSESSMENT?***  
5

6    ***A7.***    No. In its initial filing in this case, AEP Ohio claims that the costs of the proposed  
7            ETP are reasonable.<sup>3</sup> I disagree with this assessment for at least the following  
8            three reasons, which I detail further in the testimony that follows.

9  
10          First, the cost-benefit analysis that underlies this claim is fundamentally flawed.  
11          EV (or other) infrastructure that is funded through non-bypassable charges on  
12          AEP Ohio electricity consumers must be supported by a rigorous analysis of the  
13          benefits and costs for consumers, including the benefits and costs for  
14          disadvantaged and low-income consumers. This fundamental flaw in the cost-  
15          benefit analysis that underlies the design of the ETP means that the program  
16          likely is not designed to maximize the net benefits that it delivers.

17  
18          Second, the ETP introduces perverse cross-subsidies between consumers, which  
19          are harmful to consumers.

20  
21          Third, the proposed retail tariffs and other incentives that would accompany the  
22          subsidies for EV chargers are harmful to consumers.

---

<sup>3</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 26.

**Q8. HOW SHOULD COSTS AND BENEFITS BE COMPARED TO ONE ANOTHER TO MAXIMIZE THE NET BENEFITS OF A PROGRAM TO CONSUMERS AND SOCIETY AT LARGE?**

**A8.** At its heart, a cost-benefit analysis should compare the marginal cost to the marginal benefit of a proposed program. Marginal cost is a measure of the incremental cost of undertaking an incremental unit of the program. Marginal benefit is a measure of the incremental benefit of undertaking an incremental unit of the program. For instance, one could estimate the marginal cost of deploying an additional EV charging station. Such an estimate could include, for example, the capital cost of the charger itself, the cost of ongoing operations and maintenance of the charger, and the cost of requisite distribution-system upgrades. One could estimate also the marginal benefit of deploying an additional EV charging station. Marginal benefits could include, for example, added convenience to EV owners or air-quality improvements from reduced vehicle-tailpipe emissions.

To maximize its net benefits to consumers and society at large, a program should be designed to equate its marginal cost and marginal benefit. To give an illustrative example, if an incremental EV charger entails \$3000 of cost but delivers only \$2000 of benefit, the number of chargers should be reduced to maximize the net benefits of the program. Conversely, if an incremental EV charger entails \$3000 of cost and delivers \$4000 of benefit, the number of chargers should be increased to maximize the net benefits of the program.

1 **Q9. TO THE BEST OF YOUR KNOWLEDGE, HAS THE PROPOSED ETP**  
2 **BEEN DESIGNED BY THE UTILITY TO MAXIMIZE NET BENEFITS TO**  
3 **CONSUMERS AND SOCIETY AT LARGE BY AIMING TO EQUATE**  
4 **MARGINAL COST AND MARGINAL BENEFIT?**

5  
6 **A9.** No. To the best of my knowledge, AEP Ohio has not designed the ETP to  
7 maximize net benefits to consumers and society at large by aiming to equate  
8 marginal cost and marginal benefit. Instead, the Utility provides estimated  
9 aggregate benefits and costs of the proposed ETP.<sup>4</sup> Thus, there is no basis on  
10 which to claim that the proposed ETP has been designed to maximize net benefits  
11 to consumers and society at large.

12  
13 **Q10. IN WHAT WAYS CAN THE DESIGN OF THE ETP FAIL TO MAXIMIZE**  
14 **NET BENEFITS TO CONSUMERS AND SOCIETY AT LARGE IF ITS**  
15 **ESTIMATED MARGINAL COST AND MARGINAL BENEFIT ARE NOT**  
16 **EQUAL?**

17  
18 **A10.** As outlined in my response to Q9, it does not appear that the Utility has designed  
19 the ETP to maximize net benefits to consumers and society at large. As such, a  
20 number of aspects of the program's design could be flawed. For example, the  
21 aggregate scale of the program (*e.g.*, the target number of EV chargers that would  
22 be built) or the breakdown of the program components (*e.g.*, between the  
23 proposed residential, corridor, and commercial and public programs) may not  
24 maximize benefits to consumers and society at large.

---

<sup>4</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, Figures AEJ-6 and AEJ-7.

1 **Q11. IN WHAT WAYS DOES THE PROPOSED ETP CREATE PERVERSE**  
2 **CROSS SUBSIDIES BETWEEN CONSUMERS?**  
3

4 **A11.** A second aspect of the ETP that raises a significant issue that makes its costs  
5 unreasonable is the perverse cross subsidy that it creates. Over half of the  
6 proposed cost of the ETP is targeted towards subsidies for the deployment of EV  
7 charging ports.<sup>5</sup> In addition, the Utility is proposing an additional \$6 million *per*  
8 *annum* to cover 100% of contribution in aid of construction (“CIAC”) for  
9 consumer installations of EV chargers.<sup>6</sup>  
10

11 EV owners tend to be higher-income compared to the average electricity  
12 consumer.<sup>7</sup> As such, the primary beneficiaries of these components of the ETP  
13 will be higher-income consumers. The costs of these EV-charger and CAIC  
14 subsidies will be socialized to and borne by all of the Utility’s consumers,  
15 including those who are lower-income compared to the average AEP Ohio  
16 electricity consumer.<sup>8</sup>  
17

18 This aspect of the ETP creates a perverse cross subsidy, in that the program  
19 engenders a wealth transfer from all of AEP Ohio’s electricity consumers to AEP

---

<sup>5</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, Figure AEJ-7.

<sup>6</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 23.

<sup>7</sup> A. Davies, “Electric Car Owners Are Richer and Smarter Than the Average American,”  
<https://www.businessinsider.com/electric-car-owners-are-richer-and-smarter-2012-11>. Accessed May 25,  
2023.

<sup>8</sup> Direct testimony of C.M. Heitkamp on behalf of Ohio Power Company, Figure CMH-1 and Exhibit  
CMH-1.

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 Ohio's electricity consumers who are predominantly higher income compared to  
2 the average AEP Ohio electricity consumer.

3

4 ***Q12. IN WHAT WAYS ARE THE TARIFFS THAT ARE INCLUDED IN THE***  
5 ***PROPOSED ETP HARMFUL TO CONSUMERS?***

6

7 ***A12.*** The proposed ETP includes new TOU tariffs, which are designed to incentivize  
8 EV owners to shift their EV charging away from time periods with high  
9 electricity demand to time periods with low electricity demand. Any EV owner  
10 who receives a subsidy through the ETP's residential single-family program to  
11 deploy an in-home charger is required to participate in the proposed TOU tariff or  
12 in another demand-response program.<sup>9</sup>

13

14 A rationale behind this requirement stems from the fact that EV charging being  
15 coincident with peak electricity demand can impose significant costs on all AEP  
16 Ohio electricity consumers.<sup>10</sup> The TOU tariff is designed to provide an economic  
17 incentive for EV owners to shift their charging (to the extent possible) away from  
18 time periods of peak electricity demand to periods of relatively low electricity  
19 demand. If such a program is successful, it should have a downward impact on  
20 retail electricity prices, which is beneficial to consumers.<sup>11</sup> In addition, the Utility

---

<sup>9</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, Exhibit AEJ-1, p. 9.

<sup>10</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 11–14.

<sup>11</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 19–21.

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 emphasizes the importance of a TOU tariff in developing good habits among EV  
2 owners surrounding the timing of their EV charging.<sup>12</sup>

3  
4 Despite the benefits of a TOU tariff, the proposed ETP would not require  
5 recipients of subsidies through the residential multifamily, DCFC public corridor,  
6 DCFC public non-corridor, L2 public, workplace, or fleet programs (“non-TOU  
7 programs”) to participate in a TOU tariff. The stated rationale for not requiring  
8 participation in a TOU tariff by recipients of subsidies through the non-TOU  
9 programs is that the nature of these charging stations requires that they be  
10 available during all times.<sup>13</sup>

11  
12 It should be a goal to have all EV chargers, regardless of whether they receive  
13 consumer-funded subsidies, available to provide EV-charging services during all  
14 times. However, this goal does not imply that EV owners who use chargers that  
15 are subsidized through the non-TOU programs should not be provided with  
16 incentives to shift their EV charging towards time periods with lower electricity  
17 demand. By allowing chargers that are subsidized through the non-TOU programs  
18 to opt out of participating in a TOU tariff or other demand-response program, EV  
19 owners that use such chargers do not receive the requisite incentives. Moreover,  
20 the lack of price-based incentives for EV owners who use such chargers to shift

---

<sup>12</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 20.

<sup>13</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, Exhibit AEJ-1, p. 9–12.

1        their charging to time periods of low demand may result in the formation of bad  
2        EV-charging habits, which is contrary to the Utility's stated goal.<sup>14</sup>

3  
4        To the extent that chargers subsidized through the non-TOU programs yield EV-  
5        charging that is coincident with time periods of high electricity demand, the ETP  
6        will result in greater costs to all AEP Ohio electricity consumers, which is  
7        harmful to consumers.

8

9    **IV.    FIBER-OPTIC INFRASTRUCTURE**

10

11    ***Q13.    THE UTILITY CLAIMS THAT THE PROPOSED FIBER-OPTIC***  
12    ***INFRASTRUCTURE IS IN THE BEST INTERESTS OF THE UTILITY'S***  
13    ***ELECTRICITY CONSUMERS. DO YOU AGREE WITH THIS***  
14    ***ASSESSMENT?***

15

16    ***A13.*** No. In its initial filing in this case, AEP Ohio claims that the proposed fiber-optic  
17        infrastructure is in the best interests of consumers.<sup>15</sup> I disagree with this  
18        assessment for at least the following two reasons. First, there does not appear to  
19        be any cost-benefit analysis in the Utility's initial filing to substantiate claims that  
20        the proposed infrastructure is in the best interests of consumers. As such, it is not  
21        clear that the proposed fiber-optic infrastructure has been designed to equate  
22        estimated marginal costs and marginal benefits, which is necessary to maximize  
23        benefits of the proposed project (*cf.* my responses to Q8, Q9, and Q10).

---

<sup>14</sup> Direct testimony of A.E. Jaynes on behalf of Ohio Power Company, p. 20.

<sup>15</sup> Direct testimony of S.S. Osterholt, p. 23–24.

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1       Moreover, there does not appear to be any analysis to demonstrate that the  
2       aggregate benefits of the fiber-optic infrastructure outweigh its costs. Thus, there  
3       is no basis on which to claim that the project is in the best interests of AEP Ohio  
4       electricity consumers.

5  
6       Second, the Utility claims that some project costs will be defrayed through grants  
7       and by collecting fees from internet service providers (“ISPs”) that provide last-  
8       mile broadband internet service to customers in the nine-county area where the  
9       fiber-optic infrastructure would be built. The fact that grants and ISP fees are  
10      uncertain exposes AEP Ohio electricity consumers to cost risk, inasmuch as  
11      consumers would bear full infrastructure costs should these revenue streams not  
12      materialize. To the best of my knowledge, the Utility’s proposal does not address  
13      contingency or cost-mitigation plans in such an instance.

14

15   ***Q14. DOES THE UTILITY INCLUDE A COST-BENEFIT ANALYSIS OF THE***  
16   ***PROPOSED FIBER-OPTIC INFRASTRUCTURE?***

17

18   ***A14.*** In its initial filing in this case, AEP Ohio includes estimates of the costs of the  
19      proposed fiber-optic infrastructure.<sup>16</sup> However, to the best of my knowledge, there  
20      is no quantified measurement of the benefits of the project. Rather, the Utility  
21      provides qualitative descriptions of possible purported benefits.<sup>17</sup> Given the lack  
22      of a quantified assessment of project benefits, it is unclear whether project

---

<sup>16</sup> Direct testimony of S.S. Osterholt, Figures SSO-3 and SSO-4.

<sup>17</sup> Direct testimony of S.S. Osterholt, p. 8–11 and p. 20–24.



*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 benefits outweigh project costs, much less whether the proposed fiber-optic  
2 infrastructure has been designed to maximize benefits to AEP Ohio electricity  
3 consumers.

4  
5 As I detail in my responses to Q8, Q9, and Q10, maximizing the benefits to  
6 consumers and society at large of a project requires that the project be designed to  
7 equate estimated marginal costs and marginal benefits. To my knowledge, no  
8 such analysis underlies the design of the proposed fiber-optic infrastructure.

9  
10 ***Q15. ARE THERE ALTERNATIVE TECHNOLOGIES TO FIBER-OPTIC***  
11 ***INFRASTRUCTURE THAT THE UTILITY COULD USE TO***  
12 ***COMMUNICATE WITH ACCESS POINTS, SUBSTATIONS,***  
13 ***DISTRIBUTION-LINE DEVICES, AND ADVANCED-METERING***  
14 ***INFRASTRUCTURE?***

15  
16 ***A15.*** Yes. In its initial filing in this case, AEP Ohio notes that wireless communication  
17 is the most widely used method of communication in the utility industry, due to  
18 its lower overall cost.<sup>18</sup> Given that the Utility has not justified the higher cost of  
19 installing fiber-optic infrastructure on the basis of a methodologically sound cost-  
20 benefit analysis, the lower-cost and most widely used alternative of wireless  
21 communication is a suitable alternative to meet the Utility's communications  
22 needs.

---

<sup>18</sup> Direct testimony of S.S. Osterholt, Figure SSO-1.

1 **Q16. IN WHAT WAY DOES THE UTILITY'S PROPOSAL TO USE FEDERAL**  
2 **AND OTHER GRANTS TO DEFRAY THE COST OF THE PROPOSED**  
3 **FIBER-OPTIC INFRASTRUCTURE INCREASE CONSUMER RISK?**  
4

5 **A16.** In its initial filing in this case, AEP Ohio claims that grants, including those that  
6 are available under the 2021 Infrastructure Investment and Jobs Act ("IIJA"), will  
7 be used to defray the cost of the proposed fiber-optic infrastructure.<sup>19</sup> However, to  
8 the best of my knowledge, the Utility has not secured any grant funding as of its  
9 filing. As such, under the Utility's proposal, AEP Ohio electricity consumers bear  
10 complete cost risk of any fiber-optic-infrastructure investments. Should the Utility  
11 be unsuccessful in securing grants, AEP Ohio electricity consumers will be  
12 responsible for funding the full cost of building, operating, and maintaining the  
13 fiber-optic infrastructure. Alternatively, AEP Ohio could modify its proposed  
14 fiber-optic infrastructure with funding that the Utility expects to receive from  
15 IIJA, without the use of consumer subsidies.  
16

17 **Q17. IN WHAT WAY DOES THE UTILITY'S PROPOSAL TO USE REVENUES**  
18 **FROM LAST-MILE ISPS TO DEFRAY THE COST OF THE PROPOSED**  
19 **FIBER-OPTIC INFRASTRUCTURE INCREASE CONSUMER RISK?**  
20

21 **A17.** In its initial filing in this case, AEP Ohio claims that revenues from last-mile ISPs  
22 will be used to defray the cost of the proposed fiber-optic infrastructure.<sup>20</sup>  
23 However, the Utility states in its initial filing in this case that it has neither a cost  
24 model for fiber-optic leases nor any ISP partners secured.<sup>21</sup> As such, the revenues

---

<sup>19</sup> Direct testimony of S.S. Osterholt, p. 24–27.

<sup>20</sup> Direct testimony of S.S. Osterholt, p. 27–28.

<sup>21</sup> *Id.*

*Direct Testimony of Ramteen Sioshansi  
On Behalf of Office of the Ohio Consumers' Counsel  
PUCO Case No. 23-23-EL-SSO, et al.*

1 from leasing fiber-optic infrastructure to last-mile ISPs is speculative and exposes  
2 AEP Ohio electricity consumers to full cost risk of the fiber-optic infrastructure.  
3 Should the Utility be unsuccessful in securing leases from last-mile ISPs, AEP  
4 Ohio electricity consumers will be responsible for funding the full cost of  
5 building, operating, and maintaining the fiber-optic infrastructure.

6

7 **V. CONCLUSION**

8

9 ***Q18. DOES THIS CONCLUDE YOUR TESTIMONY?***

10 ***A18.*** Yes. However, I reserve the right to supplement my testimony at a later time  
11 should any party submit new or corrected information or testimony which affects  
12 materially the findings and recommendations that are presented in my testimony.

## **CERTIFICATE OF SERVICE**

I hereby certify that a copy of the foregoing Direct Testimony of Ramteen Sioshansi on behalf of the Office of the Ohio Consumers' Counsel has been served upon those persons listed below via electronic service this 9<sup>th</sup> day of June 2023.

*/s/ William J. Michael*  
William J. Michael  
Assistant Consumers' Counsel

The PUCO's e-filing system will electronically serve notice of the filing of this document on the following parties:

### **SERVICE LIST**

<a href="mailto:werner.margard@ohioago.gov">werner.margard@ohioago.gov</a>	<a href="mailto:stnourse@aep.com">stnourse@aep.com</a>
<a href="mailto:ambrosia.wilson@ohioago.gov">ambrosia.wilson@ohioago.gov</a>	<a href="mailto:mjschuler@aep.com">mjschuler@aep.com</a>
<a href="mailto:ashley.wnek@ohioago.gov">ashley.wnek@ohioago.gov</a>	<a href="mailto:egallon@porterwright.com">egallon@porterwright.com</a>
<a href="mailto:mkurtz@BKLawfirm.com">mkurtz@BKLawfirm.com</a>	<a href="mailto:christopher.miller@icemiller.com">christopher.miller@icemiller.com</a>
<a href="mailto:kboehm@BKLawfirm.com">kboehm@BKLawfirm.com</a>	<a href="mailto:matthew@msmckenzieltd.com">matthew@msmckenzieltd.com</a>
<a href="mailto:jkylercohn@BKLawfirm.com">jkylercohn@BKLawfirm.com</a>	<a href="mailto:dromig@armadapower.com">dromig@armadapower.com</a>
<a href="mailto:knordstrom@theOEC.org">knordstrom@theOEC.org</a>	<a href="mailto:bojko@carpenterlipps.com">bojko@carpenterlipps.com</a>
<a href="mailto:ctavenor@theOEC.org">ctavenor@theOEC.org</a>	<a href="mailto:wygonski@carpenterlipps.com">wygonski@carpenterlipps.com</a>
<a href="mailto:little@litohio.com">little@litohio.com</a>	<a href="mailto:tdougherty@theoec.org">tdougherty@theoec.org</a>
<a href="mailto:hogan@litohio.com">hogan@litohio.com</a>	<a href="mailto:paul@carpenterlipps.com">paul@carpenterlipps.com</a>
<a href="mailto:ktreadway@oneenergylc.com">ktreadway@oneenergylc.com</a>	<a href="mailto:emcconnell@elpc.org">emcconnell@elpc.org</a>
<a href="mailto:jdunn@oneenergylc.com">jdunn@oneenergylc.com</a>	<a href="mailto:rkelter@elpc.org">rkelter@elpc.org</a>
<a href="mailto:cgrundmann@spilmanlaw.com">cgrundmann@spilmanlaw.com</a>	<a href="mailto:stacie.cathcart@igs.com">stacie.cathcart@igs.com</a>
<a href="mailto:dwilliamson@spilmanlaw.com">dwilliamson@spilmanlaw.com</a>	<a href="mailto:evan.betterton@igs.com">evan.betterton@igs.com</a>
<a href="mailto:slee@spilmanlaw.com">slee@spilmanlaw.com</a>	<a href="mailto:michael.nugent@igs.com">michael.nugent@igs.com</a>
<a href="mailto:brian.gibbs@nationwideenergypartners.com">brian.gibbs@nationwideenergypartners.com</a>	<a href="mailto:dparram@brickergraydon.com">dparram@brickergraydon.com</a>
<a href="mailto:rdove@keglerbrown.com">rdove@keglerbrown.com</a>	<a href="mailto:dborchers@brickergraydon.com">dborchers@brickergraydon.com</a>
<a href="mailto:nbobb@keglerbrown.com">nbobb@keglerbrown.com</a>	<a href="mailto:rmains@brickergraydon.com">rmains@brickergraydon.com</a>
<a href="mailto:jlaskey@norris-law.com">jlaskey@norris-law.com</a>	<a href="mailto:kherrnstein@bricker.com">kherrnstein@bricker.com</a>
<a href="mailto:mpritchard@mcneeslaw.com">mpritchard@mcneeslaw.com</a>	<a href="mailto:dproano@bakerlaw.com">dproano@bakerlaw.com</a>
<a href="mailto:bmckenney@mcneeslaw.com">bmckenney@mcneeslaw.com</a>	<a href="mailto:ahaque@bakerlaw.com">ahaque@bakerlaw.com</a>
<a href="mailto:awalke@mcneeslaw.com">awalke@mcneeslaw.com</a>	<a href="mailto:eprouthy@bakerlaw.com">eprouthy@bakerlaw.com</a>
<a href="mailto:mjsettineri@vorys.com">mjsettineri@vorys.com</a>	<a href="mailto:pwillison@bakerlaw.com">pwillison@bakerlaw.com</a>
<a href="mailto:glpetrucci@vorys.com">glpetrucci@vorys.com</a>	<a href="mailto:Fdarr2019@gmail.com">Fdarr2019@gmail.com</a>
<a href="mailto:aasanyal@vorys.com">aasanyal@vorys.com</a>	<a href="mailto:dstinson@bricker.com">dstinson@bricker.com</a>
<a href="mailto:cpirik@dickinsonwright.com">cpirik@dickinsonwright.com</a>	<a href="mailto:gkrassen@nopec.org">gkrassen@nopec.org</a>
Attorney Examiners:	<a href="mailto:todonnell@dickinsonwright.com">todonnell@dickinsonwright.com</a>
<a href="mailto:greta.see@puco.ohio.gov">greta.see@puco.ohio.gov</a>	<a href="mailto:kshimp@dickinsonwright.com">kshimp@dickinsonwright.com</a>
<a href="mailto:david.hicks@puco.ohio.gov">david.hicks@puco.ohio.gov</a>	

## RAMTEEN SIOSHANSI

---

### OFFICE

Wean Hall 5120  
311 Hamerschlag Drive  
Pittsburgh, PA 15260

### CONTACT INFORMATION

Department of Engineering and Public Policy  
Carnegie Mellon University  
5000 Forbes Avenue  
Pittsburgh, PA 15213-3815  
[rsioshan@andrew.cmu.edu](mailto:rsioshan@andrew.cmu.edu)  
<https://www.cmu.edu/epp/people/faculty/ramteen-sioshansi.html>

### PROFESSIONAL EXPERIENCE

#### **Carnegie Mellon University**

Professor; Department of Engineering and Public Policy; 2023–Present  
Director; Carnegie Mellon Electricity Industry Center; 2023–Present  
Professor; Department of Electrical and Computer Engineering; 2023–Present

#### **The Ohio State University**

Adjunct Professor; Department of Integrated Systems Engineering; 2023–Present  
Professor; Department of Electrical and Computer Engineering; 2021–2022  
Director; EmPOWERment NSF Research Traineeship Program; 2019–2022  
Professor; Department of Integrated Systems Engineering; 2018–2022  
Associate Fellow; Center for Automotive Research; 2012–2022  
Associate Department Chair; Department of Integrated Systems Engineering; 2018–2021  
Faculty Affiliate Member; Center for Energy Research, Training, and Innovation; 2019–2020  
Associate Professor; Department of Integrated Systems Engineering; 2014–2018  
Assistant Professor; Department of Integrated Systems Engineering; 2008–2014

#### **Power Systems Engineering Research Center**

Adjunct Researcher; 2023–Present

#### **Technische Universität Dresden**

Distinguished Research Fellow; Lehrstuhl für Energiewirtschaft, Fakultät Wirtschaftswissenschaften; 2021–2022  
Visiting Professor; Lehrstuhl für Energiewirtschaft, Fakultät Wirtschaftswissenschaften; 2016

#### **Université Paris-Saclay**

Erasmus Mundus Visiting Professor; CentraleSupélec; 2013

#### **National Renewable Energy Laboratory**

Postdoctoral Researcher; Strategic Energy Analysis and Applications Center; 2007–2008

#### **University of California, Berkeley**

Postdoctoral Researcher; Engineering Research Center; 2007–2008  
Graduate Student Researcher; Electronics Research Laboratory; 2001–2007

**Federal Energy Regulatory Commission**

Economist; Office of Energy Markets and Reliability; 2006

EDUCATION

**University of California, Berkeley**

Ph.D., Industrial Engineering and Operations Research, Spring 2007  
Minors: Economics, Game Theory, and Probability Theory  
Dissertation Title: Design and Analysis of Electricity Markets  
Committee: Shmuel Oren (chair), Ilan Adler, Richard Gilbert

**University of California, Berkeley**

M.S., Industrial Engineering and Operations Research, Spring 2004

**University of London, London School of Economics and Political Science**

M.Sc., Econometrics and Mathematical Economics, July 2002

**University of California, Berkeley**

B.A., Economics and Applied Mathematics, Spring 2001

RESEARCH  
INTERESTS

Optimization · energy sustainability · energy resilience · energy reliability · energy economics · energy policy · market and mechanism design · game theory · decision science

HONORS AND  
AWARDS

- ❑ 2023 IEEE PES Prize Paper Award for the paper “Energy-Storage Modeling: State-of-the-Art and Future Research Directions.” Awarded by Institute of Electrical and Electronics Engineers (IEEE) Power and Energy Society (PES) for the best paper published during previous three years in an IEEE PES journal or magazine.
- ❑ 2023 Academic Lifetime Achievement Award. Awarded by Energy Systems Division of Institute of Industrial and Systems Engineers. For contributions to the broad impact on energy systems.
- ❑ 2023 IEEE PES PSOPPE Outgoing Subcommittee Chair Recognition for chairing Power System Economics Subcommittee of Institute of Electrical and Electronics Engineers Power and Energy Society Power System Operation, Planning and Economics Committee.
- ❑ 2023 IEEE PES PSOPPE Technical Committee Prize Paper Award for the paper “Energy-Storage Modeling: State-of-the-Art and Future Research Directions.” Awarded by Institute of Electrical and Electronics Engineers (IEEE) Power and Energy Society (PES) Power System Operation, Planning and Economics Committee for the best paper published during previous three years in an IEEE PES journal or magazine.
- ❑ 2023–2026 Fulbright Specialist Roster.
- ❑ 2023–2025 Sigma Xi Distinguished Lecturer.
- ❑ 2021 Institute of Electrical and Electronics Engineers Fellow Class. For contributions to energy storage in electric power systems.
- ❑ 2021 Top 2% of Scientists, Elsevier.
- ❑ 2021 Excellent Associate Editor Award, *Journal of Modern Power Systems and Clean Energy*.
- ❑ 2021 China Society for Electrical Engineering Best Paper Award (Third Place), for the paper “A Vector Autoregression Weather Model for Electricity Supply and Demand Modeling.”
- ❑ 2020 Award for Excellence in the Teaching of Operations Research. Awarded by Operations Research Division of Institute of Industrial and Systems Engineers.
- ❑ 2019 Outstanding Engineer Award. Awarded by Institute of Electrical and Electronics Engineers Power & Energy Society Columbus, Ohio Chapter.
- ❑ 2018 Distinguished Faculty Award. Awarded by graduating undergraduate seniors of Department of Integrated Systems Engineering.

- ❑ 2015 Distinguished Faculty Award. Awarded by graduating undergraduate seniors of Department of Integrated Systems Engineering.
- ❑ 2015 The Ohio State University College of Engineering Lumley Research Award. Awarded for research productivity.
- ❑ 2010 Campbell Watkins Energy Journal Best Paper award for best paper published in *The Energy Journal*, for the paper “The Value of Plug-In Hybrid Electric Vehicles as Grid Resources.”
- ❑ Best Paper Award at *4th International Conference on Sustainable Energy and Environmental Protection*, for the paper “Cost and Emissions Impacts of Plug-In Hybrid Vehicles (PHEVs) on the Electric Power Grid.”
- ❑ 2006 Outstanding Graduate Student Instructor Award. Awarded by faculty of Department of Industrial Engineering and Operations Research at University of California, Berkeley.
- ❑ 2006 Best Graduate Student Instructor Award. Awarded by undergraduate members of the University of California, Berkeley chapter of Institute of Industrial and Systems Engineers.

## PUBLICATIONS

**Peer-Reviewed Journal Articles**

1. K. Yagi and R. Sioshansi. Simplifying Capacity Planning for Electricity Systems with Hydro-electric and Renewable Generation. *Computational Management Science*, 2023. in press.
2. Y. Jiang and R. Sioshansi. What Duality Theory Tells Us About Giving Market Operators the Authority to Dispatch Energy Storage. *The Energy Journal*, 44:89–109, 2023.
3. M. A. Mansouri and R. Sioshansi. Comparing Electric Water Heaters and Batteries as Energy-Storage Resources for Energy Shifting and Frequency Regulation. *IEEE Open Access Journal of Power and Energy*, 10:164–175, 4 January 2023.
4. J. Barrera-Santana and R. Sioshansi. An Optimization Framework for Capacity Planning of Island Electricity Systems. *Renewable and Sustainable Energy Reviews*, 171:112955, January 2023.
5. W. Gu and R. Sioshansi. Market Equilibria with Energy Storage as Flexibility Resources. *IEEE Open Access Journal of Power and Energy*, 9:584–597, 1 November 2022.
6. M. A. Mansouri and R. Sioshansi. Using Interim Recommitment to Reduce the Operational-Cost Impact of Wind Uncertainty. *Journal of Modern Power Systems and Clean Energy*, 10:839–849, July 2022.
7. S. Bhattacharjee, R. Sioshansi, and H. Zareipour. Energy Storage Participation in Wholesale Markets: The Impact of State-of-Energy Management. *IEEE Open Access Journal of Power and Energy*, 9:173–182, 17 May 2022.
8. H. J. Kim, R. Sioshansi, E. Lannoye, and E. Ela. A Stochastic-Dynamic-Optimization Approach to Estimating the Capacity Value of Energy Storage. *IEEE Transactions on Power Systems*, 37:1809–1819, May 2022.
9. J. Yang, Z. Y. Dong, F. Wen, R. Sioshansi, M. R. Hesamzadeh, Q. Chen, and Y. Zhou. Enhancing Hosting Capability for Renewable Energy Generation in Active Distribution Networks. *IET Renewable Power Generation*, 16:651–654, 16 March 2022.
10. R. Sioshansi, P. Denholm, J. Arteaga, S. Awara, S. Bhattacharjee, A. Botterud, W. Cole, A. Cortés, A. de Queiroz, J. DeCarolís, Z. Ding, N. DiOrio, Y. Dvorkin, U. Helman, J. X. Johnson, I. Konstantelos, T. Mai, H. Pandžić, D. Sodano, G. Stephen, A. Svoboda, H. Zareipour, and Z. Zhang. Energy-Storage Modeling: State-of-the-Art and Future Research Directions. *IEEE Transactions on Power Systems*, 37:860–875, March 2022.
11. K. Yagi, R. Sioshansi, and P. Denholm. Using Concentrating-Solar-Power Plants as Economic Carbon-Free Capacity Resources. *Energy Conversion and Management: X*, 12:100112, December 2021.
12. K. Yagi and R. Sioshansi. Do Renewables Drive Coal-Fired Generation Out of Electricity Markets? *Current Sustainable/Renewable Energy Reports*, 8:222–232, December 2021.
13. R. G. Hunter-Rinderle and R. Sioshansi. Data-Driven Modeling of Operating Characteristics of Hydroelectric Generating Units. *Current Sustainable/Renewable Energy Reports*, 8:199–206, December 2021.



14. M. A. Mansouri and R. Sioshansi. The Effect of Natural-Gas Prices on Power-System Reliability. *Current Sustainable/Renewable Energy Reports*, 8:164–173, September 2021.
15. B. F. Chaiken, J. E. Duggan, Jr., and R. Sioshansi. Paid to Produce Absolutely Nothing? A Nash-Cournot Analysis of a Proposed Power Purchase Agreement. *Energy Policy*, 156:112371, September 2021.
16. M. Muratori, M. Alexander, D. Arent, M. Bazilian, P. Cazzola, E. M. Dede, J. Farrell, C. Gearhart, D. Greene, A. Jenn, M. Keyser, T. Lipman, S. Narumanchi, A. Pesaran, R. Sioshansi, E. Suomalainen, G. Tal, K. Walkowicz, and J. Ward. The rise of electric vehicles – 2020 status and future expectations. *Progress in Energy*, 3:022002, April 2021.
17. Y. Liu, R. G. Hunter-Rinderle, C. Luo, and R. Sioshansi. How Climate-Related Policy Affects the Economics of Electricity Generation. *Current Sustainable/Renewable Energy Reports*, 8:17–30, March 2021.
18. S. Bhattacharjee, R. Sioshansi, and H. Zareipour. Benefits of Strategically Sizing Wind-Integrated Energy Storage and Transmission. *IEEE Transactions on Power Systems*, 36:1141–1151, March 2021.
19. H. Kim, R. Sioshansi, and A. J. Conejo. Benefits of Stochastic Optimization for Scheduling Energy Storage in Wholesale Electricity Markets. *Journal of Modern Power Systems and Clean Energy*, 9:181–189, January 2021.
20. J. D. Ogland-Hand, J. M. Bielicki, B. M. Adams, E. S. Nelson, T. A. Buscheck, M. O. Saar, and R. Sioshansi. The Value of CO<sub>2</sub>-Bulk Energy Storage with Wind in Transmission-Constrained Electric Power Systems. *Energy Conversion and Management*, 228:113548, January 2021.
21. B. Zeng, H. Dong, R. Sioshansi, F. Xu, and M. Zeng. Bi-Level Robust Optimization of Electric Vehicle Charging Stations with Distributed Energy Resources. *IEEE Transactions on Industrial Applications*, 56:5836–5847, September-October 2020.
22. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei. Investment Equilibria Involving Gas-Fired Power Units in Electricity and Gas Markets. *IEEE Transactions on Power Systems*, 35:2736–2747, July 2020.
23. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei. Equilibria in Electricity and Natural Gas Markets with Strategic Offers and Bids. *IEEE Transactions on Power Systems*, 35:1956–1966, May 2020.
24. S. Varghese and R. Sioshansi. The Price is Right? How Pricing and Incentive Mechanisms in California Incentivize Building Distributed Hybrid Solar and Energy-Storage Systems. *Energy Policy*, 138:111242, March 2020.
25. S. Mousavian, A. J. Conejo, and R. Sioshansi. Equilibria in Investment and Spot Electricity Markets: A Conjectural-Variations Approach. *European Journal of Operational Research*, 281:129–140, 16 February 2020.
26. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei. Operational Equilibria of Electric and Natural Gas Systems with Limited Information Interchange. *IEEE Transactions on Power Systems*, 35:662–671, January 2020.
27. J. E. Duggan, Jr. and R. Sioshansi. Another Step Towards Equilibrium Offers in Unit Commitment Auctions with Nonconvex Costs: Multi-Firm Oligopolies. *The Energy Journal*, 40:249–281, November 2019.
28. L. Boffino, A. J. Conejo, R. Sioshansi, and G. Oggioni. A Two-Stage Stochastic Optimization Planning Framework to Deeply Decarbonize Electric Power Systems. *Energy Economics*, 84:104457, October 2019.
29. K. Yagi, R. Sioshansi, and P. Denholm. Evaluating a Concentrating Solar Power Plant as an Extended-Duration Peaking Resource Solar Energy. *Solar Energy*, 191:686–696, October 2019.
30. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei. Unit Commitment with an Enhanced Natural Gas-Flow Model. *IEEE Transactions on Power Systems*, 34:3729–3738, September 2019.
31. M. Arbabzadeh, R. Sioshansi, J. X. Johnson, and G. A. Keoleian. The role of energy storage in deep decarbonization of electricity production. *Nature Communications*, 10:1–11, 30 July 2019.



32. A. S. Siddiqui, R. Sioshansi, and A. J. Conejo. Merchant Storage Investment in a Restructured Electricity Industry. *The Energy Journal*, 40:129–163, 2019.
33. B. Zhao, A. Zlotnik, A. J. Conejo, R. Sioshansi, and A. M. Rudkevich. Shadow Price-Based Co-ordination of Natural Gas and Electric Power Systems. *IEEE Transactions on Power Systems*, 34:1942–1954, May 2019.
34. F. Wu and R. Sioshansi. A Stochastic Operational Model for Controlling Electric Vehicle Charging to Provide Frequency Regulation. *Transportation Research Part D: Transport and Environment*, 67:475–490, February 2019.
35. A. J. Conejo and R. Sioshansi. Electricity Market: A Conversation on Future Designs. *IEEE Power and Energy Magazine*, 17:18–19, January-February 2019.
36. B. Zhao, A. J. Conejo, and R. Sioshansi. Using Electrical Energy Storage to Mitigate Natural Gas-Supply Shortages. *IEEE Transactions on Power Systems*, 33:7076–7086, November 2018.
37. Y. Liu, M. C. Roberts, and R. Sioshansi. A Vector Autoregression Weather Model for Electricity Supply and Demand Modeling. *Journal of Modern Power Systems and Clean Energy*, 6:763–776, July 2018.
38. A. Shahmohammadi, R. Sioshansi, A. J. Conejo, and S. Afsharnia. Market Equilibria and Interactions Between Strategic Generation, Wind, and Storage. *Applied Energy*, 220:876–892, 15 June 2018.
39. A. J. Conejo and R. Sioshansi. Rethinking Restructured Electricity Market Design: Lessons Learned and Future Needs. *International Journal of Electrical Power and Energy Systems*, 98:520–530, June 2018.
40. B. Zhao, A. J. Conejo, and R. Sioshansi. Coordinated Expansion Planning of Natural Gas and Electric Power Systems. *IEEE Transactions on Power Systems*, 33:3064–3075, May 2018.
41. Y. Liu, R. Sioshansi, and A. J. Conejo. Hierarchical Clustering to Find Representative Operating Periods for Capacity-Expansion Modeling. *IEEE Transactions on Power Systems*, 33:3029–3039, May 2018.
42. A. Shahmohammadi, R. Sioshansi, A. J. Conejo, and S. Afsharnia. The Role of Energy Storage in Mitigating Ramping Inefficiencies Caused by Variable Renewable Generation. *Energy Conversion and Management*, 162:307–320, 15 April 2018.
43. Y. Liu, R. Sioshansi, and A. J. Conejo. Multistage Stochastic Investment Planning with Multiscale Representation of Uncertainties and Decisions. *IEEE Transactions on Power Systems*, 33:781–791, January 2018.
44. S. Chandrashekar, Y. Liu, and R. Sioshansi. Wind-Integration Benefits of Controlled Plug-In Electric Vehicle Charging. *Journal of Modern Power Systems and Clean Energy*, 5:746–756, September 2017.
45. F. Wu and R. Sioshansi. A Two-Stage Stochastic Optimization Model for Scheduling Electric Vehicle Charging Loads to Relieve Distribution-System Constraints. *Transportation Research Part B: Methodological*, 102:55–82, August 2017.
46. D. Gami, R. Sioshansi, and P. Denholm. Data Challenges in Estimating the Capacity Value of Solar Photovoltaics. *IEEE Journal of Photovoltaics*, 7:1065–1073, July 2017.
47. F. Wu and R. Sioshansi. A Stochastic Flow-Capturing Model to Optimize the Location of Fast-Charging Stations with Uncertain Electric Vehicle Flows. *Transportation Research Part D: Transport and Environment*, 53:354–376, June 2017.
48. B. Zhao, A. J. Conejo, and R. Sioshansi. Unit Commitment Under Gas-Supply Uncertainty and Gas-Price Variability. *IEEE Transactions on Power Systems*, 32:2394–2405, May 2017.
49. R. Sioshansi. Using Storage-Capacity Rights to Overcome the Cost-Recovery Hurdle for Energy Storage. *IEEE Transactions on Power Systems*, 32:2028–2040, May 2017.
50. X. Liu, M. C. Roberts, and R. Sioshansi. Spatial Effects on Hybrid Electric Vehicle Adoption. *Transportation Research Part D: Transport and Environment*, 52, Part A:85–97, May 2017.
51. R. Sioshansi. Retail Electricity Tariff and Mechanism Design to Incentivize Distributed Renewable Generation. *Energy Policy*, 95:498–508, August 2016.
52. X. Xi and R. Sioshansi. Quantifying the Energy-Storage Benefits of Controlled Plug-in Electric Vehicle Charging. *International Journal of Energy and Power*, 5:26–34, 2016.

53. X. Xi and R. Sioshansi. A Dynamic Programming Model of Energy Storage and Transformer Deployments to Relieve Distribution Constraints. *Computational Management Science*, 13:119–146, January 2016.
54. R. Sioshansi. Optimized Offers for Cascaded Hydroelectric Generators in a Market with Centralized Dispatch. *IEEE Transactions on Power Systems*, 30:773–783, March 2015.
55. C. Weiller and R. Sioshansi. The Role of Plug-In Electric Vehicles with Renewable Resources in Electricity Systems. *Revue d'économie industrielle*, 148:291–316, 2014.
56. R. Sioshansi. Pricing in Centrally Committed Markets. *Utilities Policy*, 31:143–145, December 2014.
57. X. Xi, R. Sioshansi, and V. Marano. A Stochastic Dynamic Programming Model for Co-optimization of Distributed Energy Storage. *Energy Systems*, 5:475–505, September 2014.
58. X. Xi and R. Sioshansi. Using Price-Based Signals to Control Plug-in Electric Vehicle Fleet Charging. *IEEE Transactions on Smart Grid*, 5:1451–1464, May 2014.
59. H. B. Smith, A. Pielow, A. Jayakumar, M. Muratori, B. J. Yurkovich, R. Sioshansi, A. Krishnamurthy, G. Rizzoni, and M. C. Roberts. A User-Steered Energy Generation and Consumption Multi-Model Simulation for Pricing and Policy Development. *Computing in Science and Engineering*, 16:22–33, March/April 2014.
60. R. Sioshansi, S. H. Madaeni, and P. Denholm. A Dynamic Programming Approach to Estimate the Capacity Value of Energy Storage. *IEEE Transactions on Power Systems*, 29:395–403, January 2014.
61. R. Sioshansi. When Energy Storage Reduces Social Welfare. *Energy Economics*, 41:106–116, January 2014.
62. G. De Filippo, V. Marano, and R. Sioshansi. Simulation of an Electric Transportation System at The Ohio State University. *Applied Energy*, 113:1686–1691, January 2014.
63. S. H. Madaeni and R. Sioshansi. Measuring the Benefits of Delayed Price-Responsive Demand in Reducing Wind-Uncertainty Costs. *IEEE Transactions on Power Systems*, 28:4118–4126, November 2013.
64. R. Sioshansi and P. Denholm. Benefits of Colocating Concentrating Solar Power and Wind. *IEEE Transactions on Sustainable Energy*, 4:877–885, October 2013.
65. S. H. Madaeni and R. Sioshansi. The Impacts of Stochastic Programming and Demand Response on Wind Integration. *Energy Systems*, 4:109–124, June 2013.
66. X. Xi, R. Sioshansi, and V. Marano. Simulation-optimization model for location of a public electric vehicle charging infrastructure. *Transportation Research Part D: Transport and Environment*, 22:60–69, July 2013.
67. M. Muratori, M. C. Roberts, R. Sioshansi, V. Marano, and G. Rizzoni. A highly resolved modeling technique to simulate residential power demand. *Applied Energy*, 107:465–473, July 2013.
68. S. H. Madaeni and R. Sioshansi. Using Demand Response to Improve the Emission Benefits of Wind. *IEEE Transactions on Power Systems*, 28:1385–1394, May 2013.
69. S. H. Madaeni, R. Sioshansi, and P. Denholm. Estimating the Capacity Value of Concentrating Solar Power Plants with Thermal Energy Storage: A Case Study of the Southwestern United States. *IEEE Transactions on Power Systems*, 28:1205–1215, May 2013.
70. R. Sioshansi. 'Handbook of Renewable Energy Technology,' edited by Ahmed F. Zobaa and Ramesh C. Bansal (book review). *The Energy Journal*, 34:246–249, 2013.
71. S. H. Madaeni, R. Sioshansi, and P. Denholm. Comparing Capacity Value Estimation Techniques for Photovoltaic Solar Power. *IEEE Journal of Photovoltaics*, 3:407–415, January 2013.
72. R. Sioshansi and A. Tignor. Do Centrally Committed Electricity Markets Provide Useful Price Signals? *The Energy Journal*, 33:97–118, 2012.
73. A. Pielow, R. Sioshansi, and M. C. Roberts. Modeling Short-run Electricity Demand with Long-term Growth Rates and Consumer Price Elasticity in Commercial and Industrial Sectors. *Energy*, 46:533–540, October 2012.
74. R. Sioshansi. Modeling the Impacts of Electricity Tariffs on Plug-in Hybrid Electric Vehicle Charging, Costs, and Emissions. *Operations Research*, 60:506–516, May-June 2012.

75. S. H. Madaeni, R. Sioshansi, and P. Denholm. Estimating the Capacity Value of Concentrating Solar Power Plants: A Case Study of the Southwestern United States. *IEEE Transactions on Power Systems*, 27:1116–1124, May 2012.
76. R. Sioshansi, P. Denholm, and T. Jenkin. Market and Policy Barriers to Deployment of Energy Storage. *Economics of Energy & Environmental Policy*, 1:47–63, March 2012.
77. S. H. Madaeni, R. Sioshansi, and P. Denholm. How Thermal Energy Storage Enhances the Economic Viability of Concentrating Solar Power. *Proceedings of the IEEE*, 100:335–347, February 2012.
78. R. Sioshansi. Emissions Impacts of Wind and Energy Storage in a Market Environment. *Environmental Science & Technology*, 45:10728–10735, December 2011.
79. R. Sioshansi and J. Miller. Plug-in hybrid electric vehicles can be clean and economical in dirty power systems. *Energy Policy*, 39:6151–6161, October 2011.
80. E. Drury, P. Denholm, and R. Sioshansi. The Value of Compressed Air Energy Storage in Energy and Reserve Markets. *Energy*, 36:4959–4973, August 2011.
81. R. Sioshansi and E. Nicholson. Towards Equilibrium Offers in Unit Commitment Auctions with Nonconvex Costs. *Journal of Regulatory Economics*, 40:41–61, August 2011.
82. R. Sioshansi, P. Denholm, and T. Jenkin. A Comparative Analysis of the Value of Pure and Hybrid Electricity Storage. *Energy Economics*, 33:56–66, January 2011.
83. R. Sioshansi. Increasing the Value of Wind with Energy Storage. *The Energy Journal*, 32:1–30, 2011.
84. R. Sioshansi, S. S. Oren, and R. O'Neill. Three-Part Auctions versus Self-Commitment in Day-ahead Electricity Markets. *Utilities Policy*, 18:165–173, December 2010.
85. R. Sioshansi, R. Fagiani, and V. Marano. Cost and emissions impacts of plug-in hybrid vehicles on the Ohio power system. *Energy Policy*, 38:6703–6712, November 2010.
86. R. Sioshansi and P. Denholm. The Value of Concentrating Solar Power and Thermal Energy Storage. *IEEE Transactions on Sustainable Energy*, 1:173–183, October 2010.
87. R. Sioshansi and D. Hurlbut. Market Protocols in ERCOT and Their Effect on Wind Generation. *Energy Policy*, 38:3192–3197, July 2010.
88. R. Sioshansi. Evaluating the Impacts of Real-Time Pricing on the Cost and Value of Wind Generation. *IEEE Transactions on Power Systems*, 25:741–748, April 2010.
89. R. Sioshansi and P. Denholm. The Value of Plug-In Hybrid Electric Vehicles as Grid Resources. *The Energy Journal*, 31:1–23, 2010.
90. R. Sioshansi. Welfare Impacts of Electricity Storage and the Implications of Ownership Structure. *The Energy Journal*, 31:173–198, 2010.
91. P. Denholm and R. Sioshansi. The value of compressed air energy storage with wind in transmission-constrained electric power systems. *Energy Policy*, 37:3149–3158, August 2009.
92. R. Sioshansi and W. Short. Evaluating the Impacts of Real-Time Pricing on the Usage of Wind Generation. *IEEE Transactions on Power Systems*, 24:516–524, May 2009.
93. R. Sioshansi, P. Denholm, T. Jenkin, and J. Weiss. Estimating the Value of Electricity Storage in PJM: Arbitrage and Some Welfare Effects. *Energy Economics*, 31:269–277, March 2009.
94. R. Sioshansi and P. Denholm. Emissions Impacts and Benefits of Plug-in Hybrid Electric Vehicles and Vehicle to Grid Services. *Environmental Science & Technology*, 43:1199–1204, February 2009.
95. R. Sioshansi, R. P. O'Neill, and S. S. Oren. Economic Consequences of Alternative Solution Methods for Centralized Unit Commitment in Day-Ahead Electricity Markets. *IEEE Transactions on Power Systems*, 23:344–352, May 2008.
96. R. Sioshansi and S. S. Oren. How good are supply function equilibrium models: an empirical analysis of the ERCOT balancing market. *Journal of Regulatory Economics*, 31:1–35, February 2007.
97. S. S. Oren and R. Sioshansi. Joint Energy and Reserve Auction with Opportunity Cost Payments for Reserves. *International Energy Journal*, 6:35–44, June 2005.

### Book Chapters

1. R. Sioshansi, L. F. Cabeza, and J. Yan. Introduction: Energy Storage Technologies. In L. F. Cabeza, R. Sioshansi, and J. Yan, editors, *Handbook of Clean Energy Systems*, volume 5, Energy Storage, chapter 1, pages 2385–2388. John Wiley & Sons Ltd, West Sussex, United Kingdom, June 2015.
2. R. Sioshansi, S. S. Oren, and R. P. O'Neill. The Cost of Anarchy in Self-Commitment Based Electricity Markets. In F. P. Sioshansi, editor, *Competitive Electricity Markets: Design, Implementation, Performance*, pages 245–266. Elsevier, 2008.

### Books

1. R. Sioshansi and A. J. Conejo. *Optimization in Engineering: Models and Algorithms*, volume 120 of *Springer Optimization and Its Applications*. Springer Nature, Gewerbestraße 11, 6330 Cham, Switzerland, 2017.
2. L. F. Cabeza, R. Sioshansi, and J. Yan, editors. *Handbook of Clean Energy Systems*, volume 5, Energy Storage. John Wiley & Sons Ltd, West Sussex, United Kingdom, June 2015.

### Under Review/In Preparation

1. R. Hunter-Rinderle, M. Y. Fong, B. Yang, H. Xian, and R. Sioshansi. Using In-Home Energy Storage to Improve the Resilience of Residential Electricity Supply.
2. T. Levin, J. Bistline, R. Sioshansi, W. J. Cole, J. Kwon, S. P. Burger, G. W. Crabtree, J. D. Jenkins, R. O'Neil, M. Korpøas, S. Wogrin, B. F. Hobbs, R. Rosner, V. Srinivasan, A. Botterud. Energy Storage Solutions to Decarbonize Electricity through Enhanced Capacity Expansion Modeling.
3. K. Yagi and R. Sioshansi. Nested Benders's Decomposition of Capacity-Planning Problems for Electricity Systems with Hydroelectric and Renewable Generation.
4. Y. Jiang and R. Sioshansi. A Computationally Efficient Approach to Optimizing Offers in Centrally Committed Electricity Markets.
5. K. Yagi and R. Sioshansi. How Market Power Can Suppress the Effect of Carbon Policies in Wholesale Electricity Markets.
6. S. Awara, M. Lynch, S. Pfenninger, K. Schell, R. Sioshansi, I. Staffell, N. Samaan, S. H. Tindemans, A. L. Wilson, S. Zachary, H. Zareipour, and C. J. Dent. Capacity Value of Solar Power and Other Variable Generation.

### PRESENTATIONS

1. R. Sioshansi, "Comparing Profit-Maximizing Offer Behavior of Generators in Centrally Versus Self-Committed Wholesale Electricity Markets," *INFORMS Annual Meeting*. October 15-18, 2023, Phoenix, AZ.
2. R. Sioshansi, "Myths and Models for Integrating Energy-Storage Resources into Wholesale Electricity Markets," invited super-session speaker in *IEEE Power & Energy Society General Meeting 2023*. July 16-20, 2023, Orlando, FL.
3. R. Sioshansi and K. Yagi, "Simplifying Capacity Planning for Power Systems with Hydroelectric and Renewable Resources," *23rd Conference of the International Federation of Operational Research Societies*. July 10-14, 2023, Santiago, Chile.
4. R. Sioshansi, "Co-Ordination of Electricity and Natural-Gas Systems," seminar in Department of Engineering and Public Policy, Carnegie Mellon University. April 11, 2023, Pittsburgh, PA.
5. R. Sioshansi, "Investment Planning in Electricity Systems with High Hydroelectric Penetrations," *Planning Under Uncertainty in Energy Markets, Winter School - Geilo 2023*. March 26-31, 2023, Geilo, Norway.
6. R. Sioshansi, "Retail Electricity Pricing," *Workshop on "Future Energy Market Design"*. March 22, 2023, Trondheim, Norway.

7. R. Sioshansi, "Techno-Economics of Decarbonizing Electricity Systems," invited seminar in Institutes of Energy and the Environment, The Pennsylvania State University. February 22, 2023, University Park, PA.
8. R. Sioshansi, "Teaching Statements," invited panelist in Future Faculty Fellows Program, Institute of Industrial and Systems Engineers. December 9, 2022.
9. R. Sioshansi, "Energy Storage: How Much, for How Long, and Where?" invited panelist in EIC-ERC Workshop on Energy Storage, November 18, 2022.
10. R. Sioshansi, "Techno-Economics of Decarbonizing Electricity Systems," invited seminar in Department of Earth and Environmental Engineering, Columbia University in the City of New York. November 10, 2022, New York, NY.
11. R. Sioshansi, "Techno-Economics of Decarbonizing Electricity Systems," invited seminar in Department of Industrial Engineering, University of Houston. October 28, 2022, Houston, TX.
12. R. Sioshansi, "Assessing the Resource-Adequacy Contribution of Energy Storage," *Carnegie Mellon Electricity Industry Center Advisory Committee Meeting*. October 19-20, 2022, Pittsburgh, PA.
13. E. Duggan, Jr. and R. Sioshansi, "When a Power Purchase Agreement Reduces Social Welfare," *INFORMS Annual Meeting*. October 16-19, 2022, Indianapolis, IN.
14. R. Sioshansi, "Technical Pathways to and Economic Issues with Decarbonizing Electricity Systems," invited keynote speaker in *16th International Conference on Energy Economics and Technology*. September 30, 2022, Dresden, Germany.
15. R. Sioshansi and K. Yagi, "Simplifying Capacity Planning for Power Systems with Hydroelectric and Renewable Resources," *Second International Workshop on "Variational Analysis and Applications for Modelling of Energy Exchange"*. May 9-10, 2022, Brescia, Italy.
16. R. Sioshansi, "A Dynamic-Programming Approach to Assessing the Reliability Contribution of Energy Storage to Electricity Systems," invited seminar in Ralph O'Connor Sustainable Energy Institute, Johns Hopkins University. April 4, 2022, Baltimore, MD.
17. R. Sioshansi, "Assessing the Resource-Adequacy Contribution of Energy Storage," invited seminar in Battery Storage and Grid Integration Program, Australian National University. March 29, 2022.
18. R. Sioshansi, "A Dynamic-Programming Approach to Assessing the Reliability Contribution of Energy Storage to Electricity Systems," invited seminar in Carnegie Mellon Electricity Industry Center, Carnegie Mellon University. March 25, 2022, Pittsburgh, PA.
19. R. Sioshansi, "Assessing the Resource-Adequacy Contribution of Energy Storage," invited seminar in Fakultät Wirtschaftswissenschaften, Technische Universität Dresden. March 16, 2022, Dresden, Germany.
20. R. Sioshansi, "Assessing the Resource-Adequacy Contribution of Energy Storage," invited seminar in Department of Industrial and Management Engineering, Pohang University of Science and Technology. March 4, 2022.
21. R. Sioshansi, "Using Concentrating Solar Power/Solar Thermal Plants as Capacity Resources," *Winter School 2022: Planning Under Uncertainty in Energy Markets*. February 28-March 4, 2022, Oppdal, Norway.
22. R. Sioshansi, "Future Directions for Industrial Engineering," invited seminar in Department of Industrial Engineering, University of Pittsburgh. February 18, 2022, Pittsburgh, PA.
23. R. Sioshansi, "A Dynamic-Programming Approach to Assessing the Resource-Adequacy Contribution of Energy Storage," invited seminar in Department of Industrial Engineering, University of Houston. February 4, 2022.
24. R. Sioshansi, "A Dynamic-Programming Approach to Assessing the Resource-Adequacy Contribution of Energy Storage," invited seminar in Lane Department of Computer Science and Electrical Engineering, West Virginia University. December 10, 2021, Morgantown, WV.
25. R. Sioshansi, "Resource-Adequacy Contribution of Energy Storage," invited seminar in Department of Industrial and Manufacturing Systems Engineering, Iowa State University of Science and Technology. December 8, 2021, Ames, IA.



26. R. Sioshansi, "Resource-Adequacy Assessment of Energy Storage," *Trans-Atlantic Cooperation on Energy Market Modeling*. November 8-12, 2021, Espoo, Finland.
27. K. Yagi, R. Sioshansi, and P. Denholm, "Using Concentrating Solar Power Plants as Capacity Resources," *INFORMS Annual Meeting*. October 24-27, 2021, Anaheim, CA.
28. S. Bhattacharjee, R. Sioshansi, and H. Zareipour, "Benefits of strategically sizing wind-integrated energy storage and transmission," *INFORMS Annual Meeting*. October 24-27, 2021, Anaheim, CA.
29. R. Sioshansi, "Approaches to Electricity Demand Response," invited seminar for Isfahan Chamber of Commerce. October 13, 2021.
30. R. Sioshansi, "Future Directions for Industrial Engineering," invited seminar in School of Industrial Engineering, Purdue University. September 24, 2021, West Lafayette, IN.
31. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar at IFP School. September 8, 2021, Rueil-Malmaison, France.
32. S. Varghese and R. Sioshansi, "The Price is Right? Incentives for Deployment and Use of Distributed Energy Resources," *2021 IEEE PES General Meeting*. July 26-29, 2021.
33. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Carnegie Mellon Electricity Industry Center, Carnegie Mellon University. April 28, 2021.
34. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Department of Industrial & Systems Engineering, Rutgers University–New Brunswick. April 20, 2021.
35. R. Sioshansi, "Technical Pathways to and Economic Issues with Decarbonizing Electricity Production," IEEE Power & Energy Society Region 2 Webinar. April 7, 2021.
36. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Department of Mechanical & Industrial Engineering, University of Toronto. March 17, 2021.
37. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Edward P. Fitts Department of Industrial and Systems Engineering, North Carolina State University. February 12, 2021.
38. R. Sioshansi, "How Electricity Systems Work and the Need for Energy Storage," *Symposium on Energy Transition and Decarbonization*, Sustainability Institute, The Ohio State University. February 10-11, 2021.
39. K. Yagi and R. Sioshansi, "Analyzing Wholesale Electricity Market Using Supply Function Equilibrium Model," *37th Conference on Energy, Economy, and Environment*. January 26-27, 2021.
40. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Department of Civil and Systems Engineering, Johns Hopkins University. January 21, 2021.
41. R. Sioshansi, "Market and Regulatory Design for Energy Storage," invited keynote speaker in *2020 International Conference on Smart Grids and Energy Systems*. November 23-26, 2020, Perth, Australia.
42. S. Varghese and R. Sioshansi, "Optimising hybrid PV and ES systems with capacity payments," *INFORMS Annual Meeting*. November 7-13, 2020.
43. H. J. Kim, R. Sioshansi, and A. J. Conejo, "Energy Storage Scheduling In Day-ahead And Real-time Wholesale Electricity Markets Using Stochastic Optimization," *INFORMS Annual Meeting*. November 7-13, 2020.
44. K. Yagi and R. Sioshansi, "Impacts Of Decarbonization Policy On Price Formation In Wholesale Electricity Markets," *INFORMS Annual Meeting*. November 7-13, 2020.
45. K. Yagi and R. Sioshansi, "Solving Capacity-Expansion Problems For Power Systems With Hydroelectric And Renewable Resources Using Representative Operating Days And Nested Benders's Decomposition," *INFORMS Annual Meeting*. November 7-13, 2020.
46. R. Sioshansi, "Teaching Panel Discussion," *IISE Annual Conference & Expo 2020*. November 1-3, 2020.

47. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited webinar, University of Edinburgh. June 25, 2020, Edinburgh, Scotland, United Kingdom.
48. R. Sioshansi, "Energy Storage Subcommittee Update," *Electricity Advisory Committee Meeting*. May 28-29, 2020.
49. R. Sioshansi, "Energy Storage Subcommittee Update," *Electricity Advisory Committee Meeting*. February 26-27, 2020, Arlington, VA.
50. R. Sioshansi, "Energy Market Design," invited discussion before the staff of Australian Energy Market Commission. December 18, 2019, Sydney, Australia.
51. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Centre for Energy and Environmental Markets and School of Photovoltaic and Renewable Energy Engineering, University of New South Wales. December 18, 2019, Sydney, Australia.
52. R. Sioshansi, "What are the Technical Pathways to and Economic Issues with Decarbonizing Electricity Production?" invited keynote speaker in *2019 9th International Conference on Power and Energy Systems*. December 10-12, 2019, Perth, Australia.
53. R. Sioshansi, "Challenges and Opportunities for Solar Deployment and Integration," plenary speaker in *2019 Asia-Pacific Solar Research Conference*. December 3-5, 2019, Canberra, Australia.
54. R. Sioshansi, "Managing the Seams Between Electromobility and Power Systems," invited keynote speaker in *Smart Mobility and Intelligent Vehicles 2019*. November 12, 2019, Paris, France.
55. R. Sioshansi, "Commentary on Commodities," panelist in *Distribution Network Economics Workshop*. November 7-8, 2019, Boston, MA.
56. R. Sioshansi, "Co-ordinating Operations of Electricity and Natural Gas Systems," invited seminar, *Laboratory for Information and Decision Systems, Massachusetts Institute of Technology*. November 7, 2019, Cambridge, MA.
57. J. D. Ogland-Hand, J. M. Bielicki, E. S. Nelson, B. M. Adams, T. A. Bushcheck, M. O. Saar, and R. Sioshansi, "Using Geologically Stored CO<sub>2</sub> and Geothermal Energy to Decarbonize the Electricity System," *INFORMS Annual Meeting*. October 20-23, 2019, Seattle, WA.
58. R. Sioshansi and A. J. Conejo, "Temporal and Spatial Decomposition of Power System Planning Problems," *INFORMS Annual Meeting*. October 20-23, 2019, Seattle, WA.
59. R. Sioshansi and A. J. Conejo, "Market Equilibria and Interactions Between Strategic Generation, Wind, and Storage," *INFORMS Annual Meeting*. October 20-23, 2019, Seattle, WA.
60. A. J. Conejo, S. Chen, and R. Sioshansi, "Equilibria in Electricity and Natural Gas Markets with Strategic Offers and Bids," *INFORMS Annual Meeting*. October 20-23, 2019, Seattle, WA.
61. R. Sioshansi, "Energy Storage Subcommittee Update," *Electricity Advisory Committee Meeting*. October, 16-17, 2019, Arlington, VA.
62. R. Sioshansi, "2020 Biennial Energy Storage Review," invited plenary speaker at *Department of Energy Office of Electricity Energy Storage Peer Review 2019*. September 23-26, 2019, Albuquerque, NM.
63. R. Sioshansi, "A Decarbonized Electricity Grid of the Future: Separating Fact From Fiction," invited breakout speaker at *2019 Citizens' Climate Lobby Great Lakes Regional Conference*. September 20-22, 2019, South Bend, IN.
64. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Department of Industrial and Systems Engineering, Lehigh University. September 17, 2019, Bethlehem, PA.
65. R. Sioshansi, "Who Should Operate Energy Storage in Restructured Electricity Markets?" *2019 IEEE PES General Meeting*. August 4-8, 2019, Atlanta, GA.
66. A. J. Conejo and R. Sioshansi, "A Financial Framework for Distribution Systems with Increasing Behind-the-Meter Resources," *2019 IEEE PES General Meeting*. August 4-8, 2019, Atlanta, GA.

67. K. Yagi, R. Sioshansi, and A. J. Conejo, "Temporal and Spatial Decomposition of Power System Planning Problems," *2019 International Conference on Stochastic Programming*. July 29-August 2, 2019, Trondheim, Norway.
68. R. Sioshansi, "Co-ordinating Operations of Electricity and Natural Gas Systems," invited seminar, North China Electric Power University. July 9, 2019, Beijing, People's Republic of China.
69. R. Sioshansi, "Using Storage-Capacity Rights to Overcome the Cost-Recovery Hurdle for Energy Storage," *42nd Annual IAAE International Conference*. May 29-June 1, 2019, Montréal, Quebec, Canada.
70. R. Sioshansi, "Technical Pathways to and Economic Issues with Decarbonizing Electricity Production," *IISE Annual Conference and Expo 2019*. May 18-21, 2019, Orlando, FL.
71. R. Sioshansi, "Decarbonization, Energy Storage, and Materials Research Needs," *2019 OSU Materials Week*. May 7-9, 2019, Columbus, OH.
72. A. Siddiqui, R. Sioshansi, and A. J. Conejo, "Merchant Storage Investment in a Restructured Electricity Industry," *Workshop on Electricity Systems of the Future: Incentives, Regulation and Analysis for Efficient Investment*. March 18-22, 2019, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, Cambridge, United Kingdom.
73. R. Sioshansi, "Energy Storage Subcommittee Update," *Electricity Advisory Committee Meeting*. March 13-14, 2019, Arlington, VA.
74. R. Sioshansi, "Coordinating Operations of Electricity and Natural Gas Systems," *Multi-Energy Systems Workshop*. March 11-12, 2019, Eidgenössische Technische Hochschule Zürich, Zürich, Switzerland.
75. R. Sioshansi, "Generation Investment, Price Formation, and Cost Recovery," *Winter School 2019*. March 3-8, 2019, Kvitfjell, Norway.
76. M. Arbabzadeh, R. Sioshansi, J. X. Johnson, and G. A. Keoleian, "The Role of Energy Storage in Deep Decarbonization of Electricity Production," invited seminar in Wind Energy Fellows Program, University of Massachusetts Amherst. December 6, 2018, Amherst, MA.
77. Y. Liu, R. Sioshansi, and A. J. Conejo, "How Climate-Related Policy Affects the Economics of Generation-Capacity Investment," *FSR Climate Annual Conference*. November 26-27, 2018, Florence, Italy.
78. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei, "Unit Commitment Of Integrated Electric And Gas Systems With An Enhanced SOC Gas Flow Model," *INFORMS Annual Meeting*. November 4-7, 2018, Phoenix, AZ.
79. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei, "Equilibria In Electricity And Gas Systems Under Limited Information Interchange," *INFORMS Annual Meeting*. November 4-7, 2018, Phoenix, AZ.
80. J. D. Ogland-Hand, J. M. Bielicki, E. S. Nelson, B. M. Adams, T. A. Bushcheck, M. O. Saar, and R. Sioshansi, "Optimizing the Use of CO<sub>2</sub>-Bulk Energy Storage for Transmission Deferral," *INFORMS Annual Meeting*. November 4-7, 2018, Phoenix, AZ.
81. R. Sioshansi "Modeling and Decomposing Multi-Stage and Multi-Scale Stochastic Investment Problems," invited seminar to *IEEE Columbus PES Chapter*. October 24, 2018, Columbus, OH.
82. R. Sioshansi, Y. Liu, L. Boffino, A. J. Conejo, G. Oggioni, "What are the Technical Pathways to and Economic Issues with Decarbonizing Electricity Production?" *3rd Japanese-German Workshop on Renewable Energies*. October 17-19, 2018, Tokyo, Japan.
83. R. Sioshansi, "Can We Get Market and Regulatory Designs 'Right' for Energy Storage?" invited seminar in Operations Research and Industrial Engineering Program, University of Texas at Austin. October 5, 2018, Austin, TX.
84. R. Sioshansi, "How Much Does Energy Storage Contribute to Power System Reliability?" invited seminar at Sandia National Laboratories. September 28, 2018, Albuquerque, NM.
85. R. Sioshansi, "Electricity Advisory Committee: Energy Storage Subcommittee," invited plenary speaker at *2018 Department of Energy Office of Electricity Energy Storage Storage Peer Review*. September 24-27, 2018, Santa Fe, NM.



86. L. Boffino, A. J. Conejo, R. Sioshansi, and G. Oggioni, "A Two-Stage Stochastic Optimization Framework for Planning Deeply Decarbonized Electric Power Systems," *42nd Annual Meeting of the Italian Association for Mathematics Applied to Economic and Social Sciences*. September 13-15, 2018, Naples, Italy.
87. A. J. Conejo and R. Sioshansi. "Revisiting Electricity Market Design: What the Past 30 Years Taught Us and What Electricity Systems of the Future Need," *IEEE Power & Energy Society General Meeting 2018*. August 5-9, 2018, Portland, OR.
88. H. Kim, R. Sioshansi, E. Ela, E. Lannoye, and A. J. Conejo. "How Market-Design Choices Affect the Reliability Contribution of Energy Storage," *IEEE Power & Energy Society General Meeting 2018*. August 5-9, 2018, Portland, OR.
89. A. J. Conejo and R. Sioshansi, "Rethinking restructured electricity market design: Lessons learned and future needs," invited brown bag seminar at Deutsches Institut für Wirtschaftsforschung. July 19, 2018, Berlin, Germany.
90. R. Sioshansi, "Energy Storage Subcommittee Update," *Electricity Advisory Committee Meeting*. July 9-10, 2018, Arlington, VA.
91. A. J. Conejo and R. Sioshansi, "A Market Design Integrating The View Of Stochastic Producers," invited seminar at Red Eléctrica de España. July 4, 2018, Madrid, Spain.
92. M. Arbabzadeh, R. Sioshansi, J. X. Johnson, and G. A. Keoleian, "Energy storage for time-shifting and greenhouse gas reductions under varying renewable penetrations—A CAISO case study," *2018 International Symposium on Sustainable Systems & Technology*. June 26-28, 2018, Buffalo, NY.
93. S. Chen, A. J. Conejo, R. Sioshansi, and Z. Wei, "Unit Commitment of Integrated Electric and Gas Systems with an Enhanced Second-Order Cone Gas Flow Model," *Technical Conference: Increasing Real-Time and Day-Ahead Market Efficiency and Enhancing Resilience through Improved Software*. June 26-28, 2018, Washington, DC.
94. H. Kim, R. Sioshansi, E. Ela, E. Lannoye, and A. J. Conejo. "Contribution of Energy Storage to Resource Adequacy" *2018 International Conference on Probabilistic Methods Applied to Power Systems*. June 24-28, 2018, Boise, ID.
95. R. Sioshansi. "Can We Get Market Design and Regulation Correct for Energy Storage?" invited keynote speaker in *Workshop on 'Commodities and Energy Market Organization in the Energy Transition Context'*. June 18-19, 2018, Rueil-Malmaison, France.
96. A. Siddiqui, R. Sioshansi, and A. J. Conejo, "Merchant Storage Investment in a Restructured Electricity Industry," *41st Annual IAEE International Conference*. June 10-13, 2018, Groningen, Netherlands.
97. R. Sioshansi, "Using the Flexibility of Energy Storage for Renewable Integration and Power System Operations," invited seminar at North China Electric Power University. May 10, 2018, Beijing, People's Republic of China.
98. R. Sioshansi, "Estimating the Capacity Value of Energy-Limited Storage in Wholesale Energy Markets," *EPRI ISO/RTO Webcast*. March 30, 2018.
99. R. Sioshansi, "EAC Energy Storage Subcommittee: Update," *Electricity Advisory Committee Meeting*. February 20-21, 2018, Arlington, VA.
100. J. D. Ogland-Hand, J. M. Bielicki, E. S. Nelson, B. M. Adams, T. A. Buscheck, R. Sioshansi, "The Value of Using Sedimentary Basin Geothermal Resources for Bulk Energy Storage in Transmission Constrained Electricity Systems," *Stanford Geothermal Workshop*. February 12-14, 2018, Palo Alto, CA.
101. R. Sioshansi, "Using Sequential Sampling to Solve a Two-Stage Stochastic Program for Scheduling Electric Vehicle Charging," *Winter School Workshop 2018 on Stochastic Programming in Energy*. February 11-14, 2018, Geilo, Norway.
102. R. Sioshansi, "Using Distributed Energy Resources for Multiple Applications Via Capacity Rights," *Distributed Energy Workshop*. January 11-13, 2018, University of Auckland, Auckland, New Zealand.

103. R. Sioshansi, "Using Energy Storage as a Source of Flexibility for Renewable Integration and Power System Operations," invited panelist at *VII Jornadas de Economía de la Energía*. November 9, 2017, Santiago, Chile.
104. R. Sioshansi, "Regulatory, Rate, and Market Design for Energy Storage," invited seminar at Groupe d'études et de recherche en analyse des décisions (GERAD), École Polytechnique de Montréal. November 2, 2017, Montréal, Quebec, Canada.
105. A. Siddiqui, R. Sioshansi, and A. J. Conejo, "Merchant Storage Investment In A Deregulated Electricity Industry," *INFORMS Annual Meeting*. October 22-25, 2017, Houston, TX.
106. A. J. Conejo and R. Sioshansi, "A Market Design Integrating The View Of Stochastic Producers," *INFORMS Annual Meeting*. October 22-25, 2017, Houston, TX.
107. R. Sioshansi, "Managing the Transition of Electric Power Systems to a Decarbonized Future," invited seminar at The Ohio State University Environmental Sciences Graduate Program. October 20, 2017, Columbus, OH.
108. H. Bahtiyar and R. Sioshansi, "The Effects of Policy Changes on Households' Behavior About Electric Vehicles and Energy Related Appliances," *2nd IAEE Eurasian Conference*. October 12-14, 2017, Zagreb, Croatia.
109. R. Sioshansi, "Energy Storage: An Introduction to Technologies, Real-World Use Cases, and Regulatory Developments," *Saudi Electricity Forum*. October 10-12, 2017, Riyadh, Saudi Arabia.
110. R. Sioshansi, "Managing Loads and Operation of Electric Power Systems," *Saudi Electricity Forum*. October 10-12, 2017, Riyadh, Saudi Arabia.
111. R. Sioshansi and A. J. Conejo, "The State of Restructured Electricity Market Design and the Need for Further Reform," *International Conference on Energy Revolution and Electricity Innovation*. September 21-22, 2017, Beijing, People's Republic of China.
112. R. Sioshansi, "EAC Energy Storage Subcommittee: Update," *Electricity Advisory Committee Meeting*. September 13-14, 2017, Arlington, VA.
113. R. Sioshansi, "An Overview of the Challenges of Today's Electricity Markets in the United States and European Union," invited joint workshop organized by Directorate-General of Joint Research Centre and Directorate-General of Energy of European Union on *Redesigning Restructured Electricity Markets: Accommodating Variable Renewables, Distributed Energy Resources, and System Security*. July 24, 2017, Brussels, Belgium.
114. R. Sioshansi, "Non-technology Barriers to the Deployment of Distributed Energy Storage," *IEEE Power & Energy Society General Meeting 2017*. July 16-20, 2017, Chicago, IL.
115. R. Sioshansi, "Economic, Regulatory, and Modeling Issues with Energy Storage," invited lecturer for tutorial on Energy Storage: An Introduction to Technologies, Applications and Best Practices at *IEEE Power & Energy Society General Meeting 2017*. July 16-20, 2017, Chicago, IL.
116. B. Zhao, A. J. Conejo, and R. Sioshansi, "Coordinated Capacity-Expansion Planning of Natural Gas and Electric Power Systems," invited seminar at Nanyang Technological University School of Electrical and Electronic Engineering. June 22, 2017, Singapore.
117. R. Sioshansi and H. B. Gooi, "Policy Framework for Energy Storage Systems in Singapore," invited seminar at Energy Market Authority. June 21, 2017, Singapore.
118. R. Sioshansi, "Energy Security and Resilience Benefits of Electric Energy Storage," plenary panelist at *40th Annual IAEE International Conference*. June 18-21, 2017, Singapore.
119. R. Sioshansi and A. J. Conejo, "Revisiting Restructured Electricity Market Design: What the Past 30 Years Taught Us and What Electricity Systems of the Future Need," invited keynote speaker in *14th International Conference on the European Energy Market*. June 6-9, 2017, Dresden, Germany.
120. R. Sioshansi, "Using Storage-Capacity Rights to Overcome the Cost-Recovery Hurdle for Energy Storage," *Eleventh Conference on The Economics of Energy and Climate Change*. June 6-7, 2017, Toulouse, France.

121. R. Sioshansi, "'Optimal network tariffs for renewable electricity production,' by Thomas P. Tangerås and Frank Wolak," invited discussant, *Eleventh Conference on The Economics of Energy and Climate Change*. June 6-7, 2017, Toulouse, France.
122. F. Wu, H. Nagarajan, A. Zlotnik, R. Sioshansi, and A. M. Rudkevich, "Adaptive Convex Relaxations for Gas Pipeline Network Optimization," *American Control Conference*. May 24-26, 2017, Seattle, WA.
123. R. Sioshansi, "PowerForward: Economic and Regulatory Innovation to Achieve the Power System of the Future," invited address to *Public Utilities Commission of Ohio*. April 18-20, 2017, Columbus, OH.
124. R. Sioshansi, "Non-technology Barriers to the Deployment of Distributed Energy Storage," invited seminar in University of Michigan series on *Emerging Topics in Sustainable Electric Power Systems*. February 2, 2017, Ann Arbor, MI.
125. R. Sioshansi, "Analyzing the Effects of Policy Levers on Energy Pricing and Investment with Stochastic Capacity Expansion Models," *Winter School 2017 in Stochastic Programming with Applications in Energy, Logistics, and Finance*. January 15-21, 2017, Passo del Tonale, Italy.
126. R. Sioshansi and A. J. Conejo, "Electricity Grid of the Future," *Presentation to Management of AEP Ohio*. January 12, 2017, Columbus, OH.
127. Y. Liu and R. Sioshansi, "Electricity Capacity Expansion and Cost Recovery With Renewables," *INFORMS Annual Meeting*. November 13-16, 2016, Nashville, TN.
128. A. J. Conejo, B. Zhao, and R. Sioshansi, "Unit Commitment Under Gas-Supply Uncertainty and Gas-Price Variability," *INFORMS Annual Meeting*. November 13-16, 2016, Nashville, TN.
129. R. Sioshansi, "Economic Regulation Issues Regarding VtG in the United States," *Expert Workshop: V2X User Perception, Business Models, and Regulatory Framework*. October 26-28, 2016, Paris, France.
130. C. J. Dent, R. Sioshansi, J. Reinhart, A. L. Wilson, S. Zachary, M. Lynch, C. Bothwell, and C. Steele, "Capacity Value of Solar Power: Report of the IEEE PES Task Force on Capacity Value of Solar Power," *2016 International Conference on Probabilistic Methods Applied to Power Systems*. October 16-20, 2016, Beijing, People's Republic of China.
131. R. Sioshansi, "Using Storage-Capacity Rights to Overcome the Cost-Recovery Hurdle for Energy Storage," invited seminar at Nanyang Technological University School of Electrical and Electronic Engineering. October 13, 2016, Singapore.
132. R. Sioshansi, "Storage Assessment and Five-Year Plan: Update and EAC Approval," *Electricity Advisory Committee Meeting*. September 28-29, 2016, Arlington, VA.
133. R. Sioshansi, "Economic, Regulatory, and Modeling Issues with Energy Storage," invited lecturer for tutorial on Energy Storage: An Introduction to Technologies, Applications and Best Practices at *IEEE Power & Energy Society General Meeting 2016*. July 17-21, 2016, Boston, MA.
134. R. Sioshansi, "Using Storage-Capacity Rights to Overcome the Cost-Recovery Hurdle for Energy Storage," invited seminar in Fakultät Wirtschaftswissenschaften, Technische Universität Dresden. July 12, 2016, Dresden, Germany.
135. R. Sioshansi, "Biennial Storage Program Assessment: Update and Work Plan," *Electricity Advisory Committee Meeting*. June 1-2, 2016, Arlington, VA.
136. R. Sioshansi, "Energy Storage Subcommittee Activities and Plans," *Electricity Advisory Committee Meeting*. June 1-2, 2016, Arlington, VA.
137. A. J. Conejo and R. Sioshansi, "A market design integrating the view of stochastic producers," invited keynote speaker in Third General Consortium Meeting, Centre for IT-Intelligent Energy Systems in Cities, Danmarks Tekniske Universitet. May 25, 2016, Lyngby, Denmark.
138. R. Sioshansi, "Planning, Operational, and Business Models for Public Electric Vehicle Charging Stations," *2016 International Conference on Global Energy Interconnection*. March 30-31, 2016, Beijing, People's Republic of China.
139. R. Sioshansi, "Biennial Storage Program Assessment: Update and Work Plan," *Electricity Advisory Committee Meeting*. March 17-18, 2016, Arlington, VA.

140. R. Sioshansi, "Modeling and Decomposing Multi-Stage and Multi-Scale Stochastic Investment Problems," *Winter School 2016 in Stochastic Programming and Energy*. March 13-17, 2016, Oppdal, Norway.
141. R. Sioshansi, "Understanding the Economic and Environmental Impacts of Energy Storage: The Role of Market Structure," invited seminar in Management Science and Engineering Department and Precourt Institute for Energy, Stanford University. February 18, 2016, Palo Alto, CA.
142. R. Sioshansi, "Vehicle-Grid System Integration Policies," *Review of DOE CERC-CVC 1.0 Programs*. January 20, 2016, Columbus, OH.
143. R. Sioshansi, "Modeling and Decomposing Multi-Stage and Multi-Scale Stochastic Optimization Problems," invited tutorial at workshop on Optimization and Equilibrium in Energy Economics, Institute for Pure and Applied Mathematics, University of California, Los Angeles. January 11-15, 2016, Los Angeles, CA.
144. Y. Liu and R. Sioshansi, "A Progressive Hedging Approach to Multistage and Multiscale Stochastic Generation and Transmission Investment," invited seminar at Groupe d'études et de recherche en analyse des décisions (GERAD), École Polytechnique de Montréal. November 26, 2015, Montréal, Quebec, Canada.
145. F. Wu and R. Sioshansi, "Public Electric Vehicle Fast Charging Station Management Strategies," *INFORMS Annual Meeting*. November 1-4, 2015, Philadelphia, PA.
146. Y. Liu and R. Sioshansi, "Stochastic Generation and Transmission Investment Planning Model," *INFORMS Annual Meeting*. November 1-4, 2015, Philadelphia, PA.
147. Y. Liu and R. Sioshansi, "A Progressive Hedging Approach to Multistage Stochastic Generation and Transmission Investment Planning," *9th Annual Trans-Atlantic INFRADAY Conference*. October 30, 2015, Washington, DC.
148. R. Sioshansi and F. Wu, "Vehicle-Grid System Integration Policies: Electric Vehicle Charging Station Placement and Management," *2015 US-China Clean Energy Research Center Annual Meeting*. August 17-18, 2015, Beijing, People's Republic of China.
149. R. Sioshansi, "Big' Problems in Energy Systems," invited talk at *JPMorgan Chase & Company Analytics Lunch and Learn Series*. July 13, 2015, Columbus, OH.
150. R. Sioshansi, "Inclusion of solar generation in adequacy studies: a survey by the PES 'Capacity Value of Solar Power' Task Force," *2015 IEEE Power and Energy Society General Meeting*. July 26-30, 2015, Denver, CO.
151. R. Sioshansi, "Needs for Improved Modeling of Storage and Greater Consistency in Methods and Metrics," *2015 IEEE Power and Energy Society General Meeting*. July 26-30, 2015, Denver, CO.
152. R. Sioshansi, "Non-Technical Barriers to Energy Storage Entering the Market," *2015 IEEE Power and Energy Society General Meeting*. July 26-30, 2015, Denver, CO.
153. R. Sioshansi, "Stochastic Dynamic Programming Models for Co-Optimizing Storage Operations," *22nd International Symposium on Mathematical Programming*. July 12-17, 2015, Pittsburgh, PA.
154. R. Sioshansi, "A Dynamic Programming Approach to Estimating the Capacity Value of Energy Storage," invited seminar at Durham University Durham Energy Institute. June 16, 2015, Durham, United Kingdom.
155. R. Sioshansi, "Retail Electricity Tariff and Mechanism Design to Incentivize Distributed Generation," *The 2nd Meeting of the ERIA Research Working Group 2014-2015 for Studies on "Financing Renewable Energy Development in EAS Countries: A Primer of Effective Policy Instruments"*. May 16-17, 2015, Chiang Mai, Thailand.
156. R. Sioshansi, "A Stochastic Dynamic Programming Model for Co-Optimizing Storage Operations," invited colloquium at University of Texas at Austin Department of Electrical and Computer Engineering. May 6, 2015, Austin, TX.
157. R. Sioshansi, "Stochastic Dynamic Programming and Energy Storage," *Winter School 2015 in Energy Systems and Markets*. March 22-28, 2015, Kvitfjell, Norway.



158. R. Sioshansi, "Non-Technical Barriers to Energy Storage Entering the Market," *University of Michigan Sustainable Systems Forum*, Invited Seminar Speaker. February 20, 2015, Ann Arbor, MI.
159. R. Sioshansi, "Wholesale and Retail Market Design for Incentivizing Renewable Energy Adoption," *The 1st Meeting of the ERIA Research Working Group 2014-2015 for Studies on "Financing Renewable Energy Development in EAS Countries: A Primer of Effective Policy Instruments"*. January 6, 2015, Jakarta, Indonesia.
160. R. Sioshansi, "Optimizing Offers for Cascaded Hydroelectric Generators in a Market with Centralized Dispatch," *INFORMS Annual Meeting*. November 9-12, 2014, San Francisco, CA.
161. R. Sioshansi, "Energy Storage and Renewable Integration: Needs, Opportunities, and Challenges," *University of Iowa Public Policy Center Conference on "Meeting the Renewable Energy Challenge"*, Invited Panelist. October 15-16, 2014, Iowa City, IA.
162. R. Sioshansi, "The Economics of Energy Storage," *International Summer School ENERstore 2014*. September 22-26, 2014, Technische Universität Dresden, Dresden, Germany.
163. R. Sioshansi and F. Wu, "Vehicle-Grid System Integration Policies: Electric Vehicle (EV) Infrastructure Location Optimization & Charging Load Estimation," *2014 US-China Clean Energy Research Center Annual Meeting*. August 11-12, 2014, Ann Arbor, MI.
164. R. Sioshansi, "Decision Support Tools for Energy Storage Investment and Operations," *2014 IEEE Power and Energy Society General Meeting*. July 27-31, 2014, National Harbor, MD.
165. R. Sioshansi, "Energy Storage," invited tutorial to *Office of the Ohio Consumers' Counsel*. July 15, 2014, Columbus, OH.
166. R. Sioshansi, "The Role of Vehicle to Grid With Renewable Resources in Electricity Markets," invited keynote speaker and roundtable participant in *Armand Peugeot Chair 1st International Conference on "Electromobility: Challenging Issues"*. December 19-20, 2013, Paris, France.
167. R. Sioshansi, "Welfare Effects of Energy Storage: Market Structure, Ownership, and the Unknown," invited seminar at Friedrich-Alexander-Universität. December 16, 2013, Nürnberg, Germany.
168. R. Sioshansi, "Economic Impact of Grid Energy Storage," *Presented at Emerging Technologies' Impact on U.S. Energy Security*, The MITRE Corporation. December 3-4, 2013, McLean, VA.
169. S. H. Madaeni, R. Sioshansi, and P. Denholm, "Estimating Capacity Value of Energy Storage Using Dynamic Programming," *INFORMS Annual Meeting*. October 6-9, 2013, Minneapolis, MN.
170. X. Xi, R. Sioshansi, and V. Marano, "A Stochastic Dynamic Programming Model for Co-optimization of Distributed Storage," *INFORMS Annual Meeting*. October 6-9, 2013, Minneapolis, MN.
171. R. Sioshansi, "Capacity Cost Allocation and Distributed Renewables," invited keynote speaker in *IET Renewable Power Generation Conference 2013*. September 19-20, 2013, Beijing, People's Republic of China.
172. R. Sioshansi and X. Xi, "Using Price-Based Signals to Control Plug-in Electric Vehicle (PEV) Charging," *2013 US-China Clean Energy Research Center Annual Meeting*. August 19-20, 2013, Beijing, People's Republic of China.
173. S. H. Madaeni and R. Sioshansi, "The Effects of Delayed Price-Responsive Demand in Reducing Wind-Uncertainty Costs," invited seminar at Institutet för Näringslivsforskning. May 31, 2013, Stockholm, Sweden.
174. R. Sioshansi, "Home Energy Management," *The Ohio State University/Battelle Memorial Institute Smart Grid Collaboration Meeting*. January 23, 2013, Columbus, OH.
175. S. H. Madaeni and R. Sioshansi, "Demand Response Can Improve the Emission Benefits of Wind," *Eighth Conference on The Economics of Energy Markets*. January 17-18, 2013, Toulouse, France.
176. R. Sioshansi, "Pricing in Restructured Electricity Markets," invited seminar at Energy and Resources Group, University of California, Berkeley. November 20, 2012, Berkeley, CA.

177. R. Sioshansi, "Energy Storage Economics and Policy and Market Interactions," invited seminar at Energy and Resources Group, University of California, Berkeley and Lawrence Berkeley National Laboratory. November 19, 2012, Berkeley, CA.
178. R. Sioshansi and A. Tignor, "Utopia Electric: Do Centrally Committed Electricity Markets Provide Useful Price Signals?" *Electricity Optimization: Optimal Power System Topologies and Generation*. November 8, 2012, Washington, DC.
179. S. H. Madaeni, R. Sioshansi, and P. Denholm, "Capacity Value of Photovoltaic Power," *INFORMS Annual Meeting*. October 14-17, 2012, Phoenix, AZ.
180. R. Sioshansi and A. Tignor, "Do Centrally Committed Markets Provide Useful Price Signals?" *INFORMS Annual Meeting*. October 14-17, 2012, Phoenix, AZ.
181. X. Xi, R. Sioshansi, and V. Marano, "A Nash Equilibrium Method to Control Plug-in Electric Vehicle Charging with Wind Integration," *INFORMS Annual Meeting*. October 14-17, 2012, Phoenix, AZ.
182. X. Xi, R. Sioshansi, and V. Marano, "Optimal Location of Public Electric Vehicle Charging Infrastructure," *INFORMS Annual Meeting*. October 14-17, 2012, Phoenix, AZ.
183. R. Sioshansi, "Electric Vehicle Adoption: Spatial and Demographic Effects," invited panelist at *Great Lakes Symposium on Smart Grid and the New Energy Economy*. September 24-26, 2012, Chicago, IL.
184. M. Roberts, R. Sioshansi, and M. Pham, "Spatial Analysis of PEV Adoption," *2012 US-China Clean Energy Research Center Annual Meeting*. August 27-28, 2012, Ann Arbor, MI.
185. R. Sioshansi, V. Marano, and X. Xi, "Price-based PEV Charging Control," *2012 US-China Clean Energy Research Center Annual Meeting*. August 27-28, 2012, Ann Arbor, MI.
186. R. Sioshansi, V. Marano, and X. Xi, "A Simulation-Optimization Model for Public PEV Charging Stations," *2012 US-China Clean Energy Research Center Annual Meeting*. August 27-28, 2012, Ann Arbor, MI.
187. R. Sioshansi, "Price and Investment Implications of Renewables," invited panelist at *Ohio Clean Energy Transmission Summit*. August 6, 2012, Columbus, OH.
188. S. H. Madaeni, R. Sioshansi, and P. Denholm, "The Capacity Value of Solar Generation in the Western United States," *2012 IEEE Power & Energy Society General Meeting*. July 22-26, 2012, San Diego, CA.
189. M. Muratori, V. Marano, R. Sioshansi, and G. Rizzoni, "Energy consumption of residential HVAC systems: a simple physically-based model," *2012 IEEE Power and Energy Society General Meeting*. July 22-26, 2012, San Diego, CA.
190. U. Helman and R. Sioshansi, "Valuing concentrating solar power with thermal energy storage: A survey of the literature and some extensions," *Advanced Workshop in Regulation and Competition: 25th Annual Western Conference*. June 27-29, 2012, Monterey, CA.
191. R. Sioshansi, "Impact of Renewable on System CO<sub>2</sub> Emission," invited presentation at Cummins Science & Technology Council Meeting. June 27, 2012, Columbus, IN.
192. X. Xi, R. Sioshansi, and V. Marano, "A Simulation-Optimization Model for the Location of Public Electric Vehicle Charging Infrastructure," invited colloquium at Institute for Future Energy Consumer Needs and Behavior and E.ON Energy Research, RWTH Aachen University. June 13, 2012, Aachen, Germany.
193. R. Sioshansi, "Transportation Electrification: What are the Benefits and Challenges?" invited seminar at IFP School. June 11-12, 2012, Rueil-Malmaison, France.
194. R. Sioshansi, "The Economics of Energy Storage: What can be Learned from the U.S. Experience?" invited seminar at IFP School. June 11-12, 2012, Rueil-Malmaison, France.
195. R. Sioshansi, "Investment Analysis of Power Distribution Networks: The Case of Norway" by Rahmatallah Poudineh and Tooraj Jamasb, invited discussant, *5th International Workshop on "Empirical Methods in Energy Economics"*. June 7-8, 2012, Berlin, Germany.
196. A. Pielow, R. Sioshansi, and M. C. Roberts, "Modeling Short-run Electricity Demand with Long-term Growth Rates and Consumer Prices Elasticity in Commercial and Industrial Sectors," *5th International Workshop on "Empirical Methods in Energy Economics"*. June 7-8, 2012, Berlin, Germany.

197. R. Sioshansi, "Market and Policy Barriers to Energy Storage," *Renewable & Sustainable Energy Technology Workshop*. April 12-13, 2012, Los Angeles, CA.
198. M. Muratori, M. Roberts, R. Sioshansi, V. Marano, G. Rizzoni, "Modeling Residential Power Demand," *6th Annual UCEAO Conference on Securing Ohio's Energy and Economic Future*. April 2-3, 2012, Columbus, OH.
199. R. Sioshansi, and E. Nicholson, "Comparison of Centrally and Self-Committed Electricity Markets," *INFORMS Annual Meeting*. November 13-16, 2011, Charlotte, NC.
200. R. Sioshansi and P. Denholm, "Benefits of Co-Locating Wind and Concentrating Solar Power," *INFORMS Annual Meeting*. November 13-16, 2011, Charlotte, NC.
201. S. H. Madaeni, R. Sioshansi, and P. Denholm, "Estimating the Capacity Value of Concentrating Solar Power Plants," *INFORMS Annual Meeting*. November 13-16, 2011, Charlotte, NC.
202. R. Sioshansi, "EV Charging Infrastructure Siting," *2011 SJTU-UM Workshop on Renewable Energy and New Energy Vehicles*. October 20-21, 2011, Shanghai, People's Republic of China.
203. R. Sioshansi, "EV Charging Infrastructure Siting—Project Overview," *2011 Annual Technology Forum of US-China Clean Vehicles Consortium*. October 17-18, 2011, Beijing, People's Republic of China.
204. R. Sioshansi, "Advanced Energy Technologies: Overview of Research Activities," invited seminar at Battelle Memorial Institute. September 12, 2011, Columbus, OH.
205. M. Muratori, V. Marano, R. Sioshansi, and M. Roberts, "Domestic Power Demand Prediction and Modelling," *The 24th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems*. July 4-7, 2011, Novi Sad, Serbia.
206. R. Sioshansi, "Market Impacts and Interactions in the Energy/Climate Nexus," National Science Foundation Workshop on *Engineering & Social Response to the Energy-Climate Nexus*. June 23-24, 2011, Arlington, VA.
207. R. Sioshansi and P. Denholm, "The Value of Plug-In Hybrid Electric Vehicles as Grid Resources," *34th IAAE International Conference*. June 19-23, 2011, Stockholm, Sweden.
208. R. Sioshansi, "Methods of Modeling the Value of Concentrating Solar Power and Thermal Energy Storage," invited seminar at BrightSource Energy. May 23, 2011, Oakland, CA.
209. R. Sioshansi "Market Interactions Between Wind and Energy Storage: Do Wind and Storage Make Economic Sense?" invited seminar at Tulane Energy Institute, Tulane University. April 8, 2011, New Orleans, LA.
210. R. Sioshansi, "Addressing Computational Issues in Large-Scale Models," *EFRI-RESIN Workshop*. January 13-14, 2011, Tucson, AZ.
211. R. Sioshansi, "Increasing the Value of Wind with Energy Storage," *INFORMS Annual Meeting*. November 7-10, 2010, Austin, TX.
212. S. Madaeni and R. Sioshansi, "Evaluating the Impact of Demand Response and Stochastic Programming on the Cost of Wind," *INFORMS Annual Meeting*. November 7-10, 2010, Austin, TX.
213. R. Sioshansi, "The Impact of Electricity Tariffs on PHEVs," *INFORMS Annual Meeting*. November 7-10, 2010, Austin, TX.
214. S. Madaeni and R. Sioshansi, "Benefits of Demand Response and Stochastic Programming on Reducing Wind Integration Costs," *12th International Conference on Stochastic Programming*. August 16-20, 2010, Halifax, NS, Canada.
215. R. Sioshansi, V. Marano, and R. Fagiani, "Cost and Emissions Impacts of Plug-In Hybrid Vehicles (PHEVs) on the Electric Power Grid," *4th International Conference on Sustainable Energy and Environmental Protection*. June 29-July 2, 2010, Bari, Italy.
216. R. Fagiani, V. Marano, and R. Sioshansi, "Cost and Emissions Impacts of Plug-in Hybrid Electric Vehicles on Ohio Power Grid," *The 2nd International Symposium on Energy Engineering, Economics and Policy: EEEP 2010*. June 29-July 2, 2010, Orlando, FL.
217. R. Sioshansi, "Using Storage to Increase the Market Value of Wind Generation," *Advanced Workshop in Regulation and Competition: 23rd Annual Western Conference*. June 23-25, 2010, Monterey, CA.

218. R. Sioshansi, "Some Policy and Research Questions Related to Energy Storage," *Workshop on Electricity Storage in Paris-Supélec*. May 10, 2010, Gif-sur-Yvette, France.
219. R. Sioshansi, "Using Storage to Increase the Market Value of Wind Generation," *Sixth Conference on The Economics of Energy Markets*. January 28-29, 2010, Toulouse, France.
220. R. Sioshansi, "Welfare and Incentive Effects of Energy Storage," *INFORMS Annual Meeting*. October 11-14, 2009, San Diego, CA.
221. R. Sioshansi and P. Denholm, "Net Emissions Impacts of Plug-In Hybrid Electric Vehicles," *INFORMS Annual Meeting*. October 11-14, 2009, San Diego, CA.
222. P. Denholm and R. Sioshansi, "The Value of Compressed-Air Energy Storage (CAES) with Transmission-Constrained Wind," *INFORMS Annual Meeting*. October 11-14, 2009, San Diego, CA.
223. S. Oren, R. Sioshansi, and R. O'Neill, "Three part auctions versus self-commitment in day ahead electricity markets," *Workshop: Designing Electricity Auctions*. September 15-16, 2009. Stockholm, Sweden.
224. R. Sioshansi, "Modeling the Impacts of Plug-In Hybrid Electric Vehicles on Electric Power Systems," *20th International Symposium on Mathematical Programming*. August 23-28, 2009, Chicago, IL.
225. P. Denholm and R. Sioshansi, "Estimating the Transmission Value of Combining Wind with Energy Storage," *32nd IAEE International Conference*. June 21-24, 2009, San Francisco, CA.
226. R. Sioshansi and P. Denholm, "Estimating the Value of Energy Storage in Concentrating Solar Thermal Plants," *32nd IAEE International Conference*. June 21-24, 2009, San Francisco, CA.
227. R. Sioshansi, "Evaluating the Impact of Real-Time Pricing on the Cost and Value of Wind Generation," *Second Annual Power Systems Modeling Conference*. March 18-20, 2009, Gainesville, FL.
228. R. Sioshansi, "The Value of Plug-in Hybrid Electric Vehicles as Grid Resources," *Second Annual Power Systems Modeling Conference*. March 18-20, 2009, Gainesville, FL.
229. R. Sioshansi, "Evaluating the Impact of Real-Time Pricing on the Cost and Value of Wind Generation," *Fifth Annual Carnegie Mellon Conference on the Electricity Industry*. March 10-11, 2009, Pittsburgh, PA.
230. R. Sioshansi, "Evaluating the Impact of Real-time Demand Response on the Integration Cost of Wind," *INFORMS Annual Meeting*. October 12-15, 2008, Washington, DC.
231. R. Sioshansi and W. Short, "Evaluating the Impacts of Real-Time Pricing on the Usage of Wind Generation," *Fifth Conference on The Economics of Energy Markets*. June 20-21, 2008, Toulouse, France.
232. R. Sioshansi, "Cournot versus Supply Functions: What does the data tell us?" by Bert Willems, Ina Rumiantseva, and Hannes Weigt, invited discussant, *Fifth Conference on The Economics of Energy Markets*. June 20-21, 2008, Toulouse, France.
233. R. Sioshansi and W. Short, "Demand Response via Real-Time Pricing to Increase Use of Operational Wind Energy Generators," *PSerc Public Teleseminar*. May 6, 2008.
234. R. Sioshansi, "Evaluating the Impacts of Real-Time Pricing on the Usage and Integration of Wind Generation," invited seminar at Division of Economics and Business, Colorado School of Mines. February 25, 2008, Golden, CO.
235. R. Sioshansi, "How Good are Supply Function Equilibrium Models: An Empirical Analysis of the Texas Spot Market," invited seminar at Tepper School of Business, Carnegie Mellon University. February 7, 2008, Pittsburgh, PA.
236. R. Sioshansi, "How Good are Supply Function Equilibrium Models: An Empirical Analysis of the Texas Spot Market," invited seminar at Department of Industrial, Welding, and Systems Engineering, The Ohio State University. January 22, 2008, Columbus, OH.
237. R. Sioshansi and E. Nicholson, "Equilibrium Bidding in Unit Commitment Auctions," *INFORMS Annual Meeting*. November 4-7, 2007, Seattle, WA.
238. R. Sioshansi and A. Svoboda, "Optimal Hydro Bidding in a Market with Centralized Dispatch," *Advanced Workshop in Regulation and Competition: 20th Annual Western Conference*. June 27-29, 2007, Monterey, CA.



239. R. Sioshansi, "How Good are Supply Function Equilibrium Models: An Empirical Analysis of the Texas Spot Market," invited seminar at Department of Geography and Environmental Engineering, Johns Hopkins University. March 28, 2007, Baltimore, MD.
240. R. Sioshansi, S. Oren, and R. O'Neill, "The Cost of Anarchy in Self-Commitment Based Electricity Markets," *INFORMS Annual Meeting*. November 5-8, 2006, Pittsburgh, PA.
241. R. Sioshansi and S. Oren, "Do Supply Function Equilibrium Models Describe Behavior in Electricity Spot Markets: An Empirical Analysis of the ERCOT Market," *Third Conference on The Economics of Electricity Markets*. June 2-3, 2005, Toulouse, France.
242. R. Sioshansi and S. Oren, "Do Supply Function Equilibrium Models Describe Behavior in Electricity Spot Markets: An Empirical Analysis of the ERCOT Market," *UC Energy Institute Seminar*. March 11, 2005, Berkeley, CA.
243. S. Oren and R. Sioshansi, "Joint Energy and Reserves Auction with Opportunity Cost Payments for Reserves," *Proceedings of the Bulk Power Systems Dynamics and Control IV*. August 22-27, 2004, Cortina d'Ampezzo, Italy.
244. S. Oren and R. Sioshansi, "Joint Energy and Reserves Auction with Opportunity Cost Payment for Reserves," *Second Conference on Competition and Coordination in the Electricity Industry*. January 16-17, 2004, Toulouse, France.

## TEACHING

### Instructor

- ☐ Approaches to Modeling and Solving Energy Problems with Uncertainty (Ph.D.-level short course); Technische Universität Dresden; Autumn 2022
- ☐ Nonlinear and Dynamic Optimization (undergraduate); The Ohio State University; Spring 2013–Autumn 2022
- ☐ Foundations of Data-Driven Sustainable Energy Systems (graduate); The Ohio State University; Autumn 2020–2022
- ☐ Restructured Electricity Market Design (graduate-level short course); IFP School; Summer 2012–2022
- ☐ Advanced Nonlinear Optimization (graduate); The Ohio State University; Spring 2013, 2014, 2019
- ☐ Decision Analysis (graduate); The Ohio State University; Autumn 2012–2013, Autumn 2016–2017
- ☐ Decomposition and Relaxation Techniques for Large-Scale Optimization Problems (Ph.D.-level short course); Technische Universität Dresden; Summer 2016
- ☐ Market Engineering and Applications (graduate); The Ohio State University; Spring 2010, Winter 2011, and Autumn 2015
- ☐ Electric Vehicle Grid Integration (graduate-level short course); CentraleSupélec; Winter 2013
- ☐ Optimization Transition (undergraduate); The Ohio State University; Spring 2012
- ☐ Seminar in Industrial Engineering (graduate); The Ohio State University; Autumn 2011–Spring 2012
- ☐ Nonlinear Programming (graduate); The Ohio State University; Winter 2011–2012
- ☐ Introduction to Applied Decision Analysis (graduate); The Ohio State University; Spring 2009 and 2010, Autumn 2011
- ☐ Fundamentals of Linear Optimization with Applications (undergraduate); The Ohio State University; Winter 2009, and Autumn 2009–2011
- ☐ Advanced Decision Analysis (graduate); The Ohio State University; Autumn 2008
- ☐ Market Engineering and Applications (undergraduate); University of California, Berkeley; Fall 2005, 2006

### Teaching Assistant

- ☐ Nonlinear Programming (graduate); University of California, Berkeley; Spring 2004
- ☐ Mathematical Programming (graduate); University of California, Berkeley; Fall 2003
- ☐ Decision Analysis (undergraduate); University of California, Berkeley; Spring 2003

SERVICE

**Advisory Work**

- ☐ Technical Advisory Committee Member; Managing Increased Electric Vehicle Shares on Decarbonizing Bulk Power Systems, National Renewable Energy Laboratory (2023)
- ☐ Reviewer; Sharing Exemplary Admissions Practices That Promote Diversity in Engineering, National Academy of Engineering (2022)
- ☐ Peer Review Panelist; DOE Office of Electricity Energy Storage Program Peer Review, United States Department of Energy (2018–2020, 2022)
- ☐ Panel Member; Energy Storage—Energy Markets for the Future, California Independent System Operator (2021)
- ☐ Technical Review Panel Member; Solar Futures Study, United States Department of Energy (2020–2021)
- ☐ External Advisory Board Member; AMS, Inc. (2019–2021)
- ☐ Member; Electricity Advisory Committee, United States Department of Energy (2014–2020)
  - Chair, Energy Storage Subcommittee (2017–2020)
  - Vice Chair, Energy Storage Subcommittee (2017)
  - Co-Chair, 2020 Biennial Energy Storage Program Assessment Working Group
  - Chair, 2018 Biennial Energy Storage Program Assessment Working Group
  - Chair, DOE’s Role in Assisting State-Level Implementation, Valuation, and Policy Treatment of Energy Storage Working Group
  - Chair, 2016 Biennial Energy Storage Program Assessment Working Group
  - Member, Energy Storage Subcommittee (2014–2020)
  - Member, Smart Grid Subcommittee (2016–2018)
- ☐ External Advisory Board Member; Beyond LCOE, Grid Modernization Initiative, United States Department of Energy (2019)
- ☐ Technical Review Committee Member; Grid Modernization Laboratory Consortium, United States Department of Energy (2016–2019)
- ☐ Lead Reviewer; 2018 Grid Modernization Initiative Peer Review, United States Department of Energy (2018)
- ☐ Invited presenter at 2012 Cummins Science & Technology Council Meeting

**Editorial Work**

- ☐ Editor in Chief, *Current Sustainable/Renewable Energy Reports*; 2022–Present.
- ☐ Co-Editor, *Energy, Sustainability and Society*; 2016–Present.
- ☐ Editorial Advisory Board Member:
  - INFORMS/Springer Book Series; 2022–Present.
  - *Renewable Energy Focus*; 2016–Present.
- ☐ Editorial Board Member:
  - *International Journal of Industrial Management*; 2016–Present.
  - *Foundations and Trends in Energy Markets and Policy*; 2013–Present.
  - *IET Renewable Power Generation*; 2012–Present.
  - *Journal of Modern Power Systems and Clean Energy*; 2013–2022.
  - *Journal of Energy Markets*; 2015–2019.
- ☐ Senior Associate Editor, *IEEE Systems Journal*; 2019–Present.
- ☐ Section Editor, Electricity Market Design to Accommodate Zero-Marginal-Cost Resources, *Current Sustainable/Renewable Energy Reports*; 2020–2022.
- ☐ Section Editor, Energy Market, *Current Sustainable/Renewable Energy Reports*; 2017–2022.
- ☐ Subject Editor, Market Design for Renewable Energy Support and Integration, *IET Renewable Power Generation*; 2018–Present.
- ☐ Associate Editor:
  - *Operations Research*; 2022–Present.
  - *IET Energy Conversion and Economics*; 2020–Present.
  - *Journal of Energy Engineering*; 2012–Present.
  - *IEEE Power Engineering Letters*; 2013–2020.

- *IEEE Transactions on Power Systems*; 2013–2020.
- *Decision Support Systems*; 2008–2015.
- ☐ Guest Editor:
  - *IET Renewable Power Generation* special issue associated with The 22nd Conference of the International Federation of Operational Research Societies on “Methodological Advances in Renewable-Energy Analysis”; 2021-2022.
  - *IET Renewable Power Generation* special issue on “Enhancing Hosting Capability for Renewable Energy Generation in Active Distribution Networks”; 2021-2022.
  - *Applied Energy* special issue on “COVID-19 impacts on Energy and Environment”; 2020-2021.
  - *Engineering* special issue on “Active Support of Power System to Energy Transition”; 2020-2021.
  - *Energy Systems* special issue on “Planning under uncertainty in the energy transition”; 2019-2020.
  - *International Journal of Electrical Power and Energy Systems* special issue on “Integrated planning, operation and control of multi-carrier energy systems”; 2018-2020.
  - *Transportation Research Part D: Transport and Environment* special issue on “Role of Infrastructure to Enable and Support Electric Drive Vehicles”; 2018–2019.
  - *IEEE Power and Energy Magazine* special issue on “Electricity Market: A Conversation on Future Designs”; 2018-2019.

### Refereeing

- ☐ *Applied Sciences*
- ☐ *Computational Management Science*
- ☐ *Current Sustainable/Renewable Energy Reports*
- ☐ *Decision Support Systems*
- ☐ *Energies*
- ☐ *Energy*
- ☐ *Energy Economics*
- ☐ *Energy, Sustainability and Society*
- ☐ *Environmental Science and Technology*
- ☐ *European Journal of Operational Research*
- ☐ *European Transactions on Electrical Power*
- ☐ *IEEE Intelligent Systems*
- ☐ *IEEE Power and Energy Magazine*
- ☐ *IEEE Signal Processing Magazine*
- ☐ *IEEE Transactions on Power Systems*
- ☐ *IEEE Transactions on Sustainable Energy*
- ☐ *IIE Transactions*
- ☐ *IIESE Transactions*
- ☐ *International Review of Economics and Finance*
- ☐ *Journal of Ambient Intelligence and Humanized Computing*
- ☐ *Journal of Modern Power Systems and Clean Energy*
- ☐ *Journal of Regulatory Economics*
- ☐ *Manufacturing and Service Operations Management*
- ☐ *Mathematical Programming A*
- ☐ *Nature Energy*
- ☐ *Naval Research Logistics*
- ☐ *Operations Research*
- ☐ *Proceedings of the IEEE*
- ☐ *Sensors*
- ☐ *Soft Computing*
- ☐ *Sustainability*
- ☐ *The Bridge*

- ☐ *The Energy Journal*
- ☐ *Transportation Research Part C: Emerging Technologies*

#### **Academic-Program Reviewing**

- ☐ Endowed-Chair Review Committee, William Ray and Marie Adamson Flesher Professor of Educational Administration; College of Education and Human Ecology, The Ohio State University; 2020–2021.
- ☐ Habilitation à Diriger des Recherches Evaluator; Olivier Massol; 2020–2021.
- ☐ Scientific Committee; Chair in Electricity Economics and Digital Transition at IFP School; 2019–2021.

#### **External Dissertation Examiner**

- ☐ Pierre Cayet; Université Paris Nanterre; France; 2021.
- ☐ Icaro Silvestre Freitas Gomes; Université Paris-Saclay; Sciences Économiques; France; 2021.
- ☐ University of New South Wales; School of Electrical Engineering and Telecommunications; Australia; 2021.
- ☐ Anna Schwele; Danmarks Tekniske Universitet; Department of Electrical Engineering; Denmark; 2020.
- ☐ University of Melbourne; Climate and Energy College; Australia; 2019.
- ☐ Nanyang Technical University; School of Electrical & Electronic Engineering; Singapore; 2017.
- ☐ University of New South Wales; School of Electrical Engineering and Telecommunications; Australia; 2016.
- ☐ University of New South Wales; School of Electrical Engineering and Telecommunications; Australia; 2016.

#### **Proposal Reviewing**

- ☐ Fonds de la Recherche Scientifique; 2016–Present.
- ☐ United States–Israel Binational Science Foundation; 2022.
- ☐ Lehigh University; Proposal Red Table Review; 2022.
- ☐ Horizon 3030; *European Research Council*; 2021.
- ☐ Site Visit Team: Power Optimization of Electro-thermal Systems; Division of Engineering Education and Centers; *National Science Foundation*; 2020.
- ☐ Division of Electrical, Communications and Cyber Systems; *National Science Foundation*; 2020.
- ☐ King Fahd University of Petroleum and Minerals; 2019.
- ☐ Engineering 2; *Fondo Nacional de Desarrollo Científico y Tecnológico*; 2019.
- ☐ Advanced Systems Integration for Solar Technologies (ASSIST); *United States Department of Energy*; 2018–2019.
- ☐ Research Center Proposals; *Khalifa University*; 2018.
- ☐ Information and Intelligent Systems Division; *National Science Foundation*; 2018.
- ☐ General Research Fund; *Research Grants Council of Hong Kong*; 2017.
- ☐ Phase I Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR); *United States Department of Energy*; 2017.
- ☐ Technology Innovation; *Bonneville Power Administration*; 2015.
- ☐ Energy, Power, and Adaptive Systems; *National Science Foundation*; 2013.
- ☐ Chemical, Bioengineering, Environmental, and Transport Systems; *National Science Foundation*; 2012.

#### **Technical Committees**

- ☐ Member, Academic Affairs Committee, United States Association for Energy Economics; 2022–Present.

- ❑ Technical Committee Program Chair, IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee; 2019–Present.
- ❑ Member, “Task Force on Capacity Value of Solar Power,” IEEE Power & Energy Society, Analytic Methods for Power Systems Committee, Reliability, Risk, and Probability Applications Subcommittee; 2012–Present.
- ❑ Past President, “Energy Systems Division,” Institute of Industrial and Systems Engineers; 2023–2024.
- ❑ President, “Energy Systems Division,” Institute of Industrial and Systems Engineers; 2022–2023.
- ❑ President-Elect, “Energy Systems Division,” Institute of Industrial and Systems Engineers; 2021–2022.
- ❑ Chair, “Power System Economics Subcommittee,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee; 2020–2022.
- ❑ Chair, “Working Group on Business Models for Energy Storage,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee, Power System Economics Subcommittee; 2019–2022.
- ❑ Member, INFORMS Chapters and Fora Committee; 2019–2022.
- ❑ Founding Chair, “Task Force on Decision Support Tools for Energy Storage Investment and Operations,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee, Power System Economics Subcommittee; 2014–2022.
- ❑ Director, “Energy Systems Division,” Institute of Industrial and Systems Engineers; 2019–2021.
- ❑ Vice Chair, “Power System Economics Subcommittee,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee; 2019–2020.
- ❑ Secretary, “Power System Economics Subcommittee,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee; 2018–2019.
- ❑ Member, “Working Group on the Economics of Energy Storage,” IEEE Power & Energy Society, Power System Operation, Planning, and Economics Committee, Power System Economics Subcommittee; 2017–2019.

#### Award Committees

- ❑ Member, IISE OR Division Award for Excellence in the Teaching of Operations Research; 2022.
- ❑ Member, IISE ESD Outstanding Young Investigator Award; 2022.
- ❑ Member, Columbus, Ohio Chapter of IEEE Power & Energy Society; 2020–2021.
- ❑ Chair, 2018 INFORMS ENRE Section Best Young Researcher Award; 2018.
- ❑ Chair, 2017 INFORMS ENRE Section Best Young Researcher Award; 2017.
- ❑ Judge, 2014 INFORMS ENRE Section Best Student Paper Award; 2014.
- ❑ Head Judge, 2013 INFORMS ENRE Section Best Student Paper Award; 2013.

#### Conference Organization

- ❑ Program Committee Member, *46th IAEE International Conference*. June 23–26, 2024.
- ❑ Concurrent Session Chair, *40th USAEE/IAEE North American Conference*. November 6–8, 2023, Chicago, IL.
- ❑ Session Co-Organizer and Co-Chair, “Game Theoretic Models of Energy Markets,” *INFORMS Annual Meeting*. October 15–18, 2023, Phoenix, AZ.
- ❑ Invited Expert Panelist, *NTNU Energy Transition Conference 2023*. March 20, 2023, Trondheim, Norway.
- ❑ Session Co-Organizer and Co-Chair, “Game Theory and Energy Market Modeling,” *INFORMS Annual Meeting*. October 16–19, 2022, Indianapolis, IN.
- ❑ Scientific Committee Member, *Second International Workshop on Variational Analysis and Applications for Modelling of Energy Exchange*. May 9–10, 2022, Brescia, Italy.
- ❑ Session Co-Organizer and Co-Chair, “Issues in Energy Market Design, Regulation, and Evolution,” *INFORMS Annual Meeting*. October 24–27, 2021, Anaheim, CA.
- ❑ Program Committee Member, *The 22nd Conference of the International Federation of Operational Research Societies*. August 22–27, 2021.



- ❑ Panel Co-Organizer, “Eugene Litvinov Tribute,” *2021 IEEE PES General Meeting*. July 25–29, 2021.
- ❑ Paper Reviewer, *2021 IEEE Madrid PowerTech*. June 27–July 2, 2021, Madrid, Spain.
- ❑ Chair, Dual Plenary Session “Shared Autonomous Electric Mobility: Triple Revolution,” *1st IAEE Online Conference*. June 7–9, 2021.
- ❑ Scientific Committee Member, *1st IAEE Online Conference*. June 7–9, 2021.
- ❑ Session Organizer and Chair, “Energy Systems,” *IISE Annual Conference and Expo 2021*. May 22–25, 2021.
- ❑ Steering Committee, *Moving from Unresolved Problems to Research Questions and Directions: National Science Foundation Workshop: Unresolved Grid Edge Research Questions and Barriers*. March 23–24, 2021.
- ❑ Session Moderator, “Energy Storage,” *2021 IEEE Innovative Smart Grid Technologies North America*. February 16–18, 2021.
- ❑ Publication Committee Member, *2021 IEEE Innovative Smart Grid Technologies North America*. February 16–18, 2021.
- ❑ Organizing Committee, *2020 Asia-Pacific Solar Research Conference*. November 30–December 2, 2020, Melbourne and Sydney, Australia.
- ❑ Technical Committee Member, *2020 International Conference on Smart Grids and Energy Systems*. November 23–26, 2020, Perth, Australia.
- ❑ Session Co-Organizer and Co-Chair, “Energy Storage to Maximise DER Penetration,” *INFORMS Annual Meeting*. November 7–13, 2020.
- ❑ Session Co-Organizer and Co-Chair, “Energy Decarbonization,” *INFORMS Annual Meeting*. November 7–13, 2020.
- ❑ Session Co-Organizer and Co-Chair, “Competition and Co-ordination in Energy Market Design,” *INFORMS Annual Meeting*. November 7–13, 2020.
- ❑ Co-Chair, Energy System Track, *IISE Annual Conference and Expo 2020*. November 1–3, 2020.
- ❑ Session Co-Chair, “Planning and Operation of Transmission & Distribution Networks,” *2019 9th International Conference on Power and Energy Systems*. December 10–12, 2019, Perth, Australia.
- ❑ Session Organizer and Chair, “Modeling Decarbonization of Energy Systems,” *INFORMS Annual Meeting*. October 20–23, 2019, Seattle, WA.
- ❑ Cluster Chair, “Emerging Topics: Sustainable Growth,” *INFORMS Annual Meeting*. October 20–23, 2019, Seattle, WA.
- ❑ Panel Co-Organizer, “Coupling of Electric Power and Natural Gas Systems,” *2019 IEEE PES General Meeting*. August 4–8, 2019, Atlanta, GA.
- ❑ Minisymposium Co-Chair, “Decomposition Techniques for Large-Scale Stochastic and Robust Energy System Models,” *2019 International Conference on Stochastic Programming*. July 29–August 2, 2019, Trondheim, Norway.
- ❑ Scientific Committee Member, *2019 International Conference on Stochastic Programming*. July 29–August 2, 2019, Trondheim, Norway.
- ❑ Chair, Dual Plenary Session “Load-Profile Challenges and Energy Storage,” *42nd IAEE International Conference*. May 29–June 1, 2019, Montréal, Canada.
- ❑ International Programme Committee Member, *42nd IAEE International Conference*. May 29–June 1, 2019, Montréal, Canada.
- ❑ Session Organizer and Chair, “Large-Scale Optimization Applied to Energy-System Problems,” *IISE Annual Conference and Expo 2019*. May 18–21, 2019, Orlando, FL.
- ❑ Panel Co-Organizer, “Prosumage and Future Utilities in a Distributed Resource Electricity System,” *2018 IEEE PES General Meeting*. August 5–10, 2018, Portland, OR.
- ❑ Panel Co-Organizer, “Revisiting Electricity Markets: Lessons Learned and Future Needs,” *2018 IEEE PES General Meeting*. August 5–10, 2018, Portland, OR.
- ❑ Session Co-Organizer and Co-Chair, “Decomposition Techniques to Solve Large-Scale Optimization Problems for Electricity and Natural Gas Systems,” *23rd Annual International Symposium on Mathematical Programming*. July 1–6, 2018, Bordeaux, France.
- ❑ Paper Reviewer, *20th Power Systems Computation Conference*. June 11–15, 2018, Dublin, Ireland.

- ❑ Scientific Committee Member, *Workshop on ‘Commodities and Energy Market Organization in the Energy Transition Context’*. June 18–19, 2018, Rueil-Malmaison, France.
- ❑ Panel Organizer. “Rate, Tariff, and Market Design for Energy Storage,” *Electricity Advisory Committee Meeting*. February 20–21, 2018, Arlington, VA.
- ❑ Session Co-Organizer and Co-Chair, “Redesigning Electricity Markets and Pricing to Account for Uncertainty,” *INFORMS Annual Meeting*. October 22–25, 2017, Houston, TX.
- ❑ Session Co-Organizer and Co-Chair, “Generation and Transmission Capacity-Expansion Planning,” *INFORMS Annual Meeting*. October 22–25, 2017, Houston, TX.
- ❑ Session Co-Organizer and Co-Chair, “Operational Modeling for Energy Storage,” *INFORMS Annual Meeting*. October 22–25, 2017, Houston, TX.
- ❑ Panel Organizer, “Decision Support Tools for Economic Valuation of Energy Storage,” *2017 IEEE PES General Meeting*. July 16–20, 2017, Chicago, IL.
- ❑ Session Chair, “Energy Markets,” *14th International Conference on the European Energy Market*. June 6–9, 2017, Dresden, Germany.
- ❑ Session Chair, “Spatial and Temporal Interdependencies in the Power System,” *14th International Conference on the European Energy Market*. June 6–9, 2017, Dresden, Germany.
- ❑ Session Chair, “Network Pricing,” *Eleventh Conference on The Economics of Energy and Climate Change*. June 6–7, 2017. Toulouse, France.
- ❑ Technical Program Committee Member, *9th Asia-Pacific Power and Energy Engineering Conference*. April 15–17, 2017. Chengdu, China.
- ❑ Session Co-Organizer and Co-Chair, “Power System Operations Under Increasing Uncertainty,” *INFORMS Annual Meeting*. November 13–16, 2016, Nashville, TN.
- ❑ Session Co-Organizer and Co-Chair, “Capacity-Expansion Planning with Increasing Renewable Levels,” *INFORMS Annual Meeting*. November 13–16, 2016, Nashville, TN.
- ❑ Scientific Committee Member, *Armand Peugeot Chair 3rd International Conference on Electromobility*. December 15–19, 2015, Singapore.
- ❑ Session Organizer and Chair, “Electric Transportation Systems Modelling,” *INFORMS Annual Meeting*. November 1–4, 2015, Philadelphia, PA.
- ❑ Session Co-Organizer and Co-Chair, “Long-Term Electric Power System Planning Models,” *INFORMS Annual Meeting*. November 1–4, 2015, Philadelphia, PA.
- ❑ Panel Organizer, “Decision Support Tools for Energy Storage Operations,” *2015 IEEE PES General Meeting*. July 26–30, 2015, Denver, CO.
- ❑ Paper Reviewer, *Second International Conference on Transformations in Engineering Education*. January 5–8, 2015, Bengaluru, India.
- ❑ Session Co-Organizer and Co-Chair, “Robust and Stochastic Modeling in Power System Operations and Planning,” *INFORMS Annual Meeting*. November 9–12, 2014, San Francisco, CA.
- ❑ Session Co-Organizer and Co-Chair, “Market Issues for Hydro-Dominated Electricity Systems,” *INFORMS Annual Meeting*. November 9–12, 2014, San Francisco, CA.
- ❑ Technical Programme Committee Member, *3rd IET Renewable Power Generation Conference*. September 24–25, 2014, Naples, Italy.
- ❑ Local Organizing Committee Member, *2014 Mixed Integer Programming Workshop*. July 21–24, 2014, Columbus, OH.
- ❑ Session Organizer and Chair, “Operations and Planning with Energy Storage,” *INFORMS Annual Meeting*. October 6–9, 2013, Minneapolis, MN.
- ❑ Technical Programme Committee Member, *2nd IET Renewable Power Generation Conference*. September 9–11, 2013, Beijing, People’s Republic of China.
- ❑ International Scientific Committee Member, *10th International Conference on the European Energy Market*. May 28–30, 2013, Stockholm, Sweden.
- ❑ Session Organizer and Chair, “Research Needs of the Electricity Industry,” *INFORMS Annual Meeting*. October 14–17, 2012, Phoenix, AZ.
- ❑ Cluster Chair, “ENRE Energy,” *INFORMS Annual Meeting*. October 14–17, 2012, Phoenix, AZ.
- ❑ International Scientific Committee Member, *9th International Conference on the European Energy Market*. May 10–12, 2012, Florence, Italy.
- ❑ Cluster Chair, “ENRE Energy,” *INFORMS Annual Meeting*. November 13–16, 2011, Charlotte,

NC.

- ☐ Session Organizer and Chair, "Capacity Expansion," *INFORMS Annual Meeting*. November 13–16, 2011, Charlotte, NC.
- ☐ Cluster Chair, "Energy," *INFORMS Midwest Conference*. August 1–2, 2011, Columbus, OH.
- ☐ Panel Organizer and Chair, "Challenges in Vehicle Electrification," *INFORMS Midwest Conference*. August 1–2, 2011, Columbus, OH.
- ☐ Session Chair, "Optimal Power Plant Operations," *34th IAEE International Conference*. June 19–23, 2011, Stockholm, Sweden.
- ☐ Session Organizer and Chair, "Joint Session Energy/ENRE Energy: Impacts of Supply Uncertainty on Power System Planning and Operations," *INFORMS Annual Meeting*. November 7–10, 2010, Austin, TX.
- ☐ Session Organizer and Chair, "Power System Impacts of Electrified Transportation," *INFORMS Annual Meeting*. November 7–10, 2010, Austin, TX.
- ☐ Session Organizer and Chair, "Modeling Benefits of Demand Management in Power Systems," *INFORMS Annual Meeting*. November 7–10, 2010, Austin, TX.
- ☐ Session Organizer, "Energy Storage Applications in Electricity Markets," *32nd IAEE International Conference*. June 21–24, 2009, San Francisco, CA.

### Student-Organization Advising

- ☐ INFORMSOSU Student Chapter (2014–2022)
- ☐ The Ohio State University Alpha Pi Mu Student Chapter (2011–2022)

### Professional Membership

- ☐ Fellow, Asia-Pacific Artificial Intelligence Association (AAIA)
- ☐ Fellow, Institute of Electrical and Electronics Engineers (IEEE)
- ☐ Member, Institute for Operations Research and Management Sciences (INFORMS)
- ☐ Senior Member, Institute of Industrial and Systems Engineers (IISE)
- ☐ Member, International Association for Energy Economics (IAEE)
- ☐ Full Member, Sigma Xi
- ☐ Member, United States Association for Energy Economics (USAEE)

### GRANTS

- ☐ Ohio State Energy Partners  
Project: Convergent Graduate Training and EmPOWERment for a Sustainable Energy Future  
Duration: 2022 (\$35,000)
- ☐ United States Department of Energy (PI: M. Hagenberger)  
Project: automated BUilding Control with Knowledge of distributed Energy resources and Electrical Systems for Grid Offerings (BUCKEYES GO!)  
Duration: 2022-2027 (\$4,900,000)
- ☐ Ohio State Energy Partners  
Project: Convergent Graduate Training and EmPOWERment for a Sustainable Energy Future  
Duration: 2021 (\$35,000)
- ☐ National Science Foundation  
Project: EPCN:Solving Electricity-Expansion Problems Efficiently via Decomposition (SEEPED)—Research Experiences for Undergraduates Supplement  
Duration: 2020 (\$8,000)
- ☐ Ohio State Energy Partners  
Project: NRT Program Coordinator  
Duration: 2020 (\$35,000)
- ☐ National Science Foundation  
Project: NRT-HDR: Convergent Graduate Training and EmPOWERment for a Sustainable Energy Future  
Duration: 2019-2024 (\$2,980,383)



- ❑ The Ohio State University (PI: J. Y. Lee)  
Project: Developing Capacity for Seasonal Energy Storage Capacity  
Duration: 2018-2019 (\$21,450)
- ❑ National Science Foundation  
Project: EPCN:Solving Electricity-Expansion Problems Efficiently via Decomposition (SEEPED)  
Duration: 2018-2023 (\$299,203)
- ❑ The Ohio State University (PI: J. Bielicki)  
Project: Engineering the Subsurface to Seasonally Store Energy While Sequestering CO<sub>2</sub>  
Duration: 2018-2019 (\$16,000)
- ❑ North China Electric Power University  
Project: Solving Electricity-Expansion Problems Efficiently via Decomposition  
Duration: 2018-2019 (50,000 CNY)
- ❑ The Ohio State University  
Project: Advancing the Decarbonization of Electric Power Systems with Concentrating Solar Thermal Generation  
Duration: 2018 (\$1,000)
- ❑ The Ohio State University (PI: J. Y. Lee)  
Project: The Impact of Electric Vehicles on Resilience in Smart Cities  
Duration: 2017-2018 (\$49,900)
- ❑ Electric Power Research Institute  
Project: Energy Storage Capacity Valuation  
Duration: 2017-2018 (\$87,386)
- ❑ Greif, Inc. (PI: S. Davanloo Tajbakhsh)  
Project: Rigid Packaging Product Demand Forecasting: Pilot Study  
Duration: 2017 (\$16,922)
- ❑ National Renewable Energy Laboratory  
Project: Concentrating Solar Power Grid Storage  
Duration: 2017 (\$90,663)
- ❑ The Ohio State University  
Project: Centrally-committed vs. Self-committed Markets for Wholesale Electricity: An Experimental Study  
Duration: 2017 (\$3,000)
- ❑ The Ohio State University (PI: G. Bayraksan)  
Project: Energy and Water Infrastructure Planning Under Extreme Events  
Duration: 2016-2017 (\$45,000)
- ❑ National Science Foundation (PI: A. J. Conejo)  
Project: EAGER: Toward Renewable Dominated Electric Energy Systems (RENDES)  
Duration: 2015-2018 (\$292,665)
- ❑ Economic Research Institute for ASEAN and East Asia  
Project: Wholesale and Retail Market Design for Incentivizing Renewable Energy Adoption  
Duration: 2014-2015 (\$8,000)
- ❑ Energy Foundation  
Project: Electric Vehicle Industry Cluster in Ohio  
Duration: Spring-Fall 2014 (\$40,000)
- ❑ National Renewable Energy Laboratory  
Project: Photovoltaic Capacity Credit Study  
Duration: 2012-2015 (\$139,886)
- ❑ National Science Foundation  
Project: GRDS: Decomposition and Precomputation Algorithms for Large-Scale Equilibrium Computation Models of Energy Systems  
Duration: Spring-Autumn 2012 (\$41,000)
- ❑ United States Department of Energy (PI: G. Rizzoni)  
Project: GATE: Energy Efficient Vehicles for Sustainable Mobility  
Duration: 2011-2016 (\$910,000)

- ☐ National Renewable Energy Laboratory  
Project: Photovoltaic Capacity Credit Study  
Duration: Spring-Autumn 2011 (\$50,000)
- ☐ United States Department of Energy (PI: G. Rizzoni)  
Project: U.S.-China Clean Energy Research Center-Clean Vehicles (CERC-CV)  
Duration: 2011-2015 (\$3,000,000)
- ☐ National Science Foundation  
Project: CDI-Type II: Energy policy and investment analysis driven by large-scale integrated power system simulations  
Duration: 2010-2016 (\$1,675,000)
- ☐ National Renewable Energy Laboratory  
Project: Analysis of co-located wind and concentrating solar power plants  
Duration: 2010-2011 (\$40,000)
- ☐ National Renewable Energy Laboratory  
Project: CSP Capacity Credit Study  
Duration: 2010-2011 (\$50,000)
- ☐ National Renewable Energy Laboratory  
Project: Concentrating Solar Power (CSP)/Thermal Storage Dispatch Study  
Duration: Winter 2008 (\$22,000)
- ☐ National Science Foundation (PI: S. Oren)  
Project: Development of Course in Market Engineering with Application to Electricity Markets  
Duration: 2004-2006 (\$120,000)
- ☐ United States Department of Energy  
Project: Testing Strategic Bidding Models of Spot Electricity Markets  
Duration: Summer 2004 (\$22,000)

**This foregoing document was electronically filed with the Public Utilities  
Commission of Ohio Docketing Information System on**

**6/9/2023 3:42:00 PM**

**in**

**Case No(s). 23-0023-EL-SSO, 23-0024-EL-AAM**

Summary: Testimony Direct Testimony of Ramteen Sioshansi on Behalf of Office of the Ohio Consumers' Counsel electronically filed by Mrs. Tracy J. Greene on behalf of Michael, William J..