



State of New Jersey  
DIVISION OF RATE COUNSEL  
140 EAST FRONT STREET, 4<sup>TH</sup> FL.  
P.O. Box 003  
TRENTON, NEW JERSEY 08625

PHIL MURPHY  
Governor

SHEILA OLIVER  
Lt. Governor

BRIAN O. LIPMAN  
Director

April 27, 2022

**Via Electronic Mail**

Honorable Carmen Diaz, Acting Board Secretary  
NJ Board of Public Utilities  
44 South Clinton Avenue  
1<sup>st</sup> Floor, P.O. Box 350  
Trenton, NJ 08625-0350

**Re: In the Matter of the Petition of Ocean Wind, LLC Pursuant to N.J.S.A. 48:3-87.1(f) for a Determination that Easements Across Green Acres-Restricted Properties and Consents Needed for Certain Environmental Permits in, and with Respect to, the City of Ocean City are Reasonably Necessary for the Construction or Operation of the Ocean Wind 1 Qualified Offshore Wind Project BPU Docket No. QO22020041**

Dear Acting Secretary Diaz:

Pursuant to the procedural schedule issued by President Fiordaliso on March 22, 2022, please find attached the direct testimony of Maximilian Chang filed on behalf of the New Jersey Division of Rate Counsel in connection with the above-referenced matter.

Consistent with the Order issued by the New Jersey Board of Public Utilities in *In the Matter of the New Jersey Board of Public Utilities' Response to the COVID-19 Pandemic for a Temporary Waiver of Requirements for Certain Non-Essential Obligations*, BPU Docket No. EO20030254, Order dated March 19, 2020, this document is being electronically filed. No paper copies will follow. Please acknowledge receipt of this submission.

Thank you for your consideration and assistance.

Respectfully submitted,

Brian O. Lipman, Esq.  
Director, Division of Rate Counsel

By: /s/ Maura Caroselli  
Maura Caroselli, Esq.  
Deputy Rate Counsel

MC  
Enclosure  
cc: Service List

In the Matter of the Petition of Ocean Wind, LLC Pursuant to N.J.S.A. 48:3-87.1(f) for a Determination that Easements Across Green Acres-Restricted Properties and Consents Needed for Certain Environmental Permits in, and with Respect to, the City of Ocean City are Reasonably Necessary for the Construction or Operation of the Ocean Wind 1 Qualified Offshore Wind Project  
BPU Dkt. No. QO22020041

Carmen Diaz, Acting  
Board Secretary  
Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Brian O. Lipman, Esq. Director  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

Maura Caroselli, Esq.  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
PO Box 003  
Trenton, NJ 08625

Megan Lupo, Esq.  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

T. David Wand, Esq.  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

Robert Glover, Esq.  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

Carlena Morrison, Paralegal  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

Karen Forbes, Legal Secretary  
Division of Rate Counsel  
140 East Front Street, 4th Floor  
P.O. Box 003  
Trenton, NJ 08625

Robert Brabston  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Jim Ferris  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Andrea Hart, Esq.  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Kimberly Diamond, Esq.  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Stacy Peterson  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Véronique Oomen  
New Jersey Board of Public Utilities  
44 South Clinton Avenue, 9th Floor  
PO Box 350  
Trenton, NJ 08625

Kelly Mooij  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Abe Silverman, Esq.  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Kira Lawrence  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Earl Pierce  
New Jersey Board of Public Utilities  
44 South Clinton Avenue  
PO Box 350  
Trenton, NJ 08625

Paul Youchak, DAG  
Department of Law  
Hughes Justice Complex  
25 Market Street  
PO Box 112  
Trenton, New Jersey 08625

Daren Eppley, DAG  
Department of Law  
Hughes Justice Complex  
25 Market Street  
PO Box 112  
Trenton, NJ 08625

Ana Murteira, Esq.  
PSEG Services Corp.  
80 Park Plaza, T5  
Newark, NJ 07101

Pamela Owen, DAG  
Department of Law  
Hughes Justice Complex  
25 Market Street  
PO Box 112  
Trenton, NJ 08625

Cara Lewis, Esq.  
PSEG Services Corp.  
80 Park Plaza, T5  
Newark, NJ 07101

Matthew Kaplan  
Orsted Offshore North America  
437 Madison Avenue  
19th Floor  
New York, NY 10022

Aaron Bullwinkel, Esq.  
Legal, Group Support  
Orsted Offshore North America  
399 Boylston St., 12th Floor  
Boston, MA 02116

Marc Reimer  
Orsted Offshore North America  
399 Boylston St., 12th Floor  
Boston, MA 02116

William Lesser, Esq.  
Cozen O'Connor PC  
3 WTC, 175 Greenwich Street  
55th Floor  
New York, NY 10007

Gregory Eisenstark, Esq.  
Cozen O'Connor  
One Gateway Center, Suite 910  
Newark, NJ 07102

Michael J. Connolly, Esq.  
Cozen O'Connor PC  
One Gateway Center, Suite 910  
Newark, NJ 07102

Tomaso Rotondi  
City Council Vice President  
407 Bay Avenue  
Ocean City, NJ 08226

Melissa Rasner, Municipal Clerk  
City of Ocean City  
861 Asbury Avenue  
Ocean City NJ 08226

Dorothy F. McCrosson, Esq.  
City Solicitor  
McCrosson & Stanton, P.C.  
200 Asbury Avenue  
Ocean City, NJ 08226

Jody Levchuk  
City Council Member  
2 Bayonne Place  
Ocean City, NJ 08226

Hon. Jay Gillian, Mayor  
City of Ocean City  
861 Asbury Avenue  
Ocean City, NJ 08226

Bobby Barr  
City Council President  
118 Roosevelt Boulevard  
Ocean City, NJ 08226

Peter V. Madden  
City Council Member  
47 Bay Road  
Ocean City, NJ 08226

Karen Bergman  
City Council Member  
39 Bayview Place  
Ocean City, NJ 08226

Keith Hartzell  
City Council Member  
720 Asbury Avenue, Apt. 3  
Ocean City, NJ 08226

Shawn M. LaTourette, Commissioner  
NJDEP  
401 E. State Street  
7<sup>th</sup> Floor, East Wing  
P.O. Box 402  
Trenton, NJ 08625

Terrence Crowley, Jr.  
City Council Member  
123 Bay Avenue  
Ocean City, NJ 08226

Max Chang  
Synapse Energy Economics, Inc.  
485 Massachusetts Ave.  
Suite 2  
Cambridge, MA 02139

Martha Sullivan Sapp  
Director, Green Acres Program  
Mail Code 501-01  
P.O. Box 420  
501 East State Street, 1<sup>st</sup> Floor  
Trenton, NJ 08625

Sean D. Moriarty  
Deputy Commissioner  
NJDEP  
401 E. State Street  
7<sup>th</sup> Floor, East Wing  
P.O. Box 402  
Trenton, NJ 08625

Megan Brunatti  
NJDEP  
401 E. State Street  
7<sup>th</sup> Floor, East Wing  
P.O. Box 402  
Trenton, NJ 08625

Rita M. Rothberg, County Clerk  
County of Cape May  
7 N. Main Street  
P.O. Box 5000  
Cape May Court House, NJ 08210

Gerald M. Thorton  
Commissioner Director  
Cape May County  
4 Moore Road  
Cape May Court House, NJ 08210

Kevin Lare, Acting Administrator  
Cape May County  
4 Moore Road  
Cape May Court House, NJ 08210

STATE OF NEW JERSEY  
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE )  
PETITION OF OCEAN WIND, )  
LLC PURSUANT TO N.J.S.A 58:3- )  
87.1(F) FOR A DETERMINATION )  
THAT EASEMENTS ACROSS )  
GREEN ACRES-RESTRICTED )  
PROPERTIED AND CONSENTS )  
NEEDED FOR CERTAIN )  
ENVIRONMENTAL PERMITS IN, )  
AND WITH RESPECT TO THE )  
CITY OF OCEAN CITY ARE )  
REASONABLY NECESSARY FOR )  
THE CONSTRUCTION OR )  
OPERATION OF THE OCEAN )  
WIND I QUALIFIED OFFSHORE )  
WIND PROJECT )

BPU DOCKET NO. QO22020041

---

DIRECT TESTIMONY OF MAXIMILIAN CHANG  
ON BEHALF OF THE NEW JERSEY DIVISION OF RATE COUNSEL

---

BRIAN O. LIPMAN, ESQ.  
DIRECTOR, DIVISION OF RATE COUNSEL

DIVISION OF RATE COUNSEL  
140 EAST FRONT STREET, 4th FLOOR  
P.O. BOX 003  
TRENTON, NJ 08625

FILED: APRIL 27, 2022

**TABLE OF CONTENTS**

**Page No.**

<b>I.</b>	<b>Statement of Qualifications.....</b>	<b>1</b>
<b>II.</b>	<b>Purpose and Summary .....</b>	<b>3</b>
<b>III.</b>	<b>Ocean Wind’s Preferred Plan.....</b>	<b>6</b>
<b>IV.</b>	<b>Green Acres Impacted Parcels .....</b>	<b>10</b>
<b>V.</b>	<b>Alternative Pathways .....</b>	<b>12</b>
<b>VI.</b>	<b>Transmission Upgrade Cost Concerns .....</b>	<b>16</b>
<b>VII.</b>	<b>Conclusions and Recommendations.....</b>	<b>19</b>

**Attachment 1**

1 **I. STATEMENT OF QUALIFICATIONS**

2 **Q. Please state your names, positions, and business address.**

3 A. My name is Maximilian Chang. I am a Principal Associate with Synapse Energy  
4 Economics, an energy consulting company located at 485 Massachusetts Avenue,  
5 Cambridge, Massachusetts.

6 **Q. On whose behalf are you submitting testimony in this proceeding?**

7 A. I am submitting testimony on behalf of the New Jersey Division of Rate Counsel  
8 (“Rate Counsel”).

9 **Q. Mr. Chang, please describe your professional background at Synapse Energy**  
10 **Economics.**

11 A. My experience is summarized in my resume, attached as **Attachment 1**. I am an  
12 environmental engineer and energy economics analyst who has analyzed energy  
13 industry issues for 13 years. In my current position at Synapse Energy Economics,  
14 I focus on economic and technical analysis of many aspects of the electric power  
15 industry, including: (1) utility mergers and acquisitions, (2) utility reliability  
16 performance and distribution investments, (3) nuclear power, (4) wholesale and  
17 retail electricity markets, and (5) offshore wind.

18 **Q. Mr. Chang, please describe your educational background.**

19 A. I hold a Master of Science degree from the Harvard School of Public Health in  
20 Environmental Health and Engineering Studies, and a Bachelor of Science degree  
21 from Cornell University in Biology and Classical Civilizations.

1 **Q. Mr. Chang, have you previously submitted testimony before the Board of**  
2 **Public Utilities?**

3 A. Yes. I filed testimony before the Board in several dockets, including, but not  
4 limited to: I/M/O the Petition of South Jersey Gas Company for Approval of an  
5 Energy Efficiency Program ("EEP") with an Associated Energy Efficiency  
6 Tracker ("EET") Pursuant to N.J.S.A. 48:3-98.1, BPU Docket No. GO12050363;  
7 I/M/O the Merger of Exelon Corporation and Pepco Holdings, Inc., BPU Docket  
8 No. EM1406581; I/M/O the Verified Petition of Rockland Electric Company for  
9 Establishment of a Storm Hardening Surcharge, BPU Docket No. ER14030250;  
10 I/M/O the Merger of the Southern Company and AGL Resources, Inc., BPU  
11 Docket No. GM15101196; I/M/O the Application of PSEG Nuclear, LLC and  
12 Exelon Generation Company, LLC for the Zero Emission Certificate Program -  
13 Salem Unit 1, BPU Docket No. ER20080557, I/M/O the Application of PSEG  
14 Nuclear, LLC and Exelon Generation Company, LLC for the Zero Emission  
15 Certificate Program - Salem Unit 2, BPU Docket No. ER20080558, and I/M/O the  
16 Application of PSEG Nuclear, LLC for the Zero Emission Certificate Program –  
17 Hope Creek, BPU Docket No.ER20080559; I/M/O the Petition of Public Service  
18 Electric and Gas Company for Approval of the Second Energy Strong Program  
19 (Energy Strong II), BPU Docket Nos. EO18060629 and GO18060630; I/M/O the  
20 Verified Petition of Jersey Central Power & Light Company for Approval of an  
21 Infrastructure Investment Program, BPU Docket No. EO18070728; and I/M/O the  
22 Petition of Atlantic City Electric Company for Approval of an Infrastructure



1        Investment Program, and Related Cost Recovery Mechanism, Pursuant to  
2        N.J.A.C. 14:3-2A.1, et seq., BPU Docket No. EO18020196.

3        **Q.    Mr. Chang, have you previously testified before utility regulatory agencies or**  
4        **legislative bodies?**

5        A.    Yes. I have previously testified before the District of Columbia Public Service  
6        Commission, the Hawaii Public Utilities Commission, Illinois State Senate, the  
7        Illinois Property Tax Appeal Board, the Maine Public Utilities Commission, the  
8        Maryland Public Service Commission, and the Massachusetts Department of  
9        Public Utilities. I have also filed testimony before the Delaware Public Utilities  
10       Commission, the Kansas Commerce Corporation, the Illinois Commerce  
11       Commission, the United States District Court for the District of Maine, and the  
12       Virginia State Corporation Commission.

13       **II.    PURPOSE AND SUMMARY**

14       **Q.    What is the purpose of your testimony in this proceeding?**

15       A.    The purpose of my testimony is to review the petition<sup>1</sup> filed by Ocean Wind, LLC  
16       (“Company” or “Ocean Wind”) requesting a determination from the New Jersey  
17       Board of Public Utilities (“Board”) that its preferred onshore export cable route is  
18       reasonably necessary for the construction and operation of the 1,100 megawatt  
19       (“MW”) Ocean Wind I project. Ocean Wind also requests the Board to find and

---

<sup>1</sup> I/M/O the Petition of Ocean Wind, LLC Pursuant to N.J.S.A. 48:3-87.1(f) for a Determination that Easements Across Green Acres-Restricted Properties and Consents Needed for Certain Environmental Permits in, and with Respect to, the City of Ocean City are Reasonably Necessary for the Construction or Operation of the Ocean Wind I Qualified Offshore Wind Project, BPU Docket No. QO22020041.

1 determine that the easements described in its petition over property owned by  
2 Ocean City (which are Green Acres-restricted) are reasonably necessary for the  
3 construction and operation of the Ocean Wind 1. Lastly, Ocean Wind requests the  
4 Board issue an Order approving the acquisition of the necessary easements across  
5 the subject properties.

6 **Q. Please summarize your findings and recommendations.**

7 A. My findings and recommendations are summarized as follows:

- 8 • Ocean Wind’s preferred plan requires “access” over Green Acres designated  
9 parcels along 35<sup>th</sup> Street and Roosevelt Boulevard in Ocean City, New  
10 Jersey.<sup>2</sup>
- 11 • Ocean Wind’s preferred plan would impact 0.658 acres of Green Acre  
12 parcels.<sup>3</sup> This reflects a reduction of 0.18 acres discussed in the Direct  
13 Testimony of Pilar Patterson, attached as Exhibit OW-2 to the petition,<sup>4</sup> and  
14 the petition of Ocean Wind.<sup>5</sup>
- 15 • Ocean Wind must provide compensation for its proposed diversion of Green  
16 Acre-restricted parcels at a ratio of at least ten-to-one.<sup>6</sup> Ocean Wind should  
17 solely bear the total cost of the Green Acre reimbursement and ratepayers  
18 should bear none of the reimbursement costs.

---

<sup>2</sup> Id. at ¶ 13.

<sup>3</sup> Response to RCR-INF-3.

<sup>4</sup> Direct Testimony of Pilar Patterson at p. 12, line 1.

<sup>5</sup> Petition at ¶ 29.

<sup>6</sup> See N.J.A.C. 7:36-26.10(g), Table 1.

- 1           • Ocean Wind did not provide the projected costs of its preferred onshore export  
2           cable route, or the alternatives<sup>7</sup> evaluated by the Company.
- 3           • Ocean Wind contends that its preferred plan is the shortest route to the B.L  
4           England (BLE) substation point of interconnection (POI) with PJM  
5           Interconnection, LLC (“PJM”).<sup>8</sup> However, Ocean Wind also identified an  
6           alternative route that follows the path of an abandoned railroad right-of-way  
7           that may be longer in distance but may result in fewer disturbances.  
8           Nonetheless, Ocean Wind qualitatively eliminated this alternative route.<sup>9</sup>
- 9           • The Board-ordered<sup>10</sup> transmission upgrade cost allocation methodology caps  
10          Ocean Wind’s contribution to any transmission upgrade at \$116 million, and  
11          provides that any transmission upgrade costs over \$174 million will be borne  
12          entirely by ratepayers.<sup>11</sup>
- 13          • Should the Board grant Ocean Wind its requested easements, I recommend  
14          that the Board require Ocean Wind demonstrate that its preferred plan is also  
15          the least cost plan to minimize the cost impact to ratepayers, or show why the  
16          least-cost plan is not a reasonable alternative.

---

<sup>7</sup> Response to RCR-INF-1.

<sup>8</sup> Direct Testimony of Pilar Patterson at p. 9, line 12.

<sup>9</sup> Id. at p. 7, lines 5-8.

<sup>10</sup> I/M/O the Board of Public Utilities Offshore Wind Solicitation for 1,100 MW – Evaluation of the Offshore Wind Applications, BPU Docket No. QO18121289, Order dated June 21, 2019, at p. 18.

<sup>11</sup> In this example, Ocean Wind’s portion would be:  $(\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.7 + \$10 \text{ million}$ . The ratepayer portion would be:  $(\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.3$ .

1 **III. OCEAN WIND’S PREFERRED PLAN**

2 **Q. Please summarize the Company’s proposed plan.**

3 A. Ocean Wind’s petition describes the Company’s plans to install its export cables  
4 from its offshore wind turbines along a proposed route that follows 35<sup>th</sup> Street in  
5 Ocean City, along Roosevelt Boulevard, and then crossing Peck Bay to a route  
6 that eventually connects to a substation located at the former BLE generating  
7 station where it will interconnect with the PJM grid as described in more detail in  
8 Ocean Wind’s petition.<sup>12</sup>

9  
10 **Q. Please describe your understanding of the Board’s obligations in this**  
11 **proceeding.**

12 A. It is my understanding that the Board must make a determination that the  
13 Company’s preferred plan is “reasonably necessary for the construction or  
14 operation of the qualified offshore wind project or open access offshore wind  
15 transmission facility.”<sup>13</sup> If the Board finds that the Company’s petition is  
16 consistent with the “reasonably necessary” standard, then the applicable statute  
17 states

18 the board shall issue an order approving the acquisition of  
19 the requested easement, right-of-way, or other real property  
20 interest, and notwithstanding the provisions of any other  
21 State law, rule, or regulation to the contrary, such order  
22 shall effectuate the qualified offshore wind project's or the  
23 open access offshore wind transmission facility's property  
24 interest and shall be recorded by the appropriate county  
25 recording officer at the request of the qualified offshore

---

<sup>12</sup> Petition at ¶ 13.

<sup>13</sup> N.J.S.A. 48:3-87.1(f)(2) (2021).

1 wind project or open access offshore wind transmission  
2 facility.<sup>14</sup>  
3

4 **Q. Has the Company provided a cost estimate for its proposed plan?**

5 A. No. Instead, Ocean Wind contends that:

6 [M]any of Rate Counsel's requests seek information  
7 relating to the cost of alternatives considered by Ocean  
8 Wind. Given the structure of the Board of Public Utilities'  
9 [Offshore Renewable Energy Certificate] OREC Order and  
10 award, the financial risk and costs association with  
11 alternative routes falls largely on Ocean Wind. With the  
12 exception of the transmission system upgrade cost sharing  
13 mechanism, it is Ocean Wind, and not New Jersey electric  
14 utility ratepayers, that bears the risk of the project costs.<sup>15</sup>  
15

16 Accordingly, Ocean Wind did not provide any cost estimates for its preferred plan  
17 or any of the qualitatively evaluated alternative paths.<sup>16</sup>

18  
19 **Q. Do you agree with the Company's contention regarding the financial risks  
20 and costs of the project costs?**

21 A. While the Company is correct that it bears some risk of the project cost, and that  
22 ratepayers share risks for the transmission system upgrade costs, the Board  
23 approved the OREC price based on public and confidential information provided  
24 by Ocean Wind. The Board should have to the opportunity to review ongoing  
25 project costs to ensure that the approved OREC price was reasonable to incent the  
26 development of offshore wind.

---

<sup>14</sup> Ibid.

<sup>15</sup> Introductory Statement Applicable to All Responses Below, provided by Ocean Wind with Responses to RCR-INF-1 through RCR-INF-17, Apr. 4, 2022.

<sup>16</sup> Response to RCR-INF-1.

1 **Q. Has the Company identified specific transmission system upgrade costs in**  
2 **this petition?**

3 A. No, the Company's Petition does not explicitly identify any related transmission  
4 system upgrade costs.

5 **Q. Does the Company identify substation upgrades in its petition?**

6 A. Yes, in response to the Board's Supplemental Question 4, the Company provided  
7 a limited narrative of the required substation upgrade costs that would be required  
8 at the BLE, Higbee, and Ontario substations.<sup>17</sup> Specifically, Ocean Wind noted  
9 that the BLE substation would be "able to receive up to 432 MW without any  
10 upgrades" but in the next sentence, Ocean Wind noted that there would need to be  
11 a substation upgrade of \$1.5 million.<sup>18</sup> In the same response, Ocean Wind  
12 indicated that the Higbee and Ontario substations would require significant  
13 upgrades since the operating voltage for both substations would need to change  
14 from 69 kilovolt ("kV") to 138 kV, and that both substations would not be able to  
15 handle the injection of capacity from Ocean Wind I.<sup>19</sup> Ocean Wind further  
16 indicated that upgrades for the Higbee substation could cost in the range of \$350  
17 million.<sup>20</sup> Ocean Wind further reiterated those preliminary estimates in the  
18 Response to RCR-INF-9.<sup>21</sup>

---

<sup>17</sup> Response to BPU Supplemental Question 4.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>20</sup> Ibid.

<sup>21</sup> Response to RCR-INF-9.

1 **Q. Do you have concerns about the need for upgrades for the BLE substation?**

2 A. Yes, as noted in the response to the Board's Supplemental Question 4, Ocean  
3 Wind stated that the BLE substation would be able to receive 432 MW without  
4 any upgrades. The remaining 668 MW from the 1,100 MW Ocean Wind I would  
5 interconnect at the Oyster Creek substation.<sup>22</sup> However, Ocean Wind did not  
6 provide any specific upgrade cost information. I find the lack of cost information  
7 to be problematic to ensure that Ocean Wind's preferred option is reasonable, if  
8 not the least cost option with regard to the transmission upgrade costs that would  
9 be shared by ratepayers.

10 **Q. If there are no specific transmission system upgrade costs specified in the**  
11 **petition, why are you concerned about costs to ratepayers?**

12 A. When the Board issued its 2019 Order approving the Ocean Wind project, the  
13 Board contemplated that there would be transmission upgrade costs expected to  
14 be between \$36 to \$130 million.<sup>23</sup> Ocean Wind anticipates that the Ocean Wind  
15 project will require transmission upgrade work even with the proposed BLE and  
16 Oyster Creek substation POIs, since the Ocean Wind project will inject more  
17 power into the transmission network than B.L England (450 MW) and Oyster  
18 Creek (636 MW) generating stations that formerly occupied the two respective

---

<sup>22</sup> Ocean Wind. Construction and Operations Plan Ocean Wind Offshore Wind Farm. Volume 1. March 2021 at p. 56. Available at <https://www.boem.gov/ocean-wind-construction-and-operations-plan>

<sup>23</sup> I/M/O the Board of Public Utilities Offshore Wind Solicitation for 1,100 MW – Evaluation of the Offshore Wind Applications, BPU Docket No. QO18121289, Order dated June 21, 2019, at p. 18.

1 locations.<sup>24</sup> At this time there appears to be limited opportunities for stakeholders  
2 to provide input to the Board as Ocean Wind embarks on its process to install  
3 1,100 MW of offshore wind. There is a nexus between the decisions about the  
4 easements for the export cable routes and the substation requirements, which then  
5 impact the POI for the project. These decisions, in turn, impact what transmission  
6 upgrades will be required for the project. Later on in my testimony, I illustrate  
7 how the Board's transmission upgrade cost sharing allocation appears to create an  
8 incentive for the Company to propose more expensive transmission upgrades  
9 since the Company's cost share becomes capped if there is a transmission upgrade  
10 cost of more than \$174 million.<sup>25</sup>

11 **IV. GREEN ACRES IMPACTED PARCELS**

12 **Q. Please summarize the identified Green Acres parcels.**

13 A. Ocean Wind contends that its preferred path would require the diversion of two  
14 parcels of land that are described in the petition and its response to RCR-INF-3.<sup>26</sup>  
15 The two parcels amount to 0.658 acres.<sup>27</sup> In addition, the Company provides  
16 another detailed description with overlaid maps of the two easement areas in  
17 Appendix D of Witness Pilar Patterson's Direct Testimony.<sup>28</sup> I note that the  
18 Company's acreage in the response to RCR-INF-3 differs from the Company's

---

<sup>24</sup> Ocean Wind. Construction and Operations Plan Ocean Wind Offshore Wind Farm. Volume 1. March 2021 at p. 23.

<sup>25</sup> Ibid.

<sup>26</sup> Response to RCR-INF-3.

<sup>27</sup> Ibid.

<sup>28</sup> Direct Testimony of Pilar Patterson, Appendix D.



1           Petition, which indicates that the parcels amount to 0.838 acres.<sup>29</sup> The Company  
2           should be required to explain the discrepancy. Since Rate Counsel had limited  
3           opportunity for discovery in this matter, I was unable to determine the reason for  
4           the discrepancy.

5           **Q.    Does Ocean Wind have a proposed compensation amount for the Green**  
6           **Acres easement areas?**

7           A.    Yes. Ocean Wind provided an appraisal value of the two parcels in response to  
8           RCR-INF-3.<sup>30</sup> Specially, Ocean Wind's appraiser determined that the easements  
9           for the two parcels have an appraised value of \$20,500.<sup>31</sup> Ocean Wind further  
10          concludes that under N.J.A.C. 7:36-26.10(g), Ocean Wind is required to  
11          compensate the appropriate entity pursuant to the New Jersey Department of  
12          Environmental Protection Green Acres Program rules a value based on a ratio of  
13          at least 10-to-one. When applied to Ocean Wind's appraised value, this results in  
14          an estimated compensation of \$205,000.

15          **Q.    Do you have an opinion of the appraised value of the easements?**

16          A.    I do not have an opinion of the appraised value of the easements since I am not an  
17          appraiser. Moreover, the Company did not provide Rate Counsel with copies of  
18          the appraisals, despite the Company's reference to the same in a discovery  
19          response.<sup>32</sup> If and when the Company provides copies of the relied-upon  
20          appraisals, other intervenors may have an opinion on the appraised value of the

---

<sup>29</sup> Id. at p. 12, line 1.

<sup>30</sup> Response to RCR-INF-3.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid.

1 easements. I do believe that the acquisition of the easements should not be  
2 considered a transmission upgrade cost, and the cost of the easement should be  
3 the sole responsibility of Ocean Wind consistent with Ocean Wind's contention  
4 that "the financial risk and costs association with alternative routes falls largely on  
5 Ocean Wind."<sup>33</sup> This is especially true since there are other proposed routes that  
6 do not require easements over Green Acres' encumbered parcels.

7 **V. ALTERNATIVE PATHWAYS**

8 **Q. Please summarize your findings regarding the Company's proposed**  
9 **alternative pathways analysis.**

10 A. While Ocean Wind provided six alternative routes,<sup>34</sup> Ocean Wind did not provide  
11 quantitative estimates of the cost of each route. At a minimum, Ocean Wind  
12 should provide an initial cost estimate of its preferred route with the cost estimate  
13 of the least cost option, if it is not the preferred route.

14 **Q. Please describe the Company's alternative route analysis as presented by the**  
15 **Company.**

16 A. In response to the Board's Supplemental Question 1, Ocean Wind provided a  
17 table summarizing the project screening and siting criteria for the onshore export  
18 cable route.<sup>35</sup> I have excerpted those criteria in the table below:  
19

---

<sup>33</sup> Introductory Statement Applicable to All Responses Below, provided by Ocean Wind with Responses to RCR-INF-1 through RCR-INF-17, Apr. 4, 2022.

<sup>34</sup> Direct Testimony of Pilar Patterson, Appendix C.

<sup>35</sup> Response to BPU Supplemental Question 1.

1           **Table 1            Ocean Wind Onshore Export Cable Selection Criteria**

2

Minimize extreme changes in slope
Prioritize property availability, including State- and county-owned roadways, and existing utility ROW.
Avoid known Superfund Sites or sites designated as hazardous
Avoid known locations of historic or archaeological resources.
Avoid or minimize number of infrastructure (e.g., roads, bridges, culverts) crossings to reduce impacts to existing onshore infrastructure
Minimize impacts to wetlands and floodplains
Minimize the overall length of the route to minimize impacts to terrestrial communities, wildlife species, and sensitive habitats
Minimize impacts to aesthetic resources
Minimize impacts to sensitive receptors such as hospitals, schools, and churches.

3

4           **Q.            Did the Company provide a summary of the length of road disturbed among**

5           **the considered onshore cable routes?**

6           A.           Yes. In Response to Board’s Supplemental Question 12, Ocean Wind provided a

7           summary of the disturbed length of road for the six considered routes shown in

8           Appendix C of Ms. Patterson’s testimony.<sup>36</sup> This table is shown below:

9           **Table 2 Length of Disturbed Roadways of Proposed Cable Routes<sup>37</sup>**

10

Route Color	Location	Length of Road (miles)
Pink	5 <sup>th</sup> Street	7.7
Blue	13 <sup>th</sup> Street	6.6
Purple	Railroad	0.6
Green	Strathmere and Route 9	16.2
GSP	Sea Isle City and GSP	12.4
Orange (Preferred)	35 <sup>th</sup> Street	4.3

11

12           Table 2 shows that the Company’s preferred route has the shortest length of

13           disturbed road in comparison to all of the other options with the exception of the

<sup>36</sup> Direct Testimony of Pilar Patterson, Appendix C.

<sup>37</sup> Response to BPU Supplemental Question 12.

1 purple railroad route (“Railroad Route”). The Railroad Route has a shorter  
2 disturbed road length distance since it follows the railroad right of way.

3 **Q. Does the Company describe the railroad route and why it was not pursued?**

4 A. Ocean Wind provides a qualitative description and analysis of the Railroad Route.  
5 In Response to the Board’s Supplemental Question 13, Ocean Wind details the  
6 proposed Railroad Route would make landfall at 51<sup>st</sup> Street, and then follow an  
7 abandoned railroad right of way for the entirety of the proposed route to the BLE  
8 substation.<sup>38</sup> Ocean Wind rejected the Railroad Route because it concluded that  
9 the “ROW includes several historic properties and designated historic districts,  
10 and impacting these resources would be inconsistent with the project siting  
11 criteria.”<sup>39</sup> Unfortunately, Ocean Wind did not conduct a cost estimate of either  
12 an overhead or underground route for the Railroad Route, so it is unclear if the  
13 longer Railroad Route would actually be more expensive than the preferred  
14 route.<sup>40</sup> I believe the Board should investigate the Railroad Route more  
15 thoroughly before it determines that it is not preferable to the preferred route.

16 **Q. Does Ocean Wind provide any quantitative analysis of the cost of the route**  
17 **alternatives?**

18 A. No. Ocean Wind did not perform any quantitative analysis of the alternatives that  
19 it considered.<sup>41</sup>

---

<sup>38</sup> Response to BPU Supplemental Question 13.

<sup>39</sup> Ibid.

<sup>40</sup> Response to RCR-INF-14.

<sup>41</sup> Response to RCR-INF-6.

1 **Q. Do you find this problematic?**

2 A. While Ocean Wind is only required to demonstrate that its route is “reasonably  
3 necessary” in this proceeding,<sup>42</sup> Ocean Wind should provide the Board with  
4 information on the costs of the alternatives and preferred route to demonstrate that  
5 the preferred route is reasonably necessary relative to the alternatives. While  
6 Ocean Wind also bears some of the costs and financial risks of the export cable  
7 route, the choice of the export cable route to the point of interconnection may  
8 have impacts on the future transmission upgrades that would be required relative  
9 to other alternatives. As I describe below, ratepayers are obligated to pay for  
10 transmission upgrades under a Board-authorized transmission upgrade cost  
11 sharing mechanism.

12 **Q. What is your recommendation for the Board pertaining to the preferred  
13 route and the evaluated alternatives?**

14 A. I recommend that the Board require Ocean Wind to provide cost estimates of the  
15 preferred route and cost estimates of the alternatives evaluated by the Company.  
16 This information would provide support for the Board’s decision if it determines  
17 that the orange preferred route is indeed “reasonably necessary.”  
18

---

<sup>42</sup> N.J.S.A. 48:3-87.1(f)(2).

1 **VI. TRANSMISSION UPGRADE COST CONCERNS**

2 **Q. Please summarize your concerns regarding transmission upgrade costs.**

3 A. While Ocean Wind's Petition concerns easements over Green Acres encumbered  
4 parcels that are required for the export cables from Ocean Wind I through Ocean  
5 City, the export cables will connect to the BLE substation as the POI with PJM. In  
6 this proceeding, Ocean Wind has only provided information that the BLE  
7 substation is currently capable of receiving 432 MW.<sup>43</sup> Ocean Wind indicated that  
8 it has not considered the Higbee and Ontario substations since both substations  
9 would need to be converted from 69 kV to 138 kV.<sup>44</sup> While I have no reason to  
10 disagree with Ocean Wind's assessment, nonetheless Ocean Wind has not  
11 provided any cost estimates of the transmission upgrades required for any of the  
12 options considered.<sup>45</sup> Therefore, the Board does not know the actual transmission  
13 upgraded costs that may be imposed on ratepayers as a result of the  
14 implementation of the Ocean Wind I project. Since the Board is aware that future  
15 transmission upgrades will be necessary for Ocean Wind I to become operational,  
16 the feasibility and costs associated with these upgrades should be evaluated at this  
17 time.

---

<sup>43</sup> Response to BPU Supplemental Question 4.

<sup>44</sup> Ibid.

<sup>45</sup> Ocean Wind has indicated that the Oyster Creek substation will be the other POI for the project.

1 **Q. Did the Board require a cost sharing mechanism for transmission upgrade**  
2 **costs?**

3 A. Yes. The Board's Order for the approval of ORECs for Ocean Wind I detailed the  
4 following transmission upgrade cost sharing mechanism:

- 5 • First \$10 million: 100% Ocean Wind
- 6 • \$10 million to \$130 million: 70% Ocean Wind, 30% Ratepayers
- 7 • \$130 million to \$174 million: 50% Ocean Wind, 50% Ratepayers
- 8 • Over \$174 million: 100% Ratepayers<sup>46</sup>

9 I note that it appears the Board chose the \$174 million based on Ocean Wind's  
10 Downside Case of \$174 million and Ocean Wind's expected upgrade cost range  
11 of \$36 to \$130 million at the time of the proceeding.<sup>47</sup>

12 **Q. How does the transmission upgrade impact Ocean Wind?**

13 A. I believe the cost sharing mechanism does not create an incentive for Ocean Wind  
14 to find the least cost transmission upgrade solution since any transmission  
15 upgrade cost above \$174 million will be borne by ratepayers. Effectively, the  
16 transmission upgrade cost sharing mechanism caps Ocean Wind's transmission  
17 upgrade costs at \$116 million. For illustrative purposes, I have created a table  
18 below that demonstrates how the cost sharing mechanism flows to Ocean Wind  
19 and ratepayers at various amounts:

---

<sup>46</sup> I/M/O the Board of Public Utilities Offshore Wind Solicitation for 1,100 MW – Evaluation of the Offshore Wind Applications, BPU Docket No. QO18121289, Order dated June 21, 2019, at p. 18.

<sup>47</sup> Ibid.

1 **Table 3 Illustrative Transmission Upgrade Costs and Cost Sharing**  
2 **Allocations based on Board-Approved Transmission Upgrade Cost Sharing**<sup>48</sup>  
3

Illustrative Transmission Upgrade Costs (\$M)	Ocean Wind Obligation (\$M)	Ratepayer Obligation (\$M)
\$10.00	\$10.00	\$0.00
\$75.00	\$55.50	\$19.50
\$125.00	\$90.50	\$34.50
\$175.00	\$116.00	\$59.00
\$200.00	\$116.00	\$84.00
\$250.00	\$116.00	\$134.00
\$300.00	\$116.00	\$184.00
\$350.00	\$116.00	\$234.00

4  
5 As shown in Table 3, any transmission upgrade cost that is above \$174 million  
6 will fall mostly to ratepayers. For example, transmission upgrade costs of \$175  
7 million will require a cost share of \$116 million for Ocean Wind and \$59 million  
8 for ratepayers.<sup>49</sup> If transmission upgrade costs are \$350 million, then Ocean  
9 Wind's cost share still remains at \$116 million whereas ratepayers' cost share  
10 rises to \$234 million. I have concerns that this cost sharing mechanism may  
11 unintentionally incent Ocean Wind to preference transmission upgrades that are  
12 not the least-cost or most efficient solution since Ocean Wind's investment in  
13 transmission upgrades are capped at \$116 million.

14 **Q. Do you have any recommendations for the Board?**

15 A. Yes. I recommend that the Board require Ocean Wind to provide an estimate of  
16 transmission upgrade costs associated with each of the POI alternatives

---

<sup>48</sup> Ibid.

<sup>49</sup> In this example, Ocean Wind's portion would be:  $(\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.7 + \$10 \text{ million}$ . The ratepayer portion would be:  $\$1 \text{ million} + (\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.3$ .



1 considered by the Company prior to finding that one of the routes is reasonably  
2 necessary. I understand that Ocean Wind may only be able to provide initial  
3 estimates, but I believe that timely and updated estimates will provide more  
4 clarity to ensure that Ocean Wind is pursuing a transmission solution for Ocean  
5 Wind I and other phases that is supported by engineering data at a reasonable cost  
6 to ratepayers.

7 **VII. CONCLUSIONS AND RECOMMENDATIONS**

8 **Q. What are your findings and recommendations?**

9 A. My findings and recommendations are summarized as follows:

- 10 • Ocean Wind's preferred route requires "access" over Green Acres designated  
11 parcels along 35<sup>th</sup> Street and Roosevelt Boulevard.<sup>50</sup>
- 12 • Ocean Wind's preferred route would impact 0.658 acres of Green Acres  
13 parcels.<sup>51</sup> This reflects a reduction of 0.18 acres discussed in the Direct  
14 Testimony of Pilar Patterson<sup>52</sup> and the application of Ocean Wind.<sup>53</sup>
- 15 • Ocean Wind must provide reimbursement for the diversion of the Green Acres  
16 parcels at a ratio of 10-to-one.<sup>54</sup> If this route is approved, Ocean Wind should  
17 bear the additional cost of the Green Acres reimbursement, not ratepayers.
- 18 • Ocean Wind did not provide the projected costs of its preferred route,  
19 including the transmission upgrades that will be necessary, or the alternatives

---

<sup>50</sup> Petition at ¶ 13.

<sup>51</sup> Response to RCR-INF-3.

<sup>52</sup> Direct Testimony of Pilar Patterson at p. 12, line 1.

<sup>53</sup> Petition at ¶ 29.

<sup>54</sup> See N.J.A.C. 7:36-26.10(g), Table 1.

1 evaluated<sup>55</sup> by the Company. The Board should require this data in advance of  
2 approving the route.

- 3 • Ocean Wind contends that its preferred route is the shortest route to the BLE  
4 substation POI with PJM.<sup>56</sup> However, the Ocean Wind also identified an  
5 alternative that follows the path of an abandoned railroad right of way that  
6 may be longer in distance but may result in fewer disturbances. Ocean Wind  
7 qualitatively eliminated this alternative route.<sup>57</sup> The Board should request  
8 further information about this Railroad Route.
- 9 • The transmission upgrade cost allocation methodology caps Ocean Wind's  
10 contribution to any transmission upgrade at \$116 million based on a total  
11 transmission upgrade cost of \$174 million.<sup>58</sup> Ratepayers bear 100% of any  
12 transmission upgrade costs above \$174 million.<sup>59</sup> As a result, in order to fully  
13 evaluate the preferred route, the Board should request information on the costs  
14 associated with the transmission upgrades that will be necessary to make the  
15 approved route operational.
- 16 • Should the Board grant Ocean Wind the requested easements, I recommend  
17 that the Board require Ocean Wind to demonstrate that its preferred route is  
18 also the least cost plan to minimize the cost impact to ratepayers.

---

<sup>55</sup> Response to RCR-INF-1.

<sup>56</sup> Direct Testimony of Pilar Patterson at p. 9, line 12.

<sup>57</sup> Id. at p. 7, lines 5-8.

<sup>58</sup> In this example, Ocean Wind's portion would be:  $(\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.7 + \$10 \text{ million}$ . The ratepayer portion would be:  $(\$174 \text{ million} - \$130 \text{ million}) * 0.5 + (\$130 \text{ million} - \$10 \text{ million}) * 0.3$ .

<sup>59</sup> I/M/O the Board of Public Utilities Offshore Wind Solicitation for 1,100 MW – Evaluation of the Offshore Wind Applications, BPU Docket No. QO18121289, Order dated June 21, 2019, at p. 18.

1    **Q.    Does this conclude your testimony?**

2    A.    Yes. However, given the limited discovery process in this proceeding, I reserve  
3       my right to modify my testimony based on additional information provided by the  
4       Company or other parties later in this proceeding.

## **ATTACHMENT 1**

## Maximilian Chang, Principal Associate

---

Synapse Energy Economics | 485 Massachusetts Avenue, Suite 3 | Cambridge, MA 02139 | 617-453-7027  
mchang@synapse-energy.com

### PROFESSIONAL EXPERIENCE

**Synapse Energy Economics Inc.**, Cambridge, MA. *Principal Associate*, 2013 – present, *Associate*, 2008 – 2013.

Consults and provides analysis of technologies and policies, electric policy modeling, evaluation of air emissions of electricity generation, and other topics including energy efficiency, consumer advocacy, environmental compliance, and technology strategy within the energy industry. Conducts analysis in utility rate-cases focusing on reliability metrics and infrastructure issues and analyzes the benefits and costs of electric and natural gas energy efficiency measures and programs.

**Environmental Health and Engineering**, Newton, MA. *Senior Scientist*, 2001 – 2008.

Managed complex EPA-mandated abatement projects involving polychlorinated biphenyls (PCBs) in building-related materials. Provided green building assessment services for new and existing construction projects. Communicated and interpreted environmental data for clients and building occupants. Initiated and implemented web-based health and safety awareness training system used by laboratories and property management companies.

**The Penobscot Group, Inc.**, Boston, MA. *Analyst*, 1994 – 2000.

Authored investment reports on Real Estate Investment Trusts (REITs) for buy-side research boutique. Advised institutional clients on REIT investment strategies and real estate asset exchanges for public equity transactions. Wrote and edited monthly publications of statistical and graphical comparison of coverage universe.

**Harvard University Extension School**, Cambridge, MA. *Teaching Assistant*, 1995 – 2002.

Teaching Assistant for Environmental Management I and Ocean Environments.

**Brigham and Women's Hospital**, Boston, MA. *Cancer Laboratory Technician*, 1992 – 1994.

Studied the biological mechanism of tumor eradication in mouse and human models. Organized and performed immunotherapy experiments for experimental cancer therapy. Analyzed and authored results in peer-reviewed scientific journals.

### EDUCATION

**Harvard University**, Cambridge, MA  
Master of Science in Environmental Science and  
Engineering, 2000

**Cornell University**, Ithaca, NY  
Bachelor of Arts in Biology and Classics, 1992

---

## PUBLICATIONS

Knight, P., Chang, M., Hall, J., White, D., Frost, J., Havumaki, B., Odom, C., Bhandari, D., Lane, C., Hopkins, A., Litynski, J., Kwok, S., Biewald, B., Chernick, P., Harvey, J., Deman, L., Rosenkranz, J., Gifford, J., Yuen, P.Y. 2021. *Avoided Energy Supply Costs in New England: 2021 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Kallay, J., A. Napoleon, B. Havumaki, J. Hall, C. Odom, A. Hopkins, M. Whited, T. Woolf, M. Chang, R. Broderick, R. Jeffers, B. Garcia. 2021. *Performance Metrics to Evaluate Utility Resilience Investments*. Synapse Energy Economics for Sandia National Laboratories.

Bhandari, D., M. Chang, P. Eash-Gates, J. Frost, S. Letendre, J. Litynski, C. Roberto, A. Takasugi, J. Taberner. R. Wilson. 2021. *Exelon Illinois Nuclear Fleet Audit*. Synapse Energy Economics for Illinois Environmental Protection Agency.

Kallay, J., A. Hopkins, A. Napoleon, B. Havumaki, J. Hall, M. Whited, M. Chang., R. Broderick, R. Jeffers, K. Jones, M. DeMenno. 2021. *The Resilience Planning Landscape for Communities and Electric Utilities*. Synapse Energy Economics for Sandia National Laboratories.

Napoleon, A., J. Hall, J. Kallay, M. Chang, P. Eash-Gates, N. L. Seidman, C. James, D. Torre, D. Brutkoski, J. Migden-Ostrander, K. Colburn, K. Maddux, D. Harlow, M. Power. 2020. *Energy Infrastructure: Sources of Inequities and Policy Solutions for Improving Community Health and Wellbeing*. Synapse Energy Economics, Regulatory Assistance Project, and Community Action Partnership for the Robert Wood Johnson Foundation.

Knight, P., E. Camp, D. Glick, M. Chang. 2018. *Analysis of the Avoided Costs of Compliance of the Massachusetts Global Warming Solutions Act*. Supplement to 2018 AESC Study. Synapse Energy Economics for Massachusetts Department of Energy Resources and Massachusetts Department of Environmental Protection.

Knight, P., Chang, M., White, D., Peluso, N., Ackerman, F., Hall, J., Chernick, P., Harper, S., Geller, S., Griffiths, B., Deman, L., Rosenkranz, J., Gifford, J., Yuen, P.Y., Snook, E., Shoesmith, J. 2018. *Avoided Energy Supply Costs in New England: 2018 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Fagan, B., M. Chang, S. Fields. 2017. *Fair and Non-Discriminatory Transmission Access on Prince Edward Island: Compliance of Maritime Electric Company Ltd. (MECL) Open Access Transmission Tariff with US Federal Energy Regulatory Commission Standards*. Synapse Energy Economics for Carr, Stevenson and Mackay (CSM), Counsel to the Prince Edward Island Regulatory and Appeals Commission.

Horowitz, A., A. Allison, N. Peluso, B. Fagan, M. Chang, D. Hurley, P. Peterson. 2017. *Comments on the United States Department of Energy's Proposed Grid Resiliency Pricing Rules (FERC Docket RM18-1-000)*. Prepared for Earthjustice.

---

Kallay, J., A. Napoleon, M. Chang. 2016. *Opportunities to Ramp Up Low-Income Energy Efficiency to Meet State and National Climate Policy Goals*. Synapse Energy Economics.

Malone, E., W. Ong, M. Chang. 2015. *State Net-to-Gross Ratios: Research Results and Analysis for Average State Net-to-Gross Ratios Used in Energy Efficiency Savings Estimates*. Synapse Energy Economics for the United States Environmental Protection Agency.

Vitolo, T., M. Chang, T. Comings, A. Allison. 2015. *Economic Benefits of the Proposed Coolidge Solar I Solar Project*. Synapse Energy Economics for Coolidge Solar I, LLC.

Chang, M. 2014. *Making the Grid More Resilient within Reason: Case Study in Public Service Electric and Gas "Energy Strong" Petition*.

White, D. E., M. Chang, B. Biewald. 2013. *State Energy Efficiency Embedded in Annual Energy Outlook Forecasts: 2013 Update*. Synapse Energy Economics for U.S. Environmental Protection Agency.

Hornby, R., P. Chernick, D. White, J. Rosenkranz, R. Denhardt, E. A. Stanton, J. Glifford, B. Grace, M. Chang, P. Luckow, T. Vitolo, P. Knight, B. Griffiths, B. Biewald. 2013. *Avoided Energy Supply Costs in New England: 2013 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Nogee, A., M. Chang, P. Knight, E.A. Stanton. 2013. *Electricity Market Restructuring and the Nuclear Industry*. Synapse Energy Economics for Whitt Law.

Koplow, D., M. Chang. 2013. *Vogtle 3 and 4 Conditional Loan Guarantee: Review of Documents Pertaining to Department of Energy Conditional Loan Guarantees for Vogtle 3 & 4*. Synapse Energy Economics and Earth Track.

Chang, M., D. White, E. Hausman. 2012. *Risks to Ratepayers: An Examination of the Proposed William States Lee III Nuclear Generation Station, and the Implications of "Early Cost Recovery" Legislation*. Synapse Energy Economics for Consumers Against Rate Hikes.

Fagan, R., M. Chang, P. Knight, M. Schultz, T. Comings, E. Hausman, R. Wilson. 2012. *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region*. Synapse Energy Economics for Energy Future Coalition.

Chang, M., D. White, P. Knight, B. Biewald. 2012. *Energy Benefits Resulting from the Investment of 2010 RGGI Auction Revenues in Energy Efficiency*. Synapse Energy Economics for Regulatory Assistance Project.

Chang, M., D. White, E. Hausman, N. Hughes, B. Biewald. 2011. *Big Risks, Better Alternatives: An Examination of Two Nuclear Energy Projects in the US*. Synapse Energy Economics for Union of Concerned Scientists.

Hornby, R., P. Chernick, C. Swanson, D. White, J. Gifford, M. Chang, N. Hughes, M. Wittenstein, R. Wilson, B. Biewald. 2011. *Avoided Energy Supply Costs in New England: 2011 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

---

Chang, M., D. White, L. Johnston, B. Biewald. 2010. *Electricity Energy Efficiency Benefits of RGGI Proceeds: An Initial Analysis*. Synapse Energy Economics for Regulatory Assistance Project.

Fisher, J., J. Levy, P. Kirshen, R. Wilson, M. Chang, J. Kallay, C. James. 2010. *Co-Benefits of Energy Efficiency and Renewable Energy in Utah*. Synapse Energy Economics for the State of Utah Energy Office.

Napoleon, A., W. Steinhurst, M. Chang, K. Takahashi, R. Fagan. 2010. *Assessing the Multiple Benefits of Clean Energy: A Resource for States*. Synapse Energy Economics for US Environmental Protection Agency.

Hornby, R., P. Chernick, C. Swanson, D. White, I. Goodman, B. Grace, B. Biewald, C. James, B. Warfield, J. Gifford, M. Chang. 2009. *Avoided Energy Supply Costs in New England: 2009 Report*. Synapse Energy Economics for Avoided-Energy-Supply-Component (AESC) Study Group.

Biewald, B., D. White, J. Fisher, M. Chang, L. Johnston. 2009. Incorporating Carbon Dioxide Emissions Reductions in Benefit Calculations for Energy Efficiency: Comments on the Department of Energy's Methodology for Analysis of the Proposed Lighting Standard. Synapse Energy Economics for New York State Attorney General.

## **ABSTRACTS**

Koehler, D., M. Chang. 1999. "Search and Disclosure: Corporate Environmental Reports." *Environment* 41 (2): 3.

Makoto, N., P. S. Goedegebuure, U. L. Burger, M. Chang, T. J. Eberlein. 1995. "Successful adoptive immunotherapy (AIT) is dependent on the infiltration of host CD8+ and CD4+ T cells into tumor." *Surgical Forum* 66:528–531.

Burger, U.L., M. Chang, P. S. Goedegebuure, T. J. Eberlein. 1994. "Changes in host T-cell concentrations but not in donor TIL concentrations at the tumor site following adoptive immunotherapy." *Surgical Forum* 45 (0): 513–515.

Burger, U.L., M. Chang, S. L. Adams, D. D. Schoof, T. J. Eberlein. 1993. "The role of CD4+ and CD8+ T-cells during TIL+ rIL-2 treatment in cancer immunotherapy." *Surgical Forum* 64:467–469.

Zuber, M., D. L. Leonard-Vidal, A. L. Rubinstein, A. F. Massaro, M. Chang, D. D. Schoof, T. J. Eberlein. 1990. "In vivo efficacy of murine tumor-infiltrating lymphocytes (TIL) reactivated by anti-CD3." *Journal of Cancer Research and Clinical Oncology* 116; A3.112.28.

Eberlein, T.J., A. F. Massaro, S. Jung, A. L. Rubinstein, U. L. Burger, M. Chang, D. D. Schoof. 1989. "Cyclophosphamide (Cy) immunosuppression potentiates tumor-infiltrating lymphocytes (TIL) therapy in the mouse." Proceedings Annual Meeting: American Association Cancer Research. A30.A1472.



---

## TESTIMONY

**Virginia State Corporation Commission (Docket PUR 2021-00142):** Direct testimony on the application of Dominion Energy Virginia for the development of offshore wind project pursuant to the Virginia Clean Economy Act of 2020. On behalf of Clean Virginia. March 25, 2022.

**Maryland Public Service Commission (Docket No. 9666):** Direct and rebuttal testimony on the applications of Skipjack Wind and US Wind for the development of offshore wind projects pursuant to the Maryland Clean Energy Jobs Act of 2019. On behalf of Maryland Office of People's Counsel. September 24, 2021.

**Illinois Senate Energy and Public Utilities Committee Hearing:** Oral testimony on Exelon Nuclear Fleet Financial Audit Report. On behalf of the Illinois Environmental Protection Agency. April 22, 2021

**New Jersey Board of Public Utilities (Docket No. ER20080557, ER20080558, ER30080559):** Direct testimony on PSEG and Exelon Generation's applications for Zero Emissions Credits. On behalf of the New Jersey Division of Rate Counsel. January 29, 2021

**Maryland Public Service Commission (Docket No. 9629):** Direct testimony on the applications of Skipjack Wind for a turbine design change pursuant to the compliance with conditions approved in 2017. On behalf of Maryland Office of People's Counsel. May 22, 2020.

**New Jersey Board of Public Utilities (Docket No. EO18060629 and GO18060630):** Direct testimony on Public Service Electric and Gas' petition for approval of the Second Energy Strong Program. On behalf of the New Jersey Division of Rate Counsel. March 1, 2019.

**New Jersey Board of Public Utilities (Docket No. EO18070728):** Direct testimony on Jersey Central Power and Light Company's petition for an Infrastructure Investment Program. On behalf of the New Jersey Division of Rate Counsel. December 17, 2018.

**New Jersey Board of Public Utilities (Docket No. EO18020196):** Direct testimony on Atlantic City Electric Company's petition for an Infrastructure Investment Program. On behalf of the New Jersey Division of Rate Counsel. September 4, 2018.

**New Jersey Board of Public Utilities (Docket No. ER18010029 and GR18010030):** Direct testimony on Public Service Electric and Gas' petition for base rate adjustments. On behalf of the New Jersey Division of Rate Counsel. August 6, 2018.

**Illinois Commerce Commission (Docket No. 18-0211):** Direct Testimony regarding Ameren Illinois Company's voltage optimization plan and the importance of prioritizing low-income communities. On behalf of the People of the State of Illinois, represented by the Office of the Illinois Attorney General. March 7, 2018.

**Maryland Public Service Commission (Docket No. 9431):** Direct testimony on the applications of US Wind and Skipjack Wind for the development of offshore wind projects pursuant to the Maryland Offshore Wind Energy Act of 2013. On behalf of Maryland Office of People's Counsel. February 15, 2017.

---

**Kansas Corporation Commission (Docket No. 16-KCPE-593-ACQ):** Direct testimony on clean energy and coal fleet retirement concerns related to the petition of Great Plains Energy Inc., Kansas City Power and Light, and Westar Energy, Inc. for the acquisition of Westar by Great Plains Energy. On behalf of Sierra Club. December 16, 2016.

**Maryland Public Service Commission (Docket No. 9424):** Direct testimony on Delmarva Power and Light Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. October 7, 2016.

**Maryland Public Service Commission (Docket No. 9418):** Direct testimony on Potomac Electric Power Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. July 6, 2016.

**Illinois Commerce Commission (Docket No. 16-0259):** Direct and rebuttal testimony on Commonwealth Edison Company's annual formula rate update and revenue requirement reconciliation on distribution and business intelligence investments. On behalf of the Office of Illinois Attorney General. June 29, 2016 and August 11, 2016.

**Illinois Property Tax Appeal Board (Case Nos. 12-02297, 12-01248)** Direct testimony on history of nuclear deregulation in Illinois and the impact of deregulation on Exelon nuclear units. On behalf of Byron Community School District. April 2016.

**Maryland Public Service Commission (Docket No. 9406):** Direct testimony on Baltimore Gas and Electric Company's application for a rate adjustment to recover smart grid costs. On behalf of Maryland Office of People's Counsel. February 8, 2016.

**New Jersey Board of Public Utilities (Docket No. ER14030250):** Direct testimony on Rockland Electric Company's petition for investments in storm hardening measures. On behalf of the New Jersey Division of Rate Counsel. September 4, 2015.

**Hawaii Public Utilities Commission (Docket No. 2015-0022):** Direct testimony on reliability, clean energy, competition, and management and performance concerns related to the petition of NextEra Corporation and Hawaiian Electric Companies (HECO) for the acquisition of HECO by NextEra. On behalf of the Hawaii Division of Consumer Advocacy. August 10, 2015.

**Delaware Public Service Commission (Docket No. 14-193):** Direct testimony evaluating the benefits and commitments of the proposed Exelon-Pepco merger. On behalf of the Delaware Department of Natural Resources. December 12, 2014.

**State of New Jersey Board of Public Utilities (Docket No. EM14060581):** Direct testimony on the reliability commitments filed by Exelon Corporation and Pepco Holdings, Inc. in their joint petition for the merger of the two entities. On behalf of the New Jersey Division of Rate Counsel. November 14, 2014.

---

**District of Columbia Public Service Commission (Formal Case No. 1119):** Direct and answer testimony on the reliability, risk, and environmental impacts of the proposed Exelon-Pepco merger. On behalf of the District of Columbia Government. November 3, 2014 and March 20, 2015.

**United States District Court District of Maine (C.A. No. 1:11-cv-00038-GZS):** Declaration regarding the ability of the New England electric grid to absorb the impact of a spring seasonal turbine shutdown at four hydroelectric facilities. On behalf of Friends of Merrymeeting Bay and Environment Maine. March 4, 2013.

**State of Maine Public Utilities Commission (Docket 2012-00449):** Testimony regarding the Request for Approval of Review of Second Triennial Plan Pertaining to Efficiency Maine Trust. On behalf of the Maine Efficiency Trust. January 8, 2013.

**New Jersey Board of Public Utilities (Docket No. GO12050363):** Testimony regarding the petition of South Jersey Gas Company for approval of the extension of energy efficiency programs and the associated cost recovery mechanism pursuant to N.J.S.A 48:3-98:1. On behalf of the New Jersey Division of Rate Counsel. November 9, 2012.

*Resume updated March 2022*