

New York Transco LLC

Application of New York Transco LLC for a Certificate of Environmental Compatibility and Public Need Pursuant to Article VII of the New York Public Service Law to Construct, Operate, and Maintain a New, Double-Circuit 54.5-Mile 345/115 Kilovolt Electric Transmission Line and Related Facilities Located in the Town of Schodack, Rensselaer County; the Towns of Stuyvesant, Stockport, Ghent, Claverack, Livingston, Gallatin, and Clermont in Columbia County; and the Towns of Milan, Clinton, and Pleasant Valley in Dutchess County

Rebuttal Testimony of
Samuel A. Newell

September 30, 2020

Submitted to:
New York State Public Service Commission
Case 19-T-0684

Submitted by:
Harris Beach PLLC

BEFORE THE
NEW YORK STATE
PUBLIC SERVICE COMMISSION

APPLICATION OF NEW YORK TRANSCO
LLC FOR A CERTIFICATE OF
ENVIRONMENTAL COMPATIBILITY AND
PUBLIC NEED PURSUANT TO ARTICLE VII
OF THE NEW YORK PUBLIC SERVICE LAW
TO CONSTRUCT, OPERATE, AND
MAINTAIN A NEW, DOUBLE-CIRCUIT 54.5-
MILE 345/115 KILOVOLT ELECTRIC
TRANSMISSION LINE AND RELATED
FACILITIES LOCATED IN THE TOWN OF
SCHODACK, RENSSELAER COUNTY; THE
TOWNS OF STUYVESANT, STOCKPORT,
GHENT, CLAVERACK, LIVINGSTON,
GALLATIN, AND CLERMONT IN
COLUMBIA COUNTY; AND THE TOWNS OF
MILAN, CLINTON, AND PLEASANT
VALLEY IN DUTCHESS COUNTY

Case: 19-T-0684

**REBUTTAL TESTIMONY OF
SAMUEL A. NEWELL
ON BEHALF OF
NEW YORK TRANSCO LLC**

Rebuttal Testimony (Samuel A. Newell)

1 **Q. Please state your full name.**

2 A. My name is Samuel A. Newell.

3 **Q. Please state the name of your employer and its business address.**

4 A. I am employed by The Brattle Group (“Brattle”), which has several offices
5 around the world. I work out of Brattle’s Boston office, located at One
6 Beacon Street, Suite 2600, Boston, MA 02108.

7 **Q. In what capacity are you employed?**

8 A. I am a Principal, the leader of the firm’s Electricity Practice, and a
9 member of the firm’s Management Committee.

10 **Q. Please summarize your educational background and work experience.**

11 A. I am an economist and engineer with 22 years of experience consulting in
12 wholesale electricity market design, wholesale market analysis, generation
13 asset valuation, integrated resource planning, and transmission benefit-
14 cost analysis. Prior to joining Brattle in 2004, I was the Director of
15 Transmission Service at Cambridge Energy Research Associates and
16 previously a Manager in the Utilities Practice at Kearney. I earned a Ph.D.
17 in Technology Management and Policy from the Massachusetts Institute
18 of Technology, an M.S. in Materials Science and Engineering from
19 Stanford University, and a B.A. in Chemistry and Physics from Harvard
20 College.

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1 Related to this matter, I led the original benefit-cost analysis of
2 candidate public policy transmission projects on behalf of the New York
3 State Department of Public Service (“NYDPS”) and the New York State
4 Independent System Operator, Inc. (“NYISO”) in the New York State
5 Public Service Commission’s (the “Commission”) 2015 AC Transmission
6 Proceeding. I also led a Brattle study for the NYISO projecting the
7 resource mix needed to cost-effectively meet the state’s Climate
8 Leadership and Community Protection Act (the “CLCPA”) goals and
9 maintain reliability and several other studies regarding carbon pricing,
10 offshore wind, and capacity markets in New York’s wholesale electricity
11 market for NYISO, New York State Energy Research & Development
12 Authority (“NYSERDA”), and offshore wind developers, as well as
13 benefit-cost analyses of transmission in other jurisdictions.

14 **Q. Do you have a curriculum vitae summarizing all of your relevant**
15 **educational background and work experience?**

16 A. Yes, attached as Exhibit __ (SN-1) is my curriculum vitae.

17 **Q. What is the purpose of your rebuttal testimony?**

18 A. On September 2, 2020, Cricket Valley Energy Center, LLC (“CVEC”)
19 filed direct testimony of Ronald E. Paryl, the CVEC Director of Markets
20 and Risk Management of Advanced Power North America, as well as
21 direct testimony of Amanvir Chahal and Matthew Tanner, both Directors

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1 at Guidehouse Inc. (“Guidehouse”). Guidehouse also submitted reports
2 appended to their testimony, specifically: (i) Guidehouse Inc. Analysis of
3 PPTN Transmission Project Segment B, and (ii) Cricket Valley Energy
4 Center Economic Impact Analysis (collectively, the “Guidehouse
5 Analysis”). I am offering this testimony on behalf of New York Transco
6 LLC (“Transco”) in support of Transco’s Application for a Certificate of
7 Environmental Compatibility and Public Need filed on October 18, 2019
8 (the “Application”) to construct, operate, and maintain the New York
9 Energy Solution project (the “Project”). Specifically, the purpose of this
10 rebuttal testimony is to respond to the following contentions by Messrs.
11 Paryl, Chahal, and Tanner, including:

- 12 1. The claim that the Projects are “unnecessary” and “uneconomic”
13 based on analysis by Guidehouse and claimed implications of recent
14 policy developments.¹
- 15 2. The assertion that the Projects would distort market prices and unduly
16 harm CVEC in ways it could not have anticipated; and that CVEC
17 should be compensated for its lost revenues if the Projects are built;²
18 and

¹ See e.g. REP-11.

² See REP-6-11; see also REP-21-23.

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1 3. The argument that the Commission should delay approval of the
2 Projects until after it has “the final program for CLCPA
3 implementation.”³

4 **Q. Please provide some background on CVEC and its line of business.**

5 A. Based on publicly-available information, CVEC owns and operates an
6 approximately 1,100-megawatt natural gas-fired combined cycle power
7 plant located in Dover, New York that transmits its output via a recently-
8 constructed 14.6-mile 345 kV transmission line connecting to the
9 Consolidated Edison Company of New York, Inc. Pleasant Valley
10 Substation located in the Town of Pleasant Valley in eastern Dutchess
11 County. CVEC participates in the competitive wholesale energy and
12 capacity markets administered by the NYISO and subject to Federal
13 Energy Regulatory Commission (“FERC”)-approved tariffs.

14 **Q. What did you do to evaluate the merits of CVEC’s assertions?**

15 A. I reviewed and analyzed the witness testimonies and analyses filed by
16 CVEC, as well as CVEC’s responses to discovery questions relating to
17 these topics. I then compared Guidehouse’s assumptions, methods, and
18 conclusions to a broader set of data and studies that I reference. I also
19 evaluated CVEC’s claims in the context of the market and regulatory

³ REP-15:12-13.

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1 environment in which CVEC’s plant operates and in which the Segment A
2 and Segment B projects from the AC Transmission Proceeding (together,
3 the “Projects”) will be built.

4 **Q. Did you prepare a report of your analysis of the testimonies presented**
5 **by Messrs. Paryl, Chahal, and Tanner?**

6 A. Yes, please see Exhibit __ (SN-2), which is a report summarizing my
7 conclusions and detailing the studies, industry experience, and data upon
8 which those conclusions are based.

9 **Q. What was your conclusion as to CVEC’s contention that the Project is**
10 **unnecessary and uneconomic?**

11 A. I disagree with that contention. The Project will provide net benefits and
12 cannot be considered “unnecessary” or “uneconomic.”

13 **Q. Why did you conclude that the Project provides net benefits?**

14 A. The NYISO Board of Directors (the “Board”) selected this Project, as well
15 as the Segment A project currently being developed by LS Power Grid
16 New York, LLC; LS Power Grid New York Corporation I; and the New
17 York Power Authority, in April 2019 based on the Projects’ net economic
18 benefits, among other metrics, and because the Projects present the more
19 efficient or cost-effective transmission solution to address Commission-
20 specified public policy transmission needs. The Board referred to rigorous
21 analyses from the NYISO with modifications by the Market Monitoring

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1 Unit (“MMU”), which, under the scenario corresponding to the market
2 and policy outlook at the time, showed quantified benefits more than 1.5x
3 the costs, plus additional non-quantified benefits. Quantified benefits
4 included capacity benefits, production cost savings and environmental
5 benefits from accessing relatively low-cost and clean Upstate resources,
6 and avoided costs of other transmission the Projects would replace or
7 obviate. There are also numerous unquantified benefits that were
8 identified.

9 **Q. How do you respond to CVEC’s contention that the studies conducted**
10 **previously are outdated given recent developments and overstate the**
11 **net benefits of the Project?**

12 A. I disagree. I am intimately familiar with the studies conducted relating to
13 the Project. I led the original analysis of candidate projects on behalf of
14 the NYDPS and NYISO in the 2015 AC Transmission Proceeding, and,
15 this year, I also led a study for NYISO projecting the resource mix needed
16 to cost-effectively meet the State’s CLCPA goals and maintain reliability.
17 Many of the assumptions these studies were based on have not changed
18 materially to raise any question as to the need for the Projects. If
19 anything, the Projects have only become more necessary and beneficial as
20 a result of recent developments.

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1 **Q. Please explain how the Projects have become more necessary and**
2 **beneficial as a result of recent developments?**

3 A. First, the State's bulk transmission grid has continued to experience high
4 congestion costs from Upstate to Downstate that the Projects would help
5 relieve – nearly \$150 million per year of congestion cost across the
6 Central East interface in 2019. Sizeable capacity price differentials of
7 \$3.70/kW-month on average have also persisted from Upstate to
8 Downstate over the past three capability periods, and the Projects would
9 help meet Downstate needs with lower-cost Upstate capacity. So, the
10 need for the Project certainly remains.

11 Looking forward, the biggest change since the studies were conducted is
12 the passage of the CLCPA in June 2019. The CLCPA sets aggressive
13 decarbonization goals that go well beyond those considered in the original
14 studies, mandating 70% renewable electricity by 2030, and requiring
15 100% carbon-free electricity by 2040 and an 85% reduction in economy-
16 wide greenhouse gas emissions by 2050, relative to 1990 levels. The
17 CLCPA also mandates developments of some of the specific resource
18 types needed to meet those goals, including energy efficiency, 6,000 MW
19 of distributed solar by 2025, 3,000 MW of energy storage by 2030, and
20 9,000 MW of offshore wind generation by 2035. Several recent studies I
21 describe in my report show that far more renewable generation resources

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1 than those mandated in the CLCPA will be needed across the State,
2 especially Upstate, to achieve the CLCPA's overall objectives and to meet
3 growing loads with all clean energy.

4 These developments and the progression toward a fully renewable energy
5 system increase the value of the transmission Projects in four ways:

- 6 1. Major investment in clean energy resources will be needed in addition
7 to Downstate offshore wind generation, and the Projects enable greater
8 reliance on relatively low-cost and plentiful Upstate resources to serve
9 Downstate loads.
- 10 2. Renewable resources are intermittent and geographically diverse in
11 their generation patterns. Transmission makes it possible to exploit this
12 diversity, for example, to utilize Upstate hydroelectric, nuclear, wind,
13 and solar power to meet Downstate load when offshore wind
14 generation is low.
- 15 3. The need to electrify heating and transportation to meet 2050
16 decarbonization goals will significantly increase the demand for clean
17 electricity across the State, and especially in Downstate population
18 centers. Higher demand increases the value of accessing clean Upstate
19 resources via the transmission Projects.
- 20 4. The State's ambitious goals imply a high value for avoiding carbon
21 emissions. The economic benefit is not just the avoided cost of the fuel

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1 saved (as represented in the original benefit-cost analysis), but also the
2 high implied value of the avoided carbon emissions.

3 **Q. The Guidehouse Analysis concludes that the Benefit/Cost ratio for the**
4 **Segment A and B projects is well below one. What, if any, issue do**
5 **you take with that conclusion?**

6 A. First, Guidehouse focuses solely on the quantified benefits and there are
7 numerous unquantified benefits that the NYISO has considered in
8 selecting the Projects. Even considering only the quantified benefits,
9 however, Guidehouse's analysis substantially understates the value of the
10 Projects.

11 **Q. How does Guidehouse understate the value of the Projects?**

12 A. This is discussed in detail in my report. There are several fundamental
13 issues with Guidehouse's assumptions. First, Guidehouse's production
14 cost simulations only consider the first 10 years of the Projects, from 2024
15 through 2033. Thereafter, they assume that the long-term benefits of the
16 Projects, from 2034 through 2068, are equal to the average savings over
17 the first 10 years. But the value in that later period is almost certain to be
18 higher than in the first 10 years. As shown in the recent Brattle NYISO
19 Evolution study and other similar studies, the amount of renewable
20 generation in New York must increase dramatically beyond 2033 to meet

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1 the 100% carbon-free generation goal by 2040.⁴ In addition, electricity
2 demand is projected to increase by 53% from 2034 to 2050 due to
3 electrification of transportation and heating to achieve economy-wide
4 decarbonization goals.⁵ Tightening emissions standards become harder
5 and harder to meet without increased transmission to leverage diverse
6 resources throughout the state. Indeed, the Brattle NYISO Grid Evolution
7 study demonstrates that flows and congestion on the transmission system
8 from Upstate to Downstate increase significantly over this time.

9 Second, as detailed in my report, even in the years 2024-2033,
10 Guidehouse's analysis understates the production cost savings of the
11 Projects by making several assumptions that systematically understate
12 congestion throughout the study period, including projecting substantially
13 lower natural gas price differentials than the price differentials that result
14 from the current gas futures prices and the trading hubs used in the
15 NYISO's 2019 Congestion Assessment and Resource Integration Study;
16 ignoring the growing premium on reducing emissions; including the

⁴ Lueken, Newell, *et al.*, *New York's Evolution to a Zero Emission Power System* (Dated June 22, 2020). ("Brattle NYISO Grid Evolution study") Available at <https://www.nyiso.com/documents/20142/13245925/Brattle%20New%20York%20Electric%20Grid%20Evolution%20Study%20-%20June%202020.pdf/69397029-ffed-6fa9-cff8-c49240eb6f9d> (last accessed Sep. 29, 2020).

⁵ In the CLCPA case, NYCA load increases from 162,401 GWh in 2033 to 248,349 GWh in 2050. Itron, New York ISO Climate Change Impact Study, Phase I: Long-Term Load Impact, submitted to NYISO, December 2019, Table A-48, at 90

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1 proposed Champlain Hudson Power Express high voltage direct current
2 line in their NYISO energy market simulations while excluding it in their
3 economic impact analysis; and not considering the fact that transmission
4 provides the greatest value under stressed, non-normal conditions.
5 Notably, Guidehouse adjusted their simulated energy prices to current
6 market prices to account for real-world conditions not reflected in their
7 simulations, which raises Downstate prices more than Upstate prices. But
8 Guidehouse did not recognize that the higher resulting price difference
9 between Upstate and Downstate should correspond to higher congestion
10 costs than they simulated. By understating congestion in the simulation,
11 Guidehouse understates the estimated savings the Projects will provide.

12 Third, there are benefits to the Project that Guidehouse simply did not
13 account for in their analysis. For example, the Projects provide capital
14 cost savings from enabling greater investment in lower-cost clean energy
15 resources Upstate, as demonstrated in the recent Brattle NYISO Grid
16 Evolution study. Guidehouse also did not consider other categories of
17 benefits beyond those quantified, including the unquantified benefits that
18 the Commission explicitly considered in identifying the need for the
19 Projects.

20 **Q. What was your conclusion regarding CVEC's contention that the**
21 **Projects will distort the market and hurt ratepayers?**

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1 A. Because the Projects provide benefits in excess of their costs, they support
2 efficient outcomes and cannot be said to distort the market or hurt
3 customers. On the contrary, eliminating, delaying, or downsizing the
4 Projects would distort and prevent efficient outcomes. Similar to any
5 other transmission system upgrade to an existing constraint, the addition
6 of the Projects will have an impact on energy and capacity prices and
7 reduce prices for generation resources that are downstream of the
8 constraint, such as CVEC in this case. The impacts of the transmission
9 system upgrade on the prices are not a distortion because they reflect an
10 efficient outcome for customers.

11 **Q. Do you see any reason that CVEC should be compensated for any**
12 **revenue decreases it may experience as a result of the construction of**
13 **the Projects?**

14 A. No. Projects that demonstrate net benefits to the system as a part of
15 transmission planning processes are part of the reality of the industry. As a
16 merchant generation resource engaged in the wholesale competitive
17 energy and capacity markets administered by the NYISO, CVEC bears the
18 risk and rewards of changes in market and regulatory conditions, so even
19 if CVEC's net revenues decrease with the addition of the Projects, there is
20 no reason to compensate CVEC for that reduction in market value.

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1 **Q. Mr. Paryl suggests that, even if the Application is approved, the**
2 **Commission should first complete its development of implementing**
3 **regulations for the CLCPA and await the incomplete State power grid**
4 **studies. Do you believe any information is forthcoming in the next**
5 **several months that is likely to have any material impact on the need**
6 **or importance of the Project?**

7 A. No. Delaying the approval process for further study is unlikely to result in
8 new information that would change the conclusion that the Projects
9 provide net benefits. Indeed, the studies underway are not expected to re-
10 evaluate the need for the Projects because the need for the Projects is long-
11 established and unquestionable, and NYISO's 2020 Reliability Needs
12 Assessment already assumes the Projects will be built. Also, there will
13 always be uncertainty about future developments of resources,
14 transmission and policy specifics, so Mr. Paryl's suggested delay of "a
15 few months" is not likely to make a difference in that respect.

16 **Q. What harm, if any, would delaying approval of the Project result in?**

17 A. Postponing the approval process would delay the realization of the
18 Project's benefits and would also delay implementation of other portions
19 of the CLCPA plan that may depend on the infrastructure provided by the
20 Projects. The Commission has ordered that the Projects should be in

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1 service by December 2023, and I understand that this target date would be
2 unrealistic if approval is delayed.

3 **Q. Was this testimony and the attached exhibit prepared by you or under**
4 **your direct supervision and control?**

5 A. Yes.

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

7 A. Yes, it does.

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Exhibit ____ (SN-1)

SAMUEL A. NEWELL

Principal

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Dr. Samuel Newell leads The Brattle Group's Electricity Practice. He has 22 years of experience supporting clients in wholesale market design, generation asset valuation, resource planning, and transmission planning. Much of his work addresses the industry's transition to clean energy. He frequently provides testimony and expert reports to Independent System Operators (ISOs), the Federal Energy Regulatory Commission (FERC), state regulatory commissions, and the American Arbitration Association.

Dr. Newell earned a Ph.D. in Technology Management & Policy from the Massachusetts Institute of Technology, an M.S. in Materials Science & Engineering from Stanford University, and a B.A. in Chemistry & Physics from Harvard College.

Prior to joining The Brattle Group in 2004, Dr. Newell was the Director of the Transmission Service at Cambridge Energy Research Associates. Before that, he was a Manager at A.T. Kearney.

AREAS OF EXPERTISE

- Transmission Planning and Modeling
- Electricity Market Design and Analysis
- Generation and Storage Asset Valuation, and Procurements
- Integrated Resource Planning
- Demand Response (DR) Resource Potential and Market Impact
- Gas-Electric Coordination
- RTO Participation and Configuration
- Energy Litigation
- Tariff and Rate Design
- Business Strategy

EXPERIENCE

Transmission Planning and Modeling

- **Economic and Environmental Evaluation of New Transmission to Quebec.** For the New Hampshire Attorney General's Office in a proceeding before the state Site Evaluation Committee, co-sponsored testimony on the benefits of the proposed Northern Pass Transmission line. Responded to the applicant's analysis and developed our own, focusing on wholesale market participation, price impacts, and net emissions savings.
- **Benefit-Cost Analysis of New York AC Transmission Upgrades.** For the New York Department of Public Service (DPS) and NYISO, led a team to evaluate 21 alternative projects to increase transfer capability between Upstate and Southeast

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NY. Quantified a broad scope of benefits: traditional production cost savings from reduced congestion, using GE-MAPS; additional production cost savings considering non-normal conditions; resource cost savings from being able to retire Downstate capacity, delay new entry, and shift the location of future entry Upstate; avoided costs from replacing aging transmission that would have to be refurbished soon; reduced costs of integrating renewable resources Upstate; and tax receipts. Identified projects with greatest and most robust net value. DPS used our analysis to inform its recommendation to the NY Public Service Commission to declare a “Public Policy Need” to build a project such as the best ones identified.

- **Evaluation of New York Transmission Projects.** For the New York Department of Public Service (DPS), provided a cost-benefit analysis for the “TOTS” transmission projects. Showed net production cost and capacity resource cost savings exceeding the project costs, and the lines were approved. The work involved running GE-MAPS and a capacity market model, and providing insights to DPS staff.
- **Benefits of New 765kV Transmission Line.** For a utility joint venture between AEP and ComEd, analyzed renewable integration and congestion relief benefits of their proposed \$1.2 billion RITELine project in western PJM. Guided client staff to conduct simulations using PROMOD. Submitted testimony to FERC.
- **Benefit-Cost Analysis of a Transmission Project for Offshore Wind.** Submitted testimony on the economic benefits of the Atlantic Wind Connection Project, a proposed 2,000 MW DC offshore backbone from New Jersey to Virginia with 7 onshore landing points. Described and quantified the effects on congestion, capacity markets, CO₂ emissions, system reliability and operations, jobs and economic stimulus, and the installed cost of offshore wind generation. Directed Ventyx staff to simulate the energy market impacts using the PROMOD model.
- **Analysis of Transmission Congestion and Benefits.** Analyzed the impacts on transmission congestion, and customer benefits in California and Arizona of a proposed inter-state transmission line. Used the DAYZER model to simulate congestion and power market conditions in the Western Electricity Coordination Council region in 2013 and 2020 considering increased renewable generation requirements and likely changes to market fundamentals.
- **Benefit-Cost Analysis of New Transmission.** For a transmission developer’s application before the California Public Utility Commission (CPUC) to build a new 500 kV line, analyzed the benefits to ratepayers. Analysis included benefits beyond those captured in a production cost model, including the benefits of integrating a pumped storage facility that would allow the system to accommodate a larger amount of intermittent renewable resources at a reduced cost.
- **Benefit-Cost Analysis of New Transmission in the Midwest.** For the American Transmission Company (ATC), supported Brattle witness evaluating the benefits of a proposed new 345 kV line (Paddock-Rockdale). Advised client on its use of

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PROMOD IV simulations to quantify energy benefits, and developed metrics to properly account for the effects of changes in congestion, losses, FTR revenues, and LMPs on customer costs. Developed and applied new methodologies for analyzing benefits not quantified in PROMOD IV, including competitiveness, long-run resource cost advantages, reliability, and emissions. Testimony was submitted to the Public Service Commission of Wisconsin, which approved the line.

- **Transmission Investments and Congestion.** Worked with executives and board of an independent transmission company to develop a metric indicating congestion-related benefits provided by its transmission investments and operations.
- **Analysis of Transmission Constraints and Solutions.** For a large, geographically diverse group of clients, performed an in-depth study identifying the major transmission bottlenecks in the Western and Eastern Interconnections, and evaluating potential solutions to the bottlenecks. Worked with transmission engineers from multiple organizations to refine the data in a load flow model and a security-constrained, unit commitment and dispatch model for each interconnection. Ran 12-year, LMP-based market simulations using GE-MAPS across multiple scenarios and quantified congestion costs on major constraints. Collaborated with engineers to design potential transmission (and generation) solutions. Evaluated the benefits and costs of candidate solutions and identified several highly economic major transmission projects.
- **Merchant Transmission Impacts.** For a merchant transmission company, used GE-MAPS to analyze the effects of the Cross Sound Cable on energy prices in Connecticut and Long Island.
- **Security-Constrained Unit Commitment and Dispatch Model Calibration.** For a Midwestern utility, calibrated their PROMOD IV model, focusing on LMPs, unit commitment, flows, and transmission constraints. Helped client to understand their model's shortcomings and identify improvement opportunities. Also assisted with initial assessments of FTRs in preparation for its submission of nominations in MISO's first allocation of FTRs.
- **Model Evaluation.** Led an internal Brattle evaluation of commercially available transmission and market simulation models. Interviewed vendors and users of PROMOD IV, Gridview, DAYZER, and other models. Intensively tested each model. Evaluated accuracy of model algorithms (e.g., LMP, losses, unit commitment) and ability to calibrate models with backcasts using actual RTO data.

Electricity Market Design and Analysis

- **MISO Resource Adequacy Framework for a Transforming Fleet.** Currently advising MISO in its Resource Availability and Need initiative to reform its resource adequacy framework to address year-round shortage risks as the fleet transforms.

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Presenting to stakeholders on resource accreditation, determination of LSE requirements, modifications to the Planning Reserve Auction, and interactions with outage scheduling and with energy and ancillary services markets.

- **Singapore Capacity Market Development.** For the Energy Market Authority (EMA) in Singapore, developing a complete forward capacity market design. Worked with EMA in collaboration with other government entities and stakeholders. Published high-level design documents and presented to stakeholders. Currently assisting with detailed design and implementation.
- **Electricity Market Transformation Study.** For NYISO, led a team to conduct simulation analyses of how prices for energy, ancillary services, capacity, and RECs may have to evolve to support adequate generation/storage investment to maintain reliability and meet the state's mandates for 70% renewable electricity by 2030 and 100% carbon-free electricity by 2040. Used an advanced Brattle-developed capacity expansion model, GridSIM, to model investment and chronological operation with large amounts of intermittent and storage resources, subject to reliability and environmental constraints, under a range of assumptions regarding market design and carbon pricing. Results and insights informed NYISO's 2019 *Grid in Transition* whitepaper, and subsequent scenario analyses are providing a foundation for NYISO's examination of reliability and market design enhancements.
- **New York State Resource Adequacy Constructs.** For NYSERDA, evaluating the customer cost impacts of several alternative constructs that differ in whether FERC or the state sets the rules and how buyer-side mitigation is implemented.
- **IESO's Market Renewal Program / Energy Market Settlements.** For the Ontario Independent Electricity System Operator (IESO), helped develop settlement equations for the new day-ahead and real-time nodal market, including make-whole payments for natural gas-fired combined-cycle plants participating as "pseudo-units" and for cascading hydro systems.
- **PJM's Capacity Market Reviews and Parameters.** For PJM, conducted all four official reviews of its Reliability Pricing Model (2008, 2011, 2014, and 2018). Analyzed capacity auctions and interviewed stakeholders. Evaluated the demand curve shape, the Cost of New Entry (CONE) parameter, and the methodology for estimating net energy and ancillary services revenues. Recommended improvements to support participation and competition, to avoid excessive price volatility, and to safeguard future reliability performance. In 2020, provided Avoidable Cost Rates for existing resources and Net CONE for new energy efficiency resources, for use in the Minimum Offer Price Rule. Submitted testimonies before FERC.
- **Seasonal Capacity in PJM.** On behalf of the Natural Resources Defense Council, analyzed the ability of PJM's capacity market to efficiently accommodate seasonal capacity resources and meet seasonal resource adequacy needs. Co-authored a

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whitepaper proposing a co-optimized two-season auction and estimating the efficiency benefits. Filed and presented report at FERC.

- **Energy Price Formation in PJM.** For NextEra Energy, analyzed PJM's integer relaxation proposal and evaluated implications for day-ahead and real-time market prices. Reviewed PJM's Fast-Start pricing proposal and authored report recommending improvements, which NextEra and other parties filed with FERC, and which FERC largely accepted and cited in its April 2019 Order.
- **Carbon Pricing to Harmonize NY's Wholesale Market and Environmental Goals.** Led a Brattle team to help NYISO: (1) develop and evaluate market design options, including mechanisms for charging emitters and allocating revenues to customers, border adjustments to prevent leakage, and interactions with other market design and policy elements; and (2) develop a model to evaluate how carbon pricing would affect market outcomes, emissions, system costs, and customer costs under a range of assumptions. Whitepaper initiated discussions with NY DPS and stakeholders. Supported NYISO in detailed market design and stakeholder engagement.
- **Market Design for Energy Security in ISO-NE.** For NextEra Energy, evaluated and developed proposals for meeting winter energy security needs in New England when pipeline gas becomes scarce. Evaluated ISO-NE's proposed multi-day energy market with new day-ahead operating reserves. Developed competing proposal for new operating reserves in both day-ahead and real-time to incent preparedness for fuel shortages; also developed criteria and high-level approach for potentially incorporating energy security into the forward capacity market. Presented evaluations and proposals to the NEPOOL Markets Committee.
- **ERCOT's Proposed Future Ancillary Services Design.** For the Electric Reliability Council of Texas (ERCOT), evaluated the benefits of its proposal to unbundle ancillary services, enable broader participation by load resources and new technologies, and tune its procurement amounts to system conditions. Worked with ERCOT staff to assess each ancillary service and how generation, load resources, and new technologies could participate. Directed their simulation of the market using PLEXOS, and evaluated other benefits outside of the model.
- **Investment Incentives and Resource Adequacy in ERCOT.** For ERCOT, led a Brattle team to: (1) interview stakeholders and characterize the factors influencing generation investment decisions; (2) analyze the energy market's ability to support investment and resource adequacy at the target level; and (3) evaluate options to enhance long-term resource adequacy while maintaining market efficiency. Worked with ERCOT staff to understand the relevant aspects of their operations and market data. Performed probabilistic simulation analyses of prices, investment costs, and reliability. Conclusions informed a PUCT proceeding in which I filed comments and presented at several workshops.

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- **Operating Reserve Demand Curve (ORDC) in ERCOT.** For ERCOT, evaluated several alternative ORDCs' effects on real-time price formation and investment incentives. Conducted backcast analyses using interval-level data provided by ERCOT and assuming generators rationally modify their commitment and dispatch in response to higher prices under the ORDC. Analysis was used by ERCOT and the PUCT to inform selection of final ORDC parameters.
- **Economically Optimal Reserve Margins in ERCOT.** For ERCOT, co-led studies (2014 and 2018) estimating the economically-optimal reserve margin, and the market equilibrium reserve margins in its energy-only market. Collaborated with ERCOT staff and Astrape Consulting to construct Monte Carlo economic and reliability simulations. Accounted for uncertainty and correlations in weather-driven load, renewable energy production, generator outages, and load forecasting errors. Incorporated intermittent wind and solar generation profiles, fossil generators' variable costs, operating reserve requirements, various types of demand response, emergency procedures, administrative shortage pricing under ERCOT's ORDC, and criteria for load-shedding. Reported economic and reliability metrics across a range of renewable penetration and other scenarios. Results informed the PUCT's adjustments to the ORDC to support desired reliability outcomes.
- **Australian Electricity Market Operator (AEMO) Redesign.** Advised AEMO on market design reforms for the National Electricity Market (NEM) to address concerns about operational reliability and resource adequacy as renewable generation displaces traditional resources. Also provided a report on potential auctions to ensure sufficient capabilities in the near-term.
- **Response to DOE's "Grid Reliability and Resiliency Pricing" Proposal.** For a broad group of stakeholders opposing the rule in a filing before FERC, evaluated DOE's proposed rule: the need (or lack thereof) for bolstering reliability and resilience by supporting resources with a 90-day fuel supply; the likely cost of the rule; and the incompatibility of DOE's proposed solution with the principles and function of competitive wholesale electricity markets.
- **Energy Market Power Mitigation in Western Australia.** Led a Brattle team to help Western Australia's Public Utilities Office design market power mitigation measures for its newly reformed energy market. Established objectives; interviewed stakeholders; assessed local market characteristics affecting the design; synthesized lessons learned from the existing energy market and from several international markets. Recommended criteria, screens, and mitigation measures for day-ahead and real-time energy and ancillary services markets. The Public Utilities Office posted our whitepaper in support of its conclusions.
- **MISO Competitive Retail Choice Solution.** For MISO, evaluated design alternatives for accommodating the differing needs of states relying on competitive retail choice and integrated resource planning. Conducted probabilistic simulations of likely

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market results under alternative market designs and demand curves. Provided expert support in stakeholder forums and submitted expert testimony before FERC.

- **Buyer Market Power Mitigation.** On Behalf of the “Competitive Markets Coalition” group of generating companies, helped develop and evaluate proposals for improving PJM’s Minimum Offer Price Rule so that it more effectively protects the capacity market from manipulation by buyers while reducing interference with non-manipulative activity. Participated in discussions with other stakeholders. Submitted testimony to FERC supporting tariff revisions that PJM filed.
- **Market Development Vision for MISO.** For the Midcontinent Independent System Operator (MISO), worked with MISO staff and stakeholders to codify a Market Vision as the basis for motivating and prioritizing market development initiatives over the next 2–5 years. Authored a foundational report for that Vision, including: describing the core services MISO must continue to provide to support a well-functioning market; establishing a set of principles for enhancing those services; identifying seven Focus Areas offering the greatest opportunities; and proposing criteria for prioritizing initiatives within and across Focus Areas.
- **ISO-NE Capacity Demand Curve Design.** For ISO New England (ISO-NE), developed a demand curve for its Forward Capacity Market. Solicited staff and stakeholder input, then established market design objectives. Provided a range of candidate curves and evaluated them against objectives, showing tradeoffs between reliability uncertainty and price volatility (using a probabilistic locational capacity market simulation model we developed). Worked with Sargent & Lundy to estimate the Net Cost of New Entry to which the demand curve prices are indexed. Submitted testimonies before FERC, which accepted the proposed curve.
- **Offer Review Trigger Prices in ISO-NE.** For the Internal Market Monitor in ISO-NE, developed benchmark prices for screening for uncompetitively low offers in the Forward Capacity Market. Worked with Sargent & Lundy to conduct bottom-up analyses of the costs of constructing and operating gas-fired generation technologies and onshore wind; also estimated the costs of energy efficiency and demand response. For each technology, estimated capacity payments needed to make the resource economically viable, given their costs and expected non-capacity revenues. Recommendations were filed with and accepted by the FERC.
- **Western Australia Capacity Market Design.** For the Public Utilities Office (PUO) of Western Australia, led a Brattle team to advise on the design and implementation of a new forward capacity market. Reviewed the high-level forward capacity market design proposed by the PUO; evaluated options for auction parameters such as the demand curve; recommended supplier-side and buyer-side market power mitigation measures; helped define administrative processes needed to conduct the auction and the governance of such processes.

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- **Western Australia Reserve Capacity Mechanism.** For EnerNOC, evaluated Western Australia's administrative Reserve Capacity Mechanism in comparison with international capacity markets, and made recommendations for improvements to meet reliability objectives more cost effectively. Evaluated whether to develop an auction-based capacity market compared or an energy-only market design. Submitted report and presented recommendations to the Electricity Market Review Steering Committee and other senior government officials.
- **Evaluation of Moving to a Forward Capacity Market in NYISO.** For NYISO, conducted a benefit-cost analysis of replacing its prompt capacity market with a 4-year forward capacity market. Evaluated options based on stakeholder interviews and the experience of PJM and ISO-NE. Addressed risks to buyers and suppliers, market power mitigation, implementation costs, and long-run costs. Recommendations were used by NYISO and stakeholders to help decide whether to pursue a forward capacity market.
- **MISO's Resource Adequacy Construct and Market Design Elements.** For MISO, conducted the first major assessment of its resource adequacy construct. Identified several successes and recommended improvements in load forecasting, locational resource adequacy, and the determination of reliability targets. Incorporated extensive stakeholder input and review. Continued to consult with MISO in its work with the Supply Adequacy Working Group on design improvements, including market design elements for its annual locational capacity auctions.
- **Demand Response (DR) Integration in MISO.** Through a series of assignments, helped MISO incorporate DR into its energy market and resource adequacy construct, including: (1) conducted an independent assessment of MISO's progress in integrating DR into its resource adequacy, energy, and ancillary services markets. Analyzed market participation barriers; (2) wrote a whitepaper evaluating various approaches to incorporating economic DR in energy markets. Identified implementation barriers and recommended improvements to efficiently accommodate curtailment service providers; (3) helped modify MISO's tariff and business practices to accommodate DR in its resource adequacy construct by defining appropriate participation rules. Informed design by surveying the practices of other RTOs and by characterizing the DR resources within the MISO footprint.
- **Survey of Demand Response Provision of Energy, Ancillary Services, and Capacity.** For the Australian Energy Market Commission (AEMC), co-authored a report on market designs and participation patterns in several international markets. AEMC used the findings to inform its integration of DR into its National Energy Market.
- **Integration of DR into ISO-NE's Energy Markets.** For ISO-NE, provided analysis and assisted with a stakeholder process to develop economic DR programs to replace the ISO's initial economic DR programs when they expired.

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- **Compensation Options for DR in ISO-NE's Energy Market.** For ISO-NE, analyzed the implications of various DR compensation options on consumption patterns, LMPs, capacity prices, consumer surplus, producer surplus, and economic efficiency. Presented findings in a whitepaper that ISO-NE submitted to FERC.
- **ISO-NE Forward Capacity Market (FCM) Performance.** With ISO-NE's internal market monitor, reviewed the performance of the first two forward auctions. Evaluated key design elements regarding demand response participation, capacity zone definition and price formation, an alternative pricing rule for mitigating the effects of buyer market power, the use of the Cost of New Entry in auction parameters, and whether to have an auction price ceiling and floor.
- **Evaluation of Tie-Benefits.** For ISO-NE, analyzed the implications of different levels of tie-benefits (i.e., assistance from neighbors, reducing installed capacity requirements) for capacity costs and prices, emergency procurement costs, and energy prices. Whitepaper submitted by ISO-NE to the FERC.
- **Evaluation of Major Initiatives.** With ISO-NE and its stakeholders, developed criteria for identifying "major" market and planning initiatives that trigger the need for the ISO to provide qualitative and quantitative information to help stakeholders evaluate the initiative, as required in ISO-NE's tariff. Developed guidelines on the kinds of information ISO-NE should provide for major initiatives.
- **Energy Market Monitoring & Market Power Mitigation.** For PJM, co-authored a whitepaper, "Review of PJM's Market Power Mitigation Practices in Comparison to Other Organized Electricity Markets."
- **Vertical Market Power.** Before the NYPSC, examined whether the merger between National Grid and KeySpan could create incentives to exercise vertical market power. Employed a simulation-based approach using the DAYZER model of the NYISO wholesale power market and examined whether outages of National Grid's transmission assets significantly affected KeySpan's generation profits.
- **LMP Impacts on Contracts.** For a West Coast client, reviewed the California ISO's proposed implementation of locational marginal pricing (LMP) in 2007 and analyzed implications for "seller's choice" supply contracts. Estimated congestion costs ratepayers would face if suppliers financially delivered power to the lowest priced nodes; estimated incremental contract costs using a third party's GE-MAPS market simulations (and helped to improve their model inputs to more accurately reflect the transmission system in California). Applied findings to support the ISO in design modifications of the California market under LMP.
- **RTO Accommodation of Retail Access.** For MISO, identified business practice improvements to facilitate retail access. Analyzed retail access programs in IL, MI, and OH. Studied retail accommodation practices in other RTOs, focusing on how they modified their procedures surrounding transmission access, qualification of capacity resources, capacity markets, FTR allocations, and settlement.

Generation and Storage Asset Valuation, and Procurements

- **Evaluation of Hydropower Procurement Options.** For a potential buyer of new transmission and hydropower from Quebec, evaluated the costs and emissions benefits under a range of contracting approaches. Accounted for the possibility of resource shuffling and backfill of emissions. Considered the value of storage services.
- **Valuation of a Gas-Fired Combined-Cycle Plant in New England.** For a party to litigation, submitted testimony on the fair market value of the plant. Simulated energy and capacity markets to forecast net revenues, and estimated exposure to capacity performance penalties. Compared the valuation to the transaction prices of similar plants and analyzed the differences. Collaborated with a co-testifying expert on project finance to assess whether the estimated value would suffice to cover the plant's debt and certain other obligations.
- **Valuation of a Portfolio of Combined-Cycle Plants across the U.S.** For a debt holder in a portfolio of plants, estimated the fair market value of each plant in 2018 and the plausible range of values five years hence. Reviewed comparables. Analyzed electricity markets in New England, New York, Texas, Arizona, and California using our own models and reference points from futures markets and publicly available studies. Performed probability-weighted discounted cash flow valuation analyses across a range of scenarios. Provided insights into market and regulatory drivers and how they may evolve.
- **Wholesale Market Value of Storage in PJM.** For a potential investor in battery storage, estimated the energy, ancillary services, and capacity market revenues their technology could earn in PJM. Reviewed PJM's market participation rules for storage. Forecast capacity market revenues and the risk of performance penalties. Developed a real-time energy and ancillary service bidding algorithm that the asset owner could employ to nearly optimize its operations, given expected prices and operating constraints. Identified changes in real-time bid/offer rules that PJM could implement to improve the efficiency of market participation by storage resources.
- **Valuation of a Generation Portfolio in ERCOT.** For the owners of a portfolios of gas-fired assets (including a cogen plant), estimated the market value of their assets by modeling future cash flows from energy and ancillary services markets over a range of plausible scenarios. Analyzed the effects load growth, entry, retirements, environmental regulations, and gas prices could have on energy prices, including scarcity prices under ERCOT's Operating Reserve Demand Curve. Evaluated how future changes in these drivers could cause the value to shift over time.
- **Valuation Methodology for a Coal Plant Transaction in PJM.** For a part owner of a very large coal plant being transferred at an assessed value that was yet to be determined by a third party, wrote a manual describing how to conduct a market

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valuation of the plant. Addressed drivers of energy and capacity value; worked with an engineering subcontractor to describe how to determine the remaining life of the plant and CapEx needs going forward. Our manual was used to inform their pre-assessment negotiation strategy.

- **Valuation of a Coal Plant in PJM.** For the lender to a bidder on a coal plant being auctioned, estimated the market value of the plant. Valuation analysis focused especially on the effects of coal and gas prices on cash flows, and the ongoing fixed O&M costs and CapEx needs of the plant.
- **Valuation of a Coal Plant in New England.** For a utility, evaluated a coal plant's economic viability and market value. Projected market revenues, operating costs, and capital investments needed to comply with future environmental mandates.
- **Valuation of Generation Assets in New England.** To inform several potential buyers' valuations of various assets being sold in ISO-NE, provided energy and capacity price forecasts and cash flows under multiple scenarios. Explained the market rules and fundamentals to assess key risks to cash flows.
- **Valuation of Generation Asset Bundle in New England.** For the lender to the potential buyer of generation assets, provided long-term energy and capacity price forecasts, with multiple scenarios to test whether the plant could be worth less than the debt. Reviewed a broad scope of documents available in the "data room" to identify market, operational, and fuel supply risks.
- **Valuation of Generation Asset Bundle in PJM.** For a potential buyer, provided energy and capacity price forecasts and reviewed their valuation analysis. Analyzed supply and demand fundamentals of the PJM capacity market. Performed locational market simulations using the DAYZER model to project nodal prices as market fundamentals evolve. Reviewed the client's spark spread options model.
- **Wind Power Development.** For a developer proposing to build a several hundred megawatt wind farm in Michigan, provided a revenue forecast for energy and capacity. Evaluated the implications of several scenarios around key uncertainties.
- **Wind Power Financial Modeling.** For an offshore wind developer proposing to build a 350 MW project in PJM off the coast of New Jersey, analyzed market prices for energy, renewable energy certificates, and capacity. Provided a detailed financial model of project funding and cash distributions to various types of investors (including production tax credit). Resulting financial statements were used in an application to the state of New Jersey for project grants.
- **Contract Review for Cogeneration Plant.** For the owner of a large cogen plant in PJM, analyzed revenues under the terms of a long-term PPA (in renegotiation) vs. potential merchant revenues. Accounted for multiple operating modes of the plant and its sales of energy, capacity, ancillary services, and steam over time.

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- **Generation Strategy/Valuation.** For an independent power producer, acted for over two years as a key advisor on the implementation of the client's growth strategy. Led a large analytical team to assess the profitability of proposed new power plants and acquisitions of portfolios of plants throughout the U.S. Used the GE-MAPS market simulation model to forecast power prices, transmission congestion, generator dispatch, emissions costs, energy margins for candidate plants; used an ancillary model to forecast capacity value.
- **Generation Asset Valuation.** For multiple banks and energy companies, provided valuations of financially distressed generating assets. Used GE-MAPS to simulate net energy revenues; a capacity model to estimate capacity revenues; and a financial valuation model to value several natural gas, coal, and nuclear power plants across a range of scenarios. Identified key uncertainties and risks.

Integrated Resource Planning (IRP)

- **Resource Planning in Hawaii.** Assisted the Hawaiian Electric Companies in developing its Power Supply Improvement Plan, filed April 2016. Our work addressed how to maintain system security as renewable penetration increases toward 100% and displaces traditional synchronous generation. Solutions involved defining technology-neutral requirements that may be met by demand response, distributed resources, and new technologies as well as traditional resources.
- **IRP in Connecticut (for the 2008, 2009, 2010, 2012, and 2014 Plans).** For the two major utilities in CT and the CT Dept. of Energy and Environmental Protection (DEEP), led the analysis for five successive integrated resource plans. Plans involved projecting 10-year Base Case outlooks for resource adequacy, customer costs, emissions, and RPS compliance; developing alternative market scenarios; and evaluating resource procurement strategies focused on energy efficiency, renewables, and traditional sources. Used an integrated modeling system that simulated the New England locational energy market (with the DAYZER model), the Forward Capacity Market, REC markets, and suppliers' likely investment/retirement decisions. Addressed electricity supply risks, natural gas supply into New England, RPS standards, environmental regulations, transmission planning, emerging technologies, and energy security. Solicited input from stakeholders. Provided oral testimony before the DEEP.
- **Contingency Plan for Indian Point Nuclear Retirement.** For the New York Department of Public Service (DPS), assisted in developing contingency plans for maintaining reliability if the Indian Point nuclear plant were to retire. Evaluated generation and transmission proposals along three dimensions: their reliability contribution, viability for completion by 2016, and the net present value of costs. The work involved partnering with engineering sub-contractors, running GE-MAPS and a capacity market model, and providing insights to DPS staff.

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- **Analysis of Potential Retirements to Inform Transmission Planning.** For a large utility in Eastern PJM, analyzed the potential economic retirement of each coal unit in PJM under a range of scenarios regarding climate legislation, legislation requiring mercury controls, and various capacity price trajectories.
- **Resource Planning in Wisconsin.** For a utility considering constructing new capacity, demonstrated the need to consider locational marginal pricing, gas price uncertainty, and potential CO₂ liabilities. Guided client to look beyond building a large coal plant. Led them to mitigate exposures, preserve options, and achieve nearly the lowest expected cost by pursuing a series of smaller projects, including a promising cogeneration application at a location with persistently high LMPs. Conducted interviews and facilitated discussions with senior executives to help the client gain support internally and begin to prepare for regulatory communications.

Demand Response (DR) Resource Potential and Market Impact

- **ERCOT DR Potential Study.** For ERCOT, estimated the market size for DR by end-user segment based on interviews with curtailment service providers and utilities and informed by penetration levels achieved in other regions. Presented findings to the Public Utility Commission of Texas at a workshop on resource adequacy.
- **DR Potential Study.** For an Eastern ISO, analyzed the biggest, most cost-effective opportunities for DR and price responsive demand in the footprint, and what the ISO could do to facilitate them. For each segment of the market, identified the ISO and/or state and utility initiatives that would be needed to develop various levels of capacity and energy market response. Also estimated the potential and cost characteristics for each segment. Interviewed numerous curtailment service providers and ISO personnel.
- **Wholesale Market Impacts of Price-Responsive Demand (PRD).** For NYISO, evaluated the potential effects of widespread implementation of dynamic retail rates. Utilized the PRISM model to estimate effects on consumption by customer class, applied empirically-based elasticities to hourly differences between flat retail rates and projected dynamic retail rates. Utilized the DAYZER model to estimate the effects of load changes on energy costs and prices.
- **Energy Market Impacts of DR.** For PJM and the Mid-Atlantic Distributed Resources Initiative (sponsored by five state commissions), quantified the market impacts and customer benefits of DR programs. Used a simulation-based approach to quantify the impact that a three percent reduction of peak loads during the top 20 five-hour blocks would have had in 2005 and under a variety of alternative market conditions. Utilized the DAYZER market simulation model, which we calibrated to represent the PJM market using data provided by PJM and public sources. Results were presented in multiple forums and cited widely, including by several utilities in

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their filings with state commissions regarding investment in advanced metering infrastructure and implementation of DR programs.

- **Value of DR Investments.** For Pepco Holdings, Inc., evaluated its proposed DR-enabling investments in advanced metering infrastructure and its efficiency programs. Estimated reductions in peak load that would be realized from dynamic pricing, direct load control, and efficiency. Built on the Brattle-PJM-MADRI study to estimate short-term energy market price impacts and addressed long-run equilibrium offsetting effects through supplier response scenarios. Estimated capacity price impacts and resource cost savings over time. Submitted a whitepaper to DE, NJ, MD, and DC commissions. Presented findings to DE Commission.

Gas-Electric Coordination

- **Gas Pipeline Investment for Electricity.** For the Maine Office of Public Advocate, co-sponsored testimony regarding the reliability and economic impacts if the Maine PUC signed long-term contracts for electricity customers to pay for new gas pipeline capacity into New England. Analyzed other experts' reports and provided a framework for evaluating whether such procurements would be in the public interest, considering their costs and benefits vs. alternatives.
- **Gas Pipeline Investment for Electricity.** For the Massachusetts Attorney General's office, provided input for their comments in the Massachusetts Department of Public Utilities' docket investigating whether and how new natural gas delivery capacity should be added to the New England market.
- **Fuel Adequacy and Other Winter Reliability Challenges.** For an ISO, co-authored a report assessing the risks of winter reliability events due to inadequate fuel, inadequate weatherization, and other factors affecting resource availability in the winter. Evaluated solutions being pursued by other ISOs. Proposed changes to resource adequacy requirements and energy market design to mitigate the risks.
- **Gas-Electric Reliability Challenges in the Midcontinent.** For MISO, provided a PowerPoint report assessing future gas-electric challenges as gas reliance increases. Characterized solutions from other ISOs. Provided inputs on the cost of firm pipeline gas vs. the cost and operational characteristics of dual-fuel capability.

RTO Participation and Configuration

- **Market Impacts of RTO Seams.** For a consortium of utilities, submitted written testimony to the FERC analyzing the financial and operational impact of the MISO-PJM seam on Michigan and Wisconsin. Evaluated economic hurdles across RTO seams and assessed the effectiveness of inter-RTO coordination efforts underway. Collaborated with MISO staff to leverage their PROMOD IV model to simulate electricity markets under alternative RTO configurations.

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- **Analysis of RTO Seams.** For a Wisconsin utility in a proceeding before the FERC, assisted expert witness on (1) MISO and PJM's real-time inter-RTO coordination process, and (2) the economic benefit of implementing a full joint-and-common market. Analyzed lack of convergence between MISO's and PJM's energy prices and shadow prices on reciprocal coordinated flow gates.
- **RTO Participation.** For an integrated Midwest utility, advised client on alternative RTO choices. Used GE-MAPS to model the transmission system and wholesale markets under various scenarios. Presented findings to senior management. Subsequently, in support of testimonies submitted to two state commissions, quantified the benefits and costs of RTO membership on customers, considering energy costs, FTR revenues, and wheeling revenues.

Energy Litigation

- **Demand Response Arbitration.** Provided expert testimony on behalf of a client that had acquired a demand response company and alleged that the company had overstated its demand response capacity and technical capabilities. Analyzed discovery materials including detailed demand response data to assess the magnitude of alleged overstatements. Calculated damages primarily based on a fair market valuation of the company with and without alleged overstatements. Provided deposition, expert report, and oral testimony before the American Arbitration Association (non-public).
- **Contract Damages.** For the California Department of Water Resources and the California Attorney General's office, supported expert providing testimony on damages resulting from an electricity supplier's alleged breaches of a power purchase agreement. Analyzed two years of hourly data on energy deliveries, market prices, ISO charges, and invoice charges to identify and evaluate performance violations and invoice overcharges. Assisted counsel in developing the theory of the case and provided general litigation support in preparation for and during arbitration. Resulted in successful award for client.
- **Contract Damages.** For the same client described above, supported expert providing testimony in arbitration regarding the supplier's alleged breaches in which its scheduled deliveries were not deliverable due to transmission congestion. Quantified damages and demonstrated the predictability of congestion, which the supplier was allegedly supposed to avoid in its choice of delivery points.
- **Contract Termination Payment.** For an independent power producer, supported expert testimony on damages from the termination of a long-term tolling contract for a gas-fired power plant in PJM, involving power market forecasting, financial valuation techniques, and a detailed assessment of the plant's costs and operating characteristics. Prepared witness for arbitration and assisted counsel in deposing and cross-examining opposing experts. Resulted in resounding victory for client.

Tariff and Rate Design

- **Wholesale Rates.** On behalf of a G&T co-op in the Western U.S., provided testimony regarding its wholesale rates, which are contested by member co-ops. Analyzed the G&T co-op's cost of service and its marginal cost of meeting customers' energy and peak demand requirements.
- **Transmission Tariffs.** For a merchant generating company participating in FERC hearings on developing a Long Term Transmission Pricing Structure, helped lead a coalition of stakeholders to develop a position on how to eliminate pancaked transmission rates while allowing transmission owners to continue to earn their allowed rate of return. Analyzed and presented the implications of various transmission pricing proposals on system efficiency, incentives for new investment, and customer rates throughout the MISO-PJM footprint.
- **Retail Rate Riders.** For a traditionally regulated Midwest utility, helped general counsel to evaluate and support legislation, and propose commission rules addressing rate riders for fuel and purchased power and the costs of complying with environmental regulations. Performed research on rate riders in other states; drafted proposed rules and tariff riders for client.
- **Rate Filings.** For a traditionally regulated Midwest utility, assisted counsel in preparing for a rate case. Helped draft testimonies regarding off-system sales margins and the cost of fuel.

Business Strategy

- **Preparing a Gentailer for a Transformed Wholesale Market Design.** Supported a gentailer in Alberta to prepare its generation and retail businesses for the implementation of a capacity market.
- **Evaluation of Cogeneration Venture.** For an unregulated division of a utility, evaluated a venture to build and operate cogeneration facilities. Estimated the market size and potential pricing, and assessed the client's capabilities for delivering such services. Analyzed the target customer base in detail; performed technical cost analysis for building and operating cogeneration plants; analyzed retail/default rate structures against which new cogeneration would have to compete. Senior management followed our recommendations to shut down the venture.
- **Strategic Sourcing.** For a large, diversified manufacturer, coordinated a cross-business unit client team to reengineer processes for procuring electricity, natural gas, and demand-side management services. Worked with executives to establish goals. Gathered data on energy usage patterns, costs, and contracts across hundreds of facilities. Interviewed energy managers, plant managers, and executives. Analyzed potential suppliers. Helped draft RFPs and develop negotiating strategy.

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Designed internal organizational structure (incorporating outsourced service providers) for managing energy procurement on an ongoing basis.

- **M&A Advisory.** For a European utility aiming to enter the U.S. markets and enhance its trading capability, evaluated acquisition targets. Assessed potential targets' capabilities and their value versus stock price. Reviewed experiences of acquirers in other M&A transactions. Advised client against an acquisition, just when the market was peaking (just prior to collapse).
- **Marketing Strategy.** For a power equipment manufacturer, identified the most attractive target customers and joint-venture candidates for plant maintenance services. Evaluated the cost structure and equipment mix of candidates using FERC data and proprietary data. Estimated the value client could bring to each customer. Worked with company president to translate findings into a marketing strategy.
- **Distributed Generation (DG) Market Assessment.** For the unregulated division of a major utility, performed a market assessment of DG technologies. Projected future market sizes by market segments in the U.S.
- **Fuel Cells.** For a European fuel cell component manufacturer, acted as a technology and electricity market advisor for a larger consulting team developing a market entry strategy in the U.S.

TESTIMONY and REGULATORY FILINGS

Before the FERC, Docket Nos. EL19-58 and ER19-1486, “Supplemental Affidavit of Samuel A. Newell and James A. Read Jr. on Behalf of PJM Interconnection, L.L.C.,” regarding the use of forward-looking data to estimate energy and ancillary services revenues for the purposes of determining capacity market parameters, September 17, 2020.

Before the FERC, Docket Nos. EL19-58 and ER19-1486, “Affidavit of Samuel A. Newell, James A. Read Jr., and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.,” regarding the use of forward-looking data to estimate energy and ancillary services revenues for the purposes of determining capacity market parameters, August 5, 2020.

Before the FERC, Docket Nos. EL16-49, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), “Supplemental Affidavit of Samuel A. Newell, John M. Hagerty and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.,” regarding the expansion of the Minimum Offer Price Rule in its forward capacity market, March 23, 2020.

Before the FERC, Docket Nos. EL16-49, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), “Affidavit of Samuel A. Newell, John M. Hagerty and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.,” regarding the expansion of the Minimum Offer Price Rule in its forward capacity market, March 17, 2020.

Before the Indiana General Assembly 21st Century Energy Policy Development Task Force, “Electricity Transmission Basics,” on behalf of the Indiana Energy Association, October 17, 2019.

Before the FERC, Docket No. ER19-105-000, Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters, “Affidavit of Samuel A. Newell, John M. Hagerty, and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.,” regarding the Cost of New Entry, accompanied by report, *PJM Cost of New Entry Combustion Turbines and Combined-Cycle Plants with June 1, 2022 Online Date*, October 12, 2018.

Before the FERC, Docket No. ER19-105-000, Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters, “Affidavit of Dr. Samuel A. Newell and David Luke Oates on behalf of PJM Interconnection, L.L.C.,” regarding the Variable Resource Requirement Curve Shape, accompanied by report, *Fourth Review of PJM’s Variable Resource Requirement Curve*, October 12, 2018.

Before the FERC, Docket Nos. EL16-49-000, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), Affidavit of Kathleen Spees and Samuel A. Newell Regarding the Need for a Self-Supply Exemption from Minimum Offer Price and Other Policy Supported Resource Rules on behalf of Dominion Energy Services, Inc. and Virginia Electric and Power Company, October 2, 2018.

Before the FERC, Docket Nos. EL17-32-000 and EL17-36-000, Prefiled Comments of Samuel A. Newell, Kathleen Spees, and Yingxia Yang on behalf on behalf of the Natural Resources Defense Council: “Opportunities to More Efficiently Meet Seasonal Capacity Needs in PJM,” April 15, 2018; presented oral testimony on the Seasonality Panel at FERC’s Seasonal Capacity Technical Conference on April 24, 2018.

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Before the FERC, Docket No. EL18-34-000, Samuel A. Newell, Pablo A. Ruiz, and Rebecca C. Carroll, “Evaluation of PJM’s Fast-Start Pricing Proposal,” report prepared for NextEra Energy Resources and attached to *Reply Brief of Joint Commenters*, March 14, 2018.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, oral testimony and cross examination on the electricity market impacts of the proposed Northern Pass Transmission Project, October 26-27, 2017.

Before the FERC, Docket No. AD17-11-000, Prefiled Comments of Samuel A. Newell re “Reconciling Wholesale Competitive Markets with State Policies,” April 25, 2017; and oral testimony on Industry Expert Panel at the Technical Conference on May 2, 2017.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, Prefiled Supplemental Testimony of Samuel Newell and Jurgen Weiss on behalf of the New Hampshire Counsel for the Public, with attached report, “Electricity Market Impacts of the Proposed Northern Pass Transmission Project-- Supplemental Report,” April 17, 2017.

Before the FERC, Docket No. ER17-284-000, filed “Response of Dr. Samuel A. Newell, Dr. Kathleen Spees, and Dr. David Luke Oates on behalf of Midcontinent Independent System Operator Regarding the Competitive Retail Solution,” January 13, 2017.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, Prefiled Direct Testimony of Samuel Newell and Jurgen Weiss on behalf of the New Hampshire Counsel for the Public, with attached report, “Electricity Market Impacts of the Proposed Northern Pass Transmission Project,” December 30, 2016.

Before the FERC, Docket No. ER17-284-000, filed “Testimony of Dr. Samuel A. Newell, Dr. Kathleen Spees, and Dr. David Luke Oates on behalf of Midcontinent Independent System Operator Regarding the Competitive Retail Solution,” November 1, 2016.

“Benefit-Cost Analysis of Proposed New York AC Transmission Upgrades,” Appendix 1 to Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives, Trial Staff Final Report, *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, New York State Department of Public Service, Matter No. 12-02457, Case No. 12-T-0502, September 22, 2015. Presented to NYISO and DPS Staff at the Technical Conference, Albany, NY, October 8, 2015.

Before the Maine Public Utilities Commission, Docket No. 2014-00071, filed “Testimony of Dr. Samuel A. Newell and Matthew P. O’Loughlin on Behalf of the Maine Office of the Public Advocate, Comments on LEI’s June 2015 Report and Recommendations for a Regional Analysis,” November 18, 2015.

Before the FERC, Docket No. ER14-2940-000, filed “Response of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC Regarding Variable Resource Requirement Curve,” for use in PJM’s capacity market, November 5, 2014.

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Before the FERC, Docket No. ER15-68-000, filed “Affidavit of Dr. Samuel A. Newell on behalf of PJM Interconnection, LLC,” regarding the Cost of New Entry for use in PJM’s Minimum Offer Price Rule, October 9, 2014.

Before the Texas House of Representatives Environmental Regulation Committee, Hearing on the Environmental Protection Agency’s Newly Proposed Clean Power Plan and Potential Impact on Texas, invited by Committee Chair to present, “EPA’s Clean Power Plan: Basics of the Rule, and Implications for Texas,” Austin, TX, September 29, 2014.

Before the FERC, Docket No. ER14-2940-000, filed “Affidavit of Dr. Samuel A. Newell and Mr. Christopher D. Ungate on Behalf of PJM Interconnection, LLC,” regarding the Cost of New Entry for use in PJM’s capacity market, September 25, 2014.

Before the FERC, Docket No. ER14-2940-000, filed “Affidavit of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC Regarding Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters,” September 25, 2014.

Before the Public Utilities Commission of the State of Colorado, Proceeding No. 13F-0145E, “Answer Testimony and Exhibits of Samuel A. Newell on Behalf of Tri-State Generation and Transmission Association, Inc.,” regarding an analysis of complaining parties’ responses to Tri-State Generation and Transmission Association, Inc.’s Third Set of Data Requests, Interrogatory, September 10, 2014.

Before the Maine Public Utilities Commission, Docket No. 2014-00071, “Testimony of Dr. Samuel A. Newell and Matthew P. O’Loughlin on Behalf of the Maine Office of the Public Advocate, Analysis of the Maine Energy Cost Reduction Act in New England Gas and Electricity Markets,” July 11, 2014.

Before the FERC, Docket No. ER14-1639-000, filed “Testimony of Dr. Samuel A. Newell and Dr. Kathleen Spees on behalf of ISO New England Inc. Regarding a Forward Capacity Market Demand Curve,” April 1, 2014.

Before the FERC, Docket No. ER14-1639-000, filed “Testimony of Dr. Samuel A. Newell and Mr. Christopher D. Ungate on Behalf of ISO New England Inc. Regarding the Net Cost of New Entry for The Forward Capacity Market Demand Curve,” April 1, 2014.

Before the FERC, Docket No. ER14-616-000, filed “Affidavit of Dr. Samuel A. Newell on Behalf of ISO New England Inc.,” and accompanying “2013 Offer Review Trigger Prices Study,” regarding the Minimum Offer Price Rule new capacity resources in capacity auctions, December 13, 2013.

Before the American Arbitration Association, provided expert testimony (deposition, written report, and oral testimony at hearing) in a dispute involving the acquisition of a demand response company, July-November, 2013. (Non-public).

Before the Public Utility Commission of Texas, at a workshop on Project No. 40000, presented “Report On ORDC B+ Economic Equilibrium Planning Reserve Margin Estimates Prepared By The Brattle Group,” on behalf of The Electric Reliability Council of Texas (ERCOT), June 25, 2013. Subsequently

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filed additional comments, “Additional ORDC B+ Economic Equilibrium Planning Reserve Margin Estimates,” July 29, 2013.

Before the FERC, Docket No. ER13-535-000, filed “Affidavit of Dr. Samuel A. Newell on Behalf of the ‘Competitive Markets Coalition’ Group Of Generating Companies,” supporting PJM’s proposed tariff revisions to change certain terms regarding the Minimum Offer Price Rule in the Reliability Pricing Model, December 28, 2012.

Before the FERC, Docket No. ER12-513-000, filed “Affidavit of Dr. Samuel A. Newell on Behalf of PJM Interconnection, LLC,” in support of PJM’s Settlement Agreement regarding the Cost of New Entry for use in PJM’s capacity market, November 21, 2012.

Before the Texas House of Representatives State Affairs Committee, Hearing on the issue of resource adequacy in the Texas electricity market, presented “The Resource Adequacy Challenge in ERCOT,” on behalf of The Electric Reliability Council of Texas, October 24, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented “Resource Adequacy in ERCOT: ‘Composite’ Policy Options,” and “Estimate of DR Potential in ERCOT” on behalf of The Electric Reliability Council of Texas (ERCOT), October 25, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented “ERCOT Investment Incentives and Resource Adequacy,” September 6, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented “Summary of Brattle’s Study on ERCOT Investment Incentives and Resource Adequacy,” July 27, 2012.

Before the FERC, Docket No. ER12-___-000, Affidavit of Dr. Samuel A. Newell on Behalf of SIG Energy, LLLP, March 29, 2012, Confidential Exhibit A in Complaint of Sig Energy, LLLP, SIG Energy, LLLP v. California Independent System Operator Corporation, Docket No. EL 12-___-000, filed April 4, 2012 (Public version, confidential information removed).

Before the FERC, Docket No. ER12-13-000, filed “Response of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC,” regarding the Cost of New Entry for use in PJM’s capacity market, January 13, 2012.

Before the FERC, Docket No. ER12-13-000, Affidavit of Dr. Samuel A. Newell on Behalf of PJM Interconnection, LLC, re: the Cost of New Entry Estimates for Delivery Year 2015/16 in PJM’s Reliability Pricing Model, filed December 1, 2011.

Before the FERC, Docket Nos. ER11-4069 and ER11-4070, Direct testimony of Johannes Pfeifenberger and Samuel Newell on behalf of the RITELine Companies, re: the public policy, congestion relief, and economic benefits of the RITELine Transmission Project, filed July 18, 2011.

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Before the FERC, Docket No. EL11-13-000, Direct testimony of Johannes Pfeifenberger and Samuel Newell on behalf of The AWC Companies re: the public policy, reliability, congestion relief, and economic benefits of the Atlantic Wind Connection Project, filed December 20, 2010.

“Economic Evaluation of Alternative Demand Response Compensation Options,” whitepaper filed by ISO-NE in its comments on FERC’s Supplemental Notice of Proposed Rulemaking in Docket No. RM10-17-000, October 13, 2010 (with K. Madjarov).

Before the FERC, Docket No. RM10-17-000, Filed Comments re: Supplemental Notice of Proposed Rulemaking and September 13, 2010 Technical Conference, October 5, 2010 (with K. Spees and P. Hanser).

Before the FERC, Docket No. RM10-17-000, Filed Comments re: Notice of Proposed Rulemaking regarding wholesale compensation of demand response, May 13, 2010 (with K. Spees and P. Hanser).

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2010 “Integrated Resource Plan for Connecticut” (see below), June 2010.

2010 “Integrated Resource Plan for Connecticut,” report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board, January 4, 2010. Presented to the Connecticut Energy Advisory Board January 8, 2010.

“Dynamic Pricing: Potential Wholesale Market Benefits in New York State,” lead authors: Samuel Newell and Ahmad Faruqui at The Brattle Group, with contributors Michael Swider, Christopher Brown, Donna Pratt, Arvind Jaggi and Randy Bowers at the New York Independent System Operator, submitted as “Supplemental Comments of the NYISO Inc. on the Proposed Framework for the Benefit-Cost Analysis of Advanced Metering Infrastructure,” in State of New York Public Service Commission Case 09-M-0074, December 17, 2009.

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2009 “Integrated Resource Plan for Connecticut” (see below), June 30, 2009.

2009 “Integrated Resource Plan for Connecticut,” report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board, January 1, 2009.

“Informational Filing of the Internal Market Monitoring Unit’s Report Analyzing the Operations and Effectiveness of the Forward Capacity Market,” prepared by Dave LaPlante and Hung-po Chao of ISO-NE with Sam Newell, Metin Celebi, and Attila Hajos of The Brattle Group, filed with FERC on June 5, 2009 under Docket No. ER09-1282-000.

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2008 “Integrated Resource Plan for Connecticut” and “Supplemental Reports” (see below), September 22, 2008.

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“Integrated Resource Plan for Connecticut,” co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board; co-authored with M. Chupka, A. Faruqui, and D. Murphy, January 2, 2008. Supplemental Report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Department of Utility Control; co-authored with M. Chupka, August 1, 2008.

“Quantifying Customer Benefits from Reductions in Critical Peak Loads from PHI’s Proposed Demand-Side Management Programs,” whitepaper by Samuel A. Newell and Ahmad Faruqui filed by Pepco Holdings, Inc. with the Public Utility Commissions of Delaware (Docket No. 07-28, 9/27/2007), Maryland (Case No. 9111, filed 12/21/07), New Jersey (BPU Docket No. EO07110881, filed 11/19/07), and Washington, DC (Formal Case No. 1056, filed 10/1/07). Presented orally to the Public Utility Commission of Delaware, September 5, 2007.

Before the Public Service Commission of Wisconsin, Docket 137-CE-149, “Planning Analysis of the Paddock-Rockdale Project,” report by American Transmission Company re: transmission cost-benefit analysis, April 5, 2007 (with J.P. Pfeifenberger and others).

Prepared Supplemental Testimony on Behalf of the Michigan Utilities before the FERC, Docket No. ER04-718-000 et al., re: Financial Impact of ComEd’s and AEP’s RTO Choices, December 21, 2004 (with J. P. Pfeifenberger).

Prepared Direct and Answering Testimony on Behalf of the Michigan-Wisconsin Utilities before the FERC, Docket No. ER04-375-002 et al., re: Financial Impact of ComEd’s and AEP’s RTO Choices on Michigan and Wisconsin, September 15, 2004 (with J.P. Pfeifenberger).

Declaration on Behalf of the Michigan-Wisconsin Utilities before the FERC, Docket No. ER04-375-002 et al., re: Financial Impact of ComEd’s and AEP’s RTO Choices on Michigan and Wisconsin, August 13, 2004 (with J.P. Pfeifenberger).

PUBLICATIONS

Offshore Wind Transmission: An Analysis of Options for New York, report prepared for Anbaric, August 2020 (with J. Pfeifenberger, W. Graf, and K. Spokas).

Singapore Foreward Capacity Market—FCM Design Proposal (third Consultation Paper), prepared for the Singapore Energy Market Authority, May 2020 (with J. Chang and W. Graf). Followed draft proposals in first and second Consultation papers in May 2019 and Dec 2019.

Quantitative Analysis of Resource Adequacy Structures, report prepared for NYSERDA and NYSDPS, July 1, 2020 (with K. Spees, J. Imon Pedtke, and M. Tracy). Update to version from May 29, 2020.

New York’s Evolution to a Zero Emission Power System: Modeling Operations and Investment Through 2040 Including Alternative Scenarios, report prepared for NYISO Stakeholders, June 22, 2020 (with R. Lueken, J. Weiss, S. Crocker Ross, and J. Moraski). Update to version from May 18, 2020.

SAMUEL A. NEWELL

Qualitative Analysis of Resource Adequacy Structures for New York, report prepared for NYSERDA and NYSDPS, May 19, 2020 (with K. Spees and J. Imon Pedtke).

Offshore Transmission in New England: The Benefits of a Better-Planned Grid, report prepared for Anbaric, May 2020 (with J. Pfeifenberger and W. Graf).

Implementing Recommended Improvements to Market Power Mitigation in the WEM, report prepared for Energy Policy WA in Western Australia, April 2020 (with T. Brown).

Gross Avoidable Cost Rates for Existing Generation and Net Cost of New Entry for New Energy Efficiency, report prepared for PJM, March 17, 2020 (with M. Hagerty, S. Sergici, E. Cohen, S. Gang, J. Wroble, and P. Daou).

“Forward Clean Energy Markets: A New Solution to State-RTO Conflicts,” *Utility Dive*, January 27, 2020 (with K. Spees and J. Pfeifenberger.)

How States, Cities, and Customers Can Harness Competitive Markets to Meet Ambitious Carbon Goals: Through a Forward Market for Clean Energy Attributes: Expanded Report Including a Detailed Market Design Proposal, report prepared for NRG, September 2019 (with K. Spees, W. Graf, and E. Shorin).

International Review of Demand Response Mechanisms in Wholesale Markets, report for the Australian Energy Market Commission, June 2019 (with T. Brown, K. Spees, and C. Wang).

How States, Cities, and Customers Can Harness Competitive Markets to Meet Ambitious Carbon Goals: Through a Forward Market for Clean Energy Attributes, report prepared for NRG, April 2019 (with K. Spees, W. Graf, and E. Shorin).

Estimation of the Market Equilibrium and Economically Optimal Reserve Margins for the ERCOT Region, 2018 Update, Final Draft, prepared for the Electric Reliability Council of Texas, December 20, 2018 (with R. Carroll, A. Kaluzhny, K. Spees, K. Carden, N. Wintermantel, and A. Krasny).

Harmonizing Environmental Policies with Competitive Markets: Using Wholesale Power Markets to Meet State and Customer Demand for a Cleaner Electricity Grid More Cost Effectively, discussion paper, July 2018 (with K. Spees, J. Pfeifenberger, and J. Chang).

Fourth Review of PJM’s Variable Resource Requirement Curve, report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, April 16, 2018 (with J. Pfeifenberger, K. Spees, and others).

PJM Cost of New Entry Combustion Turbines and Combined-Cycle Plants with June 1, 2022 Online Date, report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, April 19, 2018 (with J. Michael Hagerty, J. Pfeifenberger, S. Gang of Sargent & Lundy, and others).

Evaluation of the DOE’s Proposed Grid Resiliency Pricing Rule, [whitepaper](#) prepared for NextEra Energy Resources, October 23, 2017 (with M. Celebi, J. Chang, M. Chupka, and I. Shavel).

SAMUEL A. NEWELL

Near Term Reliability Auctions in the NEM: Lessons from International Jurisdictions, report prepared for the Australian Energy Market Operator, August 23, 2017 (with K. Spees, D.L. Oates, T. Brown, N. Lessem, D. Jang, and J. Imon Pedtke).

Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals, [whitepaper](#) prepared for the New York Independent System Operator, August 11, 2017 (with R. Lueken, J. Weiss, K. Spees, P. Donohoo-Vallett, and T. Lee).

“How wholesale power markets and state environmental Policies can work together,” [Utility Dive](#), July 10, 2017 (with J. Pfeifenberger, J. Chang, and K. Spees).

Market Power Mitigation Mechanisms for the Wholesale Electricity Market in Western Australia, whitepaper prepared for the Public Utilities Office in the Government of W. Australia's Department of Finance, September 1, 2016 (with T. Brown, W. Graf, J. Reitzes, H. Trewn, and K. Van Horn).

Western Australia's Transition to a Competitive Capacity Auction, report prepared for Enernoc, January 29, 2016 (with K. Spees and C. McIntyre).

Enhancing the Efficiency of Resource Adequacy Planning and Procurements in the Midcontinent ISO Footprint—Options for MISO, Utilities, and States, report prepared for NRG, November 9, 2015 (with K. Spees and R. Lueken).

International Review of Demand Response Mechanisms, report prepared for Australian Energy Market Commission, October 2015 (with T. Brown, K. Spees, and D.L. Oates).

Resource Adequacy in Western Australia — Alternatives to the Reserves Capacity Mechanism, report prepared for EnerNOC, Inc., August 2014 (with K. Spees).

Third Triennial Review of PJM's Variable Resource Requirement Curve, report prepared for PJM Interconnection, LLC, May 15, 2014 (with J. Pfeifenberger, K. Spees, A. Murray, and I. Karkatsouli).

Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM, report prepared for PJM Interconnection, LLC, May 15, 2014 (with M. Hagerty, K. Spees, J. Pfeifenberger, Q. Liao, and with C. Ungate and J. Wroble at Sargent & Lundy).

Developing a Market Vision for MISO: Supporting a Reliable and Efficient Electricity System in the Midcontinent, foundational report prepared for Midcontinent Independent System Operator, Inc., January 27, 2014 (with K. Spees and N. Powers).

Estimating the Economically Optimal Reserve Margin in ERCOT, report prepared for the Public Utilities Commission of Texas, January 2014 (with J. Pfeifenberger, K. Spees, and I. Karkatsouli).

“Capacity Markets: Lessons Learned from the First Decade,” *Economics of Energy & Environmental Policy*. Vol. 2, No. 2, Fall 2013 (with J. Pfeifenberger and K. Spees).

ERCOT Investment Incentives and Resource Adequacy, report prepared for the Electric Reliability Council of Texas, June 1, 2012 (with K. Spees, J. Pfeifenberger, R. Mudge, M. DeLucia, and R. Carlton).

SAMUEL A. NEWELL

“Trusting Capacity Markets: does the lack of long-term pricing undermine the financing of new power plants?” *Public Utilities Fortnightly*, December 2011 (with J. Pfeifenberger).

Second Performance Assessment of PJM’s Reliability Pricing Model: Market Results 2007/08 through 2014/15, prepared for PJM Interconnection LLC, August 26, 2011 (with J. Pfeifenberger, K. Spees).

Cost of New Entry Estimates for Combustion-Turbine and Combined-Cycle Plants in PJM, report prepared for PJM Interconnection LLC, August 24, 2011 (with J. Pfeifenberger, K. Spees, and others).

“Fostering economic demand response in the Midwest ISO,” *Energy* 35 (2010) 1544–1552 (with A. Faruqui, A. Hajos, and R.M. Hledik).

“DR Distortion: Are Subsidies the Best Way to Achieve Smart Grid Goals?” *Public Utilities Fortnightly*, November 2010.

Midwest ISO’s Resource Adequacy Construct: An Evaluation of Market Design Elements, report prepared for MISO, January 2010 (with K. Spees and A. Hajos).

Demand Response in the Midwest ISO: An Evaluation of Wholesale Market Design, report prepared for MISO, January 2010 (with A. Hajos).

Cost-Benefit Analysis of Replacing the NYISO’s Existing ICAP Market with a Forward Capacity Market, whitepaper for the NYISO and stakeholders, June 15, 2009 (with A. Bhattacharyya and K. Madjarov).

Fostering Economic Demand Response in the Midwest ISO, whitepaper written for MISO, December 30, 2008 (with R. Earle and A. Faruqui).

Review of PJM’s Reliability Pricing Model (RPM), report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, June 30, 2008 (with J. Pfeifenberger and others).

“Reviving Integrated Resource Planning for Electric Utilities: New Challenges and Innovative Approaches,” *Energy*, Vol. 1, 2008, The Brattle Group (with M. Chupka and D. Murphy).

Enhancing Midwest ISO’s Market Rules to Advance Demand Response, report written for MISO, March 12, 2008 (with R. Earle).

“The Power of Five Percent,” *The Electricity Journal*, October 2007 (with A. Faruqui, R. Hledik, and J. Pfeifenberger).

Quantifying Customer Benefits from Reductions in Critical Peak Loads from PHI’s Proposed Demand-Side Management Programs, prepared for Pepco Holdings, Inc., September 21, 2007 (with A. Faruqui).

Review of PJM’s Market Power Mitigation Practices in Comparison to Other Organized Electricity Markets, Report prepared for PJM Interconnection LLC, September 14, 2007 (with P. Fox-Penner, J. Pfeifenberger, J. Reitzes, and others).

SAMUEL A. NEWELL

“Valuing Demand-Response Benefits in Eastern PJM,” *Public Utilities Fortnightly*, March 2007 (with J. Pfeifenberger and F. Felder).

Quantifying Demand Response Benefits in PJM, study report prepared for PJM Interconnection, LLC and the Mid-Atlantic Distributed Resources Initiative, January 29, 2007 (with F. Felder).

“Modeling Power Markets: Uses and Abuses of Locational Market Simulation Models,” *Energy*, Vol. 2, 2006, The Brattle Group (with J. Pfeifenberger).

“Innovative Regulatory Models to Address Environmental Compliance Costs in the Utility Industry,” October 2005 Newsletter, American Bar Association, Section on Environment, Energy, and Resources; Vol. 3 No. 1 (with J. Pfeifenberger).

PRESENTATIONS

“Offshore Wind Transmission: An Analysis of Options for New York,” presented at LCV Virtual Policy Forum, August 6, 2020 (with J. Pfeifenberger, W. Graf, and K. Spokas).

“Possible Paths Forward from MOPR,” presented to Power Markets Today webinar on “Capacity Market Alternatives for States,” July 15, 2020.

“Considerations for Meeting Sub-Annual Needs, and Resource Accreditation across RTOs,” presented to MISO Resource Adequacy Subcommittee, July 8, 2020 (with J. Pfeifenberger, M. Hagerty, and W. Graf).

“New York’s Evolution to a Zero Emission Power System—Modeling Operations and Investment Through 2040 Including Alternative Scenarios,” presented to NYISO Stakeholders, June 22, 2020 (with R. Lueken, J. Weiss, S. Ross, and J. Moraski).

“Singapore Foreward Capacity Market Design—Industry Briefing Sessions,” presented via video to Singapore electricity market stakeholders, June 5&9, 2020 (with W. Graf).

“Industry Changes in Resource Adequacy Requirements,” presented to MISO Resource Adequacy Subcommittee, May 6, 2020 (with J. Pfeifenberger, M. Hagerty, and W. Graf).

“NYISO Grid in Transition Study: Detailed Assumptions and Modeling Description,” presented to NYISO Stakeholders, March 30, 2020 (with R. Lueken, J. Weiss, J. Moraski, and S. Ross).

“Electricity Market Designs to Achieve and Accommodate Deep Decarbonization,” presented to Advanced Energy Economy (AEE) video conference, “ISO-NE in 2050: Getting To An Advanced Energy Future In New England,” March 18, 2020.

“U.S. Offshore Wind Generation, Grid Constraints, and Transmission Needs,” presented at Offshore Wind Transmission, USA Conference, September 18, 2019 (with J. Pfeifenberger and K. Spokas).

“Pollution Pricing in the Power Sector: Market-Friendly Tools for Incorporating Public Policy,” presented to GCPA Spring Conference, Houston, TX, April 16, 2019.

SAMUEL A. NEWELL

“The Transformation of the Power Sector to Clean Energy: Economic and Reliability Challenges,” keynote address to the Power Engineers 4th Annual Power Symposium, Weehawken, NJ, April 4, 2019.

“Market Design for Winter Energy Security in New England: Further Discussion of Options,” presented to The New England Power Pool Markets Committee on behalf of NextEra Energy Resources, Westborough, MA, February 6, 2019 (with D.L. Oates and P. Ruiz).

“Market Design for Winter Energy Security in New England: Discussion of Options,” presented to The New England Power Pool Markets Committee on behalf of NextEra Energy Resources, Westborough, MA, January 9, 2019 (with D.L. Oates).

“Market Equilibrium Reserve Margin in ERCOT,” presented to Power Markets Today webinar, “A Post Summer Check-in of ERCOT’s Market,” October 31, 2018.

“Carbon Pricing in NYISO’s Wholesale Energy Market, and Applicability to Multi-State RTO markets,” presented to Raab Policy Roundtable, May 23, 2018; presented to the Energy Bar Association, 2018 EBA Energizer: Pricing Carbon in Energy Markets, June 5, 2018; presented to Bank of America Merrill Lynch, June 25, 2018.

“Reconciling Resilience Services with Current Market Design,” presented to RFF/R-Street Conference on “Economic Approaches to Understanding and Addressing Resilience in the Bulk Power System,” Washington, D.C., May 30, 2018.

“System Flexibility and Renewable Energy Integration: Overview of Market Design Approaches,” presented to Texas-Germany Bilateral Dialogue on Challenges and Opportunities in the Electricity Market, Austin, TX, February 26, 2018.

“Natural Gas Reliability: Understanding Fact from Fiction,” panelist at the NARUC Winter Policy Summit presented to The Committee on Gas, Washington, D.C., February 13, 2018 (with A. Thapa, M. Witkin, and R. Wong).

“Carbon Pricing in Wholesale Markets: Takeaways from NYISO Carbon Charge Study,” presented to Harvard Electric Policy Group, October 12, 2017.

“Pricing Carbon into NYISO’s Wholesale Energy Market: Study Overview and Summary of Findings,” presented to NYISO Business Issues Committee, September 12, 2017.

“Carbon Adders in Wholesale Power Markets—Preventing Leakage,” panelist at Resources for the Future’s workshop on carbon pricing in wholesale markets, Washington, D.C., August 2, 2017.

“Market-Based Approaches to Support States’ Decarbonization Objectives,” panelist at Independent Power Producers of New York (IPPNY) 2017 Spring Conference, Albany, NY, May 10, 2017.

“ERCOT’s Future: A Look at the Market Using Recent History as a Guide,” panelist at the Gulf Coast Power Association’s Fall Conference, Austin, TX, October 4, 2016.

SAMUEL A. NEWELL

“The Future of Wholesale Electricity Market Design,” presented to Energy Bar Association 2016 Annual Meeting & Conference, Washington, DC, June 8, 2016.

“Performance Initiatives and Fuel Assurance—What Price Mitigation?” presented to Northeast Energy Summit 2015 Panel Discussion, Boston, MA, October 27, 2015.

“PJM Capacity Auction Results and Market Fundamentals,” presented to Bloomberg Analyst Briefing Webinar, September 18, 2015 (with J. Pfeifenberger and D.L. Oates).

“Energy and Capacity Market Designs: Incentives to Invest and Perform,” presented to EUCI Conference, Cambridge, MA, September 1, 2015.

“Electric Infrastructure Needs to Support Bulk Power Reliability,” presented to GEMI Symposium: Reliability and Security across the Energy Value Chain, The University of Houston, Houston, TX, March 11, 2015.

Before the Arizona Corporation Commission, Commission Workshop on Integrated Resource Planning, Docket No. E-00000V-13-0070, presented “Perspectives on the IRP Process: How to get the most out of IRP through a collaborative process, broad consideration of resource strategies and uncertainties, and validation or improvement through market solicitations,” Phoenix, AZ, February 26, 2015.

“Resource Adequacy in Western Australia—Alternatives to the Reserve Capacity Mechanism (RCM),” presented to The Australian Institute of Energy, Perth, WA, October 9, 2014.

“Customer Participation in the Market,” panelist on demand response at Gulf Coast Power Association Fall Conference, Austin, TX, September 30, 2014.

“Market Changes to Promote Fuel Adequacy—Capacity Market to Promote Fuel Adequacy,” presented to INFOCAST- Northeast Energy Summit 2014 Panel Discussion, Boston, MA, September 17, 2014.

“EPA’s Clean Power Plan: Basics and Implications of the Proposed CO₂ Emissions Standard on Existing Fossil Units under CAA Section 111(d),” presented to Goldman Sachs Power, Utilities, MLP and Pipeline Conference, New York, NY, August 12, 2014.

“Capacity Markets: Lessons for New England from the First Decade,” presented to Restructuring Roundtable Capacity (and Energy) Market Design in New England, Boston, MA, February 28, 2014.

“The State of Things: Resource Adequacy in ERCOT,” presented to INFOCAST – ERCOT Market Summit 2014 Panel Discussion, Austin, TX, February 24-26, 2014.

“Resource Adequacy in ERCOT,” presented to FERC/NARUC Collaborative Winter Meeting in Washington, D.C., February 9, 2014.

“Electricity Supply Risks and Opportunities by Region,” presentation and panel discussion at Power-Gen International 2013 Conference, Orlando, FL, November 13, 2013.

SAMUEL A. NEWELL

“Get Ready for Much Spikier Energy Prices—The Under-Appreciated Market Impacts of Displacing Generation with Demand Response,” presented to the Cadwalader Energy Investor Conference, New York, NY, February 7, 2013 (with K. Spees).

“The Resource Adequacy Challenge in ERCOT,” presented to The Texas Public Policy Foundation’s 11th Annual Policy Orientation for legislators, Austin, TX, January 11, 2013.

“Resource Adequacy in ERCOT: the Best Market Design Depends on Reliability Objectives,” presented to the Harvard Electricity Policy Group conference, Washington, D.C., December 6, 2012.

“Resource Adequacy in ERCOT,” presented to the Gulf Coast Power Association Fall Conference, Austin, TX, October 2, 2012.

“Texas Resource Adequacy,” presented to Power Across Texas, Austin, TX, September 21, 2012.

“Resource Adequacy and Demand Response in ERCOT,” presented to the Center for the Commercialization of Electric Technologies (CCET) Summer Board Meeting, Austin, TX, August 8, 2012.

“Summary of Brattle’s Study on ‘ERCOT Investment Incentives and Resource Adequacy,’” presented to the Texas Industrial Energy Consumers annual meeting, Austin, TX, July 18, 2012.

“Market-Based Approaches to Achieving Resource Adequacy,” presentation to Energy Bar Association Northeast Chapter Annual Meeting, Philadelphia, PA, June 6, 2012.

“Fundamentals of Western Markets: Panel Discussion,” WSPP’s Joint EC/OC Meeting, La Costa Resort, Carlsbad, CA, February 26, 2012 (with J. Weiss).

“Integrated Resource Planning in Restructured States,” presentation at EUCI conference on “Supply and Demand-Side Resource Planning in ISO/RTO Market Regimes,” White Plains, NY, October 17, 2011.

“Demand Response Gets Market Prices: Now What?” NRRI teleseminar panelist, June 9, 2011.

Before the PJM Board of Directors and senior level representatives at PJM’s General Session, panel member serving as an expert in demand response on behalf of Pepco Holdings, Inc., December 22, 2007.

“Resource Adequacy in New England: Interactions with RPS and RGGI,” Energy in the Northeast Law Seminars International Conference, Boston, MA, October 18, 2007.

“Corporate Responsibility to Stakeholders and Criteria for Assessing Resource Options in Light of Environmental Concerns,” Bonbright Electric & Natural Gas 2007 Conference, Atlanta, GA, October 3, 2007.

“Evaluating the Economic Benefits of Transmission Investments,” EUCI’s Cost-Effective Transmission Technology Conference, Nashville, TN, May 3, 2007 (with J. Pfeifenberger, presenter).

SAMUEL A. NEWELL

“Quantifying Demand Response Benefits in PJM,” PowerPoint presentation to the Mid-Atlantic Distributed Resources Initiative (MADRI) Executive Committee on January 13, 2007, to the MADRI Working Group on February 6, 2007, as Webinar to the U.S. Demand Response Coordinating Council, and to the Pennsylvania Public Utility Commission staff April 27, 2007.

“Who Will Pay for Transmission,” CERA Expert Interview, Cambridge, MA, January 15, 2004.

“Reliability Lessons from the Blackout; Transmission Needs in the Southwest,” presented at the Transmission Management, Reliability, and Siting Workshop sponsored by Salt River Project and the University of Arizona, Phoenix, AZ, December 4, 2003.

“Application of the ‘Beneficiary Pays’ Concept,” presented at the CERA Executive Retreat, Montreal, Canada, September 17, 2003.

Rebuttal Testimony (Samuel A. Newell)

Exhibit ____ (SN-2)

Response to the Direct Testimony of Cricket Valley Energy Center, LLC and Guidehouse Inc.

NEW YORK STATE PUBLIC SERVICE
COMMISSION: CASE 19-T-0684

PREPARED FOR

New York Transco LLC

PREPARED BY

Samuel A. Newell

September 30, 2020

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I. Introduction

My name is Samuel A. Newell, and I am employed by The Brattle Group (“Brattle”) as a Principal and as the leader of the firm’s Electricity Practice. I am an economist and engineer with 22 years of experience consulting in wholesale electricity market design, wholesale market analysis, generation asset valuation, integrated resource planning, and transmission benefit-cost analysis. Prior to joining The Brattle Group in 2004, I was the Director of the Transmission Service at Cambridge Energy Research Associates and previously a Manager in the Utilities Practice at Kearney. I earned a Ph.D. in Technology Management and Policy from the Massachusetts Institute of Technology, an M.S. in Materials Science and Engineering from Stanford University, and a B.A. in Chemistry and Physics from Harvard College.

I led the original benefit-cost analysis of candidate public policy transmission projects on behalf of the New York State Department of Public Service (“NYDPS”) and the New York State Independent System Operator, Inc. (“NYISO”) in the New York State Public Service Commission’s (the “Commission”) 2015 AC Transmission Proceeding. I also led a Brattle study for NYISO projecting the resource mix needed to cost-effectively meet the state’s Climate Leadership and Community Protection Act (the “CLCPA”) goals and maintain reliability and several other studies regarding carbon pricing, offshore wind, and capacity markets in New York’s wholesale electricity market for the NYISO, the New York State Energy Research & Development Authority (“NYSERDA”), and offshore wind developers, as well as benefit-cost analyses of transmission in other jurisdictions. A more complete summary of my qualifications is attached as Exhibit SN-1 to my testimony.

I am submitting this Report on behalf of New York Transco LLC (“Transco”) in support of Transco’s Application for a Certificate of Environmental Compatibility and Public Need (the “Application”) to construct, operate, and maintain the New York Energy Solution project (the “Project”). The Project, also referred to as “Segment B,” is one portion of the transmission upgrades that meet the Commission’s declared transmission need “for new 345 kV major electric transmission facilities to cross the Central East [“Segment A”] and UPNY/SENY interfaces [“Segment B”] to provide additional transmission capacity to move power from upstate to downstate” (the “AC Transmission Needs”).¹ Transco filed the Application on October 18, 2019 in Case 19-T-0684 (the “Proceeding”).

¹ Case 12-T-0502, *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, Order Finding Transmission Needs Driven by Public Policy Requirements (Issued Dec. 17, 2015), at 2.

Specifically, the purpose of this Report is to respond to the Direct Testimony of Ronald E. Paryl and the Direct Testimony of Amanvir Chahal and Matthew Tanner of Guidehouse Inc. (“Guidehouse”) filed by Cricket Valley Energy Center, LLC (“CVEC”) in opposition to the Application.² I refer to Segment A and Segment B (collectively, the “Projects”) together throughout this Report because both Segment A and Segment B were discussed together throughout much of the testimony that CVEC submitted.

Specifically, I have been asked to respond to the following assertions by CVEC:

1. The claim that the Projects are “unnecessary” and “uneconomic” based on analysis by Guidehouse and claimed implications of recent policy developments;³
2. The assertion that the Projects would distort market prices and unduly harm CVEC in ways it could not have anticipated; and that CVEC should be compensated for its lost revenues if the Projects are built;⁴ and
3. The argument that the Commission should delay approval of the Projects until after it has “the final program for CLCPA implementation.”⁵

To address these issues, I reviewed the testimonies and analyses filed by CVEC as well as CVEC’s responses to discovery requests. I compared CVEC’s assumptions, methods, and conclusions to a broader set of data and studies, which I will reference below. I also evaluated CVEC’s claims in the context of the wholesale competitive market and regulatory environment in which CVEC’s plant operates and in which the Projects will be built.

² CVEC owns and operates an approximately 1,100-megawatt natural gas-fired combined cycle power plant located in Dover, New York that transmits its output via a recently-constructed 14.6-mile 345 kV transmission line connecting to the Consolidated Edison Company of New York, Inc. Pleasant Valley Substation located in the Town of Pleasant Valley in eastern Dutchess County. CVEC participates in the competitive wholesale energy and capacity markets administered by the NYISO and subject to Federal Energy Regulatory Commission-approved tariffs.

On September 2, 2020, CVEC filed, among other things, the following in the Proceeding: (i) direct testimony of Ronald E. Paryl, Director, Markets and Risk Management, of Advanced Power North America (referred to herein as “REP”); (ii) direct testimony of a panel consisting of Amanvir Chahal and Matthew Tanner, Directors in Energy at Guidehouse (referred to herein as “AC/MT”); (iii) Exhibit __ (CVEC-3) (Guidehouse Inc. Analysis of PPTN Transmission Project Segment B); and (iv) Exhibit __ (CVEC-4) (Cricket Valley Energy Center Economic Impact Analysis).

³ See *e.g.* REP-11.

⁴ See REP-6-11; *see also* REP-21-23.

⁵ REP-15:12-13.

II. Summary of Opinions

My conclusions about CVEC's three claims are as follows:

1. The Commission identified a need for certain additional transmission facilities in 2015 and reaffirmed that need in 2017 and 2019, which the Projects were ultimately selected to satisfy. The available evidence shows that the Projects will provide benefits that exceed costs; they cannot be considered “unnecessary” and “uneconomic”:
 - a. In 2019, the NYISO and the NYISO Market Monitoring Unit (“MMU”) quantified benefits in excess of costs and identified additional unquantified benefits. The subsequent passage of New York’s CLCPA can be expected to *increase* the prospective value of the Projects, not decrease it as claimed by CVEC.
 - b. Guidehouse’s analysis of the benefits of the Projects significantly understates both the near-term and long-term value of the Projects to New York electricity customers.
2. Because the Projects have net benefits, they are economically efficient, which means they will neither “distort” the market nor hurt customers. In contrast, eliminating, delaying, or downsizing the Projects would distort the market away from an efficient, least-cost outcome. There is no reason to compensate CVEC for the impact of economically-efficient transmission projects developed under the applicable transmission planning processes.
3. Delaying the approval process for further study is unlikely to result in new information that would change the conclusion that the Projects provide net benefits. Rather, doing so would delay the realization of those benefits and the State’s progress toward establishing the basic infrastructure needed to accomplish the CLCPA’s goals.

A. The Projects Are Needed and Provide Net Benefits

As discussed in more detail below, in 2015 the Commission determined that certain transmission upgrades are necessary to satisfy the AC Transmission Needs and reaffirmed that need in 2017 and 2019. In 2019, in accordance with the requirements of the NYISO’s Public Policy Transmission Planning Process (“Public Policy Process”) located in Attachment Y of the NYISO’s Open Access Transmission Tariff (“OATT”), the NYISO Board of Directors (the “Board”) selected the Projects as the more efficient or cost-effective transmission solution based on, among other

metrics, their net economic benefits and their ability to meet the Commission-specified AC Transmission Needs.⁶ The Board referred to analysis from the NYISO with modifications by the MMU, which, under the scenario corresponding to the market and policy outlook at the time, showed quantified benefits of more than 1.5 times the Projects' costs, before even considering additional non-quantified benefits.⁷ Quantified benefits included capacity benefits, production cost savings, and environmental benefits from accessing relatively low-cost and clean Upstate electric generation resources, as well as the avoided costs of other transmission facilities that the Projects will replace or obviate.⁸ Additional non-quantified benefits include improved market competition, enhanced planning and operational flexibility, and enhanced resiliency/storm hardening.

Since that NYISO-MMU evaluation, the grid has continued to experience high congestion costs from Upstate to Downstate that the Projects would help relieve—nearly \$150 million per year of congestion cost across the Central East interface in 2019,⁹ which may worsen further when Indian Point Energy Center retires between 2020-2021. Sizable capacity price differentials of \$3.70/kW-month on average have also persisted from Upstate to Downstate over the past three capability periods,¹⁰ and the Projects would help meet Downstate needs with lower-cost Upstate capacity.

⁶ NYISO, *NYISO Board of Directors' Decision on Approval of AC Transmission Public Policy Transmission Planning Report and Selection of Public Policy Transmission Projects* (Dated April 8, 2019). Available at <https://www.nyiso.com/documents/20142/1390750/Board-Decision-AC-Transmission-2019-04-08.pdf/32323d32-f534-a790-1b03-2cb110033320> (last accessed Sep. 29, 2020).

⁷ As I explain below, NYISO relied on the 2017 CARIS assumptions for its “Baseline” scenario and, separately, adjusted the resource mix to reflect the market and policy outlook at the time in its “CES+Retirement” scenario, including an additional 16 GW of renewable generating capacity to achieve the Clean Energy Standard, and updated nuclear, coal, and Downstate peaker retirements. The NYISO identified production cost and capacity procurement cost savings that result in a benefit-to-cost ratio of 0.8 to 1.1 for the six projects in the Baseline scenario and 1.5 to 1.8 for the CES+Retirement scenario.

⁸ Potomac Economics, Market Monitoring Unit for the NYISO, *NYISO MMU Evaluation of the Proposed AC Public Policy Transmission Projects* (Dated February 2019), at 10. Available at <https://www.nyiso.com/documents/20142/5172540/04d%20AC%20Transmission%20ApnxE%20MMU%20Report.pdf/113062e4-4ae4-9b7d-46a5-3eec40ad739d> (last accessed Sep. 29, 2020).

⁹ Potomac Economics, Market Monitoring Unit for the NYISO, *2019 State of the Market Report for the New York ISO Markets* (Dated May 2020), at 9. Available at <https://www.nyiso.com/documents/20142/2223763/NYISO-2019-SOM-Report-Full-Report-5-19-2020-final.pdf/bbe0a779-a2a8-4bf6-37bc-6a748b2d148e?t=1589915508638> (last accessed Sep. 29, 2020).

¹⁰ The average spot price for capacity for the 2017/18 Capability Period to the 2019/20 Capability Period was \$1.30/kW-month in the New York Control Area (“NYCA”) and \$5.01/kW-month in G-J Locality. See 2017 – 2019 State of the Market Reports here: <https://www.nyiso.com/library>.

The biggest change since the above studies were conducted is the passage of the CLCPA in June 2019. The CLCPA sets aggressive decarbonization goals that go well beyond the public policy goals considered in the original studies: mandating that 70% of Statewide electricity generation come from “renewable energy systems” by 2030, requiring 100% carbon-free electricity by 2040, and an 85% reduction in economy-wide greenhouse gas (“GHG”) emissions by 2050, relative to 1990 levels.¹¹ The CLCPA also mandates development of some of the specific resource types needed to meet those goals, including energy efficiency, 6,000 MW of distributed solar by 2025, 3,000 MW of energy storage by 2030, and 9,000 MW of offshore wind generation by 2035.¹² Several recent studies that I describe below show that far more renewable generation resources than those specifically mandated in the CLCPA will be needed across the State, especially Upstate, to achieve the CLCPA’s overall objectives to meet growing loads with all clean energy.

Contrary to Mr. Paryl’s testimony, these recent changes in New York policies will increase, not decrease, the value of the Projects in four ways:

- Major investments in clean energy resources will be needed in addition to Downstate offshore wind generation, and the Projects enable greater reliance on relatively low-cost and plentiful Upstate resources to serve Downstate loads.
- Renewable resources are intermittent and geographically diverse in their generation patterns. Transmission makes it possible to benefit from this diversity, for example, to utilize Upstate hydroelectric, nuclear, wind, and solar power to meet Downstate load when offshore wind generation is low.
- The need to electrify heating and transportation to meet 2050 decarbonization goals will significantly increase the demand for clean electricity across the State, especially in Downstate population centers. The higher demand increases the value of delivering clean Upstate resources via the transmission Projects.
- The State’s ambitious policy goals imply a value for avoiding carbon emissions that is much higher than assumed by CVEC. The economic benefit is not just the avoided cost of the fuel saved (as represented in the Projects’ original benefit-cost analysis) but also the higher implied value of the avoided carbon emissions.

B. Guidehouse Underestimates the Projects’ Net Benefits

CVEC’s contention that quantified benefits must exceed the costs to justify a project is wrong because there clearly are also unquantified benefits and needs that must be considered. Even focusing solely on the quantified benefits, however, the Guidehouse analysis submitted by CVEC substantially understates the value of the Projects in two ways:

¹¹ See Public Service Law § 66-p; see also Environmental Conservation Law, Article 75.

¹² See Public Service Law § 66-p.

1. The Guidehouse production cost simulations only consider the first 10 years of the Projects, from 2024 through 2033. Thereafter, they assume that the long-term benefits of the Projects, from 2034 through 2068, are equal to the average savings over the first 10 years. This is unreasonable and will understate the Projects' benefits because the Projects' value after 2033 should be higher than the average of the first 10 years. As shown in the recent Brattle NYISO Grid Evolution study and in similar other studies that I describe below, the amount of renewable generation in New York must increase dramatically beyond 2033 to meet the State's 100% carbon-free electricity goal by 2040. In addition, electricity demand is projected to increase by 53% from 2033 to 2050 due to electrification of transportation and heating sectors to achieve the State's economy-wide decarbonization goals.¹³ The tightening emissions standards will become increasingly difficult to meet without the Projects' increased transmission capacity, which helps leverage diverse resources throughout the State. This increased difficulty of meeting the more stringent standards in the later years also means that the average of period before 2033 is not representative of the decades after 2033. Indeed, the Brattle NYISO Grid Evolution study demonstrates that power flows on the transmission system between Upstate and Downstate increase markedly after 2033.
2. Even in the years 2024-2033 simulated by Guidehouse, their analysis understates the production cost savings of the Projects by making several assumptions that systematically understate congestion throughout the study period:
 - a. They projected natural gas price differentials between Upstate and Downstate that are 76% lower than the prices that result from the current gas futures prices and the trading hubs used in the NYISO's 2019 Congestion Assessment and Resource Integration Study ("CARIS") (contrary to their claim to have provided a fully up-to-date analysis based on the 2019 CARIS study, the only assumptions they have used from CARIS are the generation resource mix);
 - b. They ignore the growing premium on reducing emissions by assuming a GHG emissions cost of \$12/ton or less in their simulations;
 - c. They include the proposed Champlain Hudson Power Express ("CHPE") high-voltage direct current ("HVDC") line in their NYISO energy market simulations even though building the line is uncertain and they specifically excluded CHPE in their economic impact analysis; and,
 - d. Their market simulation only reflects normalized system conditions, whereas transmission often provides the greatest value under stressed, non-normal conditions, such as unplanned transmission and generation outages and unusually high energy demand.

¹³ In the CLCPA case, NYCA load increases from 162,401 GWh in 2033 to 248,349 GWh in 2050. Itron, *New York ISO Climate Change Impact Study, Phase I: Long-Term Load Impact*, submitted to NYISO, December 2019, Table A-48, at 90.

Guidehouse acknowledges that their model is deficient in some respects when they “benchmark” their simulated energy prices by adjusting them to current market prices to account for real-world conditions not reflected in their simulations. This adjustment raises Downstate prices more than Upstate prices. Yet they do not recognize that the higher resulting price difference between Upstate and Downstate corresponds to higher congestion costs than they simulated. By adding the Projects to simulations that understate congestion to start out with (without an adjustment like they did for energy prices), they also substantially understate the estimated savings.

In addition, there are benefits to the Projects that Guidehouse simply did not account for in their analysis. For example, the Projects provide capital cost savings from enabling greater investment of the relatively low-cost clean energy resources Upstate, as demonstrated in the recent Brattle NYISO Grid Evolution study. Nor did Guidehouse acknowledge or consider in their analyses any other categories of benefits beyond those quantified, including the unquantified benefits that the Commission explicitly considered in identifying the need for the Projects.

C. The Projects Neither Distort the Market nor Hurt Customers

Because the Projects have benefits that exceed costs, they are economically efficient and, thus, will neither distort the market nor hurt customers. On the contrary, eliminating, delaying, or downsizing the Projects would distort and prevent efficient outcomes. Projects that demonstrate net benefits to the system through the transmission planning processes are part of the market that CVEC invested in. Similar to any other transmission system upgrade to an existing constraint, the addition of the Projects will have an impact on energy and capacity prices and reduce prices for generation resources that are downstream of the constraint, such as CVEC in this case. The impacts of the transmission system upgrade on the prices are not a distortion because they reflect an efficient outcome for customers.

Even if CVEC’s net revenues decreased with the addition of the Projects, there is no reason to compensate CVEC for a reduction in market value caused by economically-efficient transmission projects developed under the applicable transmission planning processes in NYISO’s OATT. As a merchant generation resource, CVEC bears the risk and rewards of changes in market, grid infrastructure, and regulatory and public policy conditions. The owners and investors of CVEC also were able to account for the possible addition of new transmission facilities that reduce congestion and local capacity requirements (“LCRs”). In fact, plans to pursue transmission upgrades with an impact on network transfer limits very similar to those of the Projects were already identified by DPS Trial Staff in 2015 and approved by the Commission in December 2015, well before the close of financing and the start of construction of CVEC in January 2017.¹⁴

¹⁴ Business Wire, *Advanced Power AG Closes Financing of \$1.584 Billion Energy Center in Dover, New York* (Dated Jan. 24, 2017). Available at

Continued on next page

D. There is Little Benefit and Some Harm in Delaying Approval until the Completion of Ongoing Studies

Delaying the approval process for further study is unlikely to result in new information that would change the conclusion that the Projects provide net benefits, and it could do some harm. Mr. Paryl suggests waiting to incorporate more complete information about the future, following completion of the State's ongoing studies of how to achieve its goals under the CLCPA. Importantly, however, those studies presumably are not going to re-evaluate the need for the Projects, since the NYISO's authoritative Reliability and Needs Assessment ("RNA") already assumes that the Projects will be built.¹⁵ Nor will these studies resolve all of the surrounding questions affecting the value of the Projects, particularly the complete set of future resources that will be developed. These studies are only one of many steps in the process to identifying the path forward and should not be seen as definitive planning studies through 2050. There will always be uncertainty about future developments of resources, transmission, and policy specifics.

As such, it is doubtful that a delay would reveal new information that changes the basic conclusion that these Projects are necessary and provide benefits in excess of costs, including by strengthening the corridor between Upstate and Downstate to leverage resource diversity to meet the State's now even-more-ambitious public policy goals. Indeed, the Projects provide the foundation on which the more-specific, localized transmission and resource plans can be developed in support of the CLCPA. Postponing the approval process would delay the realization of the Projects' benefits; it would also delay implementation of other portions of the CLCPA plan that may depend on the infrastructure provided by the Projects.

Finally, any purported issues identified by CVEC related to interconnection should not indefinitely delay this approval as any such issues will be resolved through the standard NYISO process. They should not delay Commission's approval of the Projects based on the well-defined and previously-approved benefits to the system.

Continued from previous page

<https://www.businesswire.com/news/home/20170124006224/en/Advanced-Power-AG-Closes-Financing-1.584-Billion> (last accessed Sep. 29, 2020).

¹⁵ NYISO, *2020 RNA Preliminary ("1stPass") Reliability Needs* (Dated June 19, 2020), at 12. Available at https://www.nyiso.com/documents/20142/13200831/02%202020RNA_1stPassRN.pdf (last accessed Sep. 29, 2020).

III. The Projects Provide Net Benefits

I disagree with Mr. Paryl’s characterizations of the Projects as “unnecessary, uneconomic transmission facilities,”¹⁶ as “non-cost-effective,”¹⁷ and as “ratepayer-subsidized transmission lines that do not provide economic benefits to customers.”¹⁸ Mr. Paryl’s statements (1) ignore the fact that the need for the Projects has been long-established and re-affirmed by the Commission, (2) these statements are based solely on Guidehouse’s flawed analysis of the net benefits of the Projects through 2033, which I address in detail in the next section, and (3) make the incorrect assertion that the introduction of the CLCPA—which Guidehouse uses to focus on the mandate for Downstate renewable generation, while ignoring other mandates within the CLCPA—reduces the benefits of the Projects.¹⁹

A. Commission Statements on Need

The Commission determined that the transmission upgrades necessary to satisfy the AC Transmission Needs would provide positive net benefits to New York ratepayers based on analysis of the benefits and costs of the upgrades. In its December 2015 Order identifying the Public Policy Transmission Need (“PPTN”),²⁰ the Commission determined that transmission upgrades very similar to the Projects—with an increase of the UPNY/SENY interface of up to 1,136 MW normal transfer capability and 2,286 MW emergency transfer capability, and an increase on the Central East interface transfer capability of up to 375 MW²¹—would reduce ratepayer costs. Quantified savings included reduced production costs, reduced capacity resource costs, avoided refurbishment costs of aging transmission, and reduced costs of meeting renewable resource standards. The Commission also highlighted the value of upgrades in terms of improved market competition, enhanced planning and operational flexibility, and enhanced resiliency/storm hardening.

¹⁶ REP-11

¹⁷ REP-4.

¹⁸ REP-7.

¹⁹ REP-17.

²⁰ Case 12-T-0502, *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, Order Finding Transmission Needs Driven by Public Policy Requirements (Issued Dec. 17, 2015).

²¹ Case 12-T-0502, *supra*, AC Transmission - Trial Staff Final Report: Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives (Filed Sep. 22, 2015), at xvii, ES Figure 2 (noting limit increases of P11, P12, and P14).

Since the initial order establishing the AC Transmission Needs in 2015, the Commission has twice reaffirmed that need in 2017 and 2019. In January 2017, the Commission stated that new transmission capacity should be evaluated to address the “persistent congestion across the Central East and UPNY/SENY portions of the transmission system” and upgrades that “move power from Upstate to Downstate New York should provide various economic and public policy benefits.”²² In addition, the Commission noted that the changes in policy at that time, such as the Clean Energy Standard (“CES”), “further heightens the public policy need for transmission constraint relief and cross-state power flows.”²³ In its 2017 order, the Commission also specified that the projects must “provide a *minimum* 350 MW increase to the Central East interface transfer capability, while proposed solutions to Segment B (UPNY/SENY) must provide a *minimum* 900 MW increase to the UPNY/SENY interface transfer capability.”²⁴ The Commission ordered that such an upgrade “shall be considered a Public Policy Requirement and Public Policy Transmission Need.”²⁵

In July 2019, the Commission issued an order denying rehearing that reaffirms that the need for the Projects goes beyond traditional transmission planning processes that focus on reliability issues or economic benefits and includes other benefits, as envisioned in FERC Order No. 1000. The Commission confirmed that the analysis to date is sufficient to identify the need for the upgrades, stating that “[t]he record in these matters is replete with studies and analysis from the Brattle Group, NYISO, and Department of Public Service Staff, that outlines both the need for these projects and their ability to *provide statewide benefits at levels in excess of or commensurate to their costs.*”²⁶

B. NYISO Studies that Support Project Need

To support its decision to identify a PPTN, the Commission relied on a report by Trial Staff and the attached “Brattle Report,” both completed in 2015.²⁷ I was the lead author of the Brattle Report that analyzed the net benefits of nine projects submitted by transmission developers to the public policy transmission planning process that were identified by the NYISO and DPS staff

²² Case 12-T-0502, *supra*, Order Addressing Public Policy Transmission Need for AC Transmission Upgrades (Issued Jan. 24, 2017), at 19.

²³ *Id.*

²⁴ *Id.* at 7.

²⁵ *Id.* at 22.

²⁶ Case 12-T-0502, *supra*, Order Denying Rehearing and Addressing Further Process for Examining Alternating Current Transmission Upgrades (Issued July 16, 2019), at 14 (emphasis added).

²⁷ See Case 12-T-0502, *supra*, AC Transmission - Trial Staff Final Report: Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives (Filed Sep. 22, 2015), Appendix 1, Newell *et al.*, *Benefit-Cost Analysis of Proposed New York AC Transmission Upgrades* (Dated Sep 15, 2015) (the “Brattle Report”).

for further analysis. Our analysis concluded that seven of the nine transmission projects result in quantified benefits to New York ratepayers that exceed the projects' costs, including three proposals ("P11, P12, and P14") with a configuration and costs similar to those of the Projects (*i.e.*, Segment A and Segment B).²⁸ The quantified benefits included production cost savings, capacity resource savings, avoided transmission costs, reduced costs of meeting New York's Renewable Portfolio Standard ("RPS"), and offsetting tax payments back to New York customers. The proposals with a configuration similar to the Projects would result in positive net benefits of \$377 million to \$451 million and benefit-cost ratios of 1.2 to 1.3.²⁹ In addition, our analysis identified several unquantified benefits, including protection against extreme market conditions, increased competition and liquidity, storm hardening and resiliency, maximizing future capacity options on existing right of way ("ROW"), and helping to meet environmental objectives, such as the U.S. Environmental Protection Agency's (EPA) Clean Power Plan.³⁰ The study did not anticipate, however, the much more ambitious State clean energy policies that would be developed over the following four years.

In 2018 and 2019, the NYISO analyzed six projects submitted by developers to meet the PPTN to determine which of the proposal provides the more efficient or cost-effective solution. The NYISO relied on the 2017 CARIS assumptions for its "Baseline" scenario and made adjustments to the resource mix to reflect an additional 16 GW of renewable generating capacity to achieve the CES and updated nuclear, coal, and Downstate peaker retirements, which is referred to as the "CES+Retirement" scenario. The NYISO identified production cost and capacity procurement cost savings that result in a benefit-to-cost ratio of 0.8 to 1.1 for the six projects in the Baseline scenario and 1.5 to 1.8 for the CES+Retirement scenario.³¹ NYISO also found the projects will result in avoided aging transmission refurbishment costs of \$839 million.³² The NYISO also qualitatively considered other benefits the projects could provide in terms of the expandability of new infrastructure and operability of transmission equipment.³³

The MMU reviewed the NYISO's analysis in February 2019 and made several reasonable adjustments that resulted in a benefit-cost ratio of 0.74 in the Baseline scenario and 1.52 in the CES+Retirement scenario, reflecting the expected buildout of renewable resources to meet the

²⁸ See Brattle Report. For example, project P14 included both segments and increased Central East capacity by 375 MW and UPNY-SENY emergency transfer capacity by 2,286 and had a capital cost of \$1.2 billion (2015 dollars).

²⁹ *Id.* at 13.

³⁰ *Id.* at 16.

³¹ NYISO, *AC Transmission Public Policy Transmission Planning Report*, Initial Report (Dated June 19, 2018), at 10. Available at <https://www.nyiso.com/documents/20142/5990681/AC-Transmission-Public-Policy-Transmission-Plan-2019-04-08.pdf> (last accessed Sep. 29, 2020).

³² *Id.*

³³ *Id.* at 58-69.

State’s public policy goals at the time.³⁴ The MMU noted that there is considerable uncertainty in the benefits of the projects as the benefits depend on where renewable resources will be located, and the then-recent announcement of 2.4 GW of Downstate offshore wind resources could tend to make the projects “less beneficial.”³⁵ However, the MMU noted that it is difficult to know the sensitivity of the benefits to the location of the renewable resources.³⁶

Based on their review of the analysis, in April 2019, the NYISO Board of Directors selected the Projects to meet the AC Transmission Needs identified by the Commission because the Commission’s decision “drew upon extensive analysis performed by the NYISO and others concerning the benefits of expanding transmission capability to move power from Upstate to Downstate New York, including addressing persistent congestion, enabling the delivery of environmentally desirable power, enhancing system reliability, and replacing aging infrastructure.”³⁷

C. Recent Developments and Other Studies

Since the completion of these benefit studies of the Projects, several developments in the market and policy environment point to *increased net benefits* for the Projects. The NYISO and MMU studies only assumed the CES, which called for 50% renewable energy by 2030, 40% economy-wide decarbonization by 2030, and 80% by 2050. But the subsequent passage of the CLPCA in June 2019 set more aggressive clean energy and decarbonization goals, mandating that 70% of Statewide electricity generation come from renewable energy sources, and requiring 100% carbon-free electricity by 2040 and an 85% reduction in economy-wide GHG emissions by 2050, relative to 1990 levels.³⁸ The CLPCA also mandated the development of certain types of clean energy resources to help meet those goals, including energy efficiency, 6,000 MW of distributed solar by 2025, 3,000 MW of storage by 2030, and 9,000 MW of offshore wind by 2035.³⁹

These mandated and specified resources will provide only a portion of the clean energy that will be required to meet the goals of 70% renewable electricity by 2030 and 100% carbon-free electricity by 2040, however. The CLPCA requires all demand to eventually be met by non-emitting resources, and future demand will be substantially higher than it is today because economy-wide decarbonization will involve electrifying transportation and heating sectors. For

³⁴ Potomac Economics, *Market Monitoring Unit for the NYISO, NYISO MMU Evaluation of the Proposed AC Public Policy Transmission Projects* (Dated February 2019), at v.

³⁵ *Id.* at vi.

³⁶ *Id.*

³⁷ NYISO, *NYISO Board of Directors’ Decision on Approval of AC Transmission Public Policy Transmission Planning Report and Selection of Public Policy Transmission Projects* (Dated April 8, 2019), at 2-3.

³⁸ *See* Public Service Law § 66-p; *see also* Environmental Conservation Law, Article 75.

³⁹ *See* Public Service Law § 66-p.

example, NYISO’s “CLCPA” load forecast that includes electrification indicates 130 TWh of annual load Downstate by 2040,⁴⁰ compared to only about 33 TWh of supply from 9 GW of Downstate-specific mandated resources.⁴¹ The rest will have to be met by additional offshore and onshore renewable resources that can be developed cost-effectively Downstate, plus many resources from Upstate. Importantly, by expanding the transfer capability between the Upstate and Downstate portions of the State’s grid, the Projects will expand options for meeting Downstate clean energy needs from Upstate resources if Downstate resources are limited or cost more to develop.

In addition, even for a given set of resources, the Projects will allow for capturing resource diversity across the State, enabling energy from Upstate solar, wind, nuclear, and hydroelectric resources to meet Downstate needs when offshore wind generation intermittently decreases and *vice versa*. For example, offshore wind can fall to near-zero for hours or days, and its monthly average varies by season; Upstate wind and solar are also intermittent, but they complement offshore wind because their output does not follow the same patterns as offshore wind. In this context, expanding transmission between Upstate and Downstate benefits the system and represents an economic and reliability need. Expanded transmission also provides benefits by enabling lower-cost ways to meet the CLCPA emission reduction requirements, particularly when recognizing the value of avoiding emissions from fossil generation Downstate. The CLCPA requirement to eliminate all emissions—even from the most extended periods of low output from intermittent resources—implies a very high value of avoiding emissions, likely well beyond the carbon charges and social cost of carbon that have been discussed in the New York market.

Several studies completed this year that account for the CLCPA demonstrate the long-term benefits of the Projects. In fact, all of them indicate that expanding Upstate-Downstate transmission even beyond the additional capability provided by Projects would provide further benefits to New York. The relevant conclusions from those studies are as follows, with more detailed descriptions of each study provided below:

1. **NYISO’s CARIS Study (June 2020)** *assumes the Projects have been constructed* and thus includes the additional transfer capacity in their simulations and still concludes that additional transmission expansion beyond the capacity provided by the Projects, at both bulk and local levels, will be necessary to efficiently deliver renewable power to New York consumers.⁴²

⁴⁰ Itron, *New York ISO Climate Change Impact Study, Phase I: Long-Term Load Impact*, submitted to NYISO (Dated Dec. 2019), Tables A-141 through A-153, corresponding to zones G, H, I, J, and K. Available at <https://www.nyiso.com/documents/20142/10773574/NYISO-Climate-Impact-Study-Phase1-Report.pdf> (last accessed Sep. 29, 2020).

⁴¹ Assuming an average capacity factor of 42%.

⁴² NYISO, *2019 CARIS Report, Congestion Assessment and Resource Integration Study* (Dated July 2020), at 66-109. Available at <https://www.nyiso.com/documents/20142/2226108/2019-CARIS->

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2. **The Brattle “New York’s Evolution to a Zero Emission Power System” Study (June 2020)** (the “Brattle NYISO Grid Evolution Study”) shows more Upstate renewable generation being added than Downstate generation to meet the 2040 and 2050 policy goals, but that investments in lower-cost Upstate renewable generation is limited by Upstate-to-Downstate transmission capacity *even with the Projects in place*, as indicated by a greater shift to such lower-cost Upstate resources in an alternative case that expands transmission capacity beyond that provided by the Projects.⁴³
3. **The E3 Renewable Pathways Study (June 2020)** shows similar patterns of resource development and concludes that bulk transmission from Upstate to Downstate is needed.⁴⁴
4. **The Analysis Group reliability study for NYISO (April 2020)** demonstrates that, *even with the Projects*, “inter-zonal transmission limits will limit intermittent resources’ ability to meet zonal deficits due to line congestion” and “significant transmission increases would be needed to alleviate the majority of constrained hours.”⁴⁵

1. NYISO CARIS Study

In 2020, the NYISO simulated a scenario during the 2019 CARIS study that reaches 70% renewables by 2030 (“70x30 scenario”) in line with the CLCPA.⁴⁶ The NYISO assumes the Projects have been constructed and thus includes the additional transfer capacity in their simulations. The study concludes that additional transmission expansion beyond the capacity provided by the Projects, at both bulk and local levels, will be necessary to efficiently deliver renewable power to New York consumers. Renewable generation pockets are likely to develop throughout the State as the existing transmission grid would be overwhelmed by the significant

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[Phase1-Report-Final.pdf/bcf0ab1a-eac2-0cc3-a2d6-6f374309e961?t=1595616909286](https://www.nyiso.com/documents/20142/13245925/Brattle%20New%20York%20Electric%20Grid%20Evolution%20Study%20-%20June%202020.pdf/69397029-ffed-6fa9-cff8-c49240eb6f9d) (last accessed Sep. 29, 2020).

⁴³ Lueken, Newell, *et al.*, *New York’s Evolution to a Zero Emission Power System* (Dated June 22, 2020). Available at <https://www.nyiso.com/documents/20142/13245925/Brattle%20New%20York%20Electric%20Grid%20Evolution%20Study%20-%20June%202020.pdf/69397029-ffed-6fa9-cff8-c49240eb6f9d> (last accessed Sep. 29, 2020).

⁴⁴ Energy + Environmental Economics (“E3”), *Pathways to Deep Decarbonization in New York State* (Dated June 24, 2020), at 37. Available at <https://climate.ny.gov/-/media/CLCPA/Files/2020-06-24-NYS-Decarbonization-Pathways-Report.pdf> (last accessed Sep. 29, 2020).

⁴⁵ Analysis Group, *NYISO Climate Change Phase II Study* (Dated April 23, 2020), at 29. Available at <https://www.nyiso.com/documents/20142/12126107/05%20Climate%20Change%20Phase%20II.pdf/3b069a2a-9d32-6e5e-30ae-eb5703a8d64b> (last accessed Sep. 29, 2020).

⁴⁶ NYISO, *2019 CARIS Report, Congestion Assessment and Resource Integration Study* (Dated July 2020), at 66-109.

renewable capacity additions. The conclusions align with the results of the Brattle and E3 studies described below that the changes in the market towards higher levels of renewables increase the need for transfer capacity from Upstate to Downstate.

2. Brattle NYISO Grid Evolution Study

My colleagues and I released a study for the NYISO in June 2020 that evaluated how the NYISO-administered wholesale market will need to evolve to achieve the recent policy goals, including the CLCPA.⁴⁷ The study focused on the renewable resources and storage necessary to cost-effectively meet the policy mandates, given the cost and value of various resource options in different locations, and given transmission constraints between zones. Our analysis did not include an evaluation of the benefits of the Projects, which were assumed to be in place, but several key findings from the study demonstrate the continuing and increasing value of the Projects in the future power system.

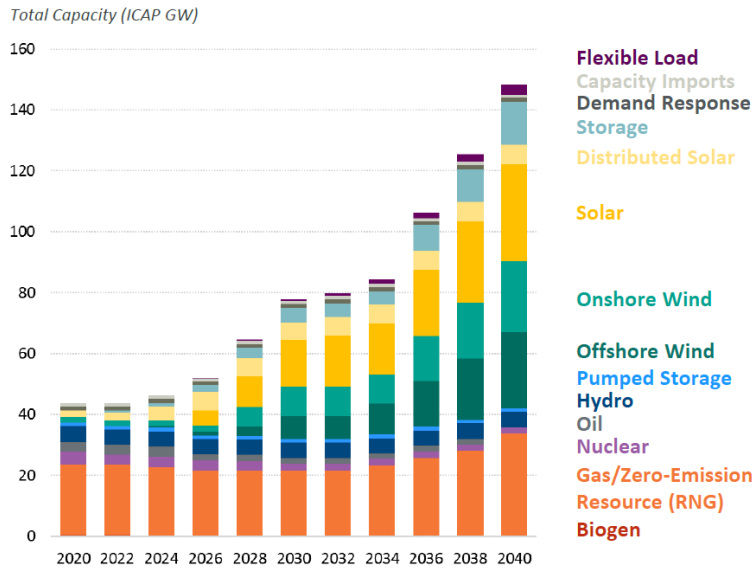
Our simulations indicated a need for large increases in renewable resource investment to meet CLCPA mandates. In the primary scenario, “High Electrification” that relies on NYISO’s CLCPA load forecast, 38 GW of renewable generation capacity was needed by 2030 to comply with the 70% renewable mandate, including 8 GW of offshore wind, 21 GW of solar, and 10 GW of onshore wind.⁴⁸ From 2030 to 2040, renewable generation additions increased by nearly 4 GW per year to meet the 2040 goal of zero emissions, resulting in a total of nearly 80 GW, including 25 GW of offshore wind, 38 GW of solar, and 23 GW of onshore wind, as shown in Figure 1.⁴⁹

⁴⁷ Lueken, Newell, *et al.*, *New York’s Evolution to a Zero Emission Power System* (Dated June 22, 2020).

⁴⁸ *Id.* at 55.

⁴⁹ *Id.*

Figure 1: Projected Generation Capacity from Brattle NYISO Grid Evolution Study (High Electrification Case)



Source: Lueken, Newell, et al., [New York's Evolution to a Zero Emission Power System](#), June 22, 2020, at 22.

Of relevance for the Projects, our study indicated that while Downstate offshore wind accounts for a large amount of the increase, the Upstate region adds an even larger amount of renewable capacity and energy, including 10 GW of wind in Zones A-E and 14 GW of solar largely in Zone F by 2030.⁵⁰ These projected increases in intermittent renewable additions in Upstate New York demonstrate that much more is changing in the New York market than the additions of offshore wind and potentially the CHPE transmission line into Zone J, the two factors that Mr. Paryl emphasizes.

Due to the scale and mix of Upstate and Downstate renewable resources being built in New York, the additional transfer capacity provided by the Projects becomes more valuable as the power system becomes increasingly dependent on intermittent renewable generation resources at each end of the Projects (*i.e.*, both Upstate and Downstate). The Projects allow the system to take advantage of the complementarity of Upstate solar and Downstate wind resources that tend to generate at above average levels at different times during the day (solar in the afternoon and wind overnight) and during the year (solar in the summer and wind in the winter).⁵¹

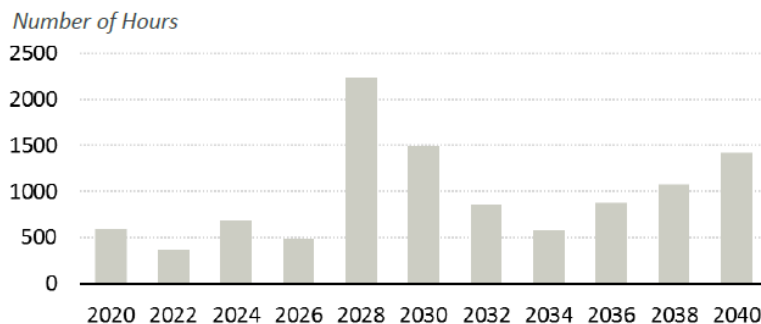
While the study did not directly evaluate the Projects or other transmission enhancements, two additional observations indicate that the benefits will increase beyond 2034, which Guidehouse did not consider. First, consistent with the observations noted above, the frequency of congestion

⁵⁰ *Id.* at 62.

⁵¹ *Id.* at 14.

between Upstate and Downstate generally increases over time, as shown in Figure 2.⁵² The jump in 2028 congestion reflects Upstate onshore wind development in the model toward the 70% renewable goal, and the drop in 2030 reflects assumed Upstate nuclear retirements, but the increasing trend continues after 2034.

Figure 2: Number of Hours with Constrained Downstate Flows



Sources: Lueken, Newell, et al., [New York’s Evolution to a Zero Emission Power System](#), June 22, 2020, at 24.

Second, the study analyzed the impact of further increasing the transfer capacity between Upstate and Downstate, above and beyond the transfer capacity provided by the Projects. The additional transmission capacity resulted in the renewable portfolio shifting investment from higher-cost Downstate offshore wind (-2 GW) to lower-cost Upstate onshore wind (+4 GW) and Upstate solar (+3 GW) in Zone F.⁵³ The shift in resources with additional transfer capacity demonstrates that, beyond congestion-relief benefits, the investment costs of renewable resources to achieve the long-term policy objectives will be also be lower with the Projects in place.

3. E3 Renewable Pathways Study

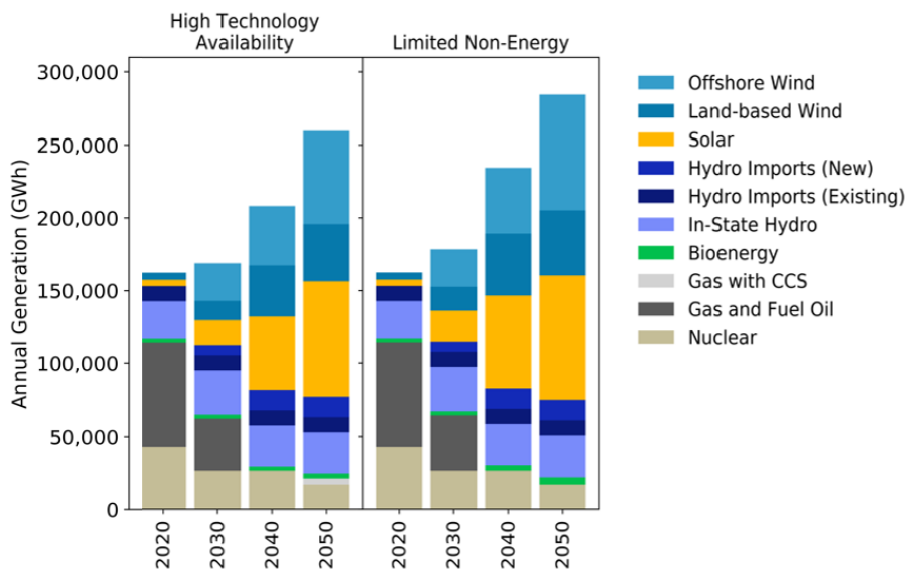
A June 2020 study funded by NYSERDA and prepared for the CLCPA’s Climate Action Council analyzed the pathways for New York to achieve its GHG reduction policy goals that demonstrate several of the same points.⁵⁴ Figure 3 below shows a similar trend as the Brattle NYISO Grid Evolution study with modest renewable generation capacity additions from 2020 to 2030 followed by the much larger deployment of renewable resources from 2030 to 2040. Notably, more of the generation is from onshore wind and solar than offshore wind.

⁵² *Id.* at 24.

⁵³ *Id.* at 48.

⁵⁴ E3, *Pathways to Deep Decarbonization in New York State* (Dated June 24, 2020).

Figure 3: New York Decarbonization Pathways Study Generation Mix



Source: E3, [Pathways to Deep Decarbonization in New York State](#), June 24, 2020, at 35.

The E3 study concludes:

“New investments in transmission will be needed to enable the delivery of 100% zero-emission electricity, including...Bulk transmission capacity from upstate New York to downstate load centers. The State has already begun the process of adding bulk transmission capacity through its selection of AC transmission projects, although additional transmission may be needed to ensure that power can be delivered into New York City and Long Island.”⁵⁵

This conclusion clearly demonstrates that, even with the changing resource mix, the transfer capacity provided by the Projects will be needed to enable the State’s clean energy goals and thus provides significant value to ratepayers.

4. Analysis Group NYISO Study

In an ongoing study for the NYISO, Analysis Group is analyzing the reliability of the NYISO market in 2040 with a resource mix that meets the CLCPA requirements. Preliminary results from April 2020 demonstrate the need for increased capacity between Upstate and Downstate zones, noting that “inter-zonal transmission limits will limit intermittent resources’ ability to meet zonal deficits due to line congestion” and “[s]ignificant transmission increases would be needed to alleviate the majority of constrained hours.”⁵⁶ Specifically for the transfer capacity from Zone E to Zone G that will increase with the addition of the Projects, their analysis finds

⁵⁵ *Id.* at 37.

⁵⁶ Analysis Group, *NYISO Climate Change Phase II Study* (Dated April 23, 2020), at 29.

that avoiding 70% of congestion on this corridor would require increasing the transfer capacity from 5,500 MW to 10,450 MW and eliminating all congestion would require increasing the capacity to 15,750 MW.⁵⁷

IV. Guidehouse Underestimates the Projects' Net Benefits

I disagree with Guidehouse's claims that "considering updated, current information, particularly regarding the development of Downstate renewable generation and energy storage, and the potential for a new HVDC line shown in NYISO's own planning study, the Projects cannot be justified."⁵⁸

It is not true that only the benefits Guidehouse quantifies have to exceed the costs to justify a project, since there are other benefits and project needs that Guidehouse has not quantified. However, even the estimates of the subset of benefits that Guidehouse quantified substantially understate the value of the Projects in two ways: (1) their analysis does not account for the growing long-term value of the Projects as New York aims to displace all fossil generation with non-emitting generation; and (2) even in the years Guidehouse simulated (2024-2033), their analysis understates the production cost savings of the Projects. In addition, the Projects' benefits that Guidehouse did not account for include the capital cost savings from enabling greater investment of lower-cost clean energy resources in Upstate New York, as demonstrated in the recent Brattle NYISO Grid Evolution study discussed above. They also did not acknowledge any other categories of benefits beyond the limited subset that Guidehouse quantified, including the unquantified benefits that the Commission considered in identifying the need for the Projects.

A. Guidehouse Ignores Long-term Growth in Benefits

As noted above, the NYISO power system will go through transformative changes during the period just beyond the timeframe that Guidehouse modeled (2024-2033) to reach New York's long-term decarbonization goals. Guidehouse understates the value of the Projects by ending their analysis in 2033 and assuming that the annual benefits for 2034 to 2068 are equal only to their understated average of benefits in the first 10 years.

⁵⁷ *Id.*

⁵⁸ AC/MT-19.

The most significant changes to the NYISO power system that were ignored include: (1) an acceleration of renewable generating capacity additions in both Upstate and Downstate; (2) a 53% increase in load from 2033 to 2050 due to electrification of transportation and heating to achieve economy-wide decarbonization objectives; and (3) the increasingly high value of reducing economy-wide carbon emissions by 85% by 2050 according to the CLCPA's long-term goals. These changes will increase the need for transfer capability between Upstate and Downstate in the decades after 2033 to serve the growing demand for clean energy with the least-cost resources and to take advantage of the diversity in renewable resource generation profiles across regions. Ignoring these factors and simply assuming that the benefits will remain equal to the average benefits over 2024-2033 will greatly understate the Projects' total benefits.

B. Guidehouse Understates Benefits During the Period Modeled

Even in the years Guidehouse simulated, from 2024 through 2033, their analysis understates the production cost savings of the Projects by making several assumptions that systematically understate congestion throughout the study period. These include natural gas prices, carbon prices, and the proposed CHPE line. In addition, their market simulation only reflects normalized system conditions, without accounting for the fact that transmission often provides the greatest value under stressed, non-normal conditions.

1. Natural Gas Prices

Guidehouse assumed a much lower natural gas price differential between Upstate and Downstate than reflected in the NYISO's CARIS approach to estimating gas prices. Instead of using the NYISO's CARIS approach that has been refined and vetted extensively by stakeholders, Guidehouse instead relied on (1) different natural gas trading hubs for developing prices in each

NYISO zone than those used in the 2019 CARIS study,⁵⁹ and (2) their own internal forecast of natural gas prices developed over a year ago.⁶⁰

Table 1 below shows that Guidehouse’s gas prices for their simulations results in a gas price differential between Upstate and Downstate in 2024 of only \$0.25/MMBtu compared to \$1.06/MMBtu based on the trading hubs used in the CARIS study and current natural gas futures, which is \$0.81/MMBtu or 76% lower than the gas price differential based on the CARIS approach.⁶¹ Through 2030, the Guidehouse gas price differential remains \$0.68/MMBtu to \$0.82/MMBtu lower than the gas price differential based on the CARIS approach.

Table 1: Comparison of Guidehouse and CARIS 2024 Natural Gas Prices

	Guidehouse Fall 2019 Prices	CARIS Fall 2020 Prices
Upstate (A – E) Average Gas Price	\$3.08/MMBtu	\$1.90/MMBtu
Downstate (F – K) Average Gas Price	\$3.33/MMBtu	\$2.96/MMBtu
Gas Price Differential (Downstate – Upstate)	+\$0.25/MMBtu	+\$1.06/MMBtu

Natural gas price differentials are a critical assumption for analyzing the benefits of the Projects. As the MMU notes, “estimated production cost savings are greatly affected by forecasted prices

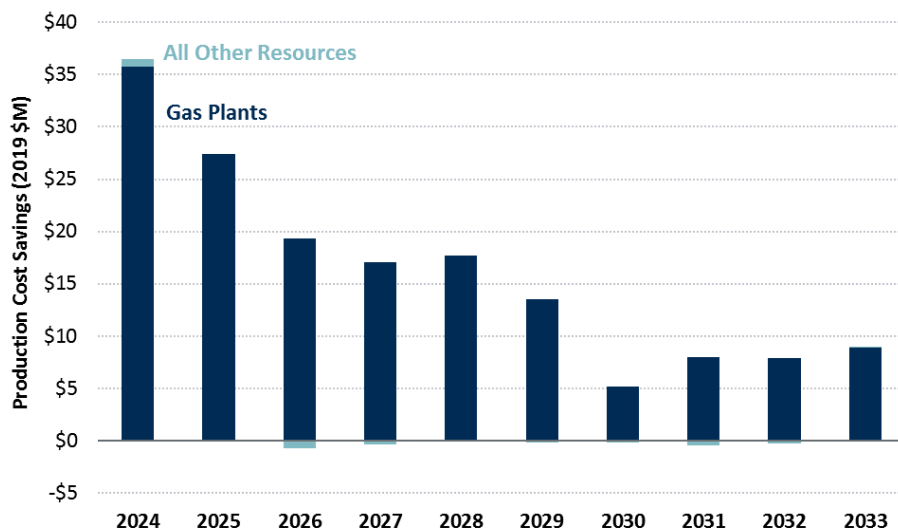
⁵⁹ The 2019 CARIS study divides the NYCA into four regions for developing natural gas prices for its simulations: Zones A to E, Zones F to I, Zone J, and Zone K. For each region, NYISO develops natural gas prices by calculating the weighted average of prices at particular natural gas hubs. For example, the natural gas price for Zones A to E is a weighted average of the prices at the Dominion South (65%), Columbia (5%), and Dawn (30%) trading hubs. Guidehouse developed their gas price assumptions based on prices at the Tennessee Zone 5 hub for gas-fired plants in Zones A to C and Iroquois Zone 1 for gas-fired plants in Zones D to E, neither of which are used in the NYISO’s CARIS approach. The CARIS definitions of the gas prices for the other zones can be found in the 2019 CARIS study (*see NYISO, 2019 CARIS Report, Congestion Assessment and Resource Integration Study* [Dated July 2020], at 28). For the other zones, Guidehouse used Iroquois Zone 2 for gas-fired plants in Zones F to H and Transco Zone 6 NY for gas-fired plants in Zone J to K. *See* CVEC response to document request NYT/CVEC-01.2a.

⁶⁰ *See* CVEC response to document request NYT/CVEC-01.1.

⁶¹ To compare the NYISO’s CARIS approach against Guidehouse’s assumptions, we calculated monthly natural gas prices for each zone based on the weighted average of natural gas futures prices for each trading hub from OTC Global Holdings (accessed via S&P Global) as of September 1, 2020 using the weights assumed in the 2019 CARIS study. The Upstate (A-E) Average Gas Price for Guidehouse is the simple average of the Zones A to C and Zones D to E prices and for CARIS is equal to the Zones A to E price. The Downstate (F – K) Average Gas Prices are the simple average of the gas prices for Zones F-I, Zone J, and Zone K calculated for both Guidehouse and CARIS.

for natural gas and emissions allowances.”⁶² That is particularly true for Guidehouse’s analysis because the primary decrease in production cost savings due to the Projects is a shift from higher cost natural gas generation to lower cost generation.⁶³ This is demonstrated in Figure 4 below, which shows the production cost savings from gas-fired generation in the dark blue bars and the production cost savings from all other resources in light blue. For that reason, by assuming a lower gas price differential, Guidehouse is significantly understating the benefits of the Projects.

Figure 4: Guidehouse Annual Production Cost Savings by Resource Type



Source and notes: Brattle analysis of CVEC response to document request NYT/CVEC-02.1.

2. The Value of Reduced Carbon Emissions

As noted in the MMU report, the assumed emissions allowance prices are also a critical assumption for estimating production cost savings of the Projects. Guidehouse’s assumptions ignore the growing premium on reducing emissions by assuming a limited GHG emissions cost of \$12/ton in their simulations. The assumption is based on projected prices under the existing Regional Greenhouse Gas Initiative (“RGGI”). By comparison, the NYISO included a scenario with a social cost of carbon that starts at \$53/ton in 2023, then rises to \$69/ton in 2030 and \$103/ton in 2040, reflecting values used by the Commission as parts of its Zero Emission Credit program for Upstate nuclear plants.⁶⁴ Applying these higher costs would result in greater

⁶² Potomac Economics, Market Monitoring Unit for the NYISO, *NYISO MMU Evaluation of the Proposed AC Public Policy Transmission Projects*, February 2019, at 16.

⁶³ In most hours, the increased Upstate generation is gas-fired; in only a small number of hours in Guidehouse’s simulations, the increased Upstate generation appears to be from reduced curtailments of renewable resources, as indicated by negative energy prices. See CVEC response to document request NYT/CVEC-02.1.

⁶⁴ NYISO, *AC Transmission Public Policy Transmission Planning Report Addendum*, April 2019, at 21.

production cost savings, as the NYISO found when it evaluated the Projects with these costs versus an alternative case with lower RGGI carbon prices. The net present value of the difference was \$111 million over the first 20 years the Projects are in service.⁶⁵

3. New HVDC Line from Hydro-Quebec

Guidehouse assumed the addition of a new 1,250 MW HVDC line from the Hydro-Quebec system to Zone J in its production cost simulations that likely reflects the proposed CHPE transmission line. Guidehouse notes in their testimony that including such a resource is “uncertain,” but included the HVDC line in their production cost simulations for consistency with the NYISO CARIS assumptions in the 70x30 study discussed above.⁶⁶

However, Guidehouse made the opposite assumption in their evaluation of the capacity price impacts of the Projects on CVEC, noting in CVEC-4 that “[w]hile the HVDC line has been incorporated into NYISO’s long term transmission planning, the lack of any forward progress in development at this time means *we cannot reasonably assume it will be coming online in the CARIS timeframe in an independent project impact analysis.*”⁶⁷

While CHPE may or may not in fact be developed, Guidehouse selectively includes the proposed CHPE line in their production cost simulations of the Projects, which reduces the Projects’ apparent production cost benefits; yet they excluded the CHPE line in the CVEC economic impact analysis of the Projects, which increases the apparent impact on CVEC’s revenues. If Guidehouse had made consistent assumptions across their analyses: (1) with CHPE consistently assumed to *not* be built, Guidehouse’s estimates of the Projects’ production cost savings would be greater; or (2) with CHPE consistently assumed to be in place, their estimated capacity price impacts of the Projects on CVEC revenues would have been lower.

4. Simulating only “Normal” Market Conditions

Guidehouse’s simulation only reflects normalized market conditions, whereas transmission often provides the greatest value under stressed, non-normal conditions that can occur in the real world. For example, unexpected transmission and generation outages can increase system production costs during those events by forcing higher cost resources to be dispatched to maintain the system reliability. However, as Guidehouse stated, “no transmission outages are included” in their simulations, and for generation outages they only modeled average outages based on a fixed Equivalent Forced Outage Rate-Demand (“EFORd”).⁶⁸ Additional real-world conditions that would impact the value of the Projects but were not accounted for in the

⁶⁵ *Id.*

⁶⁶ *See* AC-MT-18.

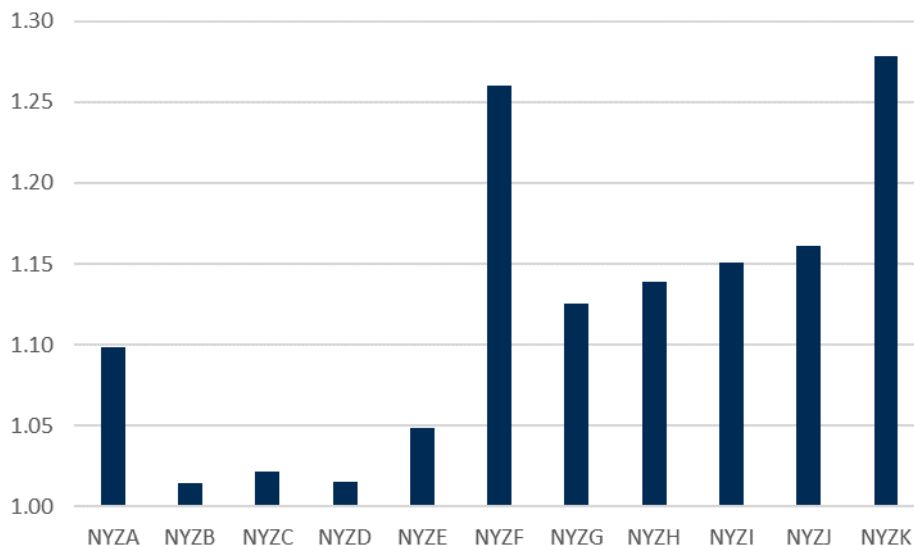
⁶⁷ Case 19-T-0684, Exhibit __ (CVEC-4), at 5 (emphasis added).

⁶⁸ CVEC responses to document request NYT/CVEC-04.2.

Guidehouse simulations include high demand conditions (due to cold snaps or heat waves), high or low renewable generation, and daily fluctuations in natural gas prices (Guidehouse assumed gas prices remain constant on a monthly basis). The additional transfer capacity provided by the Projects will increase the flexibility of the New York power system to adapt to these market conditions and avoid especially high cost outcomes if there is insufficient transmission capacity to respond.

Guidehouse acknowledges that their model is missing something important when they explain that they “utilize near term historical prices to benchmark to current year prices.”⁶⁹ By doing so, Guidehouse is adjusting their prices to account for the real-world conditions that are not reflected in their simulations. The result of their “benchmarking” are the multipliers shown in Figure 5 below that are applied disproportionately to raise prices Downstate related to prices Upstate.

Figure 5: Guidehouse Average Price Multipliers



Source: Brattle analysis of CVEC responses to document request NYT_CVEC-01.3f.

Yet, Guidehouse does not recognize that higher prices Downstate also correspond to proportionally much greater Upstate-Downstate price differentials.⁷⁰ This corresponds to much higher congestion costs than they simulated and higher production cost savings from increasing the transmission capacity across the congested interface. By then adding the Projects to the simulation and taking production cost savings directly from the model without the adjustment they did for energy prices, they substantially understate the savings. Earlier analyses of the

⁶⁹ CVEC responses to document request NYT_CVEC-01.3f.

⁷⁰ For example, if the simulated prices are \$38/MWh Upstate and \$40 Downstate, a 15% increase in the Downstate price to \$46 would fourfold the price differential. This corresponds to a higher production cost savings from transmission enabling \$38 generation to displace \$46 generation.

Projects made such adjustments to increase the production cost savings to account for these real-world conditions that are not captured in the simulations: the 2015 Brattle report grossed up production cost savings by a factor of 1.56 based on an analysis of current price differentials between Upstate and Downstate;⁷¹ the MMU 2019 report similarly grossed up savings by 40% based on a similar analysis.⁷²

C. Guidehouse Does Not Consider All of the Projects' Benefits

In addition to understating both the near-term and long-term production cost savings of the Projects, as described above, the Guidehouse analysis fails to account for the full scope of benefits that the Projects provide beyond production cost savings. For example, the Brattle NYISO Grid Evolution study showed that with Upstate-to-Downstate transmission capacity beyond the capacity provided by the Projects, renewable resource investments would shift from adding higher-cost renewables resources Downstate to lower-cost renewable resources Upstate. This shift to lower-cost resources enabled by the expansion in transmission capacity will result in lower total costs to New York ratepayers and represents an investment-cost-related benefit beyond the production cost savings and other benefits Guidehouse included in its benefit-cost analysis.

In addition, Guidehouse does not consider the many *unquantified* benefits that NYISO and the Commission have repeatedly identified as central to the need for the Projects, as noted above. These additional unquantified benefits include increased market competition, enhanced planning and operational flexibility, and enhanced resiliency/storm hardening.

V. The Projects Neither Distort the Market nor Hurt Customers

I disagree with Mr. Paryl's statements that the Projects "have the potential to distort price signals in the NYISO wholesale markets and lead to uncompetitive outcomes that will result in increased costs to New York ratepayers."⁷³

⁷¹ Newell, et al., *Benefit-Cost Analysis of Proposed New York AC Transmission Upgrades*, September 15, 2015, at 89.

⁷² Potomac Economics, *Market Monitoring Unit for the NYISO, NYISO MMU Evaluation of the Proposed AC Public Policy Transmission Projects* (Dated February 2019), at 16.

⁷³ REP-6.

Transmission development through the NYISO planning process is an integral part of developing a competitive, efficient wholesale market. The NYISO continuously performs transmission planning studies to ensure its transmission system is reliable and achieves competitive and efficient outcomes for the State's electricity customers. The primary question that the Commission has considered here and should consider in future PPTNs is not whether the addition of the Projects reduces market revenues to merchant generation resources, but whether the Projects are cost-effective overall and provide net benefits to customers. Based on the Commission's review of the analyses performed from 2015 to 2019 and numerous opportunities for stakeholders to provide comments in these filings, the Commission identified and twice reaffirmed the need for the transmission upgrades that the Projects provide, as noted above.

Because the Projects provide benefits in excess of their costs, in addition to other qualitative benefits, they support a more efficient outcome and, thus, will neither distort the market nor hurt customers. On the contrary, eliminating, delaying, or downsizing the Projects would distort the electricity market away from the efficient, least-cost outcome for New York ratepayers.

Mr. Paryl claims that the capacity premiums that have recently existed in Zone G, where CVEC is located, were the "appropriate market price signals for new generation to be developed in Zone G."⁷⁴ I agree that those prices may have been accurate based on the Installed Capacity ("ICAP") market design and the system conditions at the time. However, the ICAP market is not designed to hold prices constant indefinitely in Zone G unless the previously-observed market and system conditions actually persist. Several factors could reduce future Zone G prices that would decrease CVEC's capacity revenues, including reduced electricity demand due to expanded energy-efficiency programs and other economic factors, increased transfer capacity from other neighboring zones and electricity markets, additional new generation capacity in Zones G-J, or a change in the ICAP demand curve.

As a merchant generation resource, CVEC must account for future market risks when investing in a new plant. This includes changes in market conditions due to new transmission facilities that reduce congestion and LCRs. Transmission upgrades, like the Projects, that demonstrate sufficient net benefits based on the transmission planning processes established by NYISO and approved by the Commission and FERC. The transmission upgrades based on these planning processes are part of the reality of the industry in which CVEC and its partners invested. I agree with the NYISO Board of Director's conclusions that these Projects:

"would not have an adverse impact on the competitiveness of the NYISO-administered markets. Rather, the addition of the selected transmission facilities will reduce persistent uneconomic transmission congestion and enhance wholesale market competition by providing additional infrastructure to permit

⁷⁴ REP-8.

resources located Upstate to compete to fulfill customer needs in the NYISO-administered markets.”⁷⁵

Mr. Paryl claims that when the final decisions to proceed with financing CVEC were made, the impacts were “anticipated to be small or perhaps non-existent due to the uncertainty surrounding the development prospects of the PPTN lines at the time” and “Cricket Valley did not anticipate a significant economic impact due to reduction of projected capacity prices in the G-J Locality.”⁷⁶ Mr. Paryl asserts that, at the time, CVEC anticipated the impact of the Projects on the UPNY/SENY interface transfer capability to be consistent with the Commission’s recommendation of 900 MW, not the “significantly” higher 1,850 MW approved by the 2017 Commission Order.⁷⁷

However, that is not the case. First, Mr. Paryl misquotes the 2015 Commission Order. The Order did not request projects with impacts *equal* to 900 MW of increased normal transfer capability across the UPNY/SENY interface. Instead the Commission sought projects that could provide *at least* 900 MW of increased normal transfer capability. Specifically, the Commission required that “no transmission solution shall be selected for Segment B that provides less than a 900 MW increase in normal transfer capacity across the UPNY/SENY interface.”⁷⁸

Second, Mr. Paryl is comparing apples to oranges when he states that the impact on the UPNY/SENY transfer capability increased from 900 MW to 1,850 MW. The 2015 Commission Order requested no less than 900 MW of an increase of the *normal* transfer capability.⁷⁹ However, the larger impact of the Projects on the UPNY/SENY interface of 1,850 MW is for the *emergency* transfer capability.⁸⁰ The 2015 DPS Trial Staff report already demonstrated the significant difference between these two values. The three proposed upgrades evaluated in 2015 that were similar to the Projects (P11, P12, and P14) had an impact on the UPNY/SENY interface of 432 MW to 1,136 MW for the normal transfer capability and 1,341 MW to 2,286 MW for the

⁷⁵ NYISO, *NYISO Board of Directors’ Decision on Approval of AC Transmission Public Policy Transmission Planning Report and Selection of Public Policy Transmission Projects* (Dated April 8, 2019), at 7.

⁷⁶ REP-12-13.

⁷⁷ REP-13.

⁷⁸ Case 12-T-0502, *supra*, Order Finding Transmission Needs Driven by Public Policy Requirements (Issued Dec. 17, 2015), Appendix B.

⁷⁹ *Id.*

⁸⁰ “For T019, the incremental UPNY-SENY emergency transfer capability decreased from the previously calculated level of 2,100 MW to 1,850 MW” (NYISO, *AC Transmission Public Policy Transmission Planning Report Addendum* [Dated April 2019], at 5. Available at <https://www.nyiso.com/documents/20142/5990681/AC-Transmission-Public-Policy-Transmission-Plan-2019-04-08.pdf> [last accessed Sep. 29, 2020]).

emergency transfer capability, a difference of about 1,000 MW.⁸¹ These values demonstrate that Mr. Paryl's comparison of 900 MW of normal transfer capability to 1,850 MW of emergency transfer capability is incorrect.

Third, as of January 2017 when CVEC closed on its financing and started construction,⁸² the publicly-available 2015 Trial Staff Report showed the impact of the Projects on the UPNY/SENY ETC were in the range of 1,300 MW to 2,300 MW, similar to the Projects' impacts of 1,850 MW.

Finally, despite Mr. Paryl's claim that CVEC did not anticipate a reduction of G-J capacity prices, the 2015 Trial Staff Report identified reduced capacity prices in Zone G-J as a likely impact of building the Projects, stating "*suppliers would know well in advance about the impending reduction in SENY capacity requirements, and would be expected to plan accordingly.*"⁸³

Mr. Paryl incorrectly refers to the decrease in energy and capacity revenues as "economic damage."⁸⁴ Even if CVEC's capacity revenues were to be lower with the Projects than without, there is no reason to compensate CVEC for that difference.⁸⁵ CVEC built its plant as a merchant investor in a market with an approved transmission planning process designed to achieve lowest cost outcomes for its customers and at a time when moving forward on transmission upgrades similar to those provided by the Projects had already been evaluated and approved by the Commission.

VI. Approval of the Projects Should Not Be Delayed by Ongoing Studies

Mr. Paryl claims that the impact of the State policies developed to achieve the CLCPA on the need for the Projects will not be known until the Climate Action Council's Scoping Plan is

⁸¹ Case 12-T-0502, *supra*, AC Transmission - Trial Staff Final Report: Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives (Filed Sep. 22, 2015), at xvii.

⁸² See Business Wire, *Advanced Power AG Closes Financing of \$1.584 Billion Energy Center in Dover, New York* (Dated Jan. 24, 2017).

⁸³ Case 12-T-0502, *supra*, AC Transmission - Trial Staff Final Report: Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives (Filed Sep. 22, 2015), at 105 (emphasis added).

⁸⁴ REP-22.

⁸⁵ Note that CVEC's own analysis shows (1) that the Projects have only an *de minimus* impact on CVEC's wholesale energy market revenues; and (2) that the change in energy market revenues over time due to factors entirely unrelated to the Projects exceeds CVEC's claimed change in capacity market revenues. See CVEC Exhibit __ (CVEC-4), at 3.

released in July 2021. Mr. Paryl concludes that “any action to consider these Projects should await the development of a complete record with an assessment of those developments since such assessment will likely indicate that the Projects are either not needed at all or, if needed, should be down-sized to match the reduced need.”⁸⁶

Contrary to Mr. Paryl’s statements, delaying the approval process for further study is unlikely to result in new information that would change the conclusion that the Projects provide net benefits. Rather, delaying it likely would do some harm. The studies Mr. Paryl mentions are not expected to result in a “comprehensive transmission plan” nor to re-evaluate the need for the Projects, since NYISO’s authoritative RNA already assumes the Projects will be built.⁸⁷ As the quote included in Mr. Paryl’s testimony concerning the Transmission Planning notes, the “development of the bulk-power plan is not the topic of this action” and the “intent...is to establish any *decisional processes* needed to support bulk system investments in time to act on the results of the power grid study early in 2021.”⁸⁸ More importantly, these studies will not determine the complete set of future resources and loads, which are the variables that will most strongly affect the benefits of the Projects. The studies are only one of many steps in the process to identifying the path forward and should not be seen as definitive planning studies through 2050. There will always be uncertainty about future developments of resources, transmission, and policy specifics.

As such, it is doubtful that a delay would reveal new information that changes the basic conclusion that these Projects provide benefits in excess of costs, including by strengthening the corridor between Upstate and Downstate to leverage resource diversity to meet the State’s now even-more-ambitious public policy goals. The Projects provide the foundation on which the more specific, localized transmission and resource plans can be developed in support of the CLCPA. Postponing the approval process would delay the realization of the Project’s benefits; it would also slow resolution of other more specific parts of the CLCPA plan that may depend on the infrastructure provided by the Projects.

The issues identified by CVEC related to interconnection should not hold up approvals either, as such issues are generally resolved through the standard NYISO process. The Commission’s Article VII process is not the appropriate venue to determine these issues and should not be used to delay the Commission’s approval of the Projects based on the well-defined and previously-approved benefits to the system.

⁸⁶ REP-4.

⁸⁷ NYISO, *2020 RNA Preliminary (“1stPass”) Reliability Needs* (Dated June 19, 2020), at 12.

⁸⁸ REP-16 (emphasis added).

VII. Conclusions

Before the CLCPA was established, the Projects were repeatedly shown to meet New York’s public policy need and to provide benefits exceeding the costs. With the CLCPA now in place, the Projects became even more important to provide infrastructure that will enable New York to meet its ambitious 2040 and 2050 decarbonization goals cost-effectively and reliably. They do so by increasing the capacity for power to flow between the two distinct regions of the State that have very different generation and load profiles, and thus expanding renewable resource investment options and leveraging renewable generation diversity.

CVEC and the Guidehouse analysis CVEC relies on do not account for these additional long-term benefits of the Projects. They also understate near-term benefits of the Projects in their 2024-2033 simulations by understating gas price differentials between Upstate and Downstate New York and not modeling extreme conditions, and not adjusting for their model’s deficiencies even though their benchmarking to real-world energy prices indicates that they should. Nor do they account for other, non-quantified benefits of the Projects, including enabling investments in lower-cost Upstate renewable resources, improved market competition, enhanced planning and operational flexibility, and enhanced resiliency/storm hardening. For these reasons, CVEC’s claim based on the Guidehouse analysis that the Projects are “uneconomic” is unsubstantiated.

Since similar upgrades were first evaluated in 2015 and the specific Projects were then selected through NYISO and Commission transmission planning processes, analyses repeatedly showed the Projects provide net benefits and meet the needs the Commission has identified. The Projects increase the efficiency of the market and, thus, do not distort market prices. Therefore, there is no reason to compensate CVEC for the impact the Projects may have on their net revenues.

As for CVEC’s request to delay the approval process until 2021, that would not likely result in new information that would change the conclusion that the Projects provide net benefits. Doing so would delay the realization of benefits and the State’s progress toward establishing the basic infrastructure needed to accomplish the CLCPA’s goals.

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