

INFORMATION SHEET

PRESIDING: Finley, Brown-Bland, Bailey, Dockham, Patterson, Gray  
PLACE: Dobbs Building, Raleigh, North Carolina  
DATE: April 20, 2017 (Volume 6)  
TIME: 9:36 a.m. to 12:32 p.m.  
DOCKET NO.: E-100, Sub 148  
COMPANIES: Duke Energy Carolinas, LLC, Duke Energy Progress, LLC,  
Virginia Electric and Power Company, d/b/a Dominion  
North Carolina Power, Cypress Creek Renewables, LLC  
DESCRIPTION: General Electric Biennial Determination of Avoided Cost Rates  
for Electric Utility Purchases from Qualifying Facilities - 2016

**FILED**

**MAY 09 2017**

Clerk's Office  
N.C. Utilities Commission

APPEARANCES

FOR DUKE ENERGY CAROLINAS, LLC, AND  
DUKE ENERGY PROGRESS, LLC:

Lawrence B. Somers, Esq.  
Kendrick C. Fentress, Esq.  
E. Brett Breitschwerdt, Esq.  
Robert W. Kaylor, Esq.

**OFFICIAL COPY**

FOR VIRGINIA ELECTRIC AND POWER COMPANY, D/B/A  
DOMINION NORTH CAROLINA POWER:

Andrea R. Kells, Esq.  
Bernard L. McNamee, Esq.  
Horace P. Payne, Jr., Esq.

FOR NORTH CAROLINA SUSTAINABLE ENERGY ASSOCIATION:

Peter H. Ledford, Esq.  
Charlotte Mitchell, Esq.

FOR CAROLINA UTILITY CUSTOMERS ASSOCIATION:

Robert F. Page, Esq.

FOR THE NORTH CAROLINA PORK COUNCIL:

Kurt J. Olson, Esq.

FOR SOUTHERN ALLIANCE FOR CLEAN ENERGY:

Gudrun Thompson, Esq.  
Lauren J. Bowen, Esq.  
Peter Stein, Esq.

FOR CAROLINA INDUSTRIAL GROUP FOR FAIR  
UTILITY RATES, I, II AND III:

Adam Olls, Esq.

FOR NTE CAROLINAS SOLAR, LLC:

M. Gray Styers, Jr., Esq.

APPEARANCES CONT'D.

FOR CYPRESS CREEK RENEWABLES:

Thadeus B. Culley, Esq.

FOR NORTH CAROLINA ELECTRIC  
MEMBERSHIP CORPORATION:

Michael D. Youth, Esq.

FOR THE NORTH CAROLINA ATTORNEY GENERAL:

Jennifer T. Harrod, Esq.

FOR THE USING AND CONSUMING PUBLIC

Tim R. Dodge, Esq.

Lucy E. Edmondson, Esq.

Heather D. Fennell, Esq.

Robert Josey, Jr., Esq.

WITNESSES

Kurt G. Strunk (prefiled testimony only)

PANEL Bruce E. Petrie, J. Scott Gaskill (Cont'd)

Patrick McConnell

EXHIBITS

Strunk Exhibits 1-4 Identified/Admitted

Exhibit JSG-1 Admitted

Rebuttal JSG-1 Admitted

Exhibit BEP-1 Admitted

Confidential BEP-1 (Filed under seal) Admitted

Exhibit BEP-2 Admitted

NCSEA DNCP Cross Exhibit 1 Identified/Admitted

Public Staff Gaskill Cross Exhibit 1 Identified/Admitted

DEC/DEP McConnell Cross Exhibits 1-4 Identified

Initial Comments and Exhibits of

Dominion North Carolina Power Identified/Admitted

3 pg. 1 of 202 previously  
filed in the docket on  
11/15/16 as public and confidential

EMAIL COPIES ORDERED: Dodge, Fennell, Edmondson, Josey, Harrod, Fentress, Kells, Bowen,  
Culley, Ledford, Pendergrass

HARD COPIES ORDERED: Finley, Buffkin, ~~Harrod, Kells, Bowen, Culley, Ledford~~, Sessoms

CONFIDENTIAL: Dodge, Harrod, Fentress, Somers, Bowen, Culley, Ledford, Mitchell

REPORTED BY: Linda Garrett

TRANSCRIBED BY: Linda Garrett

DATE TRANSCRIBED: May 3, 2017

TRANSCRIPT PAGES:136

PREFILED PAGES: 24

NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18  
DOCKET #: E-100, S-1-148  
NAME OF ATTORNEY Kenneth Fentress  
TITLE Associate General Counsel  
FIRM NAME Duyl Energy  
ADDRESS \_\_\_\_\_  
CITY Raleigh NC  
ZIP \_\_\_\_\_

**APPEARING FOR:** \_\_\_\_\_

APPLICANT  COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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**NORTH CAROLINA UTILITIES COMMISSION**  
**APPEARANCE SLIP**

DATE 4/8/17  
DOCKET #: E-100, SK148  
NAME OF ATTORNEY Lawrence B. Jones  
TITLE Deputy General Counsel  
FIRM NAME Duke Energy Corp.  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
ZIP \_\_\_\_\_

**APPEARING FOR:** Duke Energy Carolinas LLC + Duke Energy Progress LLC

APPLICANT       COMPLAINANT \_\_\_\_\_      INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_      RESPONDENT \_\_\_\_\_      DEFENDANT \_\_\_\_\_

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**NORTH CAROLINA UTILITIES COMMISSION**  
**APPEARANCE SLIP**

DATE April 15, 2017  
DOCKET #: E-100, Sub 148  
NAME OF ATTORNEY Robert W. Kaylor  
TITLE Attorney  
FIRM NAME Law Office of Robert W. Kaylor, P.A.  
ADDRESS 353 E. Six Forks Rd. Ste. 260  
CITY Raleigh NC  
ZIP 27609

**APPEARING FOR:** Duke Energy Carolinas, LLC  
Duke Energy Progress, LLC

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

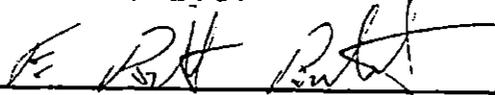
DATE 4-18  
DOCKET #: E-100 Sub 148  
NAME OF ATTORNEY F. Brent Breitkreutz  
TITLE \_\_\_\_\_  
FIRM NAME McGuire Woods LLP  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
ZIP \_\_\_\_\_

APPEARING FOR: Dulce Progress

APPLICANT  COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18/17  
DOCKET #: E100 Sub 148  
NAME OF ATTORNEY Andrea Kelly  
TITLE Counsel  
FIRM NAME McOwne Woods  
ADDRESS 434 Fayetteville St.  
CITY Raleigh  
ZIP 27601

APPEARING FOR: Dominion

APPLICANT  COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4-18-17  
DOCKET #: E-100 sub 148  
NAME OF ATTORNEY Bernard L. McNamara  
TITLE Sr. Counsel  
FIRM NAME McGuire Woods LLP  
ADDRESS 800 E. Canal St  
CITY Richmond, VA  
ZIP 23219

APPEARING FOR: Dominion North Carolina Power

APPLICANT  COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE April 18, 2017  
DOCKET #: E-100, Sub 148  
NAME OF ATTORNEY Adam Olls  
TITLE \_\_\_\_\_  
FIRM NAME Barley & Dixon, LLP  
ADDRESS 434 Fayetteville Street, Suite 2500  
CITY Raleigh  
ZIP 27601

APPEARING FOR: Carolina Industrial Group for Pw. Utility Rates I, II + III

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR \_\_\_\_\_  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18/17  
DOCKET #: E-100 Sub 148  
NAME OF ATTORNEY Pete Stem  
TITLE Attorney  
FIRM NAME Southern Environmental Law Center  
ADDRESS 601 W Rosemary St.  
CITY Chapel Hill  
ZIP 27516

APPEARING FOR: Southern Alliance for Clean Energy

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE April 18, 2017  
DOCKET #: E-100 Sub 148  
NAME OF ATTORNEY Lauren J. Bowen  
TITLE Staff Attorney  
FIRM NAME Southern Environmental Law Center  
ADDRESS 601 W. Rosemary St #220  
CITY Chapel Hill, NC  
ZIP 27516

APPEARING FOR: Southern Alliance for Clean Energy

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT

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**NORTH CAROLINA UTILITIES COMMISSION**  
**APPEARANCE SLIP**

DATE 4/18/17  
DOCKET #: E-100, Sub 148  
NAME OF ATTORNEY Michael D. Youth  
TITLE Associate Gen Counsel  
FIRM NAME NCEMC  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
ZIP \_\_\_\_\_

**APPEARING FOR:** NCEMC

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR X  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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**NORTH CAROLINA UTILITIES COMMISSION**  
**APPEARANCE SLIP**

DATE 4/18/17  
DOCKET #: E 100 Sub 148  
NAME OF ATTORNEY Kurt Olson  
TITLE \_\_\_\_\_  
FIRM NAME Law Office of Kurt Olson  
ADDRESS 3737 Glenwood Ave. Suite 100  
CITY Raleigh NC  
ZIP 27602

**APPEARING FOR:** North Carolina Park Council

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18/17  
DOCKET #: E-100 Sub 148  
NAME OF ATTORNEY Thad Culley  
TITLE Partner  
FIRM NAME Cypress and Fox LLP  
ADDRESS 401 Harrison Oaks Blvd, Suite 100  
CITY Cary, NC  
ZIP 27513

APPEARING FOR: Cypress Creek Renewables

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18/2017  
DOCKET #: E-100 Sub 148  
NAME OF ATTORNEY Peter Ledford  
TITLE General Counsel  
FIRM NAME North Carolina Sustainable Energy Association  
ADDRESS 4800 Six Forks Road Suite 300  
CITY Raleigh, NC  
ZIP 27609

APPEARING FOR: North Carolina Sustainable Energy Association

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR X  
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/10/17  
DOCKET #: E-106 SUB 148  
NAME OF ATTORNEY CHARLOTTE MITCHELL  
TITLE \_\_\_\_\_  
FIRM NAME LAW OFFICE OF CHARLOTTE MITCHELL  
ADDRESS PO Box 26212  
CITY RALEIGH NC  
ZIP 27611

APPEARING FOR: NCSEA

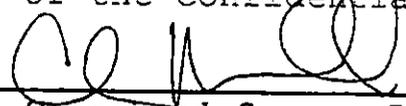
APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 04/18/17 DOCKET #: E-100, Sub 148  
NAME AND TITLE OF ATTORNEY Robert F. Page  
FIRM NAME Crisp & Page, PLLC  
ADDRESS 4010 Barrett Dr., Suite 205  
CITY Raleigh ZIP 27609

APPEARING FOR: Carolina Utility Customers Association, Inc.

APPLICANT	_____	COMPLAINANT	_____	INTERVENER	<input checked="" type="checkbox"/>
PROTESTANT	_____	RESPONDENT	_____	DEFENDANT	_____

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Signature: \_\_\_\_\_

NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE April 18, 2017  
DOCKET #: E-100, Sub 148  
NAME OF ATTORNEY Gray Shyers  
TITLE \_\_\_\_\_  
FIRM NAME Smith Moore Leatherwood  
ADDRESS 434 Fayetteville Street, Suite 2800  
CITY Raleigh, NC  
ZIP 27601

APPEARING FOR: NTE Solar, LLC

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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**NORTH CAROLINA UTILITIES COMMISSION  
PUBLIC STAFF - APPEARANCE SLIP**

DATE 04/18/17 DOCKET #: E-100, Sub 148

PUBLIC STAFF MEMBER Tim R. Dodge, Heather Fennell, Lucy Edmondson, Robert Josey

ORDER FOR TRANSCRIPT OF TESTIMONY TO BE EMAILED TO THE PUBLIC STAFF  
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COMMUNICATIONS \_\_\_\_\_

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ECONOMICS \_\_\_\_\_

**LEGAL** tim.dodge@psncuc.nc.gov,  
heather.fennell@psncuc.nc.gov,  
lucy.edmondson@psncuc.nc.gov,  
robert.josey@psncuc.nc.gov

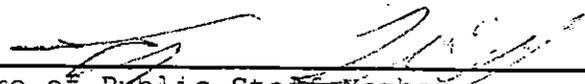
CONSUMER SERVICES \_\_\_\_\_

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All Public Staff personnel working on case.

  
\_\_\_\_\_  
Signature of Public Staff Member

NORTH CAROLINA UTILITIES COMMISSION  
APPEARANCE SLIP

DATE 4/18/2017  
DOCKET #: E-100, Sub 148  
NAME OF ATTORNEY Jennifer Harrod  
TITLE Special Deputy Attorney General  
FIRM NAME Office of NC Attorney General  
ADDRESS 114 West Edenton St  
CITY Raleigh NC  
ZIP 27602-0629

APPEARING FOR: NC Attorney General, Josh Stein

APPLICANT \_\_\_\_\_ COMPLAINANT \_\_\_\_\_ INTERVENOR   
PROTESTANT \_\_\_\_\_ RESPONDENT \_\_\_\_\_ DEFENDANT \_\_\_\_\_

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**NERA**  
ECONOMIC CONSULTING

**Kurt G. Strunk**  
Director

NERA Economic Consulting  
1166 Avenue of the Americas  
New York, New York 10036  
Tel: +1 212 345 5035 Fax: 212-345-4650  
Kurt.Strunk@nera.com  
www.nera.com

## **KURT G. STRUNK**

**Director**

Mr. Strunk is an expert in applied finance and energy matters with over 20 years of experience in complex commercial litigation, arbitration and regulatory proceedings. He has been retained as an expert to testify before arbitrators, the Federal Energy Regulatory Commission, US Tax Court, US Federal Court, and US Bankruptcy Court, the National Energy Board in Canada, as well as before state and provincial public utilities boards in the US and Canada. His testimonies have addressed the estimation of damages in breach of contract claims, asset and contract valuation, cost of capital, trading and risk management, the application of the just and reasonable rate standard, prudence, cost of service, regulatory reform, pipeline access and retail market issues. He has served as an advisor in over fifty public utility tariff reviews.

In the oil and gas sectors, Mr. Strunk has consulted on rate matters, mergers and acquisitions, restructurings, contract disputes, and product pricing. He has conducted numerous analyses of the procurement of fuels by electric generators. He served as an expert in regulatory hearings relating to pipeline tariffs in Canada and the United States. He has valued oil and gas assets and swaps in litigated disputes on behalf of major firms in the petroleum sector. He has also carried out studies of the reasonableness of gas supply agreements in various jurisdictions and assessed damages in connection with the early termination of such agreements.

In electric power, Mr. Strunk has advised governments, regulators, and energy companies on industry structure, regulation, and sector reform in North America, South America, Europe, Australia, Asia and Africa. He has worked extensively on matters related to all aspects of the electric power sector in the US and across the globe. In generation, Mr. Strunk recently co-authored a fairness opinion addressing a 6,300 MW nuclear power transaction in Ontario, Canada. He has advised a number of clients on the development of independent power contracts, fuel supply arrangements and competitive solicitations. With regard to transmission, he has advised on the design of transmission tariffs and on the design of electricity markets to encourage efficient transmission investment. He has advised on the electric sector reform program in Mexico, power market design and clean energy auctions, while also advising on capacity market design in US markets.

Mr. Strunk's assignments often require that he determines the appropriate return on equity capital for energy firms. He has calculated and supported required rates of return for power generators, gas distribution utilities, electric distribution and transmission companies, and other energy firms in the context of traditional tariff reviews for regulated entities, litigation and advisory work. Mr. Strunk frequently collaborates with NERA's Securities and Finance Practice. He has addressed liability and damages in broker-dealer disputes, and in securities class actions.

## Education

- 1997                    **INSEAD (The European Institute of Business Administration),  
Fontainebleau, France**  
MBA, with Distinction, 1997
- 1993                    **VASSAR COLLEGE,**  
**New York, USA**  
B.A., Economics, General and Departmental Honors

## Career Details

- 2017-present        **NERA ECONOMIC CONSULTING**  
Director, New York
- 2012–2016         **NERA ECONOMIC CONSULTING**  
Vice President, New York
- 2005–2012         **NERA ECONOMIC CONSULTING**  
Senior Consultant, New York
- 2003–2004         **NERA ECONOMIC CONSULTING**  
Outside Consultant, New York
- 2000–2002         **NERA ECONOMIC CONSULTING**  
Senior Consultant, New York
- 1998–1999         **NERA ECONOMIC CONSULTING**  
Senior Analyst, New York
- 1996                 **NERA ECONOMIC CONSULTING**  
Associate Analyst, New York
- 1994–1995         **NERA ECONOMIC CONSULTING**  
Research Associate, New York
- 1993–1994         **NERA ECONOMIC CONSULTING**  
Research Assistant, New York
- 1992                 **GÉNÉRALE DE BANQUE**  
Research Assistant, Brussels

## Languages

- English:            mother tongue  
French:             fluent  
Spanish:            fluent

## Project Experience

### EXPERT TESTIMONY

- 2017**                      **NV Energy**  
**Cost of Gas / Prudence**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the prudence of the Company's gas purchases, March 1, 2017.
- 2016**                      **NV Energy**  
**Cost of Capital**  
Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, September 23, 2016.
- 2016**                      **Hawai'i Electric Light**  
**Incentive Ratemaking, Fuel Adjustment Clauses**  
Direct Testimony before the Hawai'i Public Utilities Commission, on behalf of Hawai'i Electric Light, addressing alternative incentive mechanisms for the Company's power generation fleet and the reasonableness of the Company's proposed ECAC. September 19, 2016.
- 2016**                      **NV Energy**  
**Cost of Capital**  
Certification Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, August 2, 2016.
- 2016**                      **NV Energy**  
**Cost of Capital**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, addressing the cost of capital for the Company's electric and gas divisions, June 6, 2016.
- 2016**                      **PacifiCorp**  
**Cost of Capital**  
Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's expedited rate filing (Docket UE-152253), May 2, 2016.

- 2016**                    **Confidential Client**  
**Damages under Wind Power Purchase Agreement**  
Expert Report in arbitration on the valuation of damages under a PPA backed by a wind farm, April 25, 2016.
- 2016**                    **Municipality of Anchorage (ML&P), Chugach Electric Association**  
**Valuation of Gas Field and Reasonableness of Acquisition Price**  
Oral Testimony before the Regulatory Commission of Alaska on the reasonableness of the proposed acquisition of ConocoPhillips' working interest in the Beluga River Unit, April 19, 2016.
- 2016**                    **PacifiCorp**  
**Cost of capital**  
Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's expedited rate filing (Docket UE-152253), April 7, 2016.
- 2016**                    **NV Energy**  
**Cost of Gas / Prudence**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2016.

- 2016**                    **Alliance to Protect Nantucket Sound**  
**Financing of off-shore wind farm**  
Oral Testimony before the Energy Facilities Siting Board of the Commonwealth of Massachusetts on the financeability of the Cape Wind project, January 25, 2016.
- 2015**                    **PacifiCorp**  
**Cost of capital**  
Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital, November 24, 2015.
- 2015**                    **Chugach Electric Association, Inc.**  
**Regulatory principles for attributing found natural gas**  
Oral testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, August 31, 2015.
- 2015**                    **Baltimore Gas & Electric Company**  
**Risks and rate of return for retail electricity business**  
Oral Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, August 5, 2015.
- 2015**                    **Baltimore Gas & Electric Company**  
**Risks and rate of return for retail electricity business**  
Rebuttal Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, July 22, 2015.
- 2015**                    **Chugach Electric Association, Inc.**  
**Regulatory principles for attributing found natural gas**  
Pre-filed testimony before the Regulatory Commission of Alaska, addressing the regulatory treatment of gas found by the Cook Inlet Natural Gas Storage Alaska LLC, June 5, 2015.
- 2015**                    **ATX Southwest, LLC.**  
**Cost of Capital**  
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of ATX Southwest, addressing return on equity, May 28, 2015.

- 2015                    **Chugach Electric Association, Inc.**  
**Cost of Capital**  
Responsive Testimony before the Regulatory Commission of Alaska, addressing return on equity for the Enstar Natural Gas Company, May 15, 2015.
- 2015                    **Baltimore Gas & Electric Company**  
**Risks and rate of return for retail electricity business**  
Testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, April 22, 2015.
- 2015                    **NV Energy**  
**Cost of Gas / Prudence**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2015.
- 2014                    **PacifiCorp**  
**Cost of capital**  
Oral Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, December 16, 2014.
- 2014                    **PacifiCorp**  
**Cost of capital**  
Rebuttal Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, November 21, 2014.
- 2014                    **PacifiCorp**  
**Cost of capital**  
Direct Testimony before the Washington Utilities and Transportation Commission, on behalf of PacifiCorp, on the cost of capital in the Company's general rate case, including the effects of transitioning away from coal, April 30, 2014.
- 2014                    **Nevada Power Company**  
**Cost of capital**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Nevada Power Company, on the cost of capital in the Company's general rate case, April 30, 2014.

- 2015**                    **NV Energy**  
**Cost of Gas / Prudence**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of NV Energy, addressing the reasonableness of the Company's natural gas purchases, March 1, 2014.
- 2013**                    **Sierra Pacific Power Company**  
**Cost of capital**  
Oral testimony, before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, October 7, 2013.
- 2013**                    **Sierra Pacific Power Company**  
**Cost of capital**  
Rebuttal Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, September 25, 2013.
- 2013**                    **Market Area Shippers**  
**(Gaz Métro, Union Gas and Enbridge Gas Distribution)**  
**Contract Renewal Alternatives for Regulated Pipeline Service**  
Pre-filed Expert Report, with Jeff Makhholm, before the National Energy Board of Canada, in the Matter of TransCanada's Application for Tariff Amendments, Hearing Order RH-001-2013, July 26, 2013.
- 2013**                    **Sierra Pacific Power Company**  
**Cost of capital**  
Direct Testimony before the Nevada Public Utilities Commission, on behalf of Sierra Pacific Power Company, on the cost of capital for the gas and electric divisions in the Company's general rate case, June 4, 2013.
- 2013**                    **NV Energy Operating Companies**  
**Cost of capital**  
Direct Testimony before the Federal Energy Regulatory Commission, on behalf of NV Energy Operating Companies, on the appropriate rate of return for the consolidated transmission system, May 31, 2013.
- 2013**                    **Public Intervenor**  
**Wholesale Margins for Regulated Motor Fuels and Heating Oil**  
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an Application by Irving Oil Marketing GP and Irving Oil Commercial GP requesting an increase in the wholesale margins for motor fuels and heating oil*, January 29, 2013.

- 2013**                    **Public Intervenor**  
**Power sector modelling, deferral account policy, financial analysis**  
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the Point Lepreau Nuclear Generating Station Deferral Account and Section 143.1 of the Electricity Act*, January 15, 2013.
- 2012**                    **Baltimore Gas & Electric Company**  
**Potomac Electric Power Company**  
**Power Purchase Agreements, Retail electric competition**  
Oral testimony before the Maryland Public Service Commission on the financeability of a new power plant *In the Matter of Whether New Generation Resources Are Needed to Meet Long-Term Demand for Standard Offer Service*, Case No. 9214, November 26, 2012.
- 2012**                    **Public Intervenor**  
**Modelling of coal and oil plants, deferral account, financial analysis**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of the Point Lepreau Nuclear Generating Station Deferral Account and Section 143.1 of the Electricity Act*, November 26, 2012.
- 2012**                    **Nevada Power Company**  
**Cost of capital**  
Pre-filed testimony before the Federal Energy Regulatory Commission in the Nevada Power Company's Transmission Rate Case, October 31, 2012.
- 2012**                    **Public Intervenor**  
**Wholesale margins for regulated motor fuels and heating oil**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of an Application by Irving Oil Marketing G.P. and Irving Oil Commercial G.P. Requesting an Increase in the Wholesale Margins for Motor Fuels and Heating Oil*, October 26, 2012.
- 2012**                    **Nevada Power Company**  
**Prudence of gas costs for 2012**  
Pre-filed Expert Report before the Nevada Public Utilities Commission *In the Nevada Power Company's 2012 Deferred Energy Filing*, March 1, 2012.
- 2012**                    **Sierra Pacific Power Company**  
**Prudence of gas costs for 2012**  
Pre-filed Expert Report before the Nevada Public Utilities Commission *In the Nevada Power Company's 2012 Deferred Energy Filing*, March 1, 2012.

- 2011 **Public Intervenor**  
**Power system loss factors, OATT, transmission regulatory policy**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board *In the Matter of a Review of the Proposed Change to the New Brunswick System Operator's Real Power Loss Factor*, October 31, 2011.
- 2011 **John Hancock**  
**Risk analysis of European power plant leveraged lease**  
Oral Testimony before the U.S. Tax Court, on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, October 24, 2011.
- 2011 **John Hancock**  
**Risk analysis of European power plant leveraged lease**  
Rebuttal Expert Report before the U.S. Tax Court, on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, August 19, 2011.
- 2011 **John Hancock**  
**Risk analysis of European power plant leveraged lease**  
Pre-filed Expert Report before the U.S. Tax Court on behalf of plaintiff in *John Hancock Life Insurance Company and Subsidiaries v. Commissioner of Internal Revenue*, July 8, 2011.
- 2011 **Public Intervenor**  
**OATT, transmission regulatory policy**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Review of the Proposed Changes to the New Brunswick System Operator's Open Access Transmission Tariff*, February 21, 2011.
- 2011 **Public Intervenor**  
**Power system loss factor, OATT, transmission regulatory policy**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Review of the New Brunswick System Operator's Proposed Change to its Loss Factor*, February 3, 2011.
- 2011 **Baltimore Gas & Electric Company**  
**Risks and rate of return for retail electricity business**  
Oral testimony before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, January 20, 2011.

- 2010**                    **Baltimore Gas & Electric Company**  
**Risks and rate of return for retail electricity business**  
Pre-filed Expert Report before the Maryland Public Service Commission, *in the Matter of Baltimore Gas & Electric's Application to Recover Cash Working Capital for Standard Offer Service*, Case No. 9221, September 17, 2010.
- 2010**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Oral testimony before the New Brunswick Energy & Utilities Board, in the *Enbridge Gas New Brunswick Rate Case*, March 30, 2010.
- 2010**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of Enbridge Gas New Brunswick Rate Case*, March 12, 2010.
- 2009**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Oral testimony before the New Brunswick Energy & Utilities Board, *in the Review of Matters related to the Regulation of Enbridge Gas New Brunswick*, October 23, 2009.
- 2009**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of the Annual Financial Review of Enbridge Gas New Brunswick Limited Partnership*, August 21, 2009.
- 2009**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Oral testimony before the New Brunswick Energy and Utilities Board, *in the Matter of the Annual Financial Review of Enbridge Gas New Brunswick Limited Partnership*, September 15, 2009.
- 2009**                    **Public Intervenor**  
**Greenfield gas distributor, cost of service, just and reasonable rates**  
Pre-filed Expert Report before the New Brunswick Energy and Utilities Board, *in the Matter of a Review of Matters Related to the Regulation of Enbridge Gas New Brunswick Limited Partnership*, September 21, 2009.
- 2009**                    **The City of New York**  
**Cost of service, incentives and taxi lease rates**

Oral testimony in the District Court for the Southern District of New York in *Metropolitan Taxicab Board of Trade et al. v. The City of New York et al.*, on the issue of whether the Taxi and Limousine Commission's new maximum lease rates constitute a fuel efficiency and emissions mandate that would be preempted by Federal law, May 20, 2009.

2009

**The City of New York**

**Cost of service, incentives and taxi lease rates**

Pre-filed expert Report in the United States District Court for the Southern District of New York in *Metropolitan Taxicab Board of Trade et al. v. The City of New York et al.*, on the issue of whether the Taxi and Limousine Commission's new maximum lease rates constitute a fuel efficiency and emissions mandate that would be preempted by Federal law, May 18, 2009.

2009

**Public Intervenor**

**Greenfield gas distributor, cost of service, just and reasonable rates**

Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the examination of the formula for Enbridge Gas New Brunswick's market-based rate*, April 23, 2009.

2009

**Public Intervenor**

**Greenfield gas distributor, cost of service, just and reasonable rates**

Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of the examination of the formula for Enbridge Gas New Brunswick's market-based rate*, March 26, 2009.

2009

**Public Intervenor**

**Cost of service, ISO management, OATT transmission policy**

Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of the application of the New Brunswick System Operator for changes to its Charges, Rates and Tolls*, March 18, 2009.

2009

**Public Intervenor**

**Cost of service, ISO management, OATT transmission policy**

Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of the application of the New Brunswick System Operator for changes to its Charges, Rates and Tolls*, February 24, 2009.

2008

**Allegheny Power, Baltimore Gas & Electric**

**Integrated resource planning, competitive retail electric markets**

Oral testimony before the Maryland Public Service Commission, *in the Matter of the Commission's Investigation Of Investor-Owned Electric Companies' Standard Offer Service for Residential and Small Commercial Customers in Maryland*, Case No. 9117, December 15, 2008.

- 2008                    **Allegheny Power, Baltimore Gas & Electric**  
**Integrated resource planning, competitive retail electric markets**  
Pre-filed Report before the Maryland Public Service Commission, *in the Matter of the Commission's Investigation Of Investor-Owned Electric Companies' Standard Offer Service for Residential and Small Commercial Customers in Maryland*, Case No. 9117, October 1, 2008.
- 2008                    **Public Intervenor**  
**Ratemaking for greenfield gas distributor**  
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by Enbridge Gas New Brunswick for changes to its Charges, Rates and Tolls*, March 27, 2008.
- 2008                    **Public Intervenor**  
**Ratemaking for greenfield gas distributor**  
Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of an application by Enbridge Gas New Brunswick for changes to its Charges, Rates and Tolls*, March 10, 2008.
- 2007                    **Public Intervenor**  
**Prudence, just and reasonable standard, affiliate transactions**  
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, December 18, 2007.
- 2007                    **Public Intervenor**  
**Nuclear power plant Cost of Service**  
Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, December 7, 2007.
- 2007                    **Public Intervenor**  
**Prudence of power generation costs**  
Pre-filed Report before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls*, November 5, 2007.
- 2007                    **Public Intervenor**  
**Prudence of power generation costs**  
Oral testimony before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service*

*Corporation (Disco) for changes to its Charges, Rates and Tolls, June 21, 2007.*

2007

**Public Intervenor**

**Prudence of power generation costs**

Pre-filed Report before the New Brunswick Energy and Utilities Board, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, June 14, 2007.*

2006

**Brookfield Energy Marketing Inc.**

**Valuation of power purchase agreement and power plant**

Deposition testimony before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc., Debtor, Case No. 03-30465, May 22, 2006.*

2006

**Brookfield Energy Marketing Inc.**

**Valuation of power purchase agreement and power plant**

Rebuttal Report before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc., Debtor, Case No. 03-30465, May 5, 2006.*

2006

**Brookfield Energy Marketing Inc.**

**Valuation of power purchase agreement and power plant**

Expert Report before the United States Bankruptcy Court for the District of Maryland, on behalf of Brookfield Energy Marketing Inc., *In re: USGen New England, Inc., Debtor, Case No. 03-30465, March 29, 2006.*

2006

**Public Intervenor**

**Application of the prudence standard to affiliate transactions**

Oral testimony before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, March 14, 2006.*

2006

**Public Intervenor**

**Application of the prudence standard to affiliate transactions**

Pre-filed Report with Eugene Meehan before the New Brunswick Board of Commissioners of Public Utilities, *In the Matter of an application by the NBP Distribution & Customer Service Corporation (Disco) for changes to its Charges, Rates and Tolls, January 31, 2006.*

- 2005**                    **Dayton Power & Light Company**  
**Retail pricing for default service customers and option valuation**  
Oral testimony at hearings in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8 and 14 2005.
- 2005**                    **Dayton Power & Light Company**  
**Retail pricing for default service customers and option valuation**  
Deposition testimony in Ohio Public Utilities Commission Case No. 05-276-EL-AIR, November 8, 2005.
- 2005**                    **Dayton Power & Light Company**  
**Retail pricing for default service customers and option valuation**  
Testimony in Ohio Public Utilities Commission, in Support of Stipulation filed in support of Dayton's proposed settlement Case No. 05-276-EL-AIR, November 4, 2005.
- 2005**                    **Dayton Power & Light Company**  
**Retail pricing for default service customers and option valuation**  
Rebuttal testimony in Ohio Public Utilities Commission, application of financial options pricing techniques to assess the reasonableness of Dayton's proposed provider-of-last-resort charges, Case No. 05-276-EL-AIR, October 31, 2005.
- 2004**                    **Board of Public Utilities**  
**Cost of capital**  
Pre-filed testimony with Cindy Ma before the Board of Public Utilities, Newfoundland and Labrador, Canada, on "The Cost of Capital for Automobile Insurance Firms," October 13, 2004.

**CONSULTING EXPERT EXPERIENCE**

- 2016**                      **Confidential Client**  
**Valuation of Solar Generation Facilities**  
Advisor to counsel in dispute related to the valuation of solar facilities.
- 2014 -Present**            **Confidential Client**  
**Offshore Exploration and Production Permit Arbitration**  
Advised on dispute related to an agreement between two firms to develop an offshore gas field in New Zealand in arbitration at the ICC International Court of Arbitration.
- 2013–Present**            **Gaz Métro**  
**Cost Recovery of Gas Distribution System Upgrade**  
Advised client on regulatory merits of ratemaking for distribution system upgrade. Performed survey of ratemaking policies for similar upgrades in other jurisdictions in connection with proceeding before Provincial regulator.
- 2014-Present**            **Confidential Client**  
**Gas Supply Agreement Negotiation**  
Advise on cost of service and LNG contract price issues in Australia.
- 2014- Present**            **Alliance Pipeline**  
**Restructuring of services and tolls**  
Advised on Alliance’s restructuring proposal in a matter before the National Energy Board. Supervised modelling of pipeline tolls and assessment of natural gas pipeline market power.
- 2014-2015**                **Gazprom OAO**  
**Civil dispute involving gas field development and LNG importation**  
Supervised modelling of LNG netback prices and damage calculations in preparation for a jury trial before a Tarrant County, Texas District Court. Consulted with respect to a dispute between a U.S oil company and Russian oil company regarding ownership of a Russian gas field, tortious interference, and trade secret misappropriation with regards to a plan to import LNG into the United States in the mid-2000s.
- 2014**                        **FortisBC Energy Inc**  
**Tolling for pipeline in Canada**  
Analyzed toll methodology and advised on regulatory issues related to a tolling proposal of NGTL’s North Montney Mainline, an extension of the existing NGTL Alberta System.
- 2014**                        **Royal Bank of Canada**

**Gas Supply Agreement Dispute**

Served as consulting expert in a gas supply agreement dispute between RBC and three municipal gas distributors in Nevada and Iowa. Case involved analysis of Basel III regulations, capital requirements, commodity swaps and interest rate swaps.

2013

**Confidential client**

**Valuation and pricing analysis**

Performed valuation and pricing analysis for oil pipeline dispute in Texas. Provided advice to outside counsel throughout litigation.

2012-2014

**ATCO Gas & ATCO Electric**

**Cost of Service / Capital Trackers**

Provided expert review of ATCO Gas and ATCO Electric's capital tracker proposals, including a survey of capital trackers in other jurisdictions.

2012-2013

**Confidential client**

**Valuation of oil pipeline company and its hedging positions**

Performed valuation of oil pipeline company and its hedging positions in litigation involving an alleged breach of fiduciary duty. Provided advice to outside counsel throughout litigation.

2012-2013

**Confidential client**

**Approaches to regulatory accounting and cost-of-service regulation**

Contributed to study assessing benefits of various approaches to regulatory accounting and cost-of-service regulation for pipelines.

2011-2013

**Confidential client**

**Possible outcomes of power contract disputes**

Analyzed potential litigation and settlement outcomes in a series of power contract disputes. Provided advice to outside counsel.

2011-2012

**Confidential client**

**Oil pipeline cost of service and depreciation policies**

Advised counsel to a shipper in an intrastate oil pipeline company rate case before the Kansas Corporation Commission.

2011

**Confidential client**

**Antitrust aspects of a proposed pipeline merger**

Analyzed antitrust aspects of oil pipeline combinations in connection with a proposed merger. Provided advice to outside counsel.

2010-2011

**Confidential client**

**Valuation of generation assets**

Performed valuation of power plant in context of alleged expropriation.

- 2010**                    **Hydro Québec, Canada**  
**Grid connection and upgrade cost policy**  
Analyzed grid connection and upgrade cost policy. Evaluated existing policy to allocate costs of grid upgrades to generation developers and system users. Suggested modifications to policy. Prepared benchmarking analysis comparing the company's practices to those of over a dozen other entities in North America.
- 2008**                    **Confidential client**  
**Allegations of energy market manipulation**  
Advised on the evaluation of allegations of energy market manipulation in the context of physical electricity trades in RTO-managed markets.
- 2007**                    **Confidential client**  
**Valuation of valuation of long-dated oil warrants**  
Performed valuation of long-dated oil warrants priced off Venezuelan crude oil in context of damages calculation.
- 2006**                    **Confidential client**  
**Damages valuation in securities class action**  
Valued damages in a securities class action related to the bankruptcy of an energy retailer.
- 2003-2004**            **Confidential client**  
**Bid process advantages: generation pricing and transmission costs**  
Contributed to testimony on behalf of a large electric utility regarding an affiliate transaction that resulted from a competitive solicitation. Testimony before FERC focused on whether the affiliate was advantaged during the bid process, both with respect to generation pricing and electric transmission cost.
- 2003**                    **Confidential client**  
**Valuation, economic, accounting, and hedging analysis**  
Performed valuation, economic, accounting, and hedging analysis of a gas-fired power plant in an international arbitration matter.
- 2002**                    **Confidential client**  
**Prudence of forward power purchases**  
Contributed to testimony on behalf of an electric utility regarding the prudence of forward power purchases during the Western power crisis.
- 2002–2003**            **Pacific Gas & Electric**  
**Valuation of Damages Due to Gas Pipeline Capacity Withholding**

- Performed analyses of damages from withheld pipeline capacity into California. Analyses led to \$1 billion settlement.
- 2002–2003**      **Confidential client**  
**Prudence of forward power purchases**  
Contributed to testimony regarding the prudence of Department of Water Resources’s forward power purchases during the Western power crisis.
- 2002**            **Confidential client**  
**Electric and gas hedging strategies for its generation assets**  
Contributed to testimony on behalf of an energy marketing and trading firm regarding electric and gas hedging strategies for its generation assets, including an examination of the nature of competition among energy marketing and trading firms and strategies.
- 2001–2002**      **Pacific Gas & Electric Company**  
**FERC refund and other related proceedings**  
Analysis and support to a California utility in the context of the FERC refund and other related proceedings, 2001-2002.
- 2001–2002**      **Pacific Gas & Electric Company**  
**Value of a long-term affiliate power sales agreement**  
Contributed to testimony before FERC relating to the value of a long-term affiliate power sales agreement. Involved analysis and valuation of over 100 long-term power contracts in the context of this benchmarking analysis.
- 2001**            **Confidential client**  
**Valuation of a passive equity interest**  
Contributed to testimony on behalf of a leading US energy company regarding the valuation of a passive equity interest in an IPP project in El Salvador.
- 2001**            **Baltimore Gas & Electric Company**  
**Business separation of Constellation Energy Group**  
Contributed to testimony submitted to the Public Service Commission of Maryland on the business separation of Constellation Energy Group.
- 1998**            **Baltimore Gas & Electric Company**  
**Valuation of generation assets**

Performed valuation of Baltimore Gas & Electric Company's hydro, nuclear, coal and gas-fired generation assets in the context of stranded cost calculations during restructuring, 1998.

1995–1996

**Confidential client**

**Analysis of market concentration**

Performed HHI analyses to support testimony presenting a competitive assessment of the Western electric generation market in the US, 1995-1996.

1994–1995

**Confidential client**

**Damages valuation in securities class action**

Estimated losses and alleged damages for several mutual funds that invested in derivative securities.

1994–1995

**Confidential client**

**Damages valuation in securities class action**

Estimated losses and alleged damages for several mutual funds that invested in derivative securities.

1994

**Goldman Sachs**

**Default risk studies on fixed income instruments**

Prepared default risk studies on fixed income instruments for counsel to Goldman Sachs in a broker/dealer arbitration.

1994

**Confidential client**

**Damages valuation in securities class action**

Consulted to counsel for an infomercial company on materiality, liability, and damages in a shareholder class action suit.

1993

**Confidential client**

**Damages valuation in securities class action**

Assessed materiality and damages in a 10b-5 class action against a major pharmaceutical company.

**ADVISORY PROJECTS**

- 2016**                    **Utility Merger**  
**Due Diligence for Prospective Acquirer**  
Retained by a confidential acquirer to evaluate a target utility and prospective merger benefits. Provided strategic advice and due diligence relating to the financial and regulatory implications of the acquisition.
- 2016**                    **Wind Power Transaction**  
**Due Diligence for Prospective PPA Offtaker**  
Retained by a confidential offtaker to evaluate the costs, benefits and risks associated with a prospective long-term power purchase transaction backed by a wind farm.
- 2016**                    **Electric Utility Acquisition**  
**Due Diligence for Prospective Acquirer**  
Retained by a confidential equity investor to evaluate load risk associated with the prospective acquisition of an interest in a regulated electric utility. Focused on risks around load forecast.
- 2015**                    **Southern Star Central Gas Pipeline**  
**Due Diligence for Prospective Acquirer**  
Retained by a confidential equity investor to evaluate regulatory and investment risk associated with the prospective acquisition of an interest in Southern Star. Analyzed likely outcomes in the pipeline's upcoming rate case.
- 2015**                    **Independent Electricity System Operator (IESO)**  
**Reasonableness of 6,300 MW Power Transaction**  
Retained by IESO in Ontario, Canada, to prepare, together with a team of NERA experts, an Opinion as to the Fairness of the Amended and Restated Bruce Power Refurbishment Implementation Agreement.
- 2015**                    **ESKOM, South Africa**  
**Regulatory Strategy for Cost Recovery**  
Retained by ESKOM to advise on regulatory strategy, treatment of coal-plant operation and associated fuel costs, delays in unit online dates and other regulatory issues.
- 2014**                    **Hawaiian Electric Company**  
**Fuel Adjustment Clause and Oil Hedging**  
Retained by Hawaiian Electric Company to provide analysis regarding the efficiency incentives embedded in the company's fuel adjustment clause (ECAC). Analyzed the possibility of hedging oil price volatility through commercially-available contracts.

- 2014**                    **Confidential Client**  
**Pricing Principles for Domestic Gas Reservation Policy**  
 Formulated a methodology to determine a schedule of reasonable prices using a cost of service approach for gas that the company is obligated to market under the domestic gas supply policy.
- 2012/2013**            **Atlantic Path 15**  
**Due Diligence Study for Confidential Potential Buyer**  
 Performed regulatory due diligence in connection with the potential acquisition of Atlantic Path 15 transmission assets. Evaluated the regulatory climate at FERC and analyzed FERC decisions from prior rate cases, with a focus on allowed rate of return. Used NERA rate-of-return models to replicate the FERC methodology and to predict the rate-of-return to be allowed by FERC in the next rate case.
- 2013**                    **Energy trading entity**  
**Price risks and electricity transmission development**  
 Retained by energy trading entity to perform an independent study of price risks and electricity transmission development in the ERCOT market.
- 2013**                    **Electric industry client**  
**Reactive power compensation**  
 Retained by electric industry client to analyze electricity transmission tariffs and reactive power compensation in competitive electric markets.
- 2012/2013**            **New Mexico Natural Gas Company**  
**Due Diligence Study for Confidential Potential Buyer**  
 Performed regulatory due diligence in connection with the potential acquisition of New Mexico Natural Gas. Assessed hurdles to getting the transaction approved by regulatory authorities. Analyzed recent rate actions by the state commission and the likely outcomes of future cases.
- 2012**                    **Oil industry client**  
**Regulation benchmarking in downstream oil sector**  
 Retained by oil industry client to advise on margins and to perform an international benchmarking of the regulation of the downstream oil sector.
- 2012**                    **Hawaiian Electric Company**  
**Hedging and rate stabilization**  
 Retained by Hawaiian Electric Company to provide analysis regarding hedging of fuel oil and diesel fuel purchases in order to stabilize customer rates.
- 2011**                    **Confidential client**  
**Implications of CFTC proposed definition of swap dealer**

- Advised on margin, capital and reporting implications of CFTC proposed definition of swap dealer under Dodd Frank.
- 2010**                    **Confidential client**  
**Leveraged lease transaction**  
Provided litigation support services with respect to a dispute over a leveraged lease transaction.
- 2010**                    **Confidential client**  
**Valuation, risk assessment and analysis of offtake contract options**  
Performed detailed valuation, risk assessment and analysis of offtake contract options for a hydroelectric power plant.
- 2009**                    **Potomac Edison Company**  
**Capital investment planning**  
Performed least-cost capital investment planning on behalf of the Potomac Edison Company.
- 2009**                    **Government of New Brunswick, Canada**  
**Advised on asset valuation**  
Advised on inputs into the valuation of NB Power's generation fleet, including the Point Lepreau Nuclear Generation Station in connection with the potential sale of NB Power to Hydro Québec. Coordinated assumptions with financial advisor for fairness opinion.
- 2009**                    **Energy East**  
**Cost of capital**  
Advised on rate-of-return issues for electricity distributors in New York State.
- 2008**                    **Confidential client**  
**Contract design**  
Advised on design of structured contract for new wind power plant, new electricity transmission lines and associated RFPs.
- 2008**                    **Commission for Energy Regulation**  
**Review of SOLR tariffs**  
Advise the Commission for Energy Regulation on the review of SOLR tariffs in the Republic of Ireland.
- 2008**                    **Comisión Nacional de Energía**  
**Market mechanisms for distributions to serve default customers**  
Advised on design and implementation of market mechanisms by which Spanish distribution utilities buy energy to serve default customers.

- 2006–2009**                    **Hawaiian Electric Company**  
**Hedging options for fuel**  
Performed economic and accounting analysis of hedging options for low sulfur fuel oil, diesel and fuel oil on behalf of Hawaiian Electric Company.
- 2004–2010**                    **Commonwealth Edison and Ameren’s Illinois utilities**  
**Competitive procurement for power supply**  
Advised Commonwealth Edison and Ameren’s Illinois utilities on the design of a competitive procurement for short- and long-term power supply, including the contractual framework for energy purchases, 2004 to 2010.
- 2004–Present**                **New Jersey and Maryland distribution utilities**  
**Mark-to-market issues and credit policies**  
Advised several utilities in the Eastern Interconnection on mark-to-market issues and credit policies.
- 1999–2008**                    **New Jersey distribution utilities**  
**Contract design and implementation**  
Worked with credit representatives of New Jersey distribution utilities on contract design and implementation of the contract credit terms. Coordinated the utilities’ responses to changes to the forms of letters of credit proposed by bidders; oversaw bidder credit qualification process; managed approval process for alternate guaranty instruments, and served as advisor to utilities when contract interpretation issues arose, 1999 to 2008.
- 1999–2008**                    **FirstEnergy Companies**  
**Competitive procurement for power supply**  
Advised the FirstEnergy Companies on the design of a competitive procurement for intermediate term power supply, including the contractual framework for energy purchases, 2004-2005.
- 2003**                            **Commission for Energy Regulation**  
**Hedging agreement and a power plant construction agreement**  
Advised the Commission for Energy Regulation in Ireland on the structure of a long-term hedging agreement and a power plant construction agreement; assisted with the development of the hedging contract and the tender documentation; performed bid evaluation.
- 2002**                            **Sierra Pacific Resources**  
**Risk management strategies**  
Advised a major west coast utility in the US on the development of its risk management policy and procedures; reviewed past trading and risk

management strategies; and performed an assessment of its risk measurement and reporting techniques, including credit risk management policy.

- 2000**                    **Ministry of Energy, México**  
**Mexican IPP solicitation program**  
 Advised on the development of the Mexican IPP solicitation program, including transaction structure (IPP v. BLT v. BOT), credit risk management, model contracts, and bid evaluation (the Comisión Federal de Electricidad has procured as much as 2000 MW per year of long-term power supply from IPPs).
- 2000**                    **Comisión Federal de Electricidad, Mexico**  
**Credit and collateral requirements for a power purchase agreement**  
 Advised the Comisión Federal de Electricidad in Mexico on credit and collateral requirements for an-asset backed power purchase agreement with an IPP based in Mexico, including advice on the development of comparable credit and collateral requirements for an import transaction that was to be made on a firm basis with liquidated damages.
- 1998–2000**            **Ministry of Energy, Mexico**  
**Restructuring and privatization of the Mexican electricity sector**  
 Consulted to the Mexican Ministry of Energy on the restructuring and privatization of the Mexican electricity sector, the design of a competitive spot market, and the policy of IPP solicitations, electricity transmission pricing, upstream gas pricing and the development of a regulatory framework for the sector.
- 1998–1999**            **Ministry of Energy, Mexico**  
**Assessing competition in restructured Mexican electric generation**  
 Contributed to study assessing competition in restructured electric generation market in Mexico.
- 1999**                    **Swiss Re**  
**Novel insurance packages to hedge electric price and operations risk**  
 Assisted Swiss Re in the development of the modeling for the creation of novel insurance packages to hedge electric price and operations risk, 1999.
- 1998**                    **Iberdrola S.A., Spain**  
**Seminars on the deregulated markets for gas and electricity in the US**  
 Designed and conducted a series of three training courses for representatives of Iberdrola S.A. (Spain's principal private utility), which consisted of seminars on the deregulated markets for gas and electricity in the US, followed by a series of interviews with large utilities, IPPs, and energy marketers. Courses were designed to provide the European traders with an understanding of best practices employed by energy traders in the

US, with respect to risk management (credit, market, and operational), 1998.

- 1998**                    **C.E.L.P.E, Brazil**  
**Risk management and energy trading**  
Assisted in training senior management of Iberdrola's Brazilian subsidiary C.E.L.P.E. in the area of risk management and energy trading.
- 1998–2000**            **Baltimore Gas & Electric Company**  
**Sector restructuring**  
Consultant to Baltimore Gas & Electric Company on sector restructuring.
- 1998–1999**            **Baltimore Gas & Electric Company**  
**Market value estimates of generation fleet**  
Assisted in developing market value estimates of Baltimore Gas & Electric Company's generation fleet, including Calvert Cliffs Nuclear Power Plant.
- 1998**                    **Confidential Client**  
**Generation and fuel strategy**  
Participated in the development of a generation and fuel strategy for a large merchant generator and energy trader.
- 1996**                    **Iberdrola, S.A, Spain**  
**Restructuring of the electricity sector**  
Consultant to Iberdrola, S.A. on issues relating to the restructuring of the electricity sector in Spain.
- 1996**                    **Confidential client**  
**Investment strategy**  
Consultant to a major southeastern electric utility on investment strategy in the US.
- 1996**                    **Confidential client**  
**Competitive analysis of electric generation**  
Performed competitive analysis of electric generation market for utilities in eastern US.
- 1996**                    **New York State Electric and Gas Company**  
**Restructuring of the electricity market in New York State**  
Consultant to the New York State Electric and Gas Company on issues relating to the restructuring of the electricity market in New York State.
- 1995–1996**            **New York Power Authority**  
**Sector restructuring**

Consultant to senior management of the New York Power Authority on issues relating to the New York Competitive Opportunities Docket.

1995

**Southern California Edison Company**

**Proposed restructuring of California's electric services industry**

Consultant to Southern California Edison Company on issues relating to the California Public Utilities Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation.

**Publications and Presentations**

2016

**Perusahaan Gas Negara**

Provided in-depth training on regulatory practice and tariff design for gas pipelines and distribution companies.  
December 2016.

2016

**Electricity Journal**

Low interest rates and unprecedented stock market volatility: What they mean for your next rate case.  
January-February 2016.

2016

**An Economic Analysis of the Acquisition of ConocoPhillips' Interest in the Beluga River Unit**, A Report Prepared for Chugach Electric Association, Inc. and Anchorage Municipal Light and Power, March 11, 2016.

2016

**Law Seminars International, 12th Annual National Conference on Current Issues in Electric Utility Ratemaking**

Policy Options to Address Cross Subsidies from Self Generation, March 14, 2016

2016

**International Arbitration Group of International Law Firm**

Applications of Economic Analysis in International Arbitration (with a focus on the Energy Sector)  
New York, January 12, 2016

2015

**The Electricity Journal**

Low interest rates and unprecedented stock market volatility: What they mean for your next rate case  
December, 2015

- 2015            **Utility Regulation Conference: Rate Case, ROE, and Reliability**  
Brave New World for Return on Equity  
Washington DC, December 10-11, 2015
- 2015            **Law Seminars International, Energy in the Northeast**  
Energy Sector Developments and the Cost of Capital  
Boston, September 29, 2015
- 2015            **Law Seminars International, Rate Case Conference**  
A Brave New World for Return on Equity  
Las Vegas, March 5, 2014
- 2014            **Law Seminars International, Rate Case Conference**  
Current Challenges in Determining Appropriate Rates of Return for Public  
Utilities  
Las Vegas, February 28, 2014
- 2014            **National Energy Agency (China) and representatives of the State Grid**  
Regulatory Accounting and the FERC Uniform System of Accounts  
Beijing, January 16, 2014
- 2012            **Agencia Nacional de Petroleo, Gas Natural e Combustiveis (Brazil)**  
Natural Gas Pipeline Regulation in the United States (training course)  
Rio de Janiero, September 18-19, 2012
- 2012            **Center for Research in Regulated Industries Eastern Conference**  
Optimal Capital Structures for Regulated Public Utilities: When Does an  
Imputed Debt Ratio Make Sense for Ratemaking Purposes?  
Eastern Conference, Delaware May 18, 2012
- 2012            **Energy Policy Briefing Note**  
The Real Costs of Eliminating Unsecured Credit Lines and Requiring  
Cash Collateral in OTC Swaps Markets  
Co-author: Sharon Brown-Hruska, March 13, 2012
- 2012            **Law Seminars International, Electric Utility Rate Case Conference**  
Marginal Cost Pricing for Rate Design  
Las Vagas, February 2, 2012.
- 2012            **Center for Research in Regulated Industries**  
**Advanced Workshop in Regulation and Competition**  
Gas Pipeline Overearning Investigations  
Newark, New Jersey, January 13, 2012.

- 2011 **Working Group of Commercial Energy Firms**  
Cost-Benefit Analysis of the CFTC's Proposed Swap Dealer Definition  
December 20, 2011.
- 2011 **Law Seminars International, Renewable Energy in the Pacific Northwest**  
Abundant Low-Cost Natural Gas? A Driver of Market Activity  
August 4, 2011.
- 2011 **Public Utilities Fortnightly**  
Zone of Reasonableness: Coping with Rising Profitability a Decade after Restructuring  
July 2011.
- 2011 **Law Seminars International, Electric Utility Rate Case Conference**  
Rate Design Issues Among Customer Classes  
Las Vegas, February 10, 2011.
- 2011 **Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries**  
Decoupling and the Cost of Equity  
Newark, New Jersey, January 14, 2011.
- 2010 **New York State Bar Association, Business Law Section Committee on Public Utility Law**  
Getting Renewables to Market: The Importance of Transmission Ratemaking Policy  
New York, July 24, 2010.
- 2009 **Law Seminars International Conference, Renewable Energy in New England**  
Getting Renewable Power to Market  
Boston, June 25, 2009.
- 2008 **Report for Baltimore Gas & Electric and Allegheny Power**  
Evaluation of Longer-Term Procurement Plans  
October 1, 2008.
- 2008 **Electricity Journal**  
The Continuing Rationale for Full and Timely Recovery of Fuel Price Levels in Fuel Adjustment Clauses  
July 2008.

- 2008**                    **Energy in the Southwest Conference**  
Natural Gas as a Fuel: Will There Be Enough? At What Prices?  
July 22, 2008.
- 2007**                    **NERA Economic Consulting**  
The Line in the Sand: The Shifting Boundary Between Markets and  
Regulation in Network Industries.  
Coauthor.
- 2007**                    **Electric Utility and Natural Gas Interdependency**  
Managing Risk in Interdependent Gas and Power Markets  
Houston, March 6, 2007.
- 2004**                    **Electricity Journal**  
FERC Imposes New Constraints on Utility Procurement  
October 2004.
- 2003**                    **Northeast Gas Storage and Supply Strategies**  
Can Your Capital Structure Handle Today's Market, Credit and Liquidity  
Risks?  
Boston, June 17, 2003.
- 1996**                    **World Bank**  
Regulatory and institutional reforms in the Chinese power sector  
Contributor, 1996.
- 1993**                    **World Development**  
Political Economy, Convergence and Growth in Less Developed Countries  
Contributor, 1996.

December 2016

## Documents Relied Upon in NERA Testimony

### 1. Documents filed in the instant docket

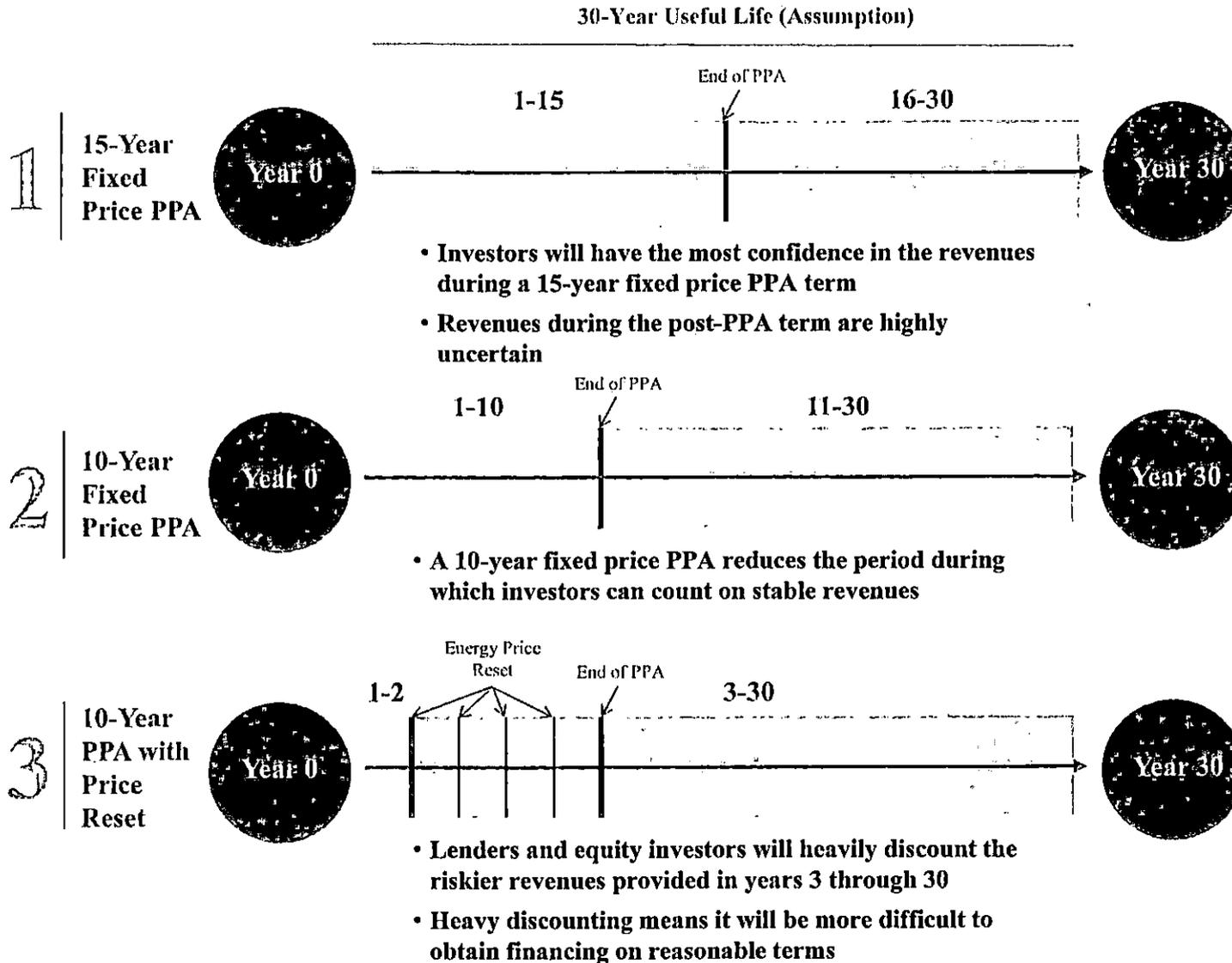
- a) Order Establishing Biennial Proceeding, Requiring Data, And Scheduling Public Hearing. State Of North Carolina Utilities Commission Raleigh. Docket No. E100-Sub 148. Janice H. Fulmore, Deputy Clerk. June 22, 2016.
- b) Order Scheduling Evidentiary Hearing and Amending Procedural Schedule. State of North Carolina Utilities Commission Raleigh. Docket No. E-100, Sub 148. February 21, 2017.
- c) Direct Testimony of Kendal C. Bowman on Behalf of Duke Energy Carolinas, LLC and Duke Energy Progress, LLC. February 21, 2016.
- d) Direct Testimony of J. Scott Gaskill on Behalf of Dominion North Carolina Power. February 21, 2017.
- e) Initial Comments and Exhibits of Dominion North Carolina Power. November 15, 2016.
- f) Joint Initial Statement and Exhibits of Duke Energy Carolinas, LLC and Duke Energy Progress, LLC. November 15, 2016.
- g) Duke Energy Carolinas, LLC and Duke Energy Progress, LLC's Avoided Cost filing Required. M. Lynn Jarvis, Chief Clerk, NC Utilities Commission. January 17, 2017.
- h) DNCP Avoided Cost Information, November 15, 2016.

### 2. Other documents

- i) Federal Energy Regulatory Commission, Order, Docket No. EL16-115-000, Windham Solar LLC and Allco Finance Limited, November 22, 2016.
- j) State Of Indiana, Indiana Utility Regulatory Commission. Joint Stipulation And Settlement Agreement. Cause No. 44734. April 15, 2016.
- k) Application of Duke Energy Progress, for Certificate of Public Convenience and Necessity to Construct 21 MW Combined Heat and Power Facility at Duke University. Docket No. E-7, Sub 1122. October 17, 2016.
- l) Duke Energy Florida, LLC's Petition For Approval Of Depreciation Rates For Solar Photovoltaic Generating Units. Dianne M. Triplett, Associate General Counsel, Duke Energy Florida, LLC. Docket No. 160017-EI. January 11, 2016.

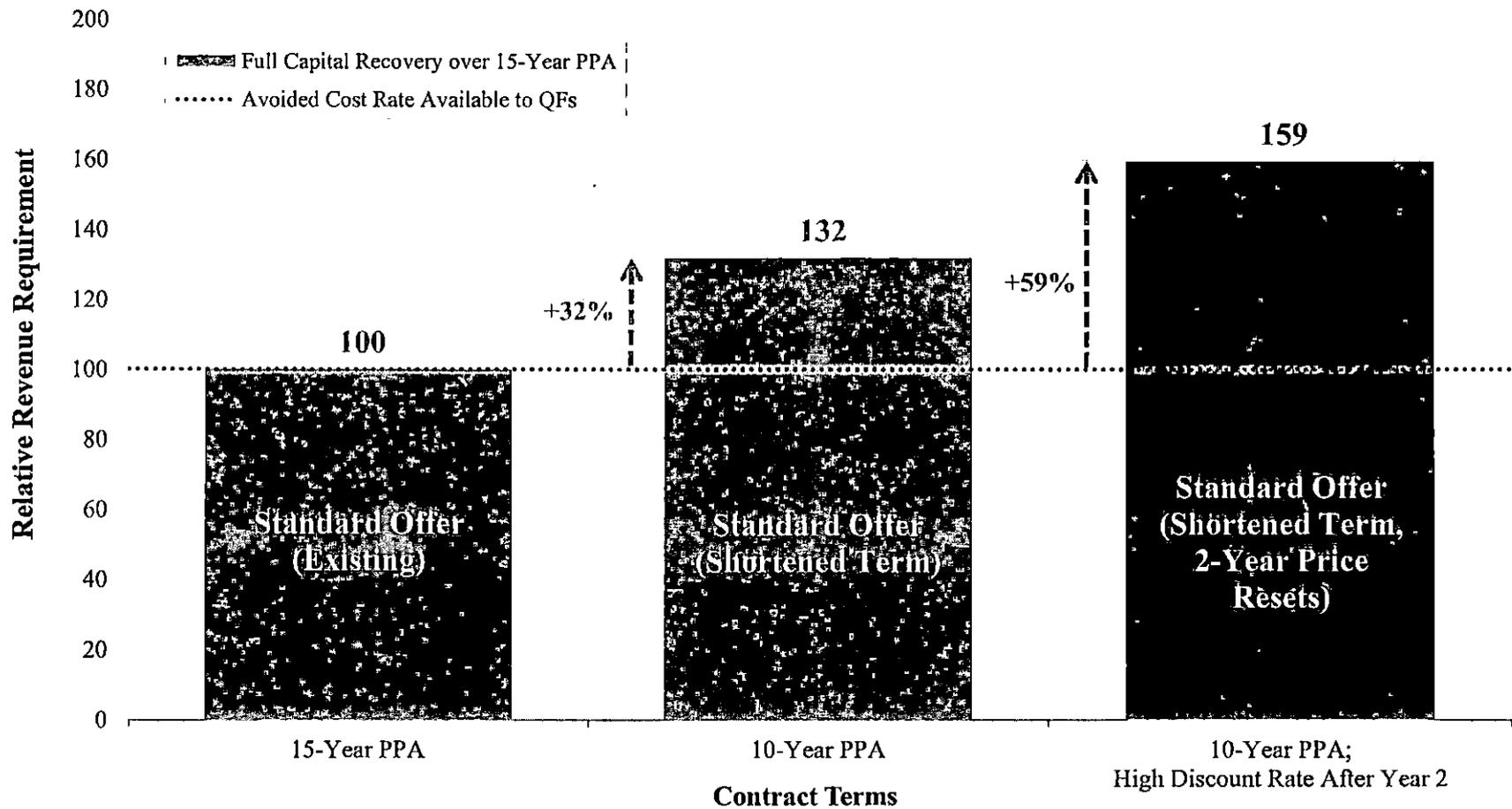
- m) Christopher J. Ayers, Executive Director, NCUC Staff, Ratemaking Presentation, available at:  
[http://epic.uncc.edu/sites/epic.uncc.edu/files/media/Ratemaking%20presentation%20EPI C.pdf](http://epic.uncc.edu/sites/epic.uncc.edu/files/media/Ratemaking%20presentation%20EPI%20C.pdf).
- n) Progress Energy – Carolinas Electric Utility Plant Depreciation Rate Study Executive Summary. December 31, 2010. Docket No. E-2, Sub 1025.
- o) Ibbotson SBBI 2013 valuation yearbook: market results for stocks, bonds, bills, and inflation 1926-2012. (2013). Chicago: Morningstar.
- p) Williamson, O. 1979, Transactions-cost economics: the governance of contractual relations. *Journal of Law and Economics* 22, 233–62.
- q) Williamson, O. "Credible Commitments: Using Hostages to Support Exchange," *American Economic Review*, September 1983, 73, 519-40.
- r) Williamson, O. *The Economic Institutions of Capitalism*, New York: Free Press, 1985.
- s) Coase, R. 1937. The nature of the firm. *Economica* 4, 386–405.

## Price Risk under Alternative PPA Constructs



4/17

## North Carolina QF Standard Offer Zero Residual Value Levelized QF Revenue Requirement

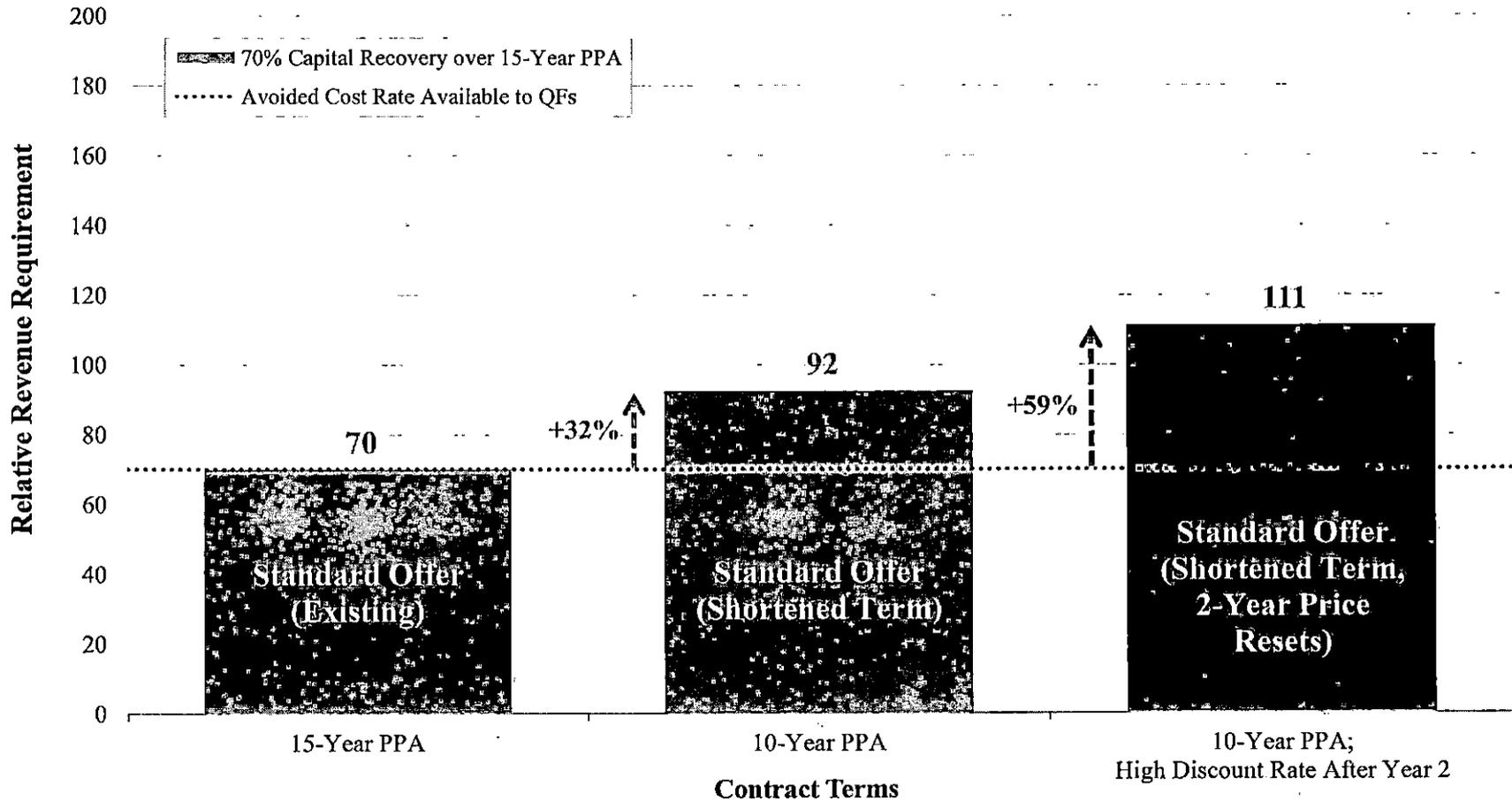


**Notes:**

- Designed to illustrate directional effect of proposed policy changes.
- Illustrative based on hypothetical capital cost and unit operating profile.
- Does not incorporate benefits of bonus depreciation, ITC, or PTC.

1/A

## North Carolina QF Standard Offer 30% Residual Value Levelized QF Revenue Requirement



**Notes:**

- Designed to illustrate directional effect of proposed policy changes.
- Illustrative based on hypothetical capital cost and unit operating profile.
- Does not incorporate benefits of bonus depreciation, ITC, or PTC.

Exhibit  
JSG-1

# NC Transformer Loading

## Transformers with DG Connected

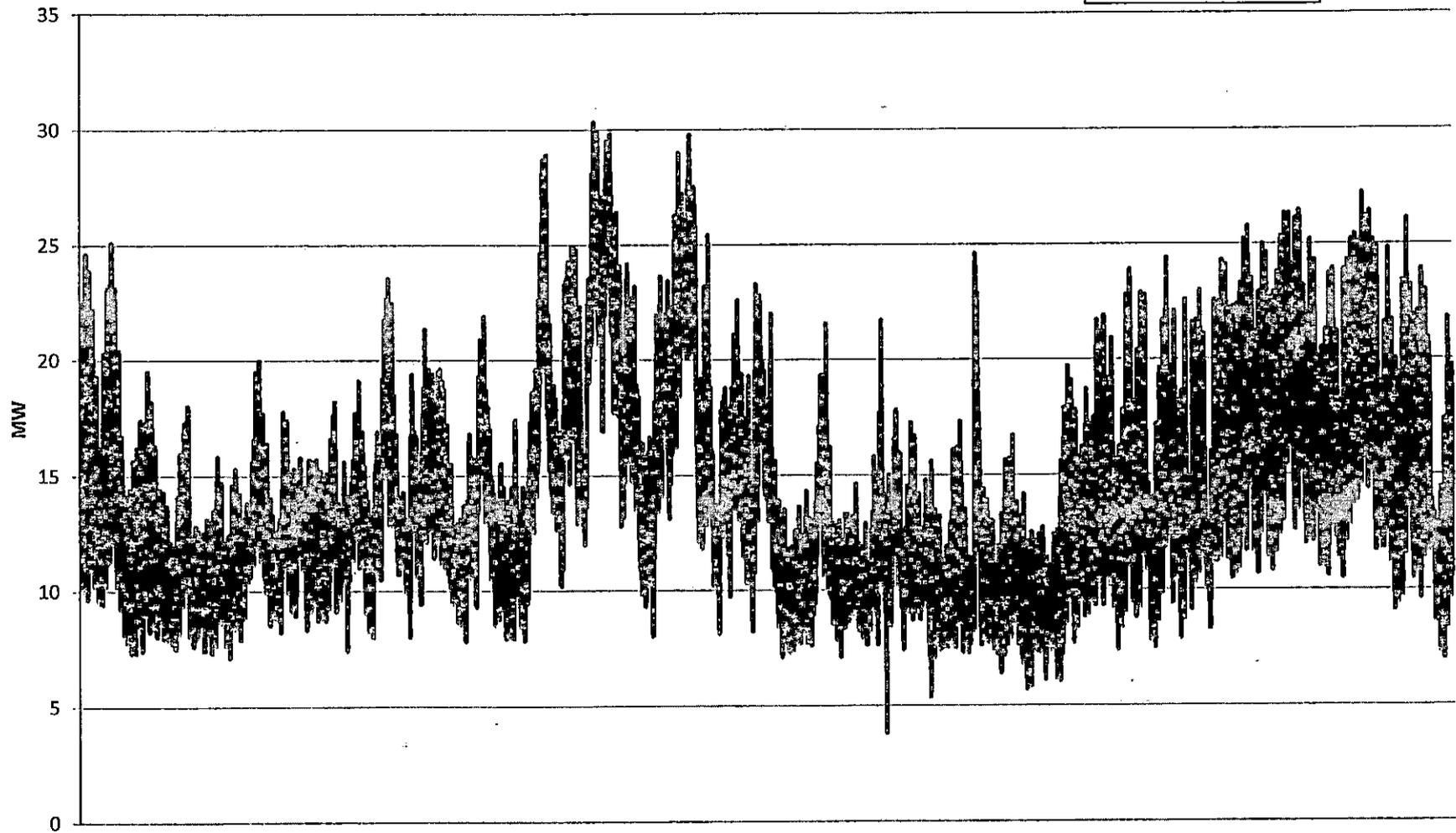
Exhibit JSG-1  
I/A

# Data Summary

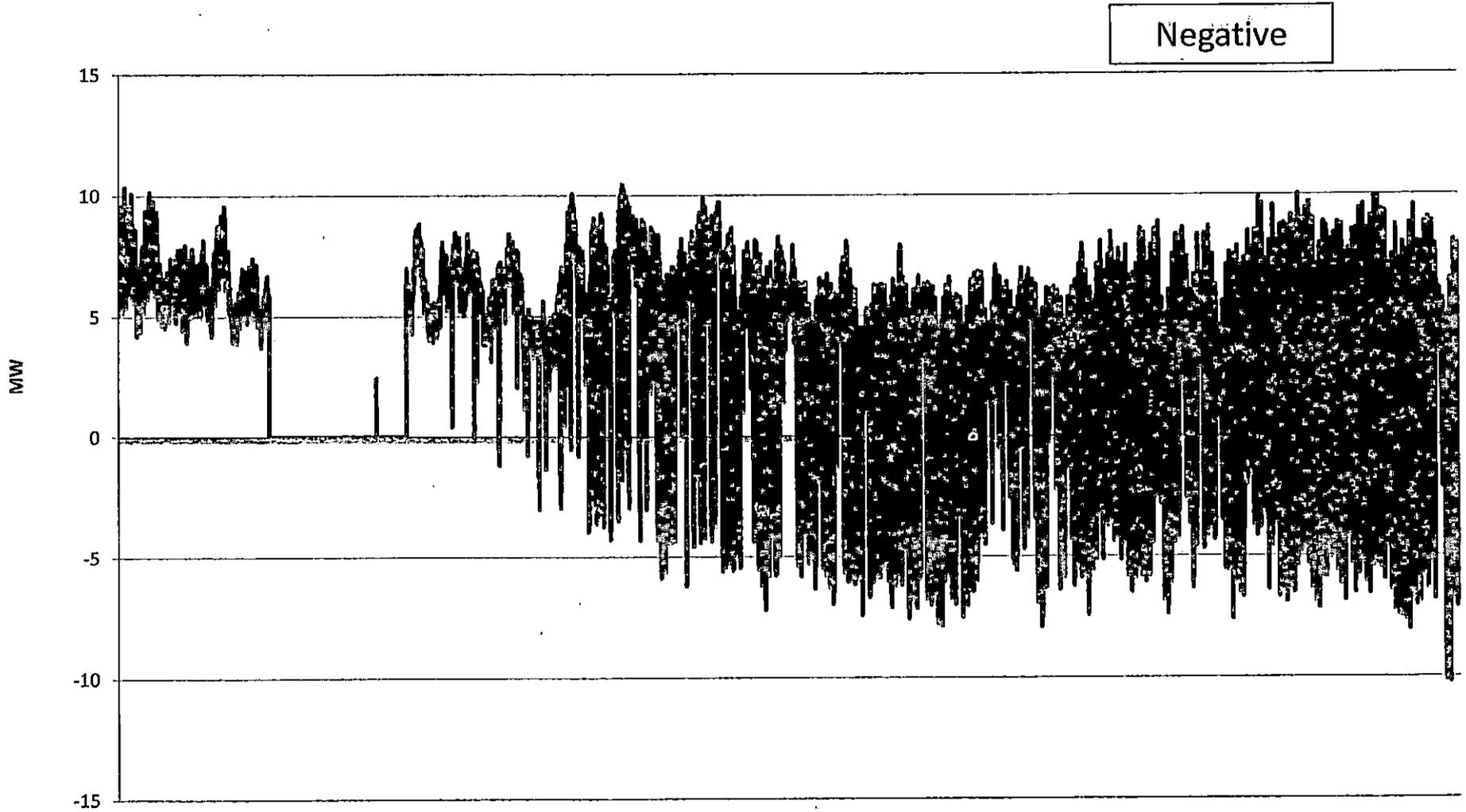
- The following charts show 30-min load flow data from the previous year (September 2015-September 2016) for the 33 transformers with distributed solar generation connected
- Definitions:
  - **Positive:** Load on transformer exceeds distributive generation
  - **Negative:** Distributive generation exceeds load (i.e. backflow)
  - **Neutral:** Mix of forward/backward flow or that there is only a small amount of excess load remaining (i.e. additional DG will create backflow)
- Of the Company's 33 North Carolina transformers with solar DG connected:
  - 4 have positive flow
  - 11 have negative flow
  - 18 have neutral flow
- Therefore, only 4 of the 33 circuits still have capacity for additional load reduction capability

### Carolina TX #2 9/1/15 - 9/7/2016

Positive

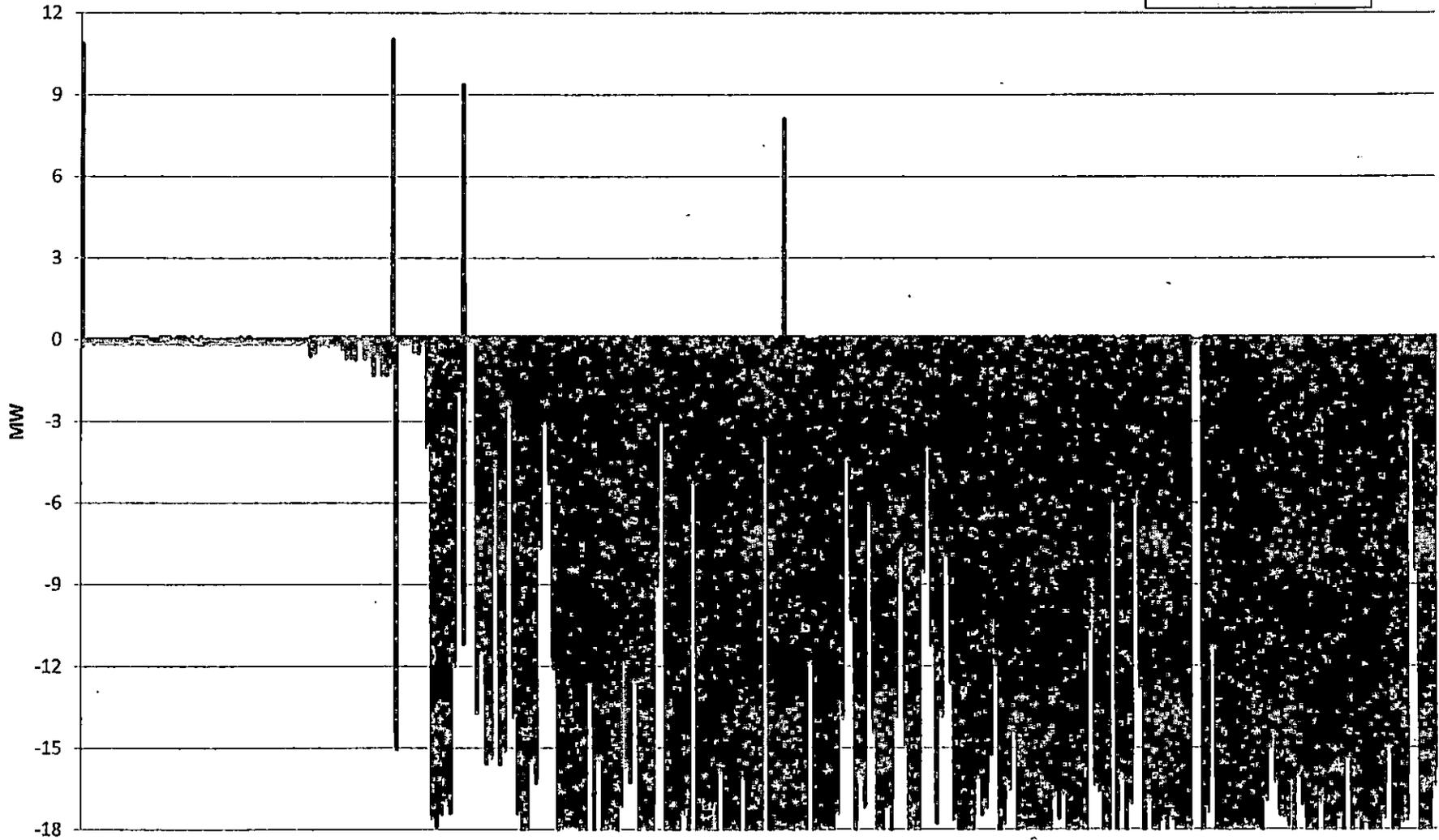


### Whitakers TX #1 9/1/15 - 9/7/16



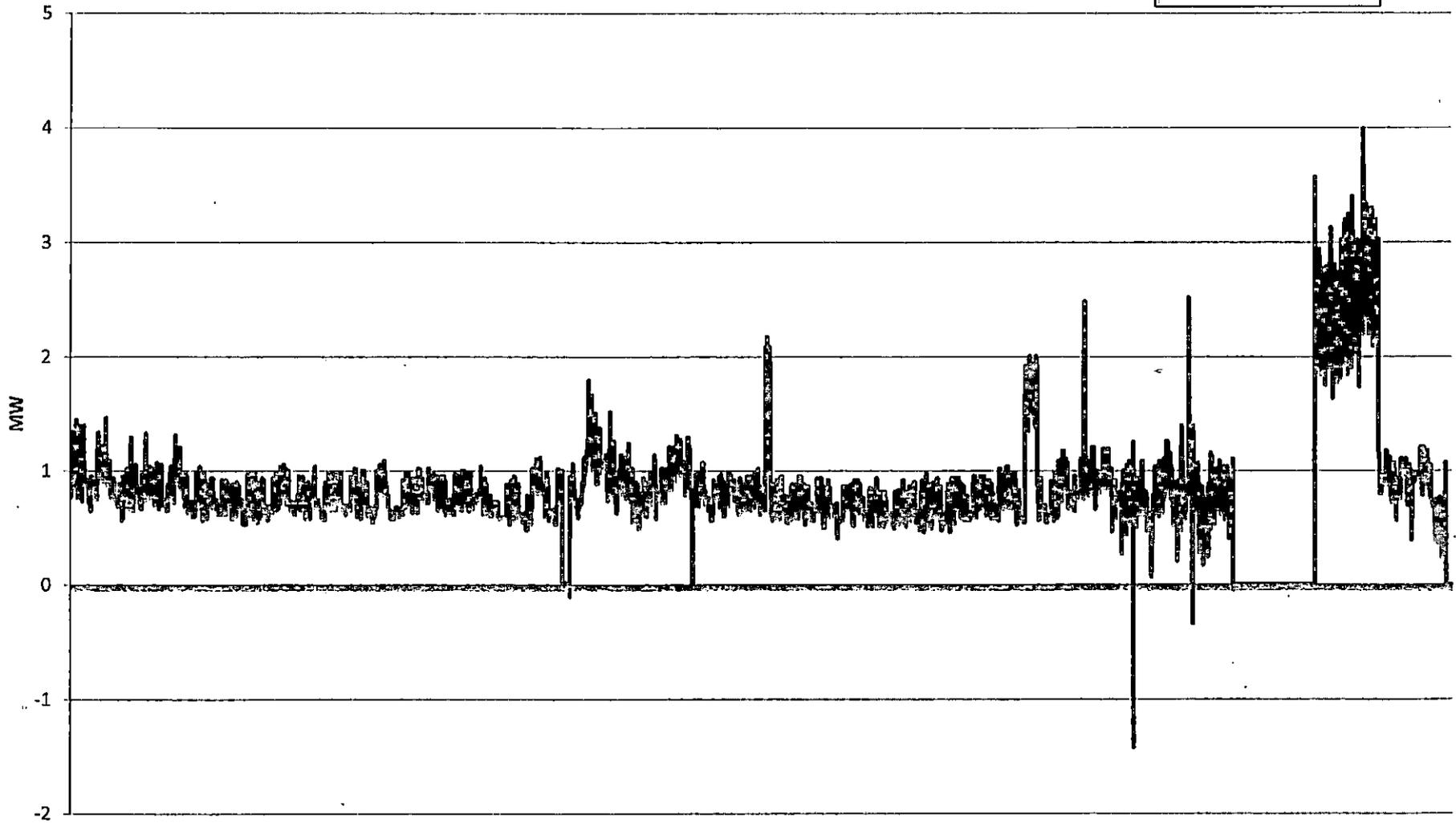
Whitakers TX #2 11/12/15 - 9/7/16 (New TX for DG)

Negative

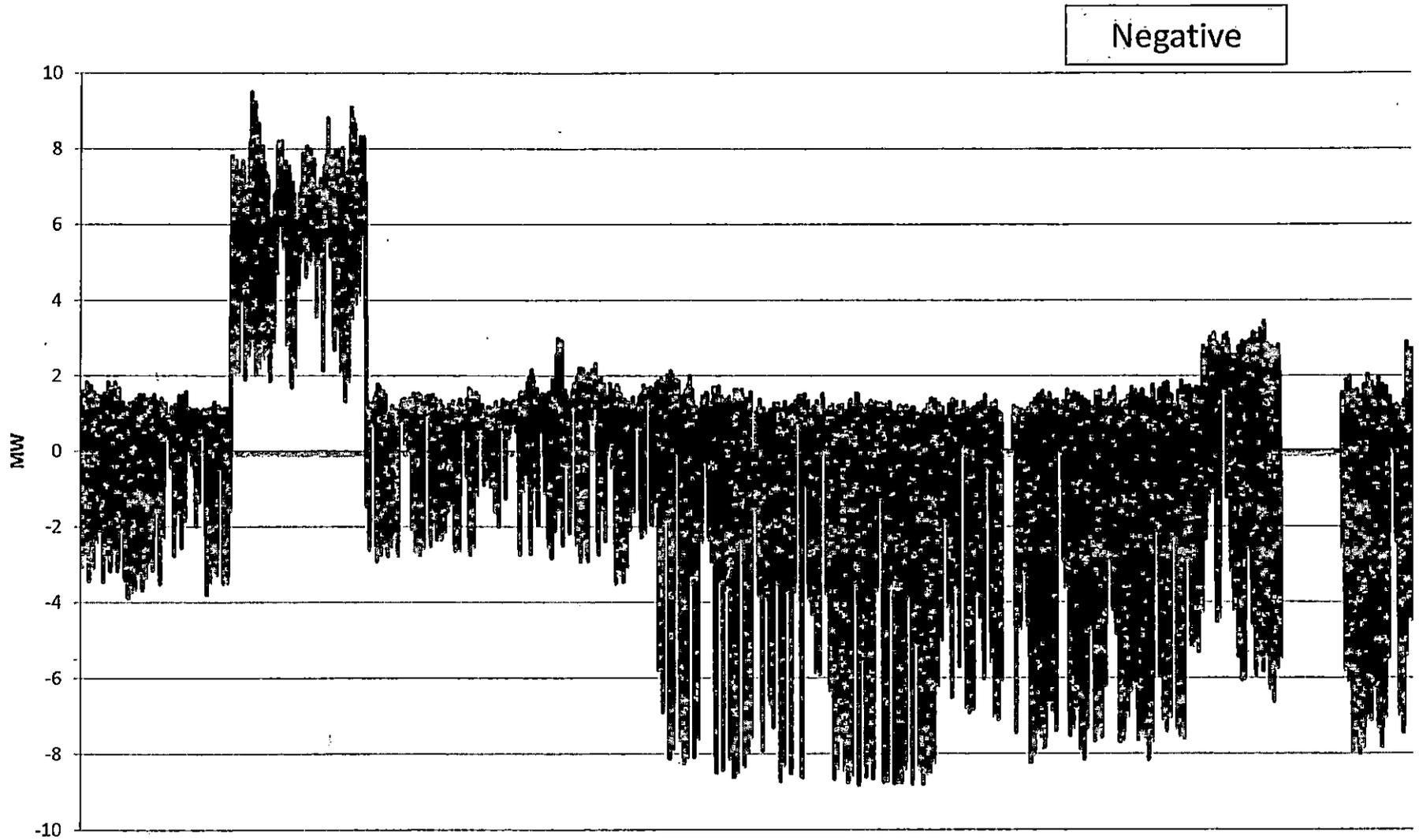


### Battleboro TX #1 9/1/15 - 9/7/16

Neutral

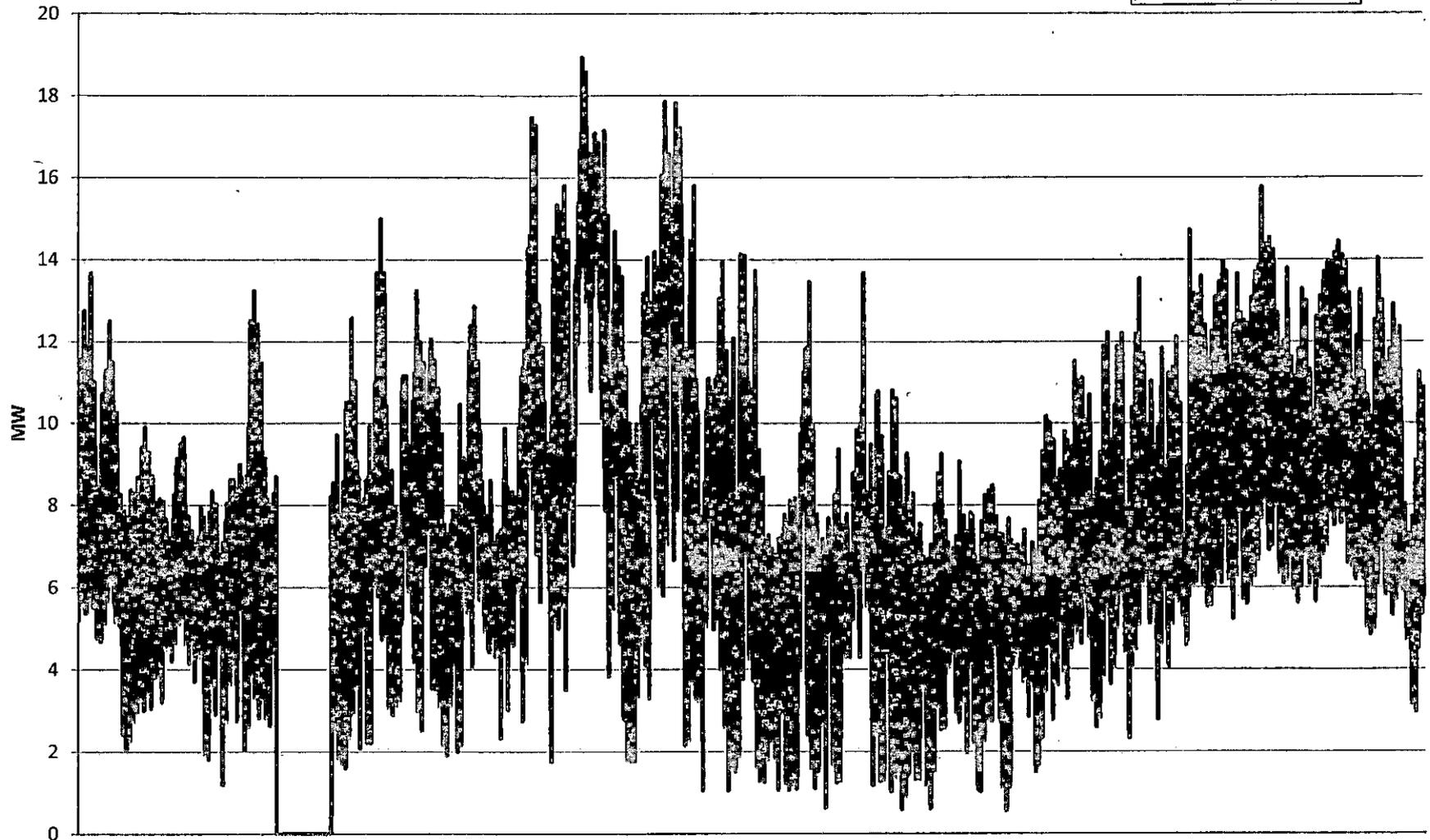


### Battleboro TX #3 9/1/15 - 9/7/16



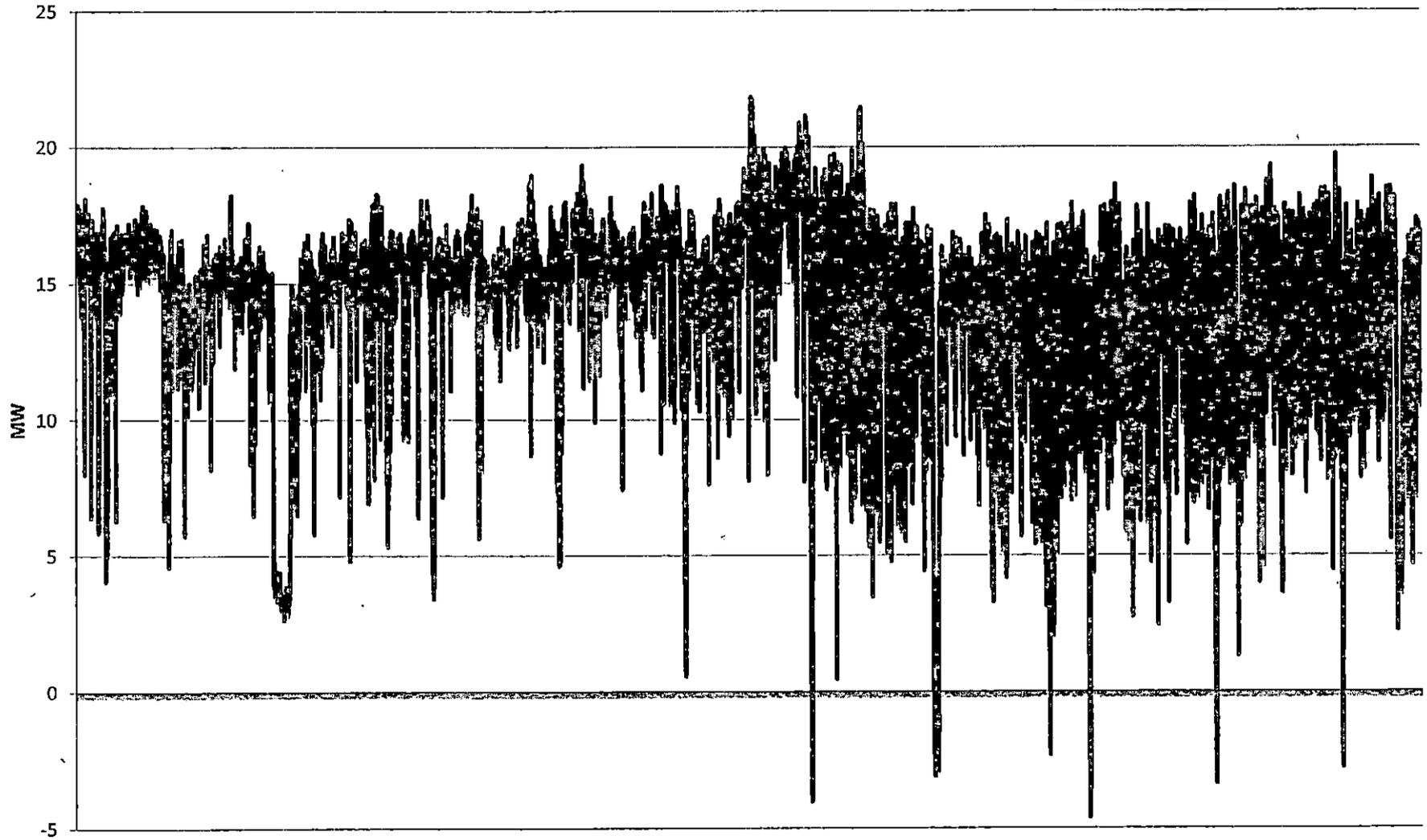
### Hornertown TX #1 9/1/15 - 9/7/16

Neutral



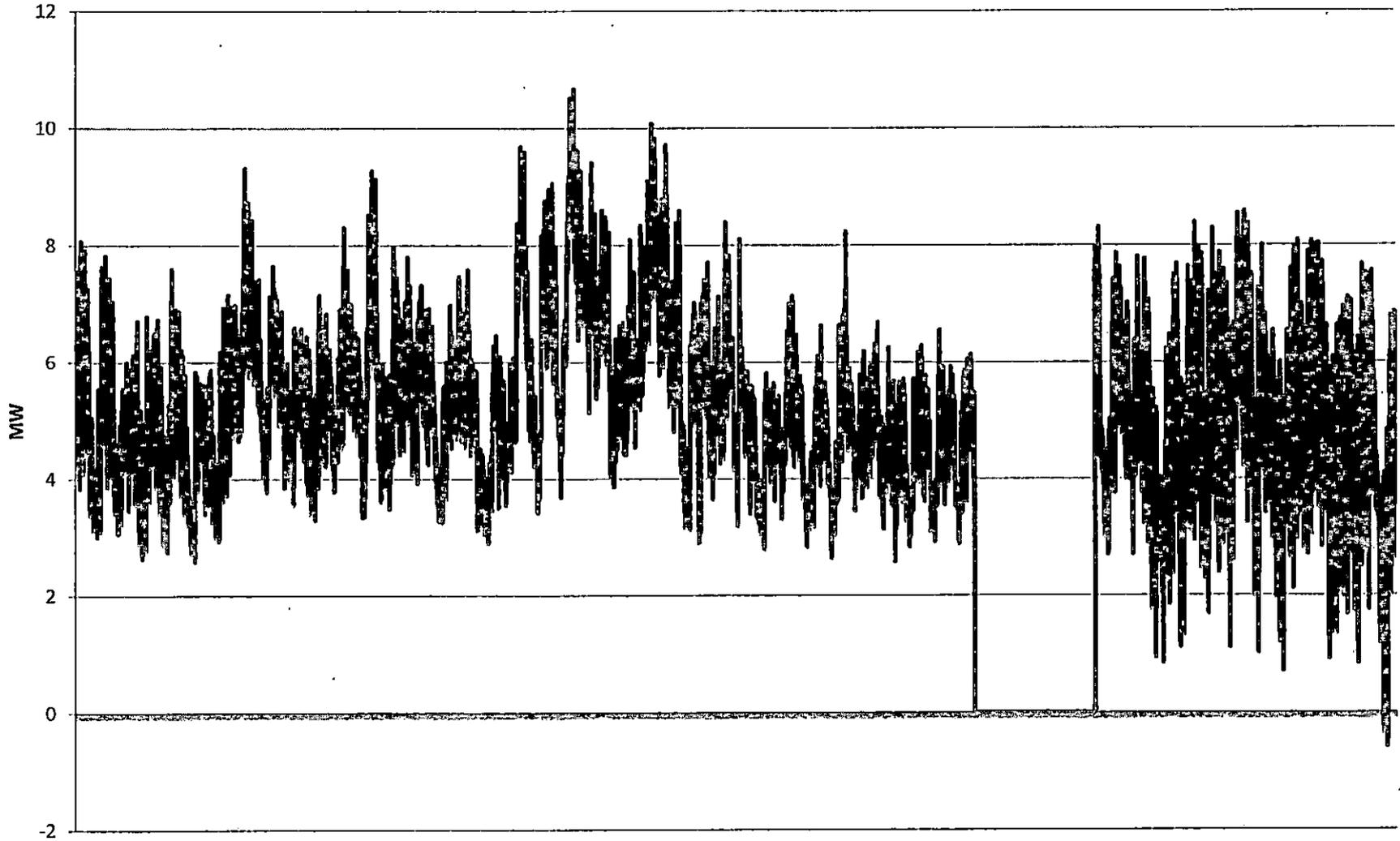
# Northampton TX #1 9/1/15 - 9/7/16

Positive



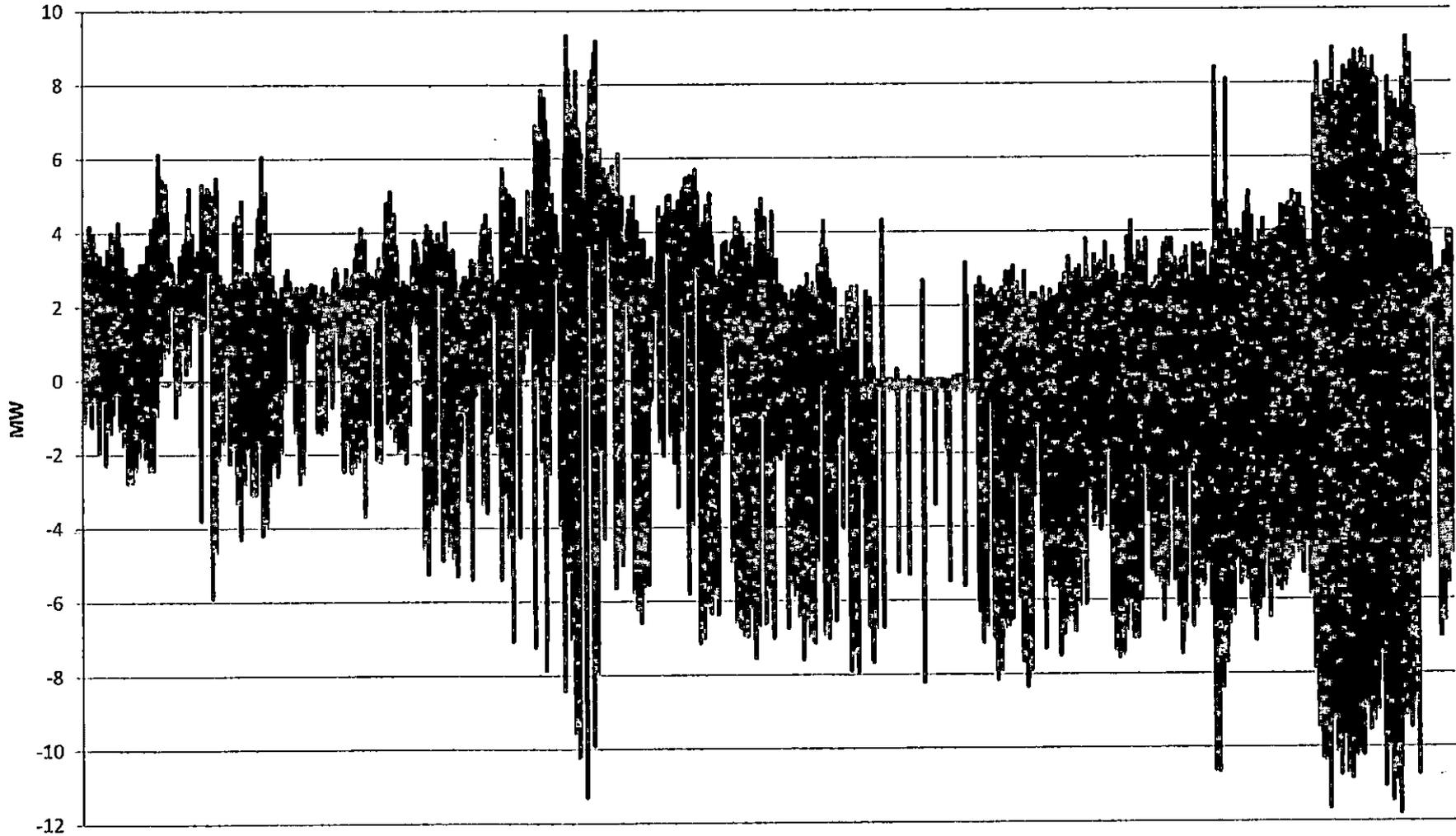
### Seaboard TX #1 9/1/15 - 9/7/16

Neutral



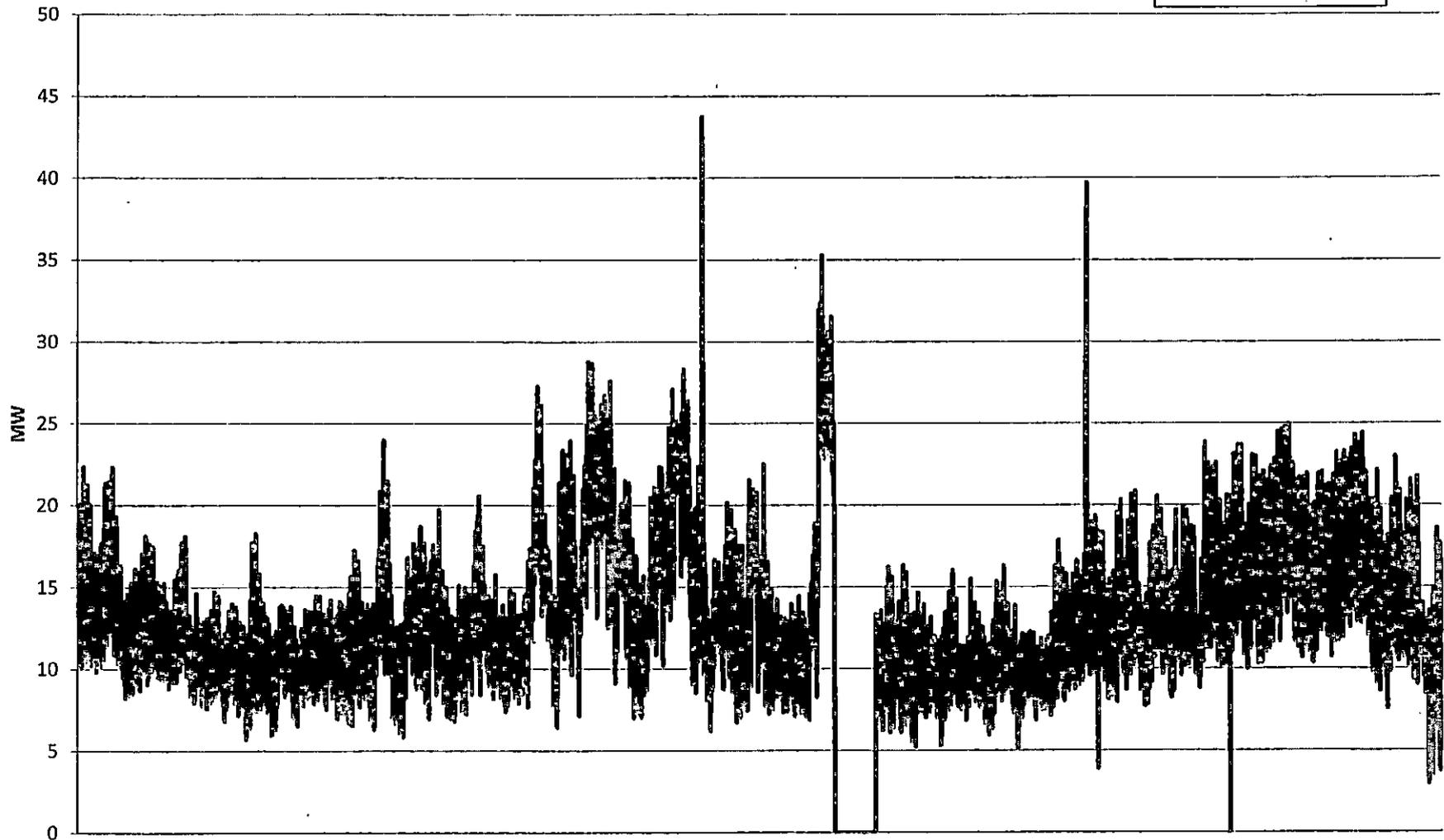
### Bethel-Carolina TX #1 9/1/15 - 9/7/16

Negative



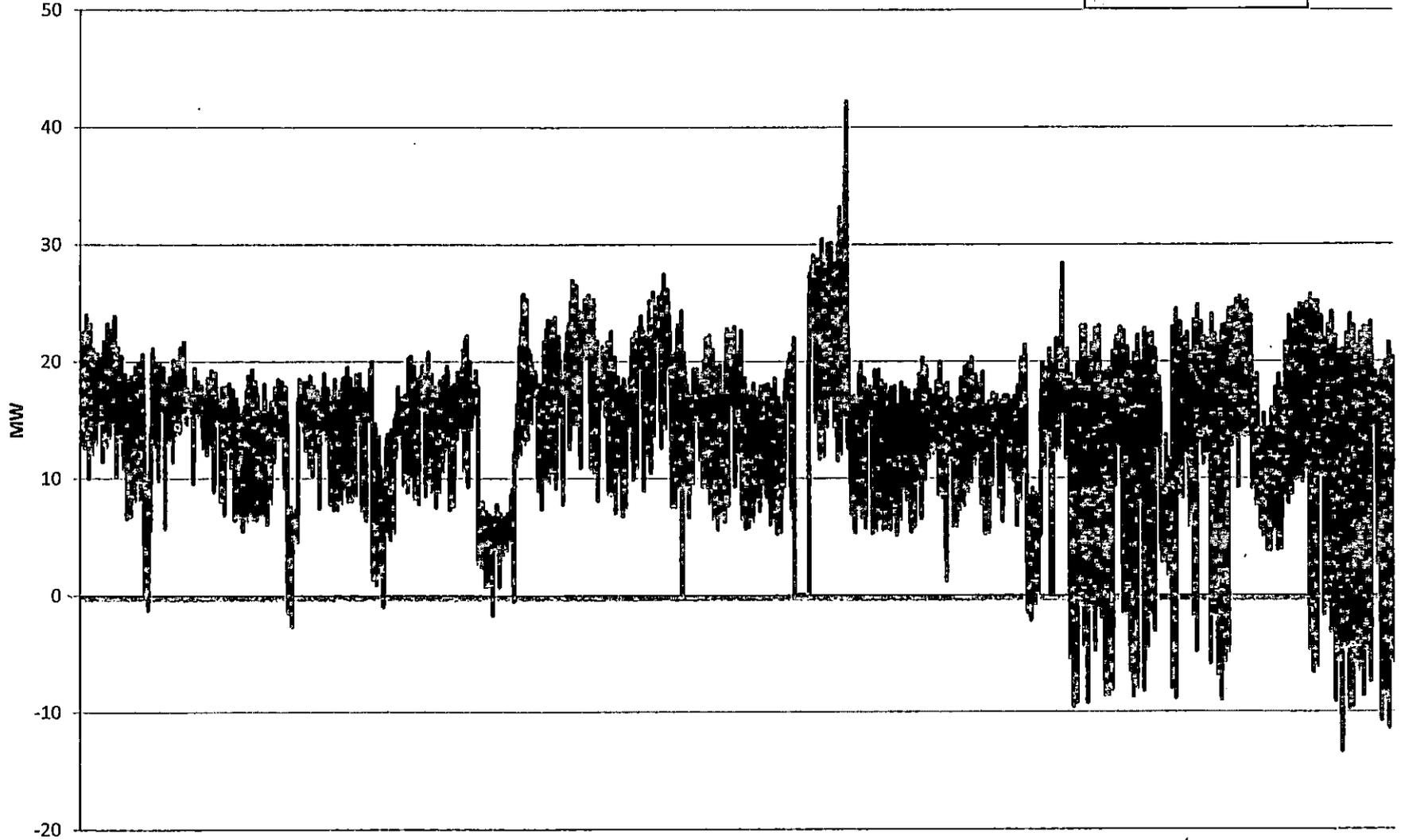
### Everetts TX #1 9/1/15 - 9/7/16

Positive



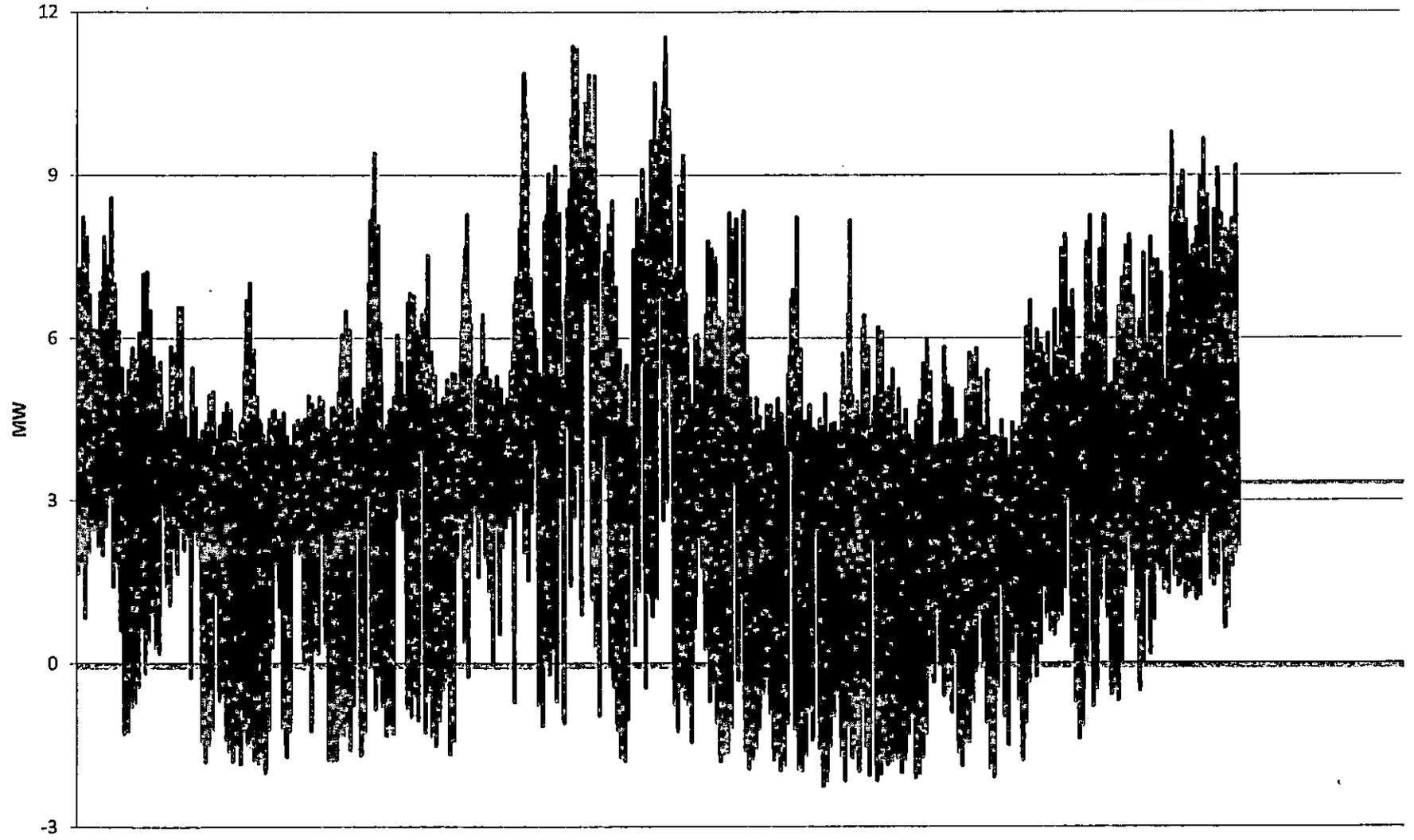
### Everetts TX #3 9/1/15 - 97/16

Neutral



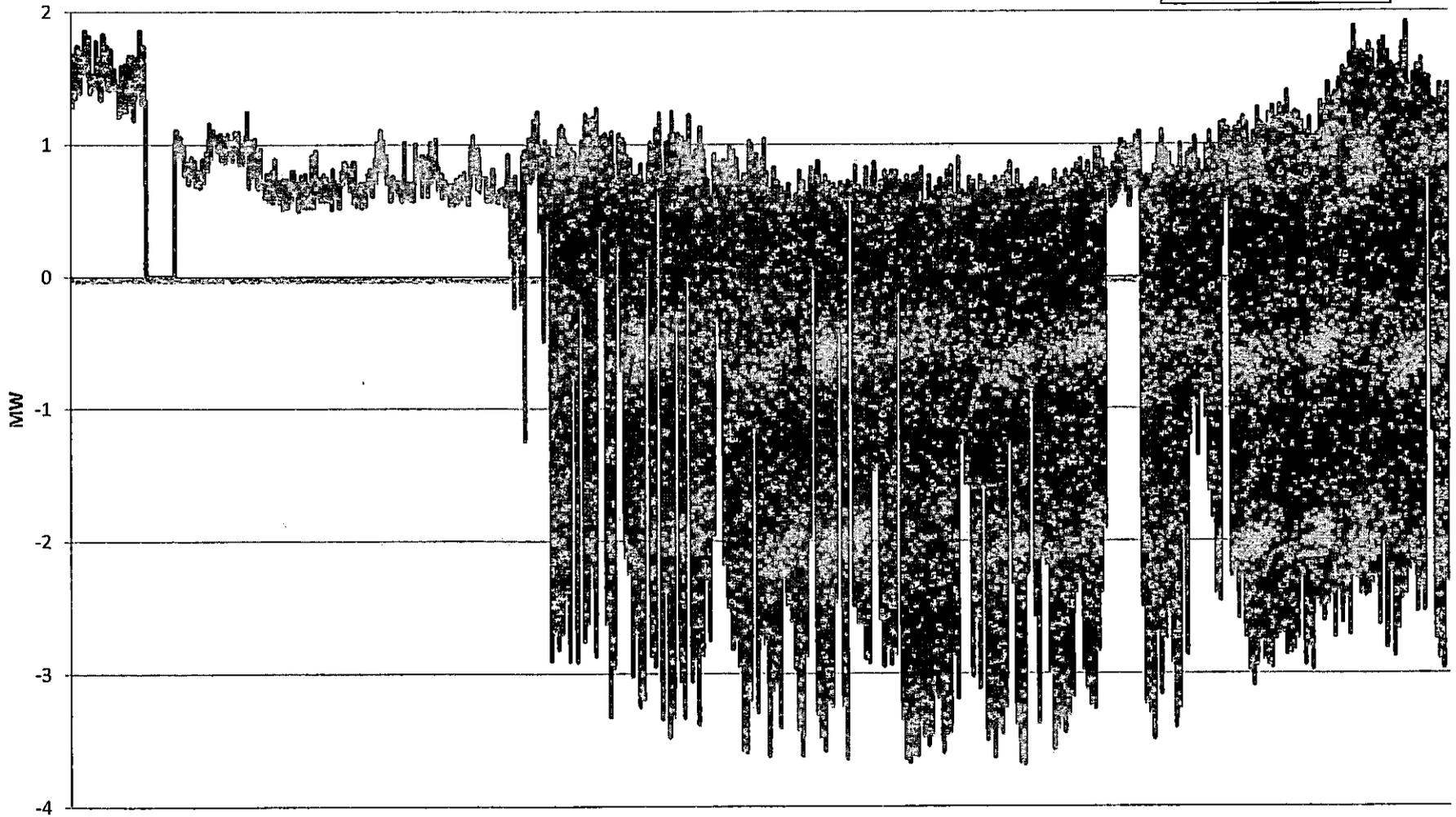
### Lilley TX #1 9/1/15 - 9/7/16

Neutral



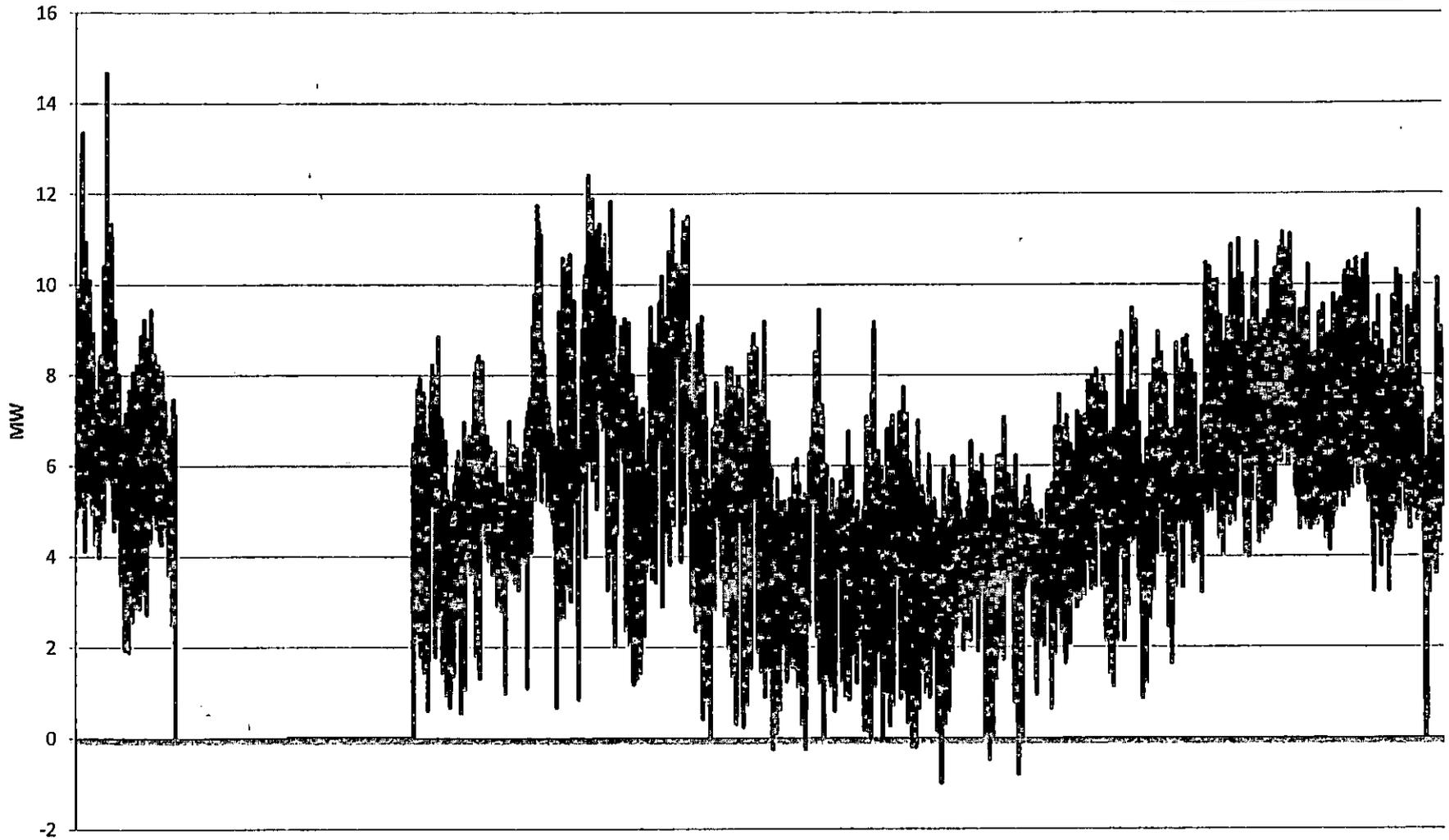
### Parmele TX #1 9/1/15 - 9/7/16

Negative



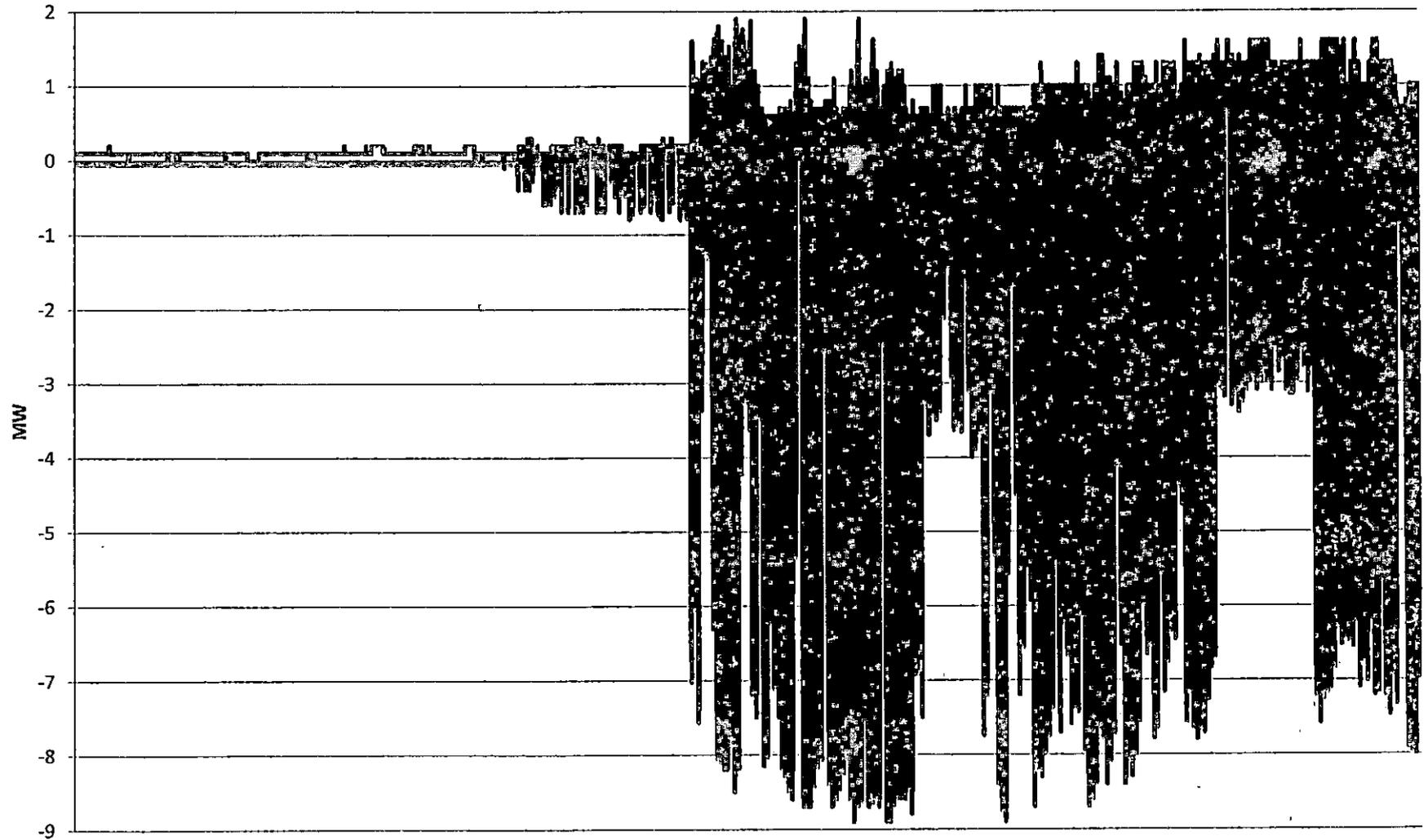
### Plymouth TX #2 9/1/15 - 9/7/16

Neutral



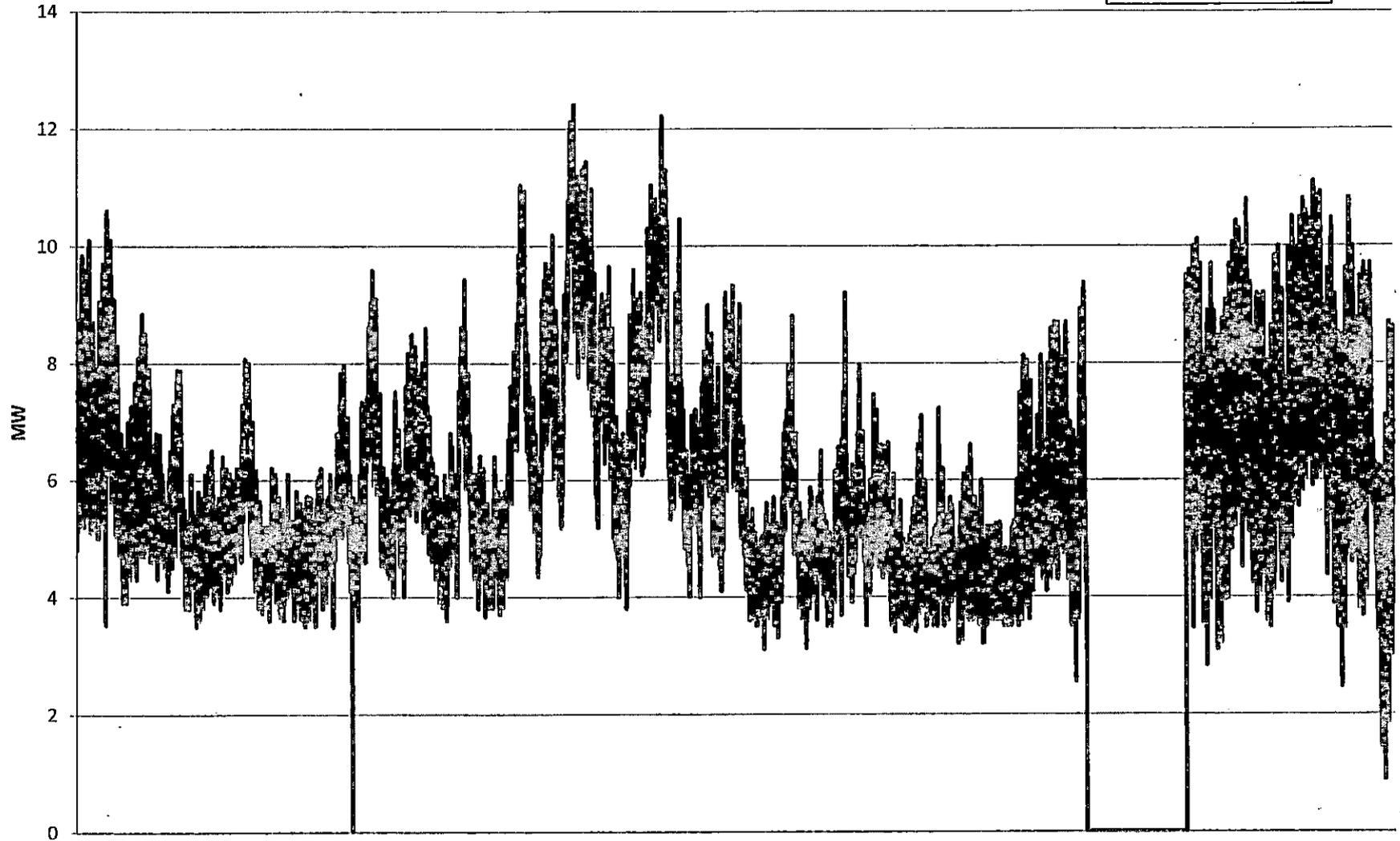
### Tarboro TX #2 9/1/15 - 9/7/16

Negative



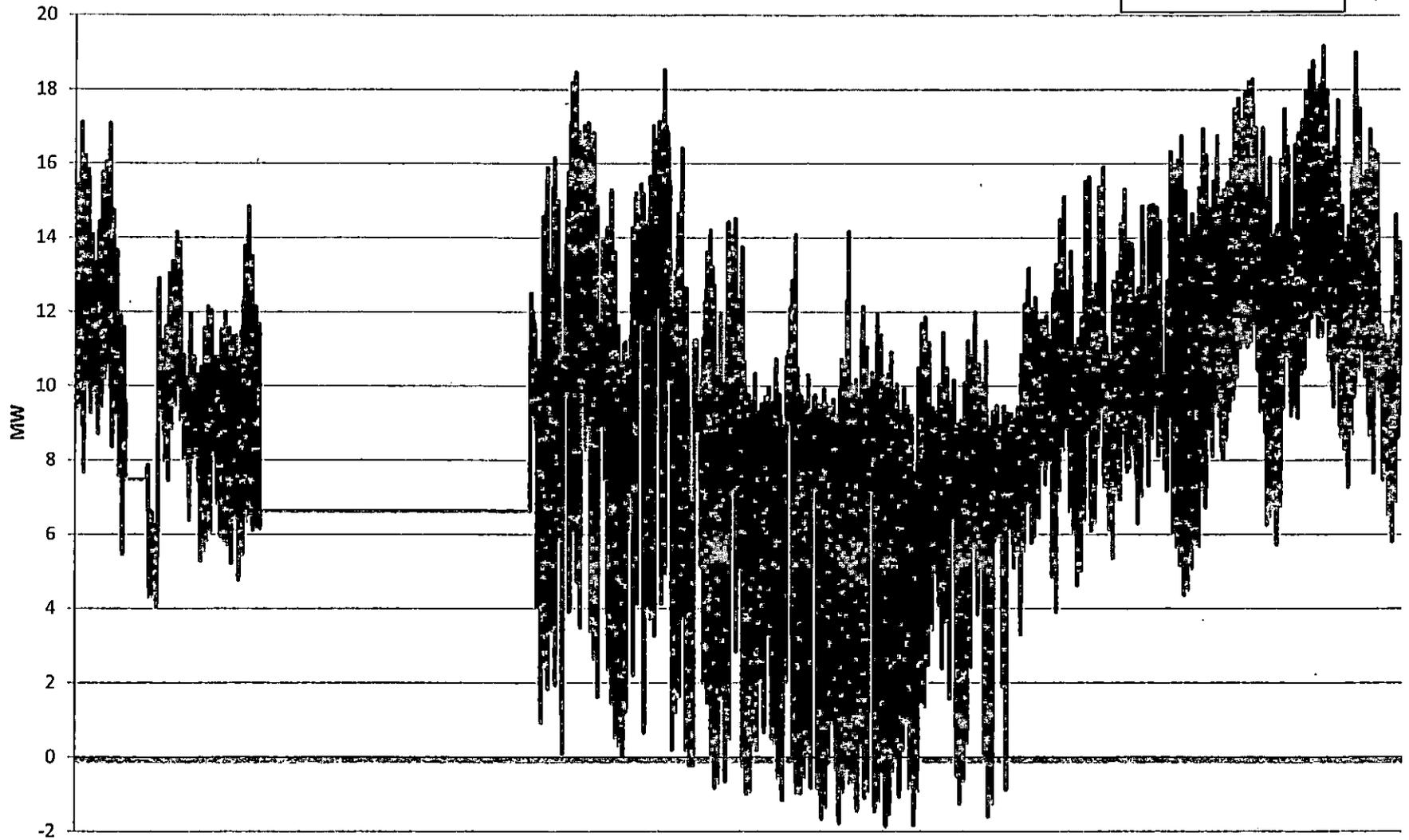
### Ahoskie TX #1 9/1/15 - 9/7/16

Neutral



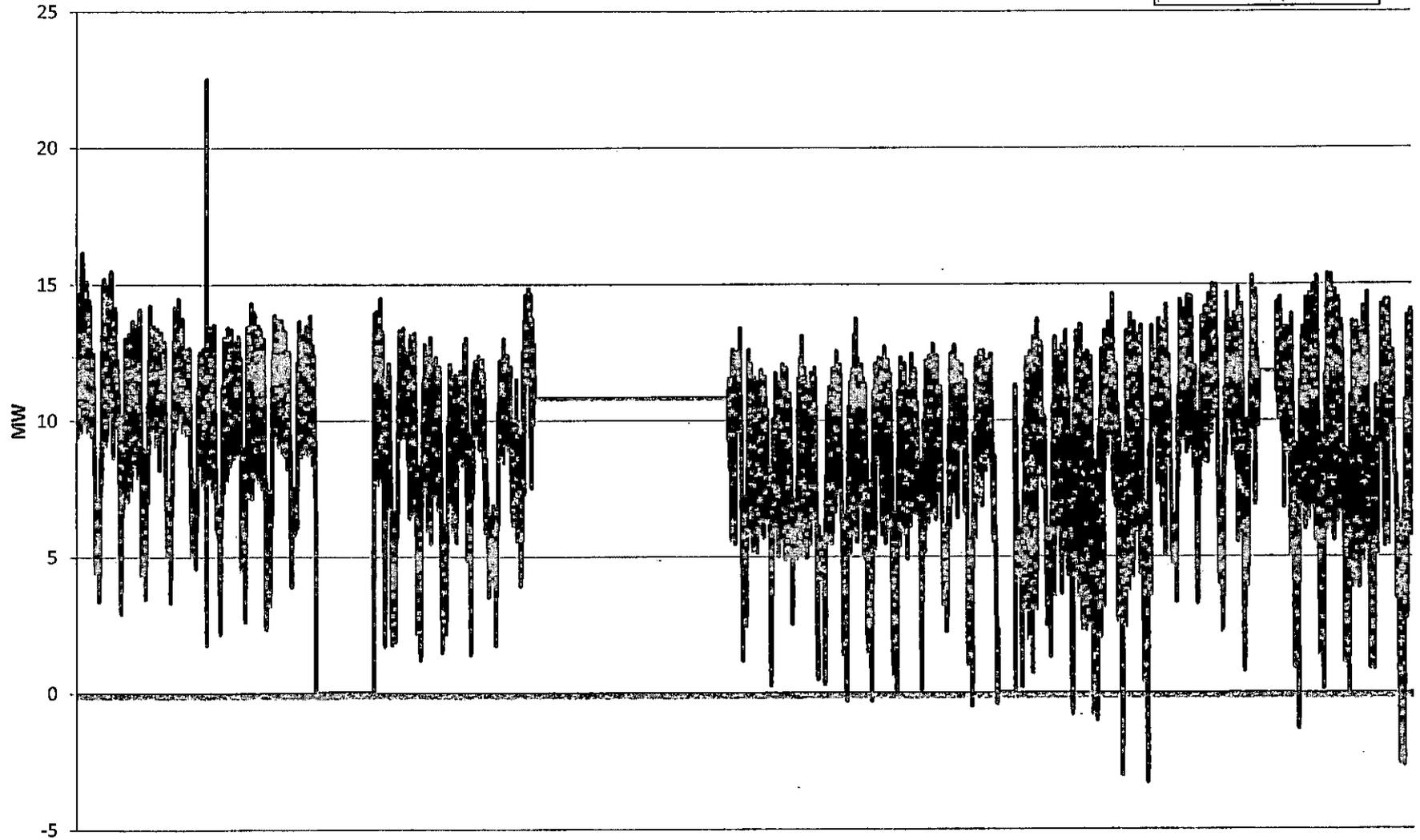
### Cashie TX #1 9/1/15 - 9/7/16

Neutral



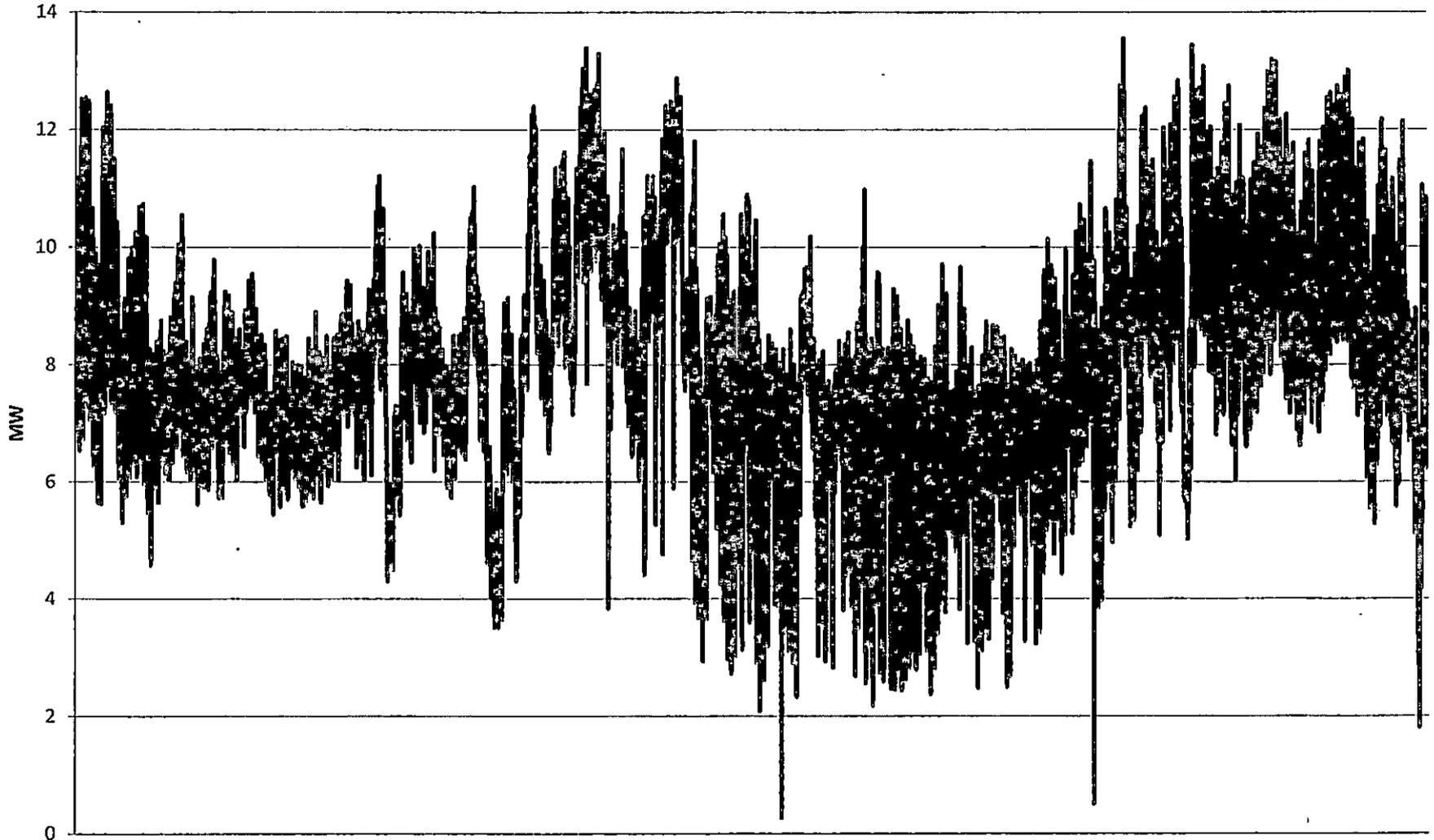
### Kelford TX #1 9/1/15 - 9/7/16

Neutral



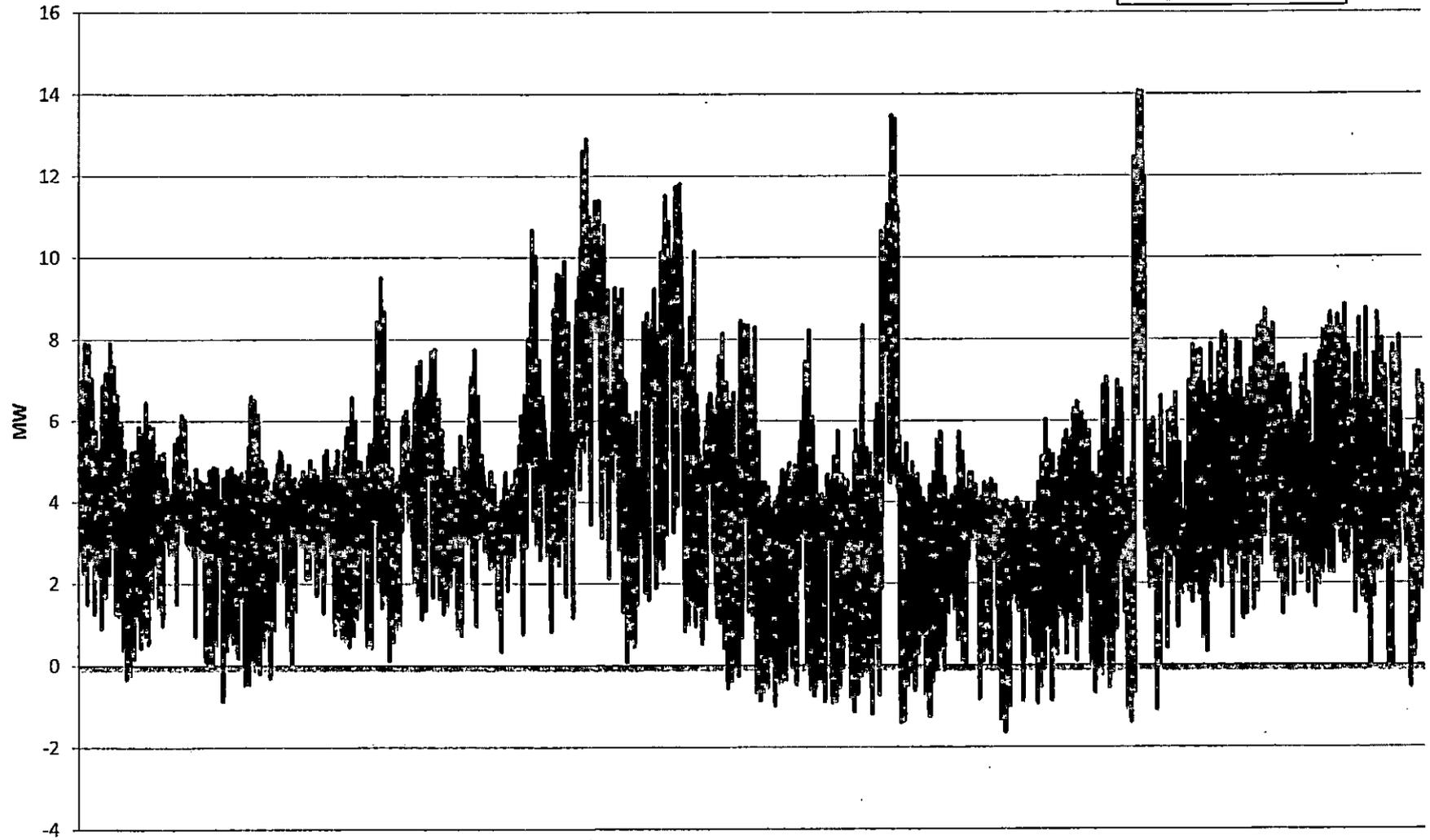
### Earleys TX #1 9/1/15 - 9/7/16

Neutral



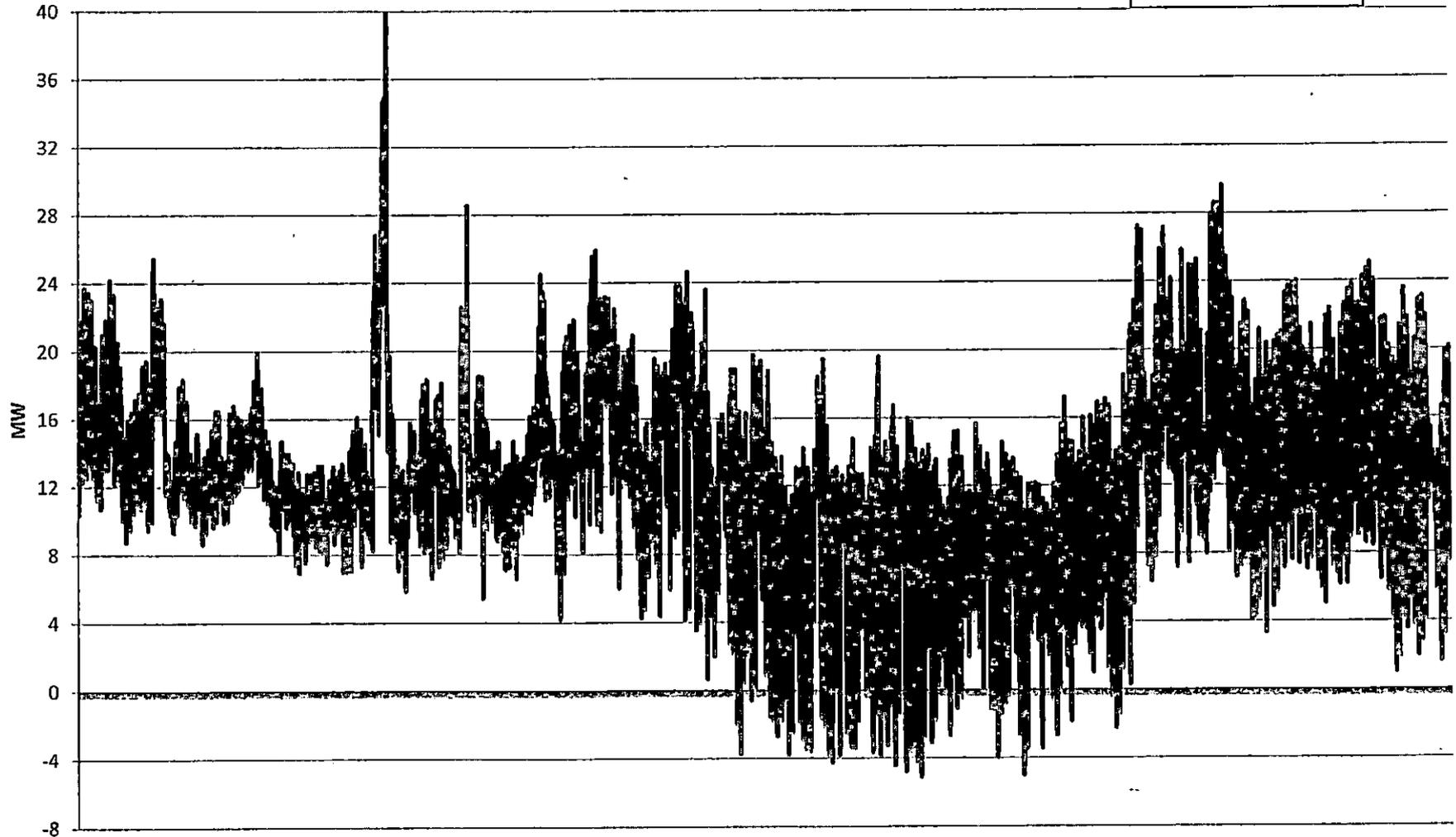
### Murphy TX #1 9/1/15 - 9/7/16

Neutral



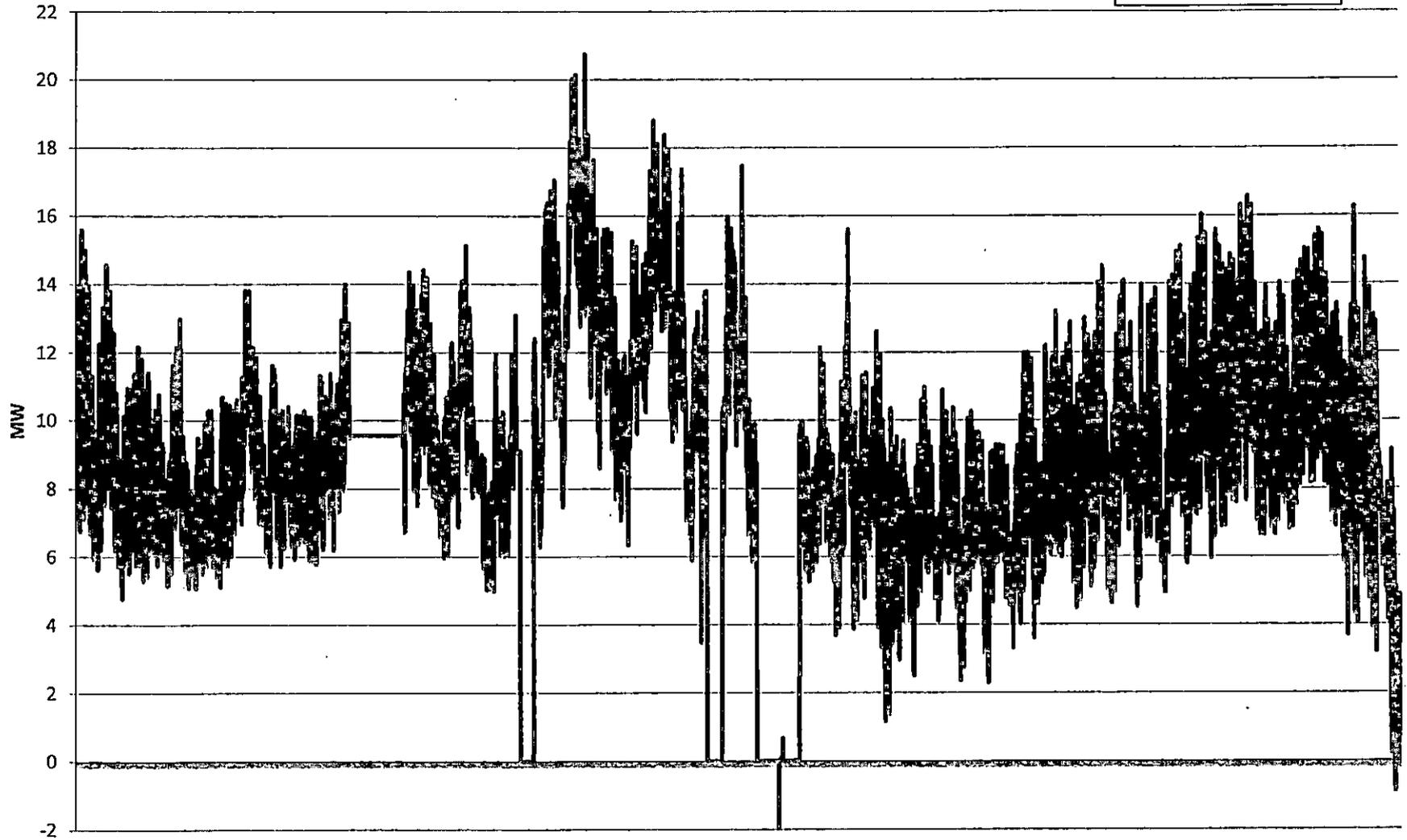
### Tunis TX #1 9/1/15 - 9/7/16

Neutral



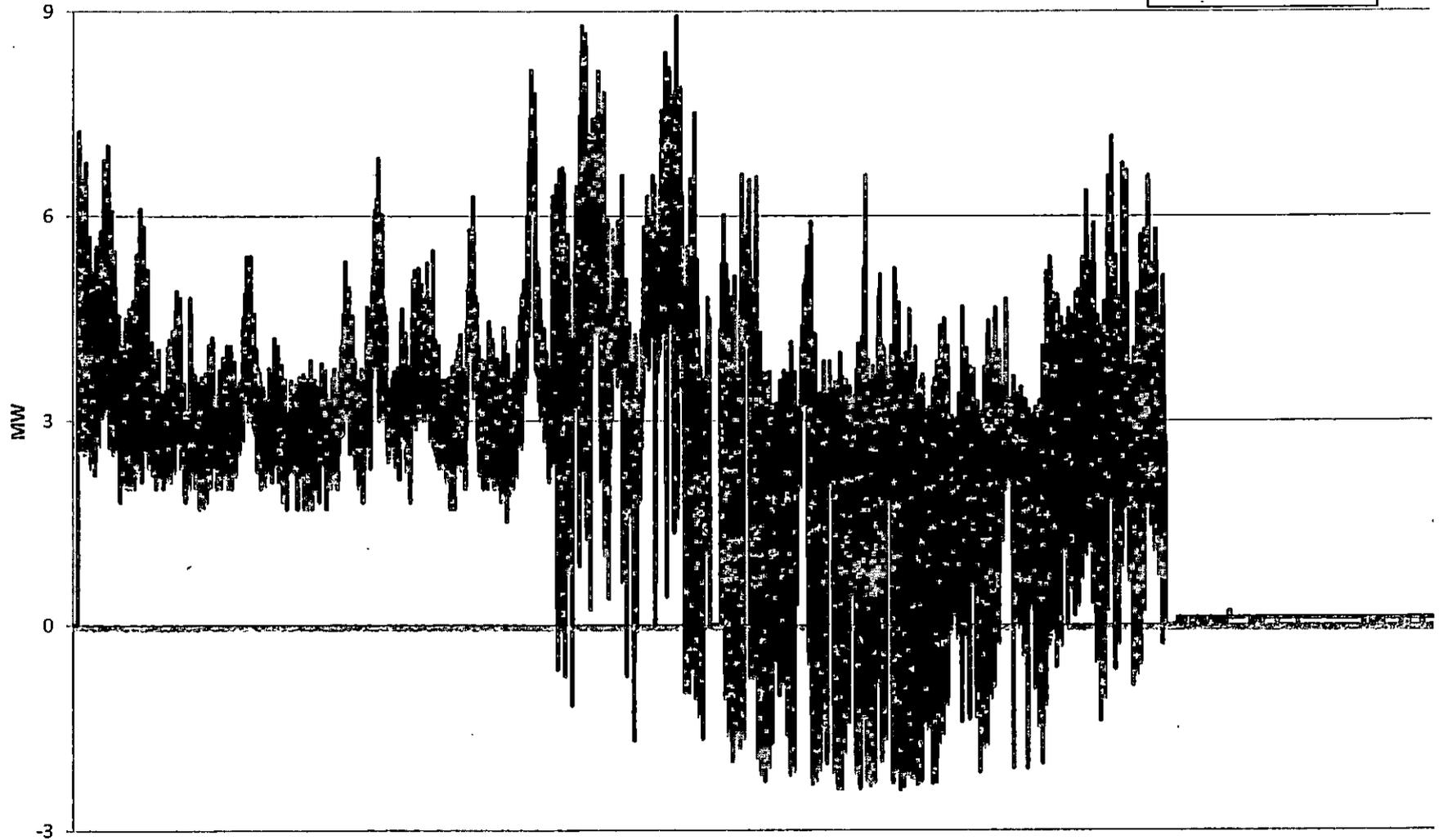
### Woodland TX #1 9/1/15 - 9/7/16

Neutral



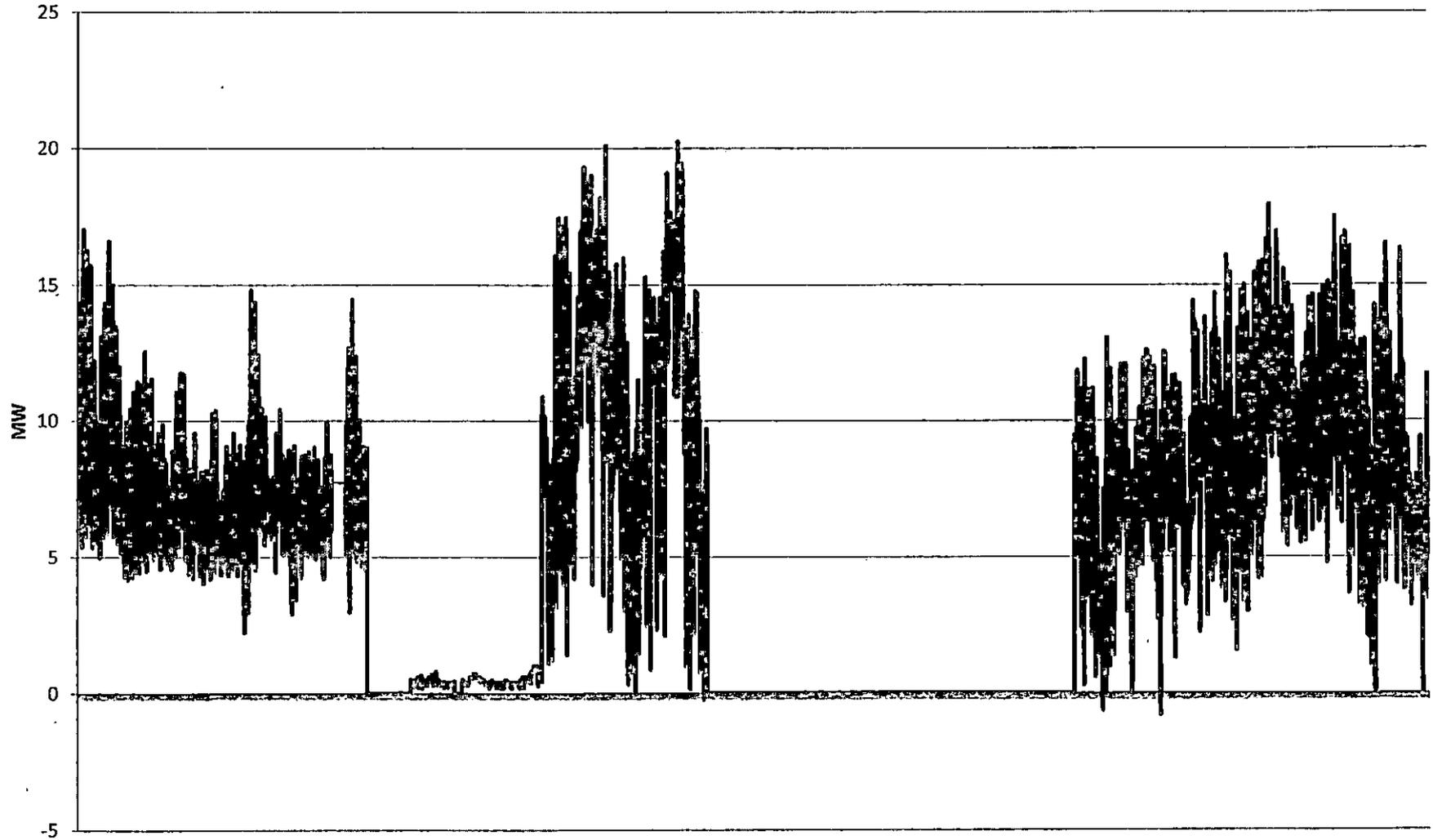
**Chowan TX #1 9/1/15 - 9/7/16**

Neutral

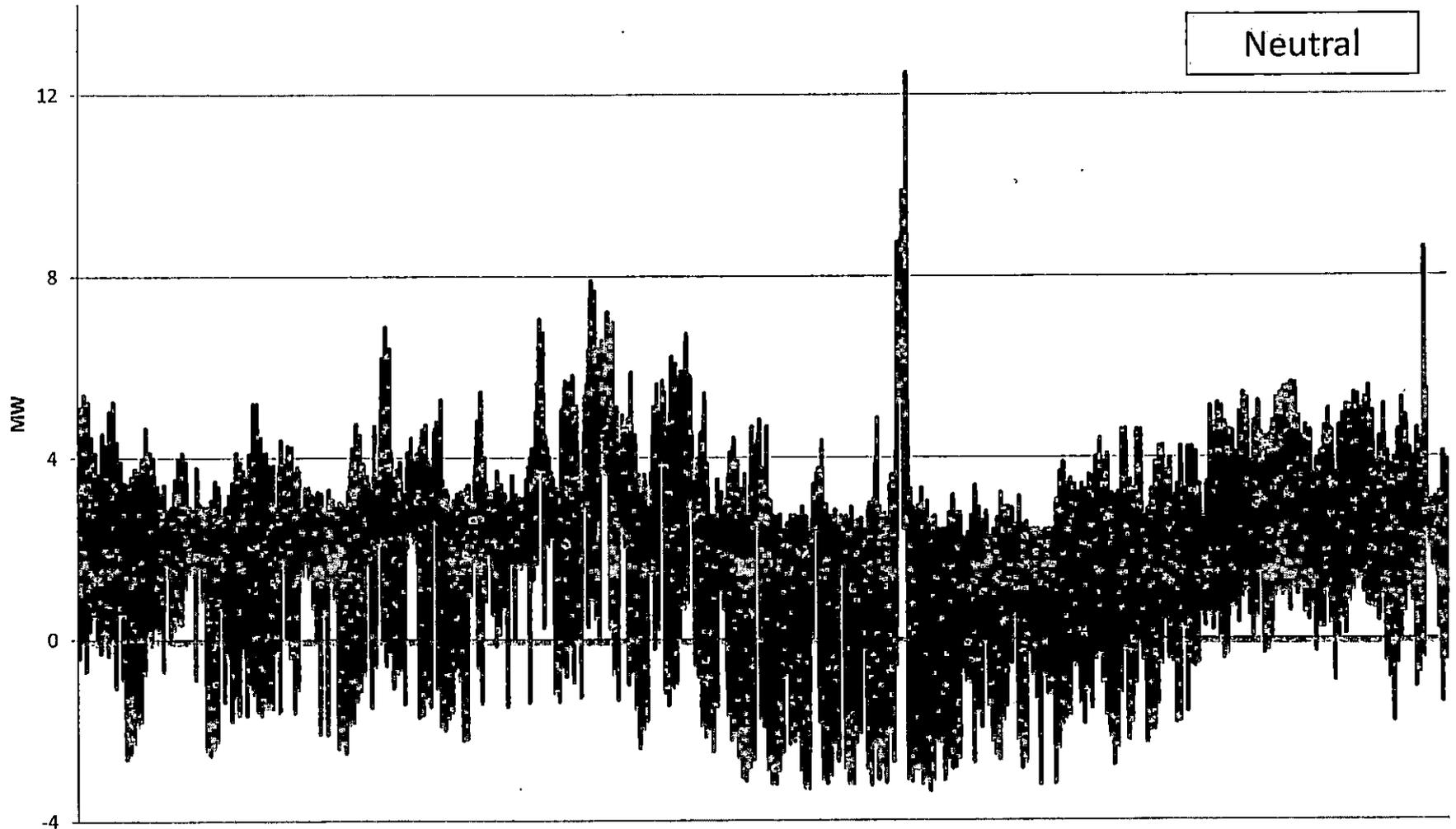


# Sunbury TX #1 9/1/15 - 9/7/16

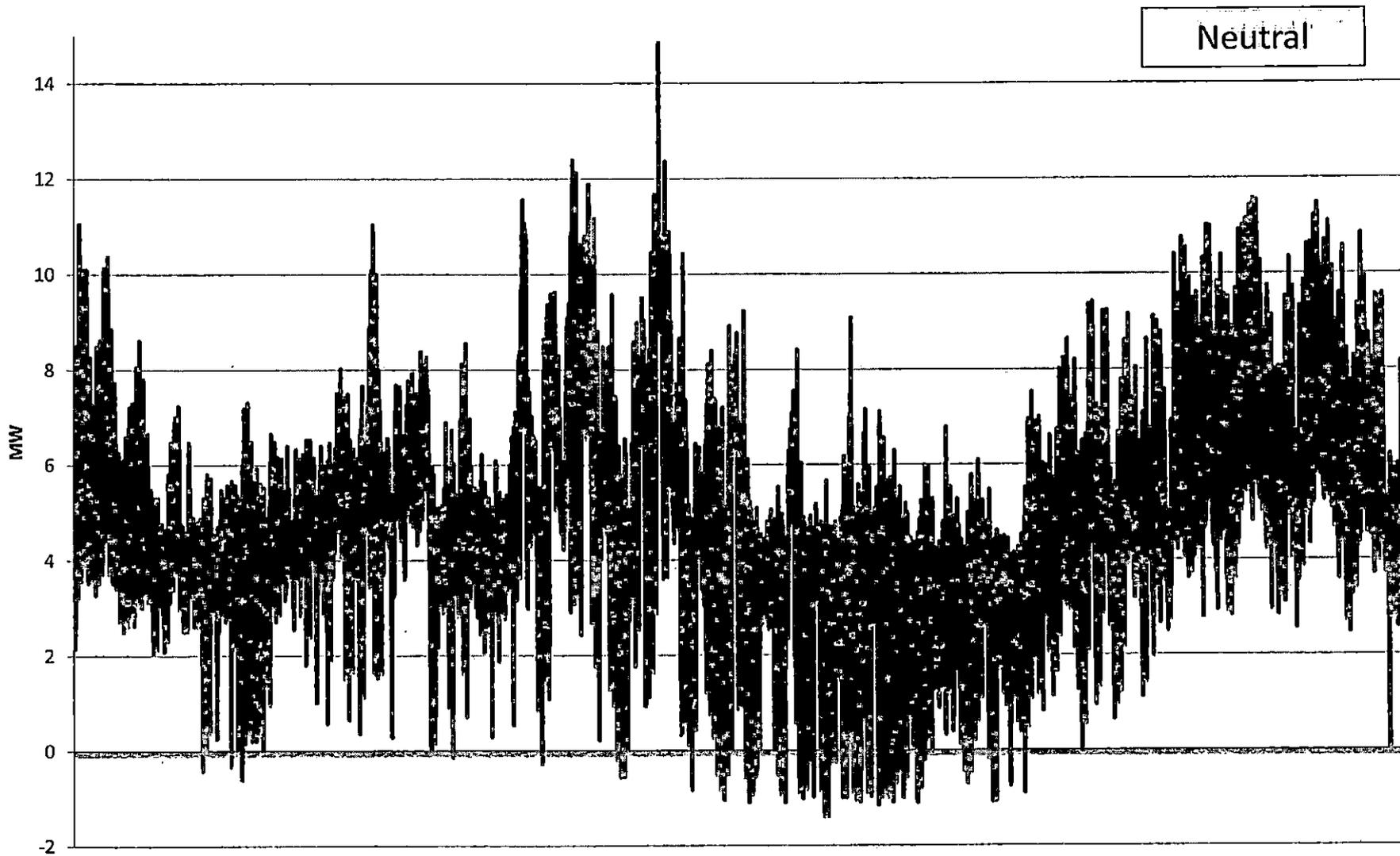
Neutral



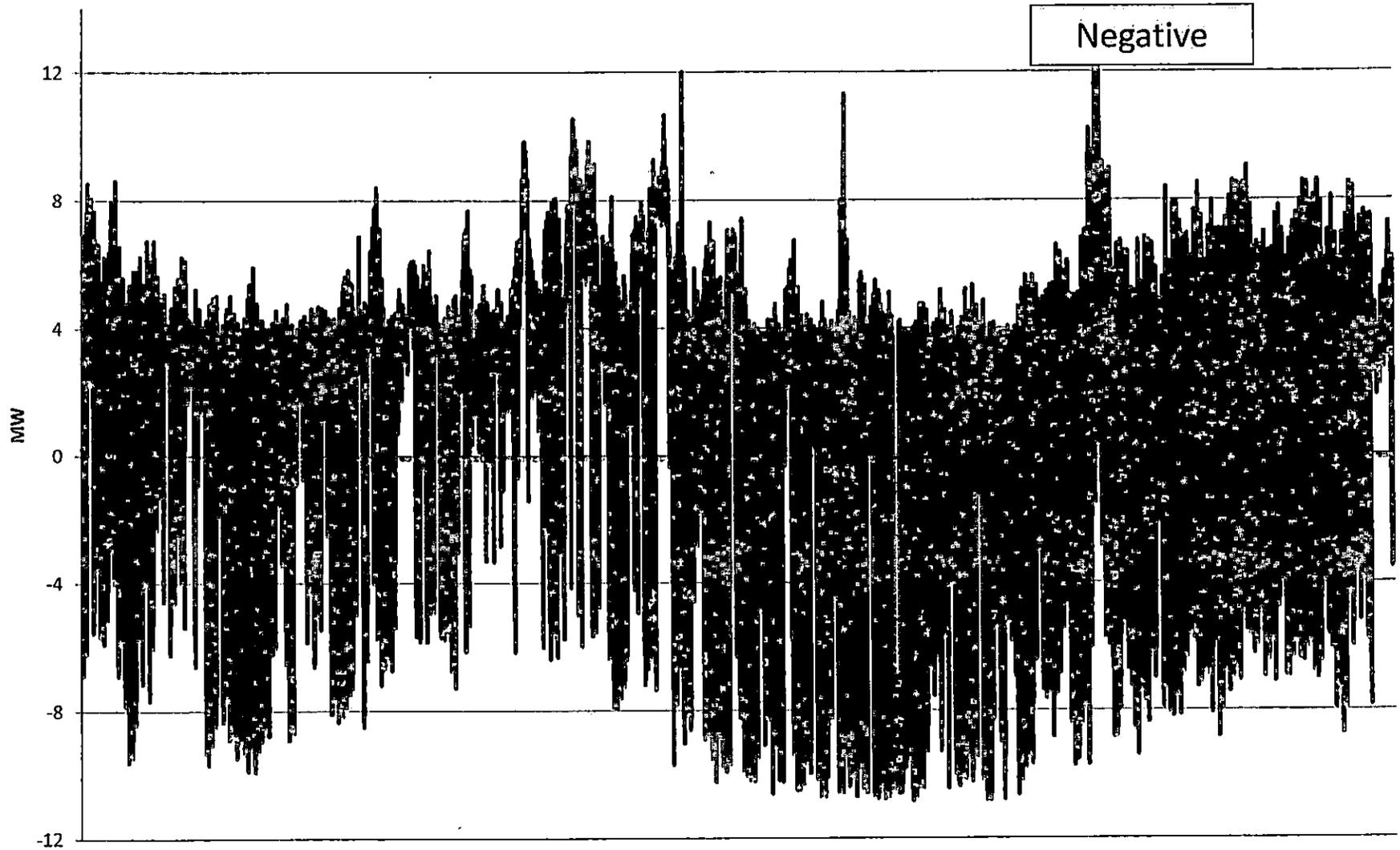
### Winfall TX #4 9/1/15 - 9/7/16



### Winfall TX #5 9/1/15 - 9/7/16

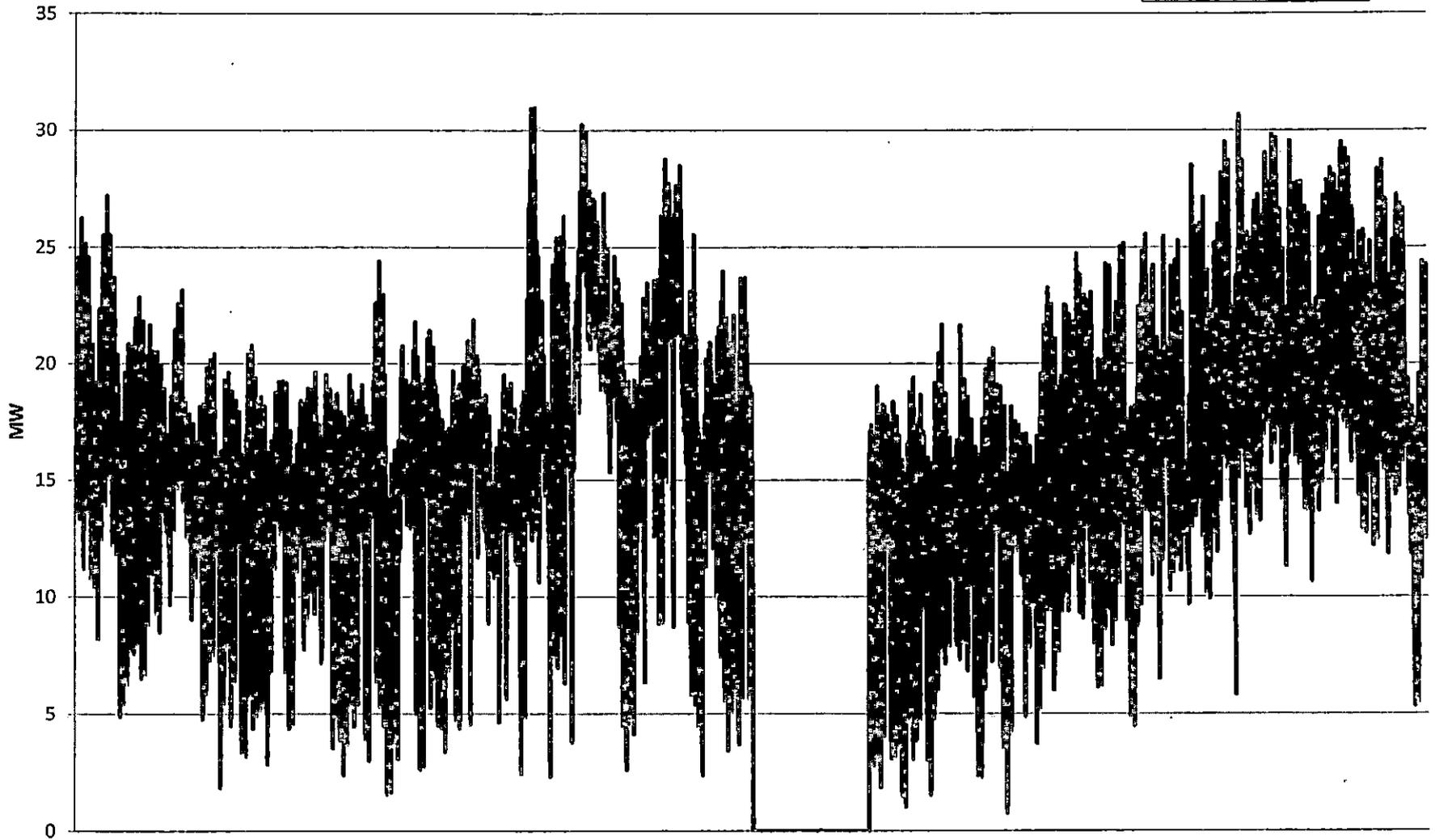


### Creswell TX #2 9/1/15 - 9/7/16



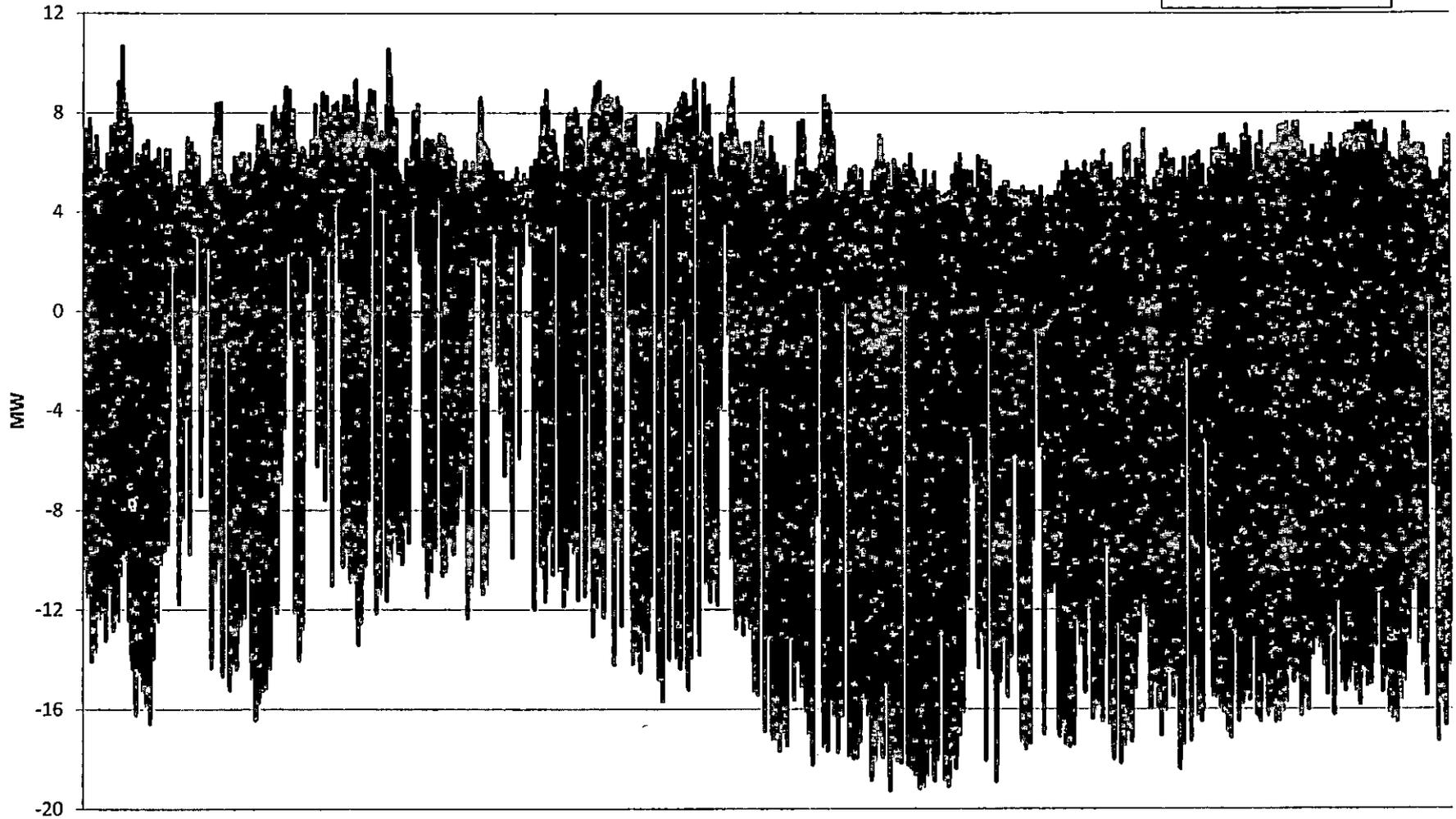
### Hornertown TX #5 9/1/15 - 9/7/16

Positive

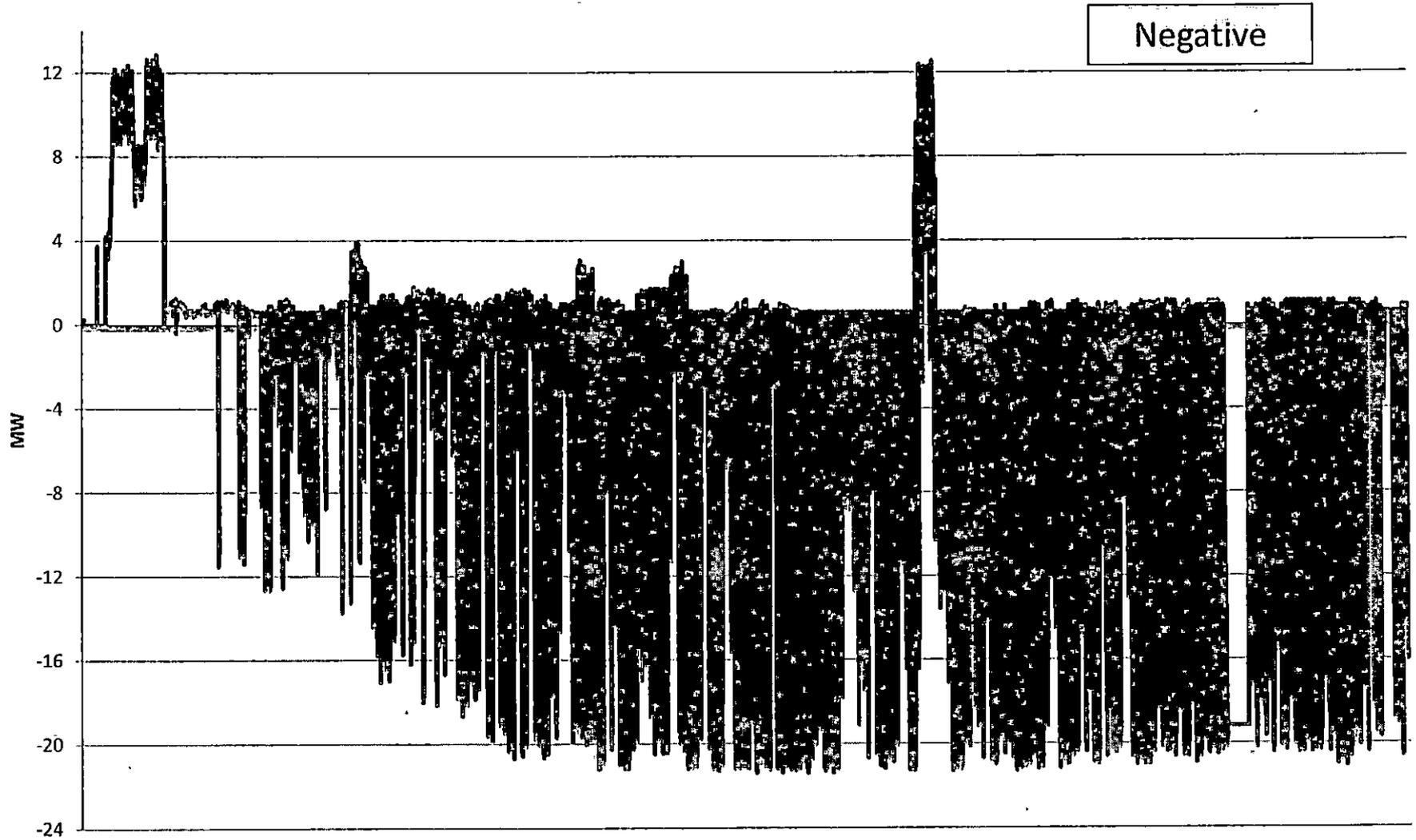


### Scotland Neck TX #2 9/1/15 - 9/7/16

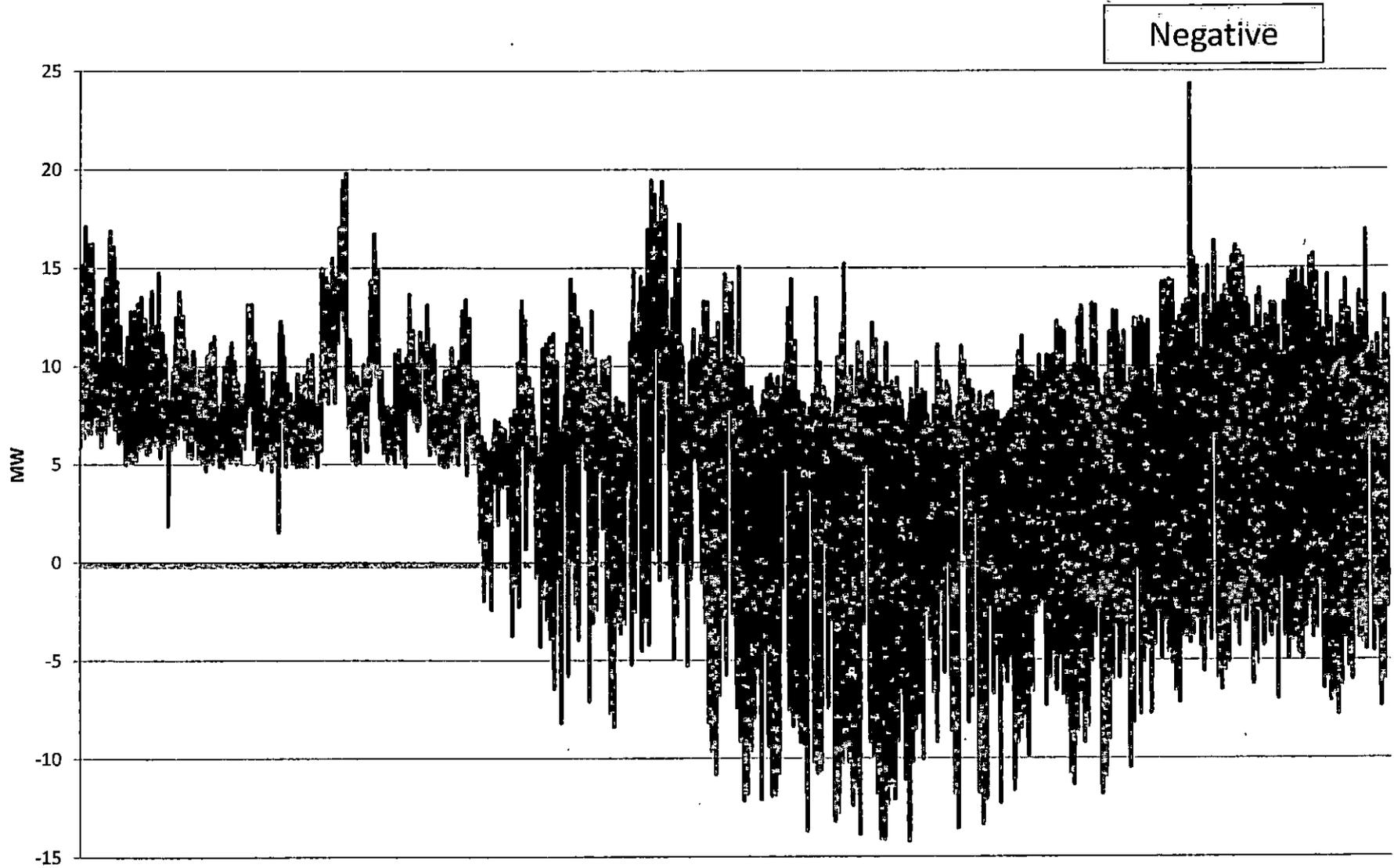
Negative



### Kelford TX #2 11/2/15~ 9/7/16 (New Transformer for DG)

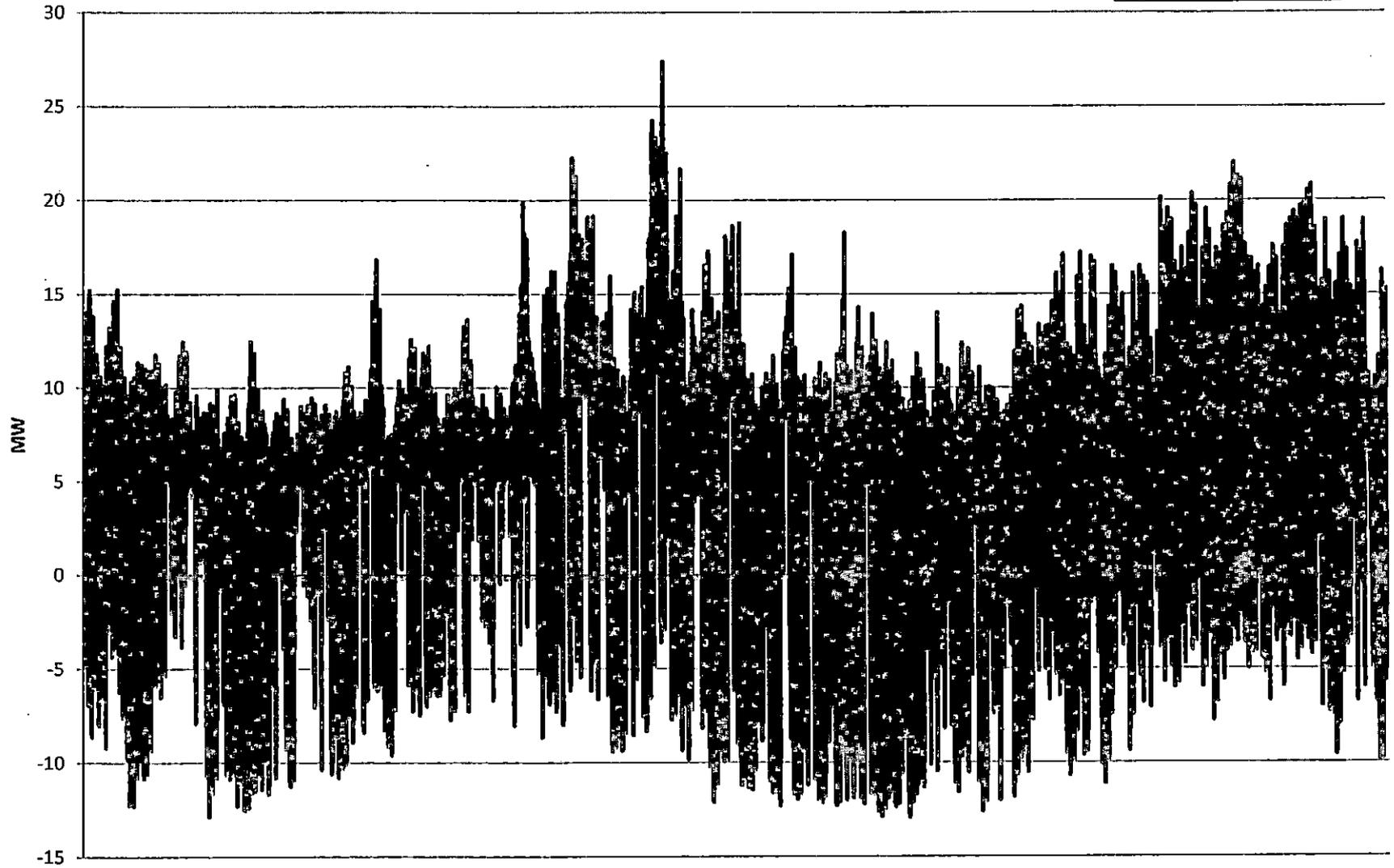


### Elizabeth City TX #2 9/1/15 - 9/7/16



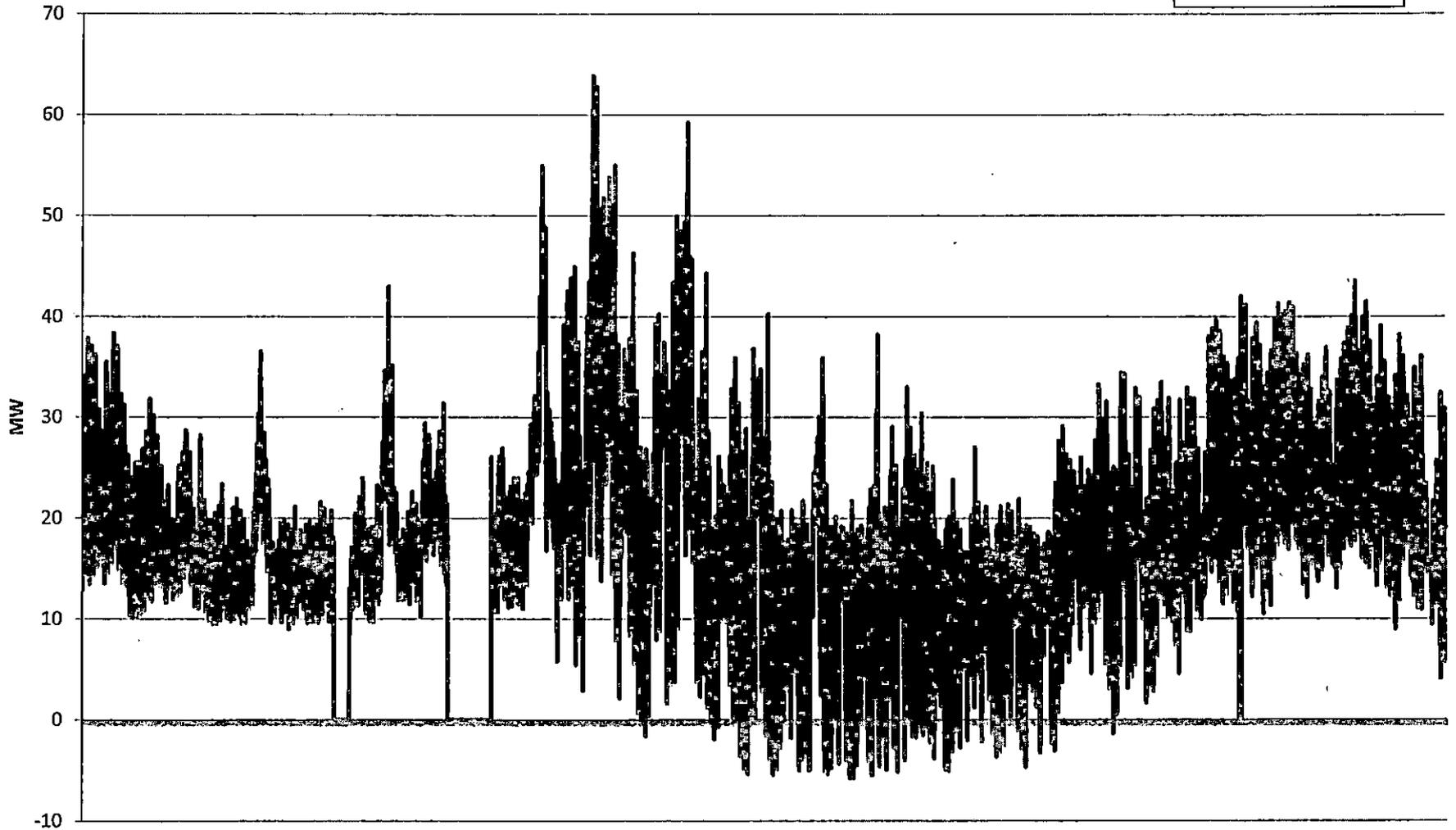
### Pasquotank TX #1 9/1/15 - 9/7/16

Negative



### Sligo TX #1 9/1/15 - 9/7/16

Neutral



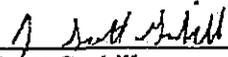
I/A

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Apr 10 2017

Dominion North Carolina Power  
2016 NC Avoided Cost Case – Docket No. E-100, Sub 148  
Public Staff  
Data Request No. 04

The following response to Question No. 2 of Public Staff Data Request No. 04, dated February 22, 2017 has been prepared under my supervision.

  
\_\_\_\_\_  
J. Scott Gaskill  
Director – Power Contracts

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**Question No. 2:**

Regarding the statement on pg. 23 of the filing, “will lead to even additional losses and congestion issues.”

- a. Please provide a narrative describing the losses and congestion issues.
- b. Please provide any analysis or quantification off losses the Company has already experienced.
- c. Please provide any analysis of quantification of other additional losses the Company is applying in this statement.

**Response:**

- a. Figure 5 on page 23 of the Company’s Initial Comments shows that LMPs in the Company’s North Carolina service area are consistently lower than the prices for the Dom Zone as whole. There are two reasons that cause LMPs to be different from one location to another: congestion and marginal loss as implied in the calculation of LMP. The table below shows the LMP congestion and loss components included in the LMPs presented in Figure 5. See also the direct testimony of Company Witness Gaskill at pp 23-27 and Company Witness Petrie at pp 7-11.

			Congestion			Losses		
			On peak	Off peak	All hrs	On peak	Off peak	All hrs
Jan-Dec 2014	Dom zone	\$/MWh	6.19	4.22	4.65	(0.04)	0.11	0.08
	NC locations	\$/MWh	4.49	2.66	3.06	(0.82)	(0.40)	(0.49)
	Difference	\$/MWh	(1.70)	(1.55)	(1.59)	(0.78)	(0.51)	(0.57)
			On peak	Off peak	All hrs	On peak	Off peak	All hrs
Jan-Dec 2015	Dom zone	\$/MWh	5.78	3.85	4.28	0.52	0.43	0.45
	NC locations	\$/MWh	3.78	2.09	2.46	0.24	0.27	0.27
	Difference	\$/MWh	(2.00)	(1.77)	(1.82)	(0.29)	(0.16)	(0.19)
			On peak	Off peak	All hrs	On peak	Off peak	All hrs
Jan-Sep 2016	Dom zone	\$/MWh	3.52	2.73	2.91	0.06	0.13	0.12
	NC locations	\$/MWh	1.67	1.57	1.59	(0.37)	(0.12)	(0.17)
	Difference	\$/MWh	(1.84)	(1.16)	(1.31)	(0.43)	(0.25)	(0.29)

The difference in congestion and losses between the NC Locations and DOM Zone are highlighted. The negative value indicates that there exists congestion and losses in between North Carolina to the rest of the load in DOM Zone (i.e. LMPs are lower because there is less value in adding incremental generation there).

LMPs are fundamentally a function of supply and demand at each location. As more generation is added in a location where it is not needed, congestion and marginal losses will become more negative, reflecting the re-dispatch cost to enable this generation to "flow" to locations to the transmission grid.

- b. The LMP table above indicates that marginal loss component in the on-peak period have been between \$0.29/MWh and \$0.78/MWh over the past three years. For additional discussion on distribution losses, please see the Company's response to SACE Set 2-21.
- c. See response to part (b) above and the Company's response to SACE Set 2-21.

I/A

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Feb 21 2017

**POWER PURCHASE ASSUMPTIONS IN PROMOD**

*Schedule 19 and other non-dispatchable qualifying facilities:*

Non-dispatchable NUGs are considered "behind the meter" and are designated as such in PROMOD. Dispatchable NUGs are modeled to operate in accordance with their unique, contract-specific parameters.

*Market purchases:*

Market purchases from the PJM energy market are available in the model, and can be used to displace Company owned generation.

*Emergency purchases:*

Emergency purchases are priced at \$1,500/MWh.

**UNIT OPERATING ASSUMPTIONS**

**Nuclear Units**

*Surry Units 1 and 2:*

- 98.0% availability between planned outages
- Unit 1 is scheduled for a [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]-day outage in 2018
- Unit 2 is scheduled for a [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]-day outage in 2017 and a [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]-day outage in 2018

*North Anna Units 1 and 2:*

- 98.0% availability between planned outages
- Unit 1 is scheduled for a [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]-day outage in 2018
- Unit 2 is scheduled for a [BEGIN CONFIDENTIAL] [REDACTED] [END CONFIDENTIAL]-day outage in 2017
- PROMOD reflects ODEC's undivided 11.6% ownership

**Fossil Units**

The company's Power Generation department provides the capacity states, availabilities, emission rates, unplanned outage rates, and heat rate data which are input to PROMOD. In developing the assumptions for each unit, Power Generation takes into account the current state of repair of the unit, the expected performance, and any planned modifications to the unit.

**New Units**

The Brunswick County combined cycle unit came online in April 2016. The capacity rating of the unit is 1,368 MW in the summer and 1,509 MW in the winter.

**Planned New Units**

The company has included the following planned generation additions in this study:

<u>Unit Name</u>	<u>Type</u>	<u>Planned COD</u>	<u>Summer MW</u>
Greenville CC	Combined Cycle	May-2019	1,585
VOWTAP	Off-Shore Wind Project	Jan-2021	11
Generic CTs	Combustion Turbine	Jan-2022	457
Generic CTs	Combustion Turbine	Jan-2023	457
Generic CC	Combined Cycle	Jan-2028	1,585
Solar	Solar	2017-2021	803

**Hydro Units**

*Conventional hydro units:*

- Cushaw                    2 MW                    Modeled using 10-year average of actual generation
- North Anna            0.992 MW            Modeled using 10-year average of actual generation
- Gaston                    220 MW                Modeled using 10-year average of actual generation
- Roanoke Rapids        95 MW                    Modeled using 10-year average of actual generation

*Bath County Pumped Storage Facility:*

- Currently 1,802 MW (60% of project ownership) of generating capability
- 1,728 MW of pumping capability
- Weekly refill cycle with an assumed output/input, or cycle efficiency, of 79.6%
- Annual forced outage rate of approximately 3%
- Pumping energy necessary to fill the upper reservoir is assumed to be 31,447 MWh

**FUEL AND PJM POWER COST ASSUMPTIONS**

For the first 18 months of the forecast period, the fuel, PJM power, and emission allowance prices are based on estimated market prices as of September 29, 2016. For the next 18 months, the prices are a blend of the market prices and the ICF commodity price forecast as of early October 2016. For the remainder of the term, the prices are based on ICF's commodity price forecast.

**VARIABLE O&M COST ASSUMPTIONS**

Generating unit variable operation and maintenance costs are included in the PROMOD analyses. Variable O&M rates are escalated at 1.5% annually.

\*Pg. 1 of 202  
previously filed  
in the docket  
as public and  
confidential

Initial Comments and  
Exhibits of Dominion  
North Carolina Power

J/A

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Nov 15 2016

STATE OF NORTH CAROLINA  
UTILITIES COMMISSION  
RALEIGH

DOCKET NO. E-100, SUB 148

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of	)	
Biennial Determination of Avoided Cost	)	INITIAL COMMENTS AND
Rates for Electric Utility Purchases from	)	EXHIBITS OF DOMINION
Qualifying Facilities – 2016	)	NORTH CAROLINA POWER

NOW COMES Virginia Electric and Power Company, d/b/a Dominion North Carolina Power (“DNCP” or the “Company”), pursuant to the June 22, 2016 *Order Establishing Biennial Proceeding, Requiring Data, and Scheduling Public Hearing* and the October 27, 2016 *Order Granting Motion for Extension of Time* issued by the North Carolina Utilities Commission (“Commission”) in the above-captioned docket, and submits its Initial Comments and Exhibits relating to the Company’s proposed avoided cost rates and standard avoided cost contract terms and conditions. In support thereof, DNCP shows the Commission the following:

**I. Introduction**

The Company’s previously effective avoided cost rates and standard contract terms and conditions were filed on February 2, 2016, as revised on February 26, 2016, in compliance with the Commission’s December 31, 2014 *Order Setting Avoided Cost Parameters* (“2014 Phase 1 Order”) and its December 17, 2015 *Order Establishing Standard Rates and Contract Terms for Qualifying Facilities* (“2014 Phase 2 Order”), both issued in Docket No. E-100, Sub 140 (the “2014 Avoided Cost Case”). In those orders, the Commission addressed the methods used to calculate avoided cost payments

## Development of Fixed, Levelized Energy Purchase Prices for QFs 2016 North Carolina Schedule 19 Filing, Docket No. E-100, Sub 148

### OPTION A

DISCOUNT RATE =

7.723%

Cents/kWh Including Fuel Hedge Benefit  
 END OF YEAR \$    END OF YEAR \$  
ON-PEAK            OFF-PEAK

Variable Energy Rate

ON-PEAK            OFF-PEAK            Non-time differentiated  
 3.246                    2.544                    2.795

1	2017	<b>3.180</b>	<b>2.496</b>
2	2018	<b>3.313</b>	<b>2.591</b>
3	2019	<b>2.915</b>	<b>2.480</b>
4	2020	<b>3.104</b>	<b>2.672</b>
5	2021	<b>3.277</b>	<b>2.785</b>
6	2022	<b>3.356</b>	<b>2.852</b>

### 5 YEAR CONTRACT STARTING IN                    2017 or 2018

	<u>YEAR</u>	<u>END OF YEAR \$ ON-PEAK</u>	<u>END OF YEAR \$ OFF-PEAK</u>	<u>BEG OF YEAR 2017 PRESENT VALUE FACTOR</u>	<u>BEG OF YEAR 2017 PRESENT VALUE ON-PEAK</u>	<u>BEG OF YEAR 2017 PRESENT VALUE OFF-PEAK</u>
1	2017	3.180	2.496	0.9283	2.95214	2.31729
2	2018	3.313	2.591	0.8618	2.85459	2.23260
3	2019	2.915	2.480	0.8000	2.33169	1.98428
4	2020	3.104	2.672	0.7426	2.30516	1.98436
5	2021	3.277	2.785	0.6894	<u>2.25924</u>	<u>1.91972</u>
CUMULATIVE					12.70282	10.43824

LEVELIZED RATE	Cents/kWh	3.158	2.595
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Exhibit BEP-2 T/A

**Development of Fixed, Levelized Energy Purchase Prices for QFs**

2016 North Carolina Schedule 19 Filing, Docket No. E-100, Sub 148

**OPTION A**

DISCOUNT RATE =

7.723%

		Cents/kWh Including Fuel Hedge Benefit		Adj Cents/kWh excluding fuel hedge benefit			Promod	c/kwh	Promod results[unadj]		\$/MWh	
		END OF YEAR \$	END OF YEAR \$	Avg en on pk	Avg en off pk	Avg hedge benefit	unadjusted	Avg energy	avoided energy \$/MWh		Adj for LMP impact	
		<u>ON-PEAK</u>	<u>OFF-PEAK</u>				Avg energy	Incl hedg	<u>On peak</u>	<u>Off peak</u>	<u>On peak</u>	<u>Off peak</u>
						All hours	All hours			0.953	0.953	
1	2017	3.180	2.496	3.166	2.482	0.014	2.861	2.740	33.22	26.05	31.66	24.82
2	2018	3.313	2.591	3.299	2.577	0.014	2.974	2.849	34.61	27.04	32.99	25.77
3	2019	2.915	2.480	2.901	2.466	0.014			30.44	25.88	29.01	24.66
4	2020	3.104	2.672	3.090	2.658	0.014			32.42	27.89	30.90	26.58
5	2021	3.277	2.785	3.263	2.771	0.014			34.24	29.07	32.63	27.71
6	2022	3.356	2.852	3.342	2.838	0.014			35.07	29.78	33.42	28.38
7	2023	3.395	2.871	3.381	2.857	0.014			35.48	29.98	33.81	28.57
8	2024	3.621	3.073	3.607	3.059	0.014			37.84	32.10	36.07	30.59
9	2025	3.814	3.202	3.800	3.188	0.014			39.88	33.45	38.00	31.88
10	2026	4.114	3.386	4.100	3.372	0.014			43.03	35.38	41.00	33.72
11	2027	4.205	3.447	4.191	3.433	0.014			43.98	36.03	41.91	34.33

**10 YEAR CONTRACT, STARTING IN**

**2017 or 2018**

YEAR	END OF YEAR \$	END OF YEAR \$	BEG OF YEAR 2017	BEG OF YEAR 2017	BEG OF YEAR 2017	
	<u>ON-PEAK</u>	<u>OFF-PEAK</u>	PRESENT	PRESENT VALUE	PRESENT VALUE	
			<u>VALUE FACTOR</u>	<u>ON-PEAK</u>	<u>OFF-PEAK</u>	
1	2017	3.180	2.496	0.9283	2.95214	2.31729
2	2018	3.313	2.591	0.8618	2.85459	2.23260
3	2019	2.915	2.480	0.8000	2.33169	1.98428
4	2020	3.104	2.672	0.7426	2.30516	1.98436
5	2021	3.277	2.785	0.6894	2.25924	1.91972
6	2022	3.356	2.852	0.6400	2.14786	1.82511
7	2023	3.395	2.871	0.5941	2.01718	1.70552
8	2024	3.621	3.073	0.5515	1.99665	1.69462
9	2025	3.814	3.202	0.5119	1.95281	1.63901
10	2026	4.114	3.386	0.4752	1.95531	1.60917

CUMULATIVE 22.77262 18.91168

LEVELIZED RATE Cents/kWh 3.352 2.783

Feb 21 2017

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**Development of Fixed, Levelized Energy Purchase Prices for QFs  
2015 North Carolina Schedule 19 Filing, Docket No. E-100, Sub 148**

**OPTION B**

DISCOUNT RATE =

7.723%

Cents/kWh Including Fuel Hedge Benefit

Variable Energy Rate

END OF YEAR \$    END OF YEAR \$

ON-PEAK

OFF-PEAK

ON-PEAK

OFF-PEAK

3.292

2.656

1	2017	<b>3.209</b>	<b>2.610</b>
2	2018	<b>3.375</b>	<b>2.702</b>
3	2019	<b>2.929</b>	<b>2.553</b>
4	2020	<b>3.130</b>	<b>2.741</b>
5	2021	<b>3.294</b>	<b>2.867</b>
6	2022	<b>3.396</b>	<b>2.930</b>

**5 YEAR CONTRACT STARTING IN**

**2017 or 2018**

	<u>YEAR</u>	<u>END OF YEAR \$ ON-PEAK</u>	<u>END OF YEAR \$ OFF-PEAK</u>	<u>BEG OF YEAR 2017 PRESENT VALUE FACTOR</u>	<u>BEG OF YEAR 2017 PRESENT VALUE ON-PEAK</u>	<u>BEG OF YEAR 2017 PRESENT VALUE OFF-PEAK</u>
1	2017	3.209	2.610	0.9283	2.97856	2.42277
2	2018	3.375	2.702	0.8618	2.90869	2.32811
3	2019	2.929	2.553	0.8000	2.34315	2.04271
4	2020	3.130	2.741	0.7426	2.32445	2.03587
5	2021	3.294	2.867	0.6894	<u>2.27075</u>	<u>1.97674</u>
			CUMULATIVE		12.82560	10.80619

LEVELIZED RATE

Cents/kWh

3.189
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2.687
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**Development of Fixed, Levelized Energy Purchase Prices for QFs**

2016 North Carolina Schedule 19 Filing, Docket No. E-100, Sub 148

**OPTION B**

DISCOUNT RATE =

7.723%

		Cents/kWh Including Fuel Hedge Benefit			Adj Cents/kWh excluding fuel hedge benefit			Promod results avoided energy \$/MWh		\$/MWh Adj for LMP impact		
		END OF YEAR \$			Avd en on pk		Avd en off pk	Avd hedge benefit	On peak	Off peak	On peak	Off peak
		ON-PEAK	OFF-PEAK								0.956	0.952
1	2017	3.209	2.610	3.195	2.596	0.014	33.42	27.27	31.95	25.96		
2	2018	3.375	2.702	3.361	2.688	0.014	35.16	28.23	33.61	26.88		
3	2019	2.929	2.553	2.915	2.539	0.014	30.49	26.68	29.15	25.39		
4	2020	3.130	2.741	3.116	2.727	0.014	32.59	28.65	31.16	27.27		
5	2021	3.294	2.867	3.280	2.853	0.014	34.31	29.97	32.80	28.53		
6	2022	3.396	2.930	3.382	2.916	0.014	35.37	30.63	33.82	29.16		
7	2023	3.429	2.955	3.415	2.941	0.014	35.73	30.89	34.15	29.41		
8	2024	3.682	3.153	3.668	3.139	0.014	38.37	32.97	36.68	31.39		
9	2025	3.901	3.286	3.887	3.272	0.014	40.65	34.37	38.87	32.72		
10	2026	4.201	3.491	4.187	3.477	0.014	43.80	36.52	41.87	34.77		
11	2027	4.306	3.554	4.292	3.540	0.014	44.89	37.18	42.92	35.40		

**10 YEAR CONTRACT, STARTING IN**

2017 or 2018

YEAR	END OF YEAR \$ ON-PEAK	END OF YEAR \$ OFF-PEAK	BEG OF YEAR 2017 PRESENT VALUE FACTOR	BEG OF YEAR 2017 PRESENT VALUE		
				ON-PEAK	OFF-PEAK	
1	2017	3.209	2.610	0.9283	2.97856	2.42277
2	2018	3.375	2.702	0.8618	2.90869	2.32811
3	2019	2.929	2.553	0.8000	2.34315	2.04271
4	2020	3.130	2.741	0.7426	2.32445	2.03587
5	2021	3.294	2.867	0.6894	2.27075	1.97674
6	2022	3.396	2.930	0.6400	2.17318	1.87532
7	2023	3.429	2.955	0.5941	2.03728	1.75523
8	2024	3.682	3.153	0.5515	2.03075	1.73872
9	2025	3.901	3.286	0.5119	1.99688	1.68244
10	2026	4.201	3.491	0.4752	1.99657	1.65915

CUMULATIVE 23.06026 19.51704

LEVELIZED RATE Cents/kWh 3.394 2.872

Feb 21 2017

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**NCSEA DNCP CROSS EXHIBIT 1**

**Dominion North Carolina Power Queue Status Report (Excluding Net Metering)**

Data as of: **January 30, 2017**

Source: DNCP Response to NCSEADR 2

Queue No	Fuel Type	Date Queue No Assigned	Capacity (MW)	Substation and Transformer	Circuit	Status Description
NC13013	Solar	5/10/2013	14.0	Chowan Tx 1	71 445 (Chowan)	Cancelled
NC13014	Solar	5/28/2013	5.0	Parmele Tx 1	62 740 (Parmele)	Cancelled
NC13016	Solar	5/28/2013	5.0	Winfall Tx 4	71 420 (Winfall)	Cancelled
NC13017	Solar	5/28/2013	5.0	Parmele Tx 1	62 735 (Parmele)	Cancelled
NC13020	Solar	5/31/2013	5.0	Plymouth Tx 1	62 335 (Plymouth)	Cancelled
NC13022	Solar	6/24/2013	12.0	Riders Creek Tx 1	62 342 (Riders Creek)	Cancelled
NC13027	Solar	7/20/2013	5.0	Winfall Tx 4	71 420 (Winfall)	Cancelled
NC13040	Solar	9/20/2013	5.0	Earleys Tx 2	67 303 (Earleys)	Cancelled
NC13041	Solar	10/1/2013	5.0	Tar River Tx 1	62 715 (Tar River)	Cancelled
NC13046	Solar	10/8/2013	5.0	Bethel-Carolina Tx 1	62 755 (Bethel-Carolina)	Cancelled
NC13049	Solar	10/21/2013	2.0	Earleys Tx 1	67 302 (Earleys)	Cancelled
NC13061	Solar	11/15/2013	12.0	Carolina Tx 2	61 810 (Carolina)	Cancelled
NC13063	Solar	11/18/2013	5.0	Everetts Tx 3	62 325 (Everetts)	Cancelled
NC13066	Solar	11/18/2013	5.0	Chowan Tx 1	71 445 (Chowan)	Cancelled
NC13072	Solar	12/13/2013	5.0	Poplar Chapel Tx 1	62 334 (Poplar Chapel)	Cancelled
NC13076	Solar	12/18/2013	5.0	Whitakers Tx 1	61 330 (Whitakers)	Cancelled
NC13077	Solar	12/18/2013	5.0	Earleys Tx 1	67 302 (Earleys)	Cancelled
NC14001	Solar	1/3/2014	5.0	Hornertown Tx 1	61 828 (Hornertown)	Cancelled
NC14002	Solar	1/3/2014	5.0	Hornertown Tx 5	61 320 (Hornertown)	Cancelled
NC14003	Solar	1/3/2014	5.0	Bethel-Carolina Tx 1	62 755 (Bethel-Carolina)	Cancelled
NC14005	Solar	1/10/2014	5.0	Creswell Tx 1	62 370 (Creswell)	Cancelled
NC14006	Solar		2.0	Everetts Tx 3	62 310 (Everetts)	Cancelled
NC14008	Solar	1/14/2014	3.0	Bethel-Carolina Tx 1	62 755 (Bethel-Carolina)	Cancelled
NC14009	Solar	1/31/2014	3.0	Seaboard Tx 1	61 818 (Seaboard)	Cancelled
NC14011	Solar	2/11/2014	5.0	Chowan Tx 1	71 445 (Chowan)	Cancelled
NC14014	Solar	3/10/2014	5.0	Whitakers Tx 1	61 330 (Whitakers)	Cancelled
NC14020	Solar	4/8/2014	4.5	Carolina Tx 2	61 810 (Carolina)	Cancelled
NC14029	Solar	4/30/2014	5.0	Winfall Tx 5	71 430 (Winfall)	Cancelled
NC14031	Solar	5/1/2014	5.0	Winfall Tx 5	71 430 (Winfall)	Cancelled
NC14033	Solar	5/21/2014	5.0	Seaboard Tx 1	61 818 (Seaboard)	Cancelled
NC14035	Solar	5/22/2014	5.0	Carolina Tx 2	61 810 (Carolina)	Cancelled
NC14039	Solar	6/3/2014	5.0	Seaboard Tx 1	61 817 (Seaboard)	Cancelled
NC14042	Solar	6/10/2014	2.0	Seaboard Tx 1	61 818 (Seaboard)	Cancelled
NC14044	Solar	6/16/2014	5.0	Poplar Chapel Tx 1	62 334 (Poplar Chapel)	Cancelled
NC14047	Solar	7/2/2014	5.0	Pasquotank Tx 1 & Okisko Tx 1	71 555 (Okisko Sub)	Cancelled
NC14048	Solar	7/2/2014	5.0	Hornertown Tx 1	61 828 (Hornertown)	Cancelled
NC14051	Solar	7/3/2014	5.0	Cashie Tx 1 & Tx 2	67 - To Windsor DP (Cashie Tx 2)	Cancelled
NC14052	Solar	7/7/2014	5.0	Murphy Tx 2	67 309 (Murphy)	Cancelled
NC14053	Solar	7/14/2014	20.0	Lake Gaston Tx 1	61 331 (Lake Gaston)	Cancelled
NC14054	Solar	7/17/2014	5.0	Tunis Tx 1	67 327 (Tunis)	Cancelled
NC14055	Solar	7/21/2014	2.0	Northampton Tx 1	61 381C (Northampton)	Cancelled
NC14056	Solar	7/21/2014	2.0	Northampton Tx 1	61 381 (Northampton)	Cancelled
NC14057	Solar	7/21/2014	5.0	Tunis Tx 1	67 327 (Tunis)	Cancelled
NC14058	Solar	7/21/2014	5.0	Woodland Tx 1	67 304 (Woodland)	Cancelled
NC14059	Solar	7/23/2014	5.0	Earleys Tx 2	67 303 (Earleys)	Cancelled
NC14062	Solar	7/25/2014	0.9	Elizabeth City Tx 2	71 412 (Elizabeth City)	Cancelled
NC14066	Solar	8/5/2014	5.0	Winfall Tx 5	71 430 (Winfall)	Cancelled

Dominion North Carolina Power Queue Status Report (Excluding Net Metering)

Data as of:

January 30, 2017

Source: DNCP Response to NCSEADR 2

Queue No.	Fuel Type	Date Queue No. Assigned	Capacity (MW)	Substation and Transformer	Circuit	Status Description
NC14067	Solar	8/5/2014	5.0	Ahoskie Tx 1	67 329 (Ahoskie)	Cancelled
NC14068	Solar	8/5/2014	5.0	Ahoskie Tx 1	67 329 (Ahoskie)	Cancelled
NC14069	Solar	8/5/2014	5.0	Earleys Tx 1	67 302 (Earleys)	Cancelled
NC14070	Solar	8/5/2014	5.0	Tunis Tx 1	67 327 (Tunis)	Cancelled
NC14071	Solar	8/13/2014	5.0	Pasquotank Tx 1	71 434 (Pasquotank)	Cancelled
NC14073	Solar	9/4/2014	5.0	Pasquotank Tx 1	71 472 (Pasquotank)	Cancelled
NC14074	Solar	9/9/2014	2.0	Seaboard Tx 1	61 818 (Seaboard)	Cancelled
NC14075	Solar	9/15/2014	2.0	Hornertown Tx 5	61 320 (Hornertown)	Cancelled
NC14080	Solar	9/25/2014	5.0	Tar River Tx 1	62 715 (Tar River)	Cancelled
NC14084	Solar	10/2/2014	5.0	Sligo Tx 1	71 470A (Sligo)	Cancelled
NC14088	Solar	10/31/2014	5.0	Hornertown Tx 5	61 320 (Hornertown)	Cancelled
NC14095	Solar	12/4/2014	20.0	Seaboard Tx 1	61 818 (Seaboard)	Cancelled
NC15006	Solar	2/13/2015	12.0	Chowan Tx 1	71 445 (Chowan)	Cancelled
NC15007	Solar	2/13/2015	20.0	Winfall Tx 5	71 430 (Winfall)	Cancelled
NC15008	Solar	2/13/2015	16.0	Winfall Tx 4	71 420 (Winfall)	Cancelled
NC15016	Solar	3/27/2015	5.0	Everetts TX 3	Everetts 320/325 TBD	Cancelled
NC15021	Solar	4/23/2015	5.0	Hornertown Tx 5	61 320 (Hornertown)	Cancelled
NC16025	Solar	4/4/2016	21.0	Sligo TX 1	71 470(Sligo)	Cancelled
NC16028	Solar	4/13/2016	5.0	Ahoskie Tx 1	67 329(Ahoskie)	Cancelled
NC11009	Solar	1/1/2011	5.0	Plymouth Tx 2	62 340 (Plymouth)	Connected
NC13002	Solar	2/11/2013	5.0	Hornertown Tx 1	61 824 (Hornertown)	Connected
NC13003	Solar	2/13/2013	5.0	Everetts Tx 3	62 325 (Everetts)	Connected
NC13004	Solar	2/13/2013	5.0	Kelford Tx 1	67 380 (Kelford)	Connected
NC13005	Solar	2/13/2013	5.0	Cashle Tx 1	67 360 (Cashle)	Connected
NC13006	Solar	3/13/2013	5.0	Lilley Tx 1	62 805 (Lilley)	Connected
NC13007	Solar	3/13/2013	5.0	Bethel-Carolina Tx 1	62 755 (Bethel-Carolina)	Connected
NC13008	Solar	3/27/2013	15.0	Hornertown Tx 5	61 320 (Hornertown)	Connected
NC13009	Solar	3/27/2013	20.0	Scotland Neck Tx 2	61 723 (Scotland Neck)	Connected
NC13011	Solar	5/7/2013	5.0	Earleys Tx 1	67 302 (Earleys)	Connected
NC13012	Solar	5/7/2013	19.9	Sligo Tx 1	71 475 (Sligo)	Connected
NC13015	Solar	5/28/2013	5.0	Battleboro Tx 2	61 316 (Battleboro)	Connected
NC13018	Solar	5/31/2013	19.9	Whitakers Tx 1	61 336 (Whitakers)	Connected
NC13021	Solar	6/19/2013	1.4	Carolina Tx 2	61 810 (Carolina)	Connected
NC13023	Solar	7/18/2013	5.0	Bethel-Carolina Tx 1	62 755 (Bethel-Carolina)	Connected
NC13024	Solar	7/18/2013	5.0	Everetts Tx 3	62 310 (Everetts)	Connected
NC13025	Solar	7/20/2013	5.0	Winfall Tx 4	71 420 (Winfall)	Connected
NC13026	Solar	7/20/2013	5.0	Winfall Tx 5	71 430 (Winfall)	Connected
NC13028	Solar	7/23/2013	19.9	Everetts Tx 3	62 325 (Everetts)	Connected
NC13031	Solar	8/15/2013	14.0	Creswell Tx 1	62 370 (Creswell)	Connected
NC13032	Solar	8/20/2013	5.0	Sunbury Tx 1	71 425(Sunbury)	Connected
NC13032A	Solar	8/20/2013	5.0	Sunbury Tx 1	71 425(Sunbury)	Connected
NC13033	Solar	8/20/2013	5.0	Everetts Tx 3	62 325 (Everetts)	Connected
NC13034	Solar	8/26/2013	5.0	Battleboro Tx 2	61 316(Battleboro)	Connected
NC13035	Solar	8/28/2013	5.0	Tarboro Tx 1	62 710 ( Tarboro)	Connected
NC13037	Solar	8/30/2013	5.0	Tarboro Tx 1	62 710 (Tarboro)	Connected
NC13038	Solar	8/30/2013	5.0	Parmele Tx 1	62 740 (Parmele)	Connected
NC13039	Solar	9/11/2013	5.0	Tar River Tx 1	62 715 (Tar River)	Connected
NC13042	Solar	10/1/2013	5.0	Everetts Tx 1	62 320 (Everetts)	Connected
NC13043	Solar	10/2/2013	5.0	Northampton Tx 1	61 381 (Northampton)	Connected

402.4

Dominion North Carolina Power Queue Status Report (Excluding Net Metering)

Data as of:

January 30, 2017

Source: DNCP Response to NCSEADR 2

Queue No	Fuel Type	Date Queue No Assigned	Capacity (MW)	Substation and Transformer	Circuit	Status Description
NC13044	Solar	10/2/2013	5.0	Tunis Tx 1	67 326 (Tunis)	Connected
NC13045	Solar	10/2/2013	5.0	Woodland Tx 1	67 304 (Woodland)	Connected
NC13048	Solar	10/21/2013	5.0	Tunis Tx 1	67 326 (Tunis)	Connected
NC13050	Solar	10/21/2013	5.0	Murphy Tx 1	67 310 (Murphy)	Connected
NC13051	Solar	10/21/2013	5.0	Earleys Tx 1	67 302 (Earleys)	Connected
NC13052	Solar	10/21/2013	13.5	Murphy Tx 2	67 309 (Murphy)	Connected
NC13057	Solar	11/15/2013	5.0	Ahoskie Tx 1	67 329 (Ahoskie)	Connected
NC13060	Solar	11/15/2013	3.4	Whitakers Tx 1	61 330 (Whitakers)	Connected
NC13060A	Solar	11/15/2013	5.0	Carolina Tx 2	61 815 (Carolina)	Connected
NC13062	Solar	11/18/2013	5.0	Seaboard Tx 1	61 818 (Seaboard)	Connected
NC13064	Solar	11/18/2013	5.0	Chowan Tx 1	71 445 (Chowan)	Connected
NC13067	Solar	11/25/2013	5.0	Kelford Tx 1	67 380 (Kelford)	Connected
NC13069	Solar	12/2/2013	5.0	Tunis Tx 1	67 327 (Tunis)	Connected
NC13071	Solar	12/11/2013	5.0	Tunis Tx 1	67 328 (Tunis)	Connected
NC13073	Solar	12/18/2013	5.0	Northampton Tx 1	61 381 (Northampton)	Connected
NC13074	Solar	12/18/2013	5.0	Earleys Tx 2	67 303 (Earleys)	Connected
NC13075	Solar	12/18/2013	0.1	Kitty Hawk Tx 8	68 407 (Kitty Hawk)	Connected
NC14010	Solar	1/31/2014	5.0	Northampton Tx 1	61 381 (Northampton)	Connected
NC14018	Solar	4/3/2014	5.0	Everetts Tx 1	62 330 (Everetts)	Connected
NC14019	Solar	4/4/2014	5.0	Everetts Tx 1	62 320 (Everetts)	Connected
NC14023	Solar	4/23/2014	5.0	Cashie Tx 1 & Tx 2	67 - To Windsor DP (Cashie Tx 2)	Connected
NC14032	Solar	5/13/2014	5.0	Battleboro Tx 1	61 315 (Battleboro)	Connected
NC14043	Solar	6/12/2014	5.0	Woodland Tx 1	67 307 (Woodland)	Connected
NC14049	Solar	7/2/2014	3.1	Pasquotank Tx 1	71 434 (Pasquotank)	Connected
NC13001	Solar	1/28/2013	1.8	Seaboard Tx 1	61 817 (Seaboard)	IA Executed
NC13019	Solar	5/31/2013	16.5	Hornertown Tx 5	61 320 (Hornertown)	IA Executed
NC13053	Solar	10/29/2013	10.0	Parmele Tx 1	62 740 (Parmele)	IA Executed
NC13054	Solar	10/29/2013	16.0	Murphy Tx 1	67 310 (Murphy)	IA Executed
NC13055	Solar	10/29/2013	3.4	Parmele Tx 1	62 740 (Parmele)	IA Executed
NC13056	Solar	10/29/2013	20.0	Murphy Tx 2	67 309 (Murphy)	IA Executed
NC13058	Solar	11/15/2013	20.0	Aydlett Tx 2	71 482 (Aydlett)	IA Executed
NC13059	Solar	11/15/2013	5.0	Woodland Tx 1	67 304 (Woodland)	IA Executed
NC13068	Solar	12/2/2013	5.0	Murphy Tx 2	67 309 (Murphy)	IA Executed
NC13070	Solar	12/2/2013	5.0	Carolina Tx 2	61 810 (Carolina)	IA Executed
NC14004	Solar	1/6/2014	5.0	Hornertown Tx 5	61 320 (Hornertown)	IA Executed
NC14012	Solar	2/12/2014	5.0	Ahoskie Tx 1	67 329 (Ahoskie)	IA Executed
NC14025	Solar	4/28/2014	5.0	Winfall Tx 5	71 430 (Winfall)	IA Executed
NC14026	Solar	4/28/2014	5.0	Northampton Tx 1	61 381 (Northampton)	IA Executed
NC14046	Solar	7/2/2014	5.0	Poplar Chapel Tx 1	62 334 (Poplar Chapel)	IA Executed
NC14061	Solar	7/24/2014	5.0	Sligo TX 1	71 470 (Sligo)	IA Executed
NC14085	Solar	10/3/2014	5.0	Elizabeth City Tx 2	71 410S (Elizabeth City)	IA Executed
NC16060	Solar	7/13/2016	20.0	Hornertown	61 320(Hornertown)	IA Executed
NC16061	Solar	7/13/2016	16.0	Hornertown	61 320(Hornertown)	IA Executed
NC13055	Solar	11/18/2013	5.0	Earleys Tx 1	67 302 (Earleys)	Project A
NC14024	Solar	4/24/2014	5.0	Sunbury Tx 1	71 425 (Sunbury)	Project A
NC14028	Solar	4/30/2014	5.0	Winfall Tx 5	71 430 (Winfall)	Project A
NC14034	Solar	5/22/2014	5.0	Northampton Tx 1	61 381 (Northampton)	Project A
NC14050	Solar	7/3/2014	10.0	Creswell Tx 1	62 370 (Creswell)	Project A
NC14060	Solar	7/23/2014	3.0	Scotland Neck Tx 2	61 730 (Scotland Neck)	Project A

345.2

173.7

Dominion North Carolina Power Queue Status Report (Excluding Net Metering)

Data as of:

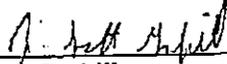
January 30, 2017

Source: DNCP Response to NCSEADR 2

Queue No	Fuel Type	Date Queue No Assigned	Capacity (MW)	Substation and Transformer	Circuit	Status Description
NC14063	Solar	7/29/2014	5.0	Sligo TX 1	71 470 (Sligo)	Project A
NC14065	Solar	7/31/2014	5.0	Poplar Chapel Tx 1	62 334 (Poplar Chapel)	Project A
NC14077	Solar	9/22/2014	5.0	Everetts Tx 3	62 310 (Everetts)	Project A
NC14078	Solar	9/24/2014	10.0	Cashie Tx 1	62 360 (Cashie)	Project A
NC14089	Solar	10/31/2014	2.0	Hornertown Tx 5	61 320 (Hornertown)	Project A
NC14090	Solar	11/4/2014	0.1	Plymouth Tx 2	62 340 (Plymouth)	Project A
NC15112	Solar	4/21/2016	2.0	Kelford Tx 1	67 380 (Kelford)	Project A
NC15129	Solar	12/16/2015	16.2	Winfall Tx 4	71 420 (Winfall)	Project A
NC16009	Solar	2/23/2016	5.0	Chowan Tx 1	71 445 (Chowan)	Project A
NC16019	Solar	3/24/2016	5.0	Hickory TX #2	23 325 (Hickory)	Project A
NC16036	Solar	5/19/2016	5.0	S. Hertford Tx 1	71 460(S. Hertford)	Project A
NC16048	Solar	6/27/2016	1.9	Murphy Tx 2	71 309(Murphy)	Project A
NC16053	Solar	7/5/2016	4.0	Carolina Tx 2	61 815(Carolina)	Project A
NC16054	Solar	7/5/2016	4.5	Tunis Tx 1	67 326(Tunis)	Project A
NC16055	Solar	7/5/2016	4.5	Seaboard Tx 1	61 818(Seaboard)	Project A
NC16063	Solar	7/26/2016	5.0	Ahoskie Tx 1	67 329(Ahoskie)	Project A
NC16064	Solar	7/28/2016	4.0	Battleboro Tx 3	61 316(Battleboro)	Project A
NC16069	Solar	8/15/2016	5.0	Murphy Tx 1	67 310(Murphy)	Project A
NC16080	Solar	9/16/2016	15.0	Aydlett Tx 2	71 482(Aydlett)	Project A
NC16089	Solar	10/24/2016	20.0	Carolina Tx 2	61 810(Carolina)	Project A
NC16090	Solar	10/25/2016	5.0	Tar River Tx 1	62 715(Tar River)	Project A
NC16109	Solar	11/9/2016	0.0	Cashie Tx 1 & Tx 2	67 - To Windsor DP (Cashie Tx 2)	Project A
NC14030	Solar	5/1/2014	5.0	Winfall Tx 5	71 430 (Winfall)	Project B
NC14083	Solar	10/2/2014	5.0	Sligo Tx 1	71 467 (Sligo)	Project B
NC15110	Solar	10/26/2015	5.0	Plymouth Tx 2	62 340 (Plymouth)	Project B
NC16035	Solar	5/18/2016	20.0	Elizabeth City Tx 2	71 410(E. City)	Project B
NC16037	Solar	5/19/2016	4.5	Poplar Chapel Tx 1	62 334(P. Chapel)	Project B
NC16038	Solar	5/19/2016	4.5	Chowan Tx 1	71 445(Chowan)	Project B
NC16056	Solar	7/5/2016	4.0	Carolina Tx 2	61 815(Carolina)	Project B
NC16102	Solar	11/2/2016	4.0	Tunis Tx 1	67 326(Tunis)	Project B
NC16107	Solar	11/2/2016	5.0	Hornertown	61 319(Hornertown)	Project B
NC14027	Solar	4/28/2014	6.8	Northampton Tx 1	61 381 (Northampton)	Subordinate
NC16018	Solar	3/24/2016	6.9	Plymouth TX #2	62 340(Plymouth)	Subordinate
NC16046	Solar	6/21/2016	6.9	Chowan Tx 1	71 445(Chowan)	Subordinate
NC16047	Solar	6/27/2016	6.9	S. Hertford Tx 1	71 460(S. Hertford)	Subordinate
NC16070	Solar	8/15/2016	7.0	Murphy Tx 1	67 310(Murphy)	Subordinate
NC16073	Solar	8/17/2016	7.0	S. Hertford Tx 1	71 460(S. Hertford)	Subordinate
NC16074	Solar	8/17/2016	7.1	S. Hertford Tx 1	71 460(S. Hertford)	Subordinate
NC16108	Solar	11/2/2016	7.1	Hornertown	61 319(Hornertown)	Subordinate
NC16115	Solar	11/21/2016	7.2	S. Hertford Tx 1	71 460(S. Hertford)	Subordinate

Dominion North Carolina Power  
2016 NC Avoided Cost Case – Docket No. E-100, Sub 148  
Public Staff  
Data Request No. 04

The following response to Question No. 1 of Public Staff Data Request No. 04, dated February 22, 2017 has been prepared under my supervision.

  
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J. Scott Gaskill  
Director – Power Contracts

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**Question No. 1:**

Please provide the data underlying Figure 1: QF Solar Development in DNCP's North Carolina Territory located on pg. 5 of the Company's November 15, 2016 filing.

- a. Please provide a revised Figure 1 using the existing QF generation graphed, but adjusting the Average On-Peak Load to reflect Dominion's system Average On-Peak Load.
- b. Please provide a revised Figure 1 using the QF generation for Dominion's system, not just the North Carolina portion, along with Dominion's system Average On-Peak Load.

**Response:**

- (a) See Attachment Public Staff Set 4-1
- (b) As explained in the Company's response to Public Staff Set Question 1-32, the Company does not possess all of the data as that in Figure 1 for all third-party development projects in Virginia.

