VERIFIED DIRECT TESTIMONY OF MELISSA BARTOS

Q1. Please state your name, business address and title.

A1. My name is Melissa Bartos. My business address is 293 Boston Post Road West, Suite 500, Marlborough, Massachusetts 01752. I am a Vice President at Concentric Energy Advisors ("Concentric").

Q2. On whose behalf are you submitting this direct testimony?

A2. I am submitting this testimony on behalf of Northern Indiana Public Service Company LLC ("NIPSCO" or the "Company").

Q3. Please describe your educational and employment background.

A3. I received a Bachelor of Arts in Mathematics and Psychology with a concentration in Computer Science in 1998 from the College of the Holy Cross in Worcester, Massachusetts. I received a Master of Science degree in Mathematics with a concentration in Statistics in 2003 from the University of Massachusetts at Lowell. My entire career has been in energy consulting. I began my career with Reed Consulting Group, which was later purchased and merged into Navigant Consulting, Inc. I joined what is now Concentric Energy Advisors in 2002. Both firms specialize in consulting for the energy industry.

Q4. What are your responsibilities as a Vice President at Concentric?

A4. In my current position as a Vice President at Concentric, I am responsible for the execution of numerous projects related to the energy industry. I specialize in demand forecasting, rates and regulatory issues and market analysis. My resume is attached as Attachment 18-A.

Q5. Have you previously testified before the Indiana Utility Regulatory Commission (the "Commission") or any other regulatory commission?

A5. Yes. I testified before the Commission in NIPSCO's most recent gas rate case in Cause No. 45621. I have also testified before several other state, federal, and Canadian provincial regulatory agencies on dozens of occasions. My testimony list is attached as Attachment 18-B.

Q6. Are you sponsoring any attachments to your direct testimony in this Cause?

A6. Yes. I am sponsoring Attachments 18-A through Attachment 18-C, all of which were prepared by me or under my direction and supervision.

Q7. What is the purpose of your direct testimony?

A7. The purpose of my direct testimony is to explain how Historic Base Period (January 1, 2021 through December 31, 2021) kilowatt hours ("kWh") are normalized for weather. I also explain the methodology used to develop the forecasted number of customers and usage for the Budget Period (January 1, 2022 through December 31, 2022) and the Forward Test Year (January 1, 2023 through December 31, 2023).

<u>Weather Normalization of Historic Base Year kWh</u>

Q8. Please explain the weather normalization methodology.

A8. NIPSCO used the same baseload/temperature-sensitive load normalization methodology that was used in its most recent electric rate cases (Cause Nos. 45159 and 44688). At a high level, to determine Historic Base Period usage for cooling season temperature-sensitive residential and commercial classes, actual kWh per customer is separated into two categories: (1) base use and (2) temperature-sensitive. Monthly temperature-sensitive kWh per customer in each of the cooling season months is adjusted by the ratio of normal to actual cooling degree days ("CDD") by month to derive normal temperature-sensitive kWh per customer by month. The monthly normal temperature-sensitive kWh per customer is added to the base kWh per customer to arrive at the normal kWh per customer. This value is multiplied by the customer count by month to produce monthly normal sales. All calculations are performed on a billing month basis and use billing month kWh sales, the average number of days in the billing cycle, and billing month CDD for the cooling season.

Q9. What is a CDD?

A9. A CDD is a unit of measure used to relate a day's temperature to the energy demands of air conditioning. CDD are calculated by subtracting a reference point temperature of 65 from the day's average temperature. For example, if a day's average temperature was 80°F, CDD is calculated by subtracting 65 from 80, which results in 15 CDD for that day.

Q10. What data sources do you use for your calculations?

A10. I use the Company's billing records to obtain monthly customer counts and billed kWh sales for the residential and commercial classes for the Historic Base Period. To calculate CDD, I use temperatures from DTN, a weather consulting service which aggregates National Weather Service weather stations relevant to the Company's service territory. I rely on temperature data from three weather stations (Valparaiso, South Bend, and Fort Wayne) due to the geographical dispersion of NIPSCO's customers. A weighted average CDD for the Company is calculated using the percent of residential customers assigned to each station as a weight for that station.

Q11. What is base usage and how is it determined?

A11. Base usage is the portion of usage that is not dependent on weather, i.e., not temperature-sensitive. Consistent with recent prior NIPSCO rate cases, I assume that there is no temperature sensitive usage in the month of May, therefore, all usage in May is base use and is not affected by the weather normalization process. In addition, the total kWh per customer per day (Total Use/Customer/Day) for May is all base use.

Q12. How are monthly sales in the remaining cooling season months normalized for weather?

A12. The base kWh per customer per day is multiplied by the number of days ((base use/customer/day)*days in billing cycle) to produce monthly base kWh per customer. Temperature-sensitive kWh per customer equals the total kWh per customer minus the base kWh per customer. The temperature-sensitive kWh per customer is normalized for weather by multiplying it by a ratio of normal CDD to actual CDD. Normal kWh per customer is calculated by adding the base kWh per customer to the normal temperature-sensitive kWh per customer. Total monthly normalized usage is generated by multiplying monthly normal kWh per customer by the monthly customer count. This calculation for the Historic Base Period is prepared separately for residential and commercial customers in Rates 811 (revenue codes 1 and 3), 821 (revenue code 4), 823 (revenue code 4), 824 (revenue codes 4 and 5), 826 (revenue code 4), and 826 (revenue code 5), and the results are presented in Attachment 18-C. For cooling season non-temperature-sensitive Rates 821 (revenue code 5) and 823 (revenue code 5), weather normalized usage is equal to actual usage, and results for these rates are also presented in Attachment 18-C.

Q13. Has the definition of normal weather changed from NIPSCO's last electric rate case?

A13. Yes. In this case, the historical average CDD have been defined as the most recent 20-year history (i.e., 20 years ended December 31, 2021).

NIPSCO's last electric rate case defined normal weather as the 30-year average (i.e., 30 years ended December 31, 2017). The 20-year billing ending December 31, 2021 is 872 CDD on a billing period basis, while the 30-year average ending December 31, 2021 is 824 CDD on a billing period basis, resulting in the 20-year average being approximately 5.8% higher than the 30-year average.

Q14. Why is NIPSCO using a 20-year average CDD in the weather normalization process?

A14. NIPSCO is proposing to use a 20-year average CDD in the weather normalization process for several reasons. Using a 20-year average will ensure consistency with the methodology used in NIPSCO's most recent gas rate case (Cause No. 45621).[1] It makes sense for the NIPSCO electric and gas utilities to use a consistent definition of normal weather. In addition, an analysis of weather data demonstrates that a rolling 20-year average is generally a better predictor of one-year-ahead CDD and two-year-ahead CDD than the 30-year average CDD. The 20-year average CDD is also a more dynamic measure than the 30-year average CDD.

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[1] NIPSCO's proposal to utilize a 20-year average HDD for purpose of calculating gas rates was not challenged by any participant in Cause No. 45621 and was approved by the Commission.

Q15. Please explain your analysis demonstrating that the 20-year average CDD is generally a better predictor of one-year-ahead and two-year-ahead annual CDD than the 30-year average CDD.

A15. Table 1 compares the actual CDD experienced each year from 1991 through 2021 with the historical average CDD calculated using either the 20-year average or the 30-year average ending the prior year or the second prior year. For example, in the Following Year analysis, the 20-year and 30-year average CDD for the year ending 1990 are used to predict the annual CDD for 1991. In the Two Years Ahead analysis, the 20-year and 30-year average CDD for the year ending 1990 are used to predict the annual CDD for 1992. The error is calculated as the difference between the 20-year or 30-year historical average CDD and the actual CDD for that year. The absolute error is calculated as the absolute value of the difference between the actual CDD and either the 20-year or 30-year average.

Table 1 demonstrates that the 20-year average CDD has a lower error on average when predicting the one-year-ahead and two-years-ahead CDD as compared to the 30-year average CDD, while the 30-year average CDD has a lower absolute error on average when predicting the one-year-ahead and two-years-ahead CDD as compared to the 20-year average CDD. In addition, in four of the last five years, the 20-year average CDD was a better predictor of one-year-ahead CDD than the 30-year average, and in three of the last five years, the 20-year average CDD was a better predictor of two-year-ahead CDD than the 30-year average.

Table 1
Moving Averages as Predictors

	Annual Cooling Degree Days			Following Year				Two Years Ahead			
				Error		Absolute Error		Error		Absolute Error	
	Actual	20-yr Average	30-yr Average	20-yr Average	30-yr Average	20-yr Average	30-yr Average	20-yr Average	30-yr Average	20-yr Average	30-yr Average
1990		831	797								
1991	1165	853	810	-334	-368	334	368				
1992	488	847	800	365	322	365	322	343	309	343	309
1993	782	840	802	65	18	65	18	71	28	71	28
1994	770	842	798	70	32	70	32	77	30	77	30
1995	955	850	808	-113	-157	113	157	-115	-153	115	153
1996	602	846	808	248	206	248	206	240	196	240	196
1997	595	828	808	251	213	251	213	255	213	255	213
1998	900	829	814	-73	-92	73	92	-54	-92	54	92
1999	983	840	822	-154	-169	154	169	-156	-175	156	175
2000	666	824	817	174	156	174	156	163	148	163	148
2001	778	830	819	46	39	46	39	62	44	62	44
2002	1076	851	835	-246	-257	246	257	-252	-259	252	259
2003	585	816	824	266	250	266	250	245	234	245	234
2004	594	803	819	222	230	222	230	257	241	257	241
2005	963	810	825	-160	-144	160	144	-147	-139	147	139
2006	730	809	827	80	95	80	95	73	89	73	89
2007	973	808	827	-164	-146	164	146	-163	-149	163	149
2008	719	788	822	89	108	89	108	90	108	90	108
2009	533	779	814	255	289	255	289	275	294	275	294
2010	1011	793	815	-232	-197	232	197	-223	-189	223	189
2011	921	781	823	-128	-106	128	106	-142	-107	142	107
2012	1092	811	838	-311	-269	311	269	-299	-277	299	277
2013	803	812	822	8	35	8	35	-22	20	22	20
2014	664	807	816	148	158	148	158	147	174	147	174
2015	763	798	814	44	53	44	53	49	59	49	59
2016	996	817	822	-198	-182	198	182	-189	-180	189	180
2017	858	830	817	-41	-36	41	36	-60	-44	60	44
2018	1180	844	819	-350	-363	350	363	-363	-358	363	358
2019	965	844	828	-121	-146	121	146	-135	-148	135	148
2020	904	855	834	-61	-76	61	76	-60	-85	60	85
2021	1035	868	829	-180	-201	180	201	-192	-207	192	207
			Average	-17	-23	168	165	-7	-13	164	158

Q16. Please explain your analysis demonstrating that the 20-year average CDD is more dynamic than the 30-year average CDD.

A16. The 20-year normal CDD is a more dynamic measure that is able to react more quickly to weather changes because it replaces 5% of the data each year rather than the 3% that is replaced in the 30-year average. Table 2 demonstrates that the average annual absolute change for the 20-year average CDD is 1.4%, while the average annual absolute change for the 30-year average is 0.8%. However, both are much more stable than the annual CDD, which has an average annual absolute change of 29.2%. In addition, the maximum annual absolute change for the 20-year average is 4.0%, while the maximum annual absolute change for the 30-year average is 2.0%, and the maximum annual absolute change for the annual CDD is 89.7%. Overall, the 20-year average represents a good balance between being dynamic enough to capture changes in weather trends, while being stable enough to not vary significantly from year to year as it is updated.

Table 2
Annual Absolute Percent Change 1992-2021
NIPSCO Electric

	20-yr Average	30-yr Average	Annual CDD
Average	1.4%	0.8%	29.2%
Maximum	4.0%	2.0%	89.7%

Q17. What are the results of NIPSCO's weather normalization?

A17. Actual CDD during the Historic Base Period cooling season were 11% higher than normal (i.e., the Historic Base Period was warmer than normal), so cooling season usage for the weather normalized rates was adjusted down by 4% to reflect normal weather. NIPSCO Witness Siegler uses the weather normalized volumes to calculate pro-forma expense and revenue levels. Weather normalization results by rate class are shown in Attachment 18-C.

Demand Forecast Methodology for the Budget Period and Forward Test Year

A. Demand Forecast Methodology Overview

Q18. Please explain the methodology employed for developing the forecasted number of customers and volume for the Budget Period and Forward Test Year.

A18. The forecasts are developed using approaches that are similar to the Company's previous rate cases. Total residential and total commercial customers and energy use are forecasted using econometric models. Econometric modeling (or regression analysis) is a common technique used to forecast customer counts and energy use and involves studying the relationship between one variable, the dependent variable, and one or more other variables, the independent or explanatory variables. One of the primary applications of regression analysis is to predict or forecast values of the dependent variable given forecasted values of the independent variables. Total industrial energy use is forecasted based on knowledge gained through relationships with large industrial customers.

Q19. What data sources do you use to develop the econometric models for the residential and commercial classes?

A19. I use the Company's billing records through February 2022 to obtain historical monthly customer counts and billed kWh for the residential and commercial customer classes. Historical billed kWh is divided by historical customer counts to produce monthly historical kWh per customer data for residential and commercial customers. The historical customer counts and kWh per customer are used as the dependent variables in the residential customer, residential kWh per customer, commercial customer, and commercial kWh per customer econometric models.

Several sources are used to obtain data for the independent variables included in the econometric models. Historical and forecast values for energy intensity data is provided by Itron, Inc. Historical and forecast values for economic and demographic variables (e.g., households and gross county product) are from IHS Global Insight, Inc., a data consultant. Historical weather data (CDD and heating degree days ("HDD")) is provided by DTN, a weather consulting service. Itron, Inc., IHS Global

Insight, Inc., and DTN are large, independent data providers relied upon by the Company in previous rate cases, as well as relied upon by many other companies world-wide. The same 20-year average CDD ending December 31, 2021 described in the weather normalization process above is used as the CDD during forecast period, and the 20-year average HDD ending in December 31, 2021 is used as the HDD during the forecast period.

Q20. What is an HDD?

A20. An HDD is a unit of measure used to relate a day's temperature to the energy demands of space heating. HDD are calculated by subtracting the day's average temperature from a reference point temperature of 65. For example, if a day's average temperature was 30°F, HDD is calculated by subtracting 30 from 65, which results in 35 HDD for that day.

B. Residential Customer Forecast

Q21. Please describe the residential customer forecast methodology.

A21. The residential customer forecast is developed using a monthly econometric model based on the number of households in the counties in NIPSCO's electric service territory.

Q22. Please describe the residential kWh per customer forecast methodology.

A22. The residential kWh per customer forecast is developed using a monthly econometric model that incorporates weather in the form of CDD and HDD, energy intensity, and several monthly variables for additional seasonal shaping.[2]

Q23. How is the forecast of monthly residential energy use determined?

A23. Monthly residential customer counts are multiplied by monthly residential kWh per customer to produce monthly residential energy use. Forecasted energy use from additional electric vehicles is added to residential energy use forecast.

C. Commercial Customer Forecast

Q24. Please describe the commercial customer forecast methodology.

A24. The commercial customer forecast is developed using a monthly econometric model that incorporates real gross county product and monthly variables for seasonal shaping.

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[2] A variable used for monthly shaping has a value of "1" for the month it applies to and a value of "0" for all other months. For example, a monthly shaping variable for February has a value of 0 for all months except for February, when it has a value of 1. This allows the value of the dependent variable to be higher or lower than other months of the year and results in creating a seasonal shape.

Q25. Please describe the commercial kWh per customer forecast methodology.

A25. The commercial kWh per customer forecast is developed using a monthly econometric model that incorporates weather in the form of CDD and HDD, energy intensity, and several monthly variables for additional shaping.

Q26. How is the forecast of monthly commercial energy use determined?

A26. Monthly commercial customer counts are multiplied by monthly commercial kWh per customer to produce monthly commercial energy use.

D. Industrial Customer Forecast

Q27. Please describe the industrial customer forecast methodology.

A27. The industrial customer forecast is provided by NIPSCO's Major Accounts group. The Major Accounts group relies on individual interviews of the largest industrial customers to understand their upcoming plans and expected level of electric consumption. The Major Accounts group also relies on historical industrial consumption and industry trends to forecast industrial electric energy consumption.

E. Other Forecasts

Q28. How were forecasts for public authority customers, railroad customers, and company use determined?

A28. Public authority and railroad customer counts were assumed to remain consistent with recent levels. Public authority, railroad and company energy use was based on averages of recent energy use.

Q29. How was the forecast for streetlighting determined?

A29. The streetlighting forecast was based on an assumed annual kWh reduction from current street light energy use to reflect the ongoing conversion to LED street lights. The street light kWh is forecasted to remain flat once the conversion to LEDs is complete.

Q30. Does this conclude your prefiled direct testimony?

A30. Yes.

VERIFICATION

I, Melissa Bartos, Vice President, Concentric Energy Advisors, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

Melissa Fay Bartos

Melissa Bartos

Date: September 15, 2022

CONCENTRIC ENERGY ADVISORS

MELISSA F. BARTOS
Vice President

Ms. Bartos is a financial and economic consultant with more than twenty years of experience in the energy industry. In the last several years, she has focused on natural gas markets issues, including conducting comprehensive market assessments for various clients considering infrastructure investments and developing detailed demand forecasts for a number of gas distribution companies. Ms. Bartos has also designed, built, and enhanced numerous financial and statistical models to support clients in asset-based transactions, energy contract negotiations, reliability studies, asset and business valuations, rate and regulatory matters, cost-of-service analysis, and risk management. Her modeling experience includes building Monte-Carlo simulation models, designing an allocated cost-of-service model, statistical modeling using SPSS, and programming using Visual Basic for Applications (VBA). Ms. Bartos has also provided expert testimony on multiple occasions regarding natural gas demand forecasting and supply planning issues, natural gas markets, and marginal cost studies.

REPRESENTATIVE PROJECT EXPERIENCE

Natural Gas Market Assessments

- Reviewed and evaluated long-term natural gas supply and demand, existing natural gas pricing dynamics, and future implications associated with new natural gas infrastructure in New England, New York, and New Jersey.
- Provided an analysis of the existing Gulf Coast natural gas market, the client's natural gas pipeline competitors, changing flows, and how those factors may affect transportation values to the client going forward.
- Prepared a comprehensive study examining the costs associated with improving natural gas pipeline access from western Canada and the eastern U.S. to Atlantic Canada.
- Produced a report on the benefits associated with incremental natural gas supplies delivered to New York City.
- Prepared an independent natural gas supply and pipeline transportation route assessment associated with natural gas for the client's proposed LNG export terminal.

Natural Gas Expansion

- Conducted a study that examined potential commercial and industrial conversions from oil-based fuels to natural gas in various east coast U.S. markets.
- Produced a report that identified growth potential in off-system stationary and mobile markets in the mid-west that could be served by compressed natural gas or liquefied natural gas.
- Performed an external audit and filed expert testimony associated with two natural gas utilities' hurdle rate/contribution in aid of construction calculations for new off main customers.

- Produced a report that identified and reviewed innovative cost model approaches that utilities and regulators are using across the U.S. that allow expansion of gas distributions systems to new communities.
- Assisted in developing a strategy to identify residential natural gas growth opportunities within the client's franchise area.
- Presented at two Northeast Gas Association conferences regarding "Regulatory Policy and Residential Main Extensions".

Demand Forecasting

- Filed expert testimony regarding the development of demand forecast models and the evaluation of natural gas resource plans for multiple northeast gas utilities.
- Provided litigation support regarding demand forecasting techniques with respect to certain natural gas pipeline and storage decisions for a mid-west gas utility.
- Reviewed demand forecasting practices and procedures and recommended certain changes to improve the methodology and accuracy of the forecast for a multi-state utility.
- For a mid-west gas utility, developed a natural gas demand forecast that was utilized for supply and capacity decisions.

Ratemaking and Utility Regulation

- Participated in the rate case of a large North American gas distribution company, which determined the client's five-year incentive regulation plan, including performing benchmarking and productivity analyses that were filed with the regulator.
- Developed a marginal cost study, including data collection, analysis and testimony development, in support of rate case filings for a number of New England utilities.
- Provided comprehensive analysis, drafted testimony and provided litigation support regarding the appropriate return on equity for a New England water utility, and for proposed wind and coal electric generation facility additions for a mid-west combination utility.
- Performed a detailed analysis of the components included in the client's lost and unaccounted for gas calculation.
- Conducted multiple natural gas portfolio asset optimization analyses to evaluate performance of the client's asset manager for regulatory purposes.
- On behalf of multiple New England gas companies, participated in the 2009 Avoided Energy Supply Cost Study Group (for New England), which worked with third-party consultants to develop the marginal energy supply costs that will be avoided due to reductions in the use of electricity, natural gas, and other fuels resulting from energy efficiency programs.
- Conducted a study to determine the cost of significantly reducing peak day natural gas demand for a northeast gas utility through energy efficiency, conservation and demand management measures. Project involved researching natural gas energy efficiency plans in multiple U.S. states and Canadian provinces, reviewing energy efficiency potential studies, and exploring geothermal, peak pricing and direct load control options.

PROFESSIONAL HISTORY

Concentric Energy Advisors, Inc. (2002 – Present)
Vice President
Assistant Vice President
Project Manager
Senior Consultant

Navigant Consulting, Inc. (1996 – 2002)
Senior Consultant

EDUCATION

University of Massachusetts at Lowell
M.S., Mathematics (Statistics), 2003

College of the Holy Cross
B.S., Mathematics and Psychology, *magna cum laude*, 1998

PROFESSIONAL ASSOCIATIONS

Member of the American Statistical Association

Member of the Northeast Energy and Commerce Association

Member of the Northeast Gas Association

SPONSOR	DATE	CASE/APPLICANT	DOCKET NO.	SUBJECT
Connecticut Public Utilities Regulatory Authority				
Connecticut Natural Gas Corporation & Southern Connecticut Gas Company	2014	Connecticut Natural Gas Corporation & Southern Connecticut Gas Company	Docket No. 13-06-02	CIAC Hurdle Rate Calculation
Federal Energy Regulatory Commission				
PennEast Pipeline Company, LLC	2015	PennEast Pipeline Company, LLC	Docket No. CP15-558	Market Conditions/Need
PennEast Pipeline Company, LLC	2016	PennEast Pipeline Company, LLC	Docket No. CP15-558	Market Conditions/Need
Millennium Pipeline Company, LLC	2017	Millennium Pipeline Company, LLC	Docket No. CP16-486	Market Conditions/Need
Laclede Gas Company	2017	Spire STL Pipeline, LLC	Docket No. CP17-40	Market Conditions/Need
Spire Missouri Inc. (Laclede Gas Company)	2021	Spire STL Pipeline, LLC	Docket No. CP17-40	Market Conditions/Need
Indiana Utility Regulatory Commission				
Northern Indiana Public Service Company LLC (Gas)	2021	Northern Indiana Public Service Company LLC (Gas)	Cause # 45621	Weather Normalization; Demand Forecast
Kentucky Public Service Commission				
Columbia Gas of Kentucky, Inc.	2021	Columbia Gas of Kentucky, Inc.	Case No. 2021-00183	Demand Forecast
Maine Public Utilities Commission				
Northern Utilities, Inc.	2011	Northern Utilities	Docket No. 2011-526	Integrated Resource Plan; Demand Forecast
Massachusetts Department of Public Utilities				
New England Gas Company	2008	New England Gas Company	D.P.U. 08-11	Integrated Resource Plan; Demand Forecast; Supply Planning
New England Gas Company	2010	New England Gas Company	D.P.U. 10-61	Integrated Resource Plan; Demand Forecast; Supply Planning
Berkshire Gas Company	2010	Berkshire Gas Company	D.P.U. 10-100	Integrated Resource Plan; Demand Forecast

SPONSOR	DATE	CASE/APPLICANT	DOCKET NO.	SUBJECT
New England Gas Company	2012	New England Gas Company	D.P.U. 12-41	Integrated Resource Plan; Demand Forecast; Supply Planning
Berkshire Gas Company	2012	Berkshire Gas Company	D.P.U. 12-62	Integrated Resource Plan; Demand Forecast
NSTAR Gas Company	2014	NSTAR Gas Company	D.P.U. 14-63	Integrated Resource Plan; Demand Forecast
Berkshire Gas Company	2014	Berkshire Gas Company	D.P.U. 14-98	Integrated Resource Plan; Demand Forecast
Liberty Utilities (New England Gas Company)	2015	Liberty Utilities (New England Gas Company)	D.P.U. 15-75	Marginal Cost of Service Study
Berkshire Gas Company	2016	Berkshire Gas Company	D.P.U. 16-103	Integrated Resource Plan; Demand Forecast
Eversource Energy	2017	Eversource Energy (NSTAR Electric and WMECO)	D.P.U. 17-05	Marginal Cost of Service Study
National Grid (Boston Gas Company and Colonial Gas Company)	2017	National Grid (Boston Gas Company and Colonial Gas Company)	D.P.U. 17-170	Marginal Cost of Service Study
Bay State Gas Company d/b/a/ Columbia Gas of Massachusetts	2018	Bay State Gas Company d/b/a/ Columbia Gas of Massachusetts	D.P.U. 18-45	Marginal Cost of Service Study
Berkshire Gas Company	2018	Berkshire Gas Company	D.P.U. 18-40	Marginal Cost of Service Study
Berkshire Gas Company	2018	Berkshire Gas Company	D.P.U. 18-107	Integrated Resource Plan; Demand Forecast
NSTAR Gas Company	2019	NSTAR Gas Company	D.P.U. 19-120	Marginal Cost of Service Study
Bay State Gas Company d/b/a Columbia Gas of Massachusetts	2019	Bay State Gas Company d/b/a Columbia Gas of Massachusetts	D.P.U. 19-135	Integrated Resource Plan; Demand Forecast
Berkshire Gas Company	2020	Berkshire Gas Company	D.P.U. 20-139	Integrated Resource Plan; Demand Forecast
Boston Gas d/b/a National Grid	2020	Boston Gas d/b/a National Grid	D.P.U. 20-120	Marginal Cost Study
Berkshire Gas Company	2022	Berkshire Gas Company	D.P.U. 20-80	Future of Gas

SPONSOR	DATE	CASE/APPLICANT	DOCKET NO.	SUBJECT
Berkshire Gas Company	2022	Berkshire Gas Company	D.P.U. 22-20	Marginal Cost of Service Study
New Hampshire Public Utilities Commission				
Northern Utilities, Inc.	2011	Northern Utilities	DG 2011-290	Integrated Resource Plan; Demand Forecast
Liberty Utilities (EnergyNorth Natural Gas)	2017	Liberty Utilities (EnergyNorth Natural Gas)	DG 17-048	Marginal Cost of Service Study
Liberty Utilities (Granite State Electric)	2019	Liberty Utilities (Granite State Electric)	De 19-064	Marginal Cost of Service Study
New Jersey Board of Public Utilities				
South Jersey Gas Company	2015	South Jersey Gas Company	GR15010090	Energy Efficiency Cost Benefit Analysis
New York State Public Service Commission				
Liberty Utilities (St. Lawrence Gas) Corp.	2022	Liberty Utilities (St. Lawrence Gas) Corp.	Case 21-G-0577	Demand Forecast
Ontario Energy Board				
Enbridge Gas Distribution	2012	Enbridge Gas Distribution	EB-2011-0354	Industry Benchmarking Study
Enbridge Gas Distribution	2013	Enbridge Gas Distribution	EB-2012-0459	Incentive Rate Making
Pennsylvania Public Utility Commission				
Columbia Gas of Pennsylvania, Inc.	2021	Columbia Gas of Pennsylvania, Inc	R-2021-3024296	Weather Normalization; Demand Forecast
Columbia Gas of Pennsylvania, Inc.	2022	Columbia Gas of Pennsylvania, Inc	R-2022-3031211	Weather Normalization; Demand Forecast
Public Utilities Commission of Ohio				
Columbia Gas of Ohio, Inc.	2021	Columbia Gas of Ohio, Inc.	Case No. 21-637-GA-AIR	Adjustments to Demand
Régie de l'énergie du Québec				
TransCanada Pipelines Ltd.	2014	TransCanada Pipelines Ltd.	R-3900-2014	Natural Gas Market Assessment
Washington Utilities and Transportation Commission				
Puget Sound Energy, Inc.	2015	Puget Sound Energy, Inc.	UG-151663	Distributed LNG Market Assessment

NIPSCO Normalization

For 12 Months Ending December 2021

	811	811	821	821	823	823	824	824	826	826	
Actual KWH	1	3	4	5	4	5	4	5	4	5	Total
1	314,139,910	287,064	117,740,610	1,336,141	67,629,042	49,672	45,404,828	12,848,493	40,343,888	17,768,432	617,548,080
2	278,669,576	261,365	111,809,293	1,325,052	63,155,499	45,205	42,409,475	12,005,563	30,303,436	16,154,650	556,139,114
3	265,737,911	246,091	114,391,460	1,359,640	66,056,474	47,876	47,307,275	12,900,483	33,588,754	17,679,956	559,315,920
4	220,609,806	205,069	103,904,399	1,302,200	62,313,004	34,833	43,950,745	12,169,273	33,843,380	17,004,610	495,337,319
5	199,632,170	179,280	95,059,774	1,139,831	57,543,126	41,898	41,345,170	10,716,467	31,171,547	16,106,098	452,935,361
6	311,952,015	267,277	120,199,836	1,279,861	72,155,220	52,313	50,384,333	13,220,433	40,971,093	20,073,928	630,556,309
7	380,598,367	322,233	131,672,872	1,187,203	76,964,925	51,300	52,596,455	13,976,085	41,616,033	20,759,128	719,744,601
8	408,226,630	338,485	140,701,435	1,374,990	78,466,299	53,400	54,987,319	14,234,554	43,581,211	21,836,970	763,801,293
9	415,105,808	351,167	147,222,188	1,599,968	83,566,988	56,248	55,965,915	17,147,778	42,248,807	20,519,752	783,784,619
10	265,334,988	280,797	120,461,985	1,232,161	68,697,623	46,713	48,856,533	14,617,997	36,472,757	17,894,154	573,895,708
11	217,452,834	249,255	108,039,474	1,238,890	58,798,652	48,171	43,284,005	12,115,018	32,228,339	14,735,904	488,190,542
12	267,745,945	273,460	117,883,390	1,686,395	63,011,636	51,122	45,697,188	12,329,692	33,037,973	17,930,466	559,647,267
Annual	3,545,205,960	3,261,543	1,429,086,716	16,062,332	818,358,488	578,751	572,189,241	158,281,836	439,407,218	218,464,048	7,200,896,133

Normal KWH											
1	314,139,910	287,064	117,740,610	1,336,141	67,629,042	49,672	45,404,828	12,848,493	40,343,888	17,768,432	617,548,080
2	278,669,576	261,365	111,809,293	1,325,052	63,155,499	45,205	42,409,475	12,005,563	30,303,436	16,154,650	556,139,114
3	265,737,911	246,091	114,391,460	1,359,640	66,056,474	47,876	47,307,275	12,900,483	33,588,754	17,679,956	559,315,920
4	220,609,806	205,069	103,904,399	1,302,200	62,313,004	34,833	43,950,745	12,169,273	33,843,380	17,004,610	495,337,319
5	199,632,170	179,280	95,059,774	1,139,831	57,543,126	41,898	41,345,170	10,716,467	31,171,547	16,106,098	452,935,361
6	287,112,170	248,157	115,606,571	1,279,861	69,616,176	52,313	48,931,263	12,791,461	39,187,732	19,805,008	594,630,711
7	386,124,295	326,559	132,643,862	1,187,203	77,456,655	51,300	52,850,404	14,056,274	41,859,011	20,871,344	727,426,908
8	408,226,630	338,485	140,701,435	1,374,990	78,466,299	53,400	54,987,319	14,234,554	43,581,211	21,836,970	763,801,293
9	361,827,927	308,812	135,684,469	1,599,968	77,911,461	56,248	52,983,901	15,804,172	40,337,787	19,761,976	706,276,721
10	265,334,988	280,797	120,461,985	1,232,161	68,697,623	46,713	48,856,533	14,617,997	36,472,757	17,894,154	573,895,708
11	217,452,834	249,255	108,039,474	1,238,890	58,798,652	48,171	43,284,005	12,115,018	32,228,339	14,735,904	488,190,542
12	267,745,945	273,460	117,883,390	1,686,395	63,011,636	51,122	45,697,188	12,329,692	33,037,973	17,930,466	559,647,267
Annual	3,472,614,162	3,204,394	1,413,926,722	16,062,332	810,655,648	578,751	568,008,106	156,589,447	435,955,815	217,549,569	7,095,144,945

Difference											
1	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-
6	(24,839,845)	(19,120)	(4,593,265)	-	(2,539,044)	-	(1,453,070)	(428,972)	(1,783,361)	(268,920)	(35,925,598)
7	5,525,928	4,326	970,990	-	491,730	-	253,949	80,189	242,978	112,216	7,682,307
8	-	-	-	-	-	-	-	-	-	-	-
9	(53,277,881)	(42,355)	(11,537,719)	-	(5,655,527)	-	(2,982,014)	(1,343,606)	(1,911,020)	(757,776)	(77,507,898)
10	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-
Annual	-72,591,798	-57,149	-15,159,994	0	-7,702,840	0	-4,181,135	-1,692,389	-3,451,403	-914,479	-105,751,188
Annual %	-2.0%	-1.8%	-1.1%	0.0%	-0.9%	0.0%	-0.7%	-1.1%	-0.8%	-0.4%	-1.5%
Seasonal %	-4.8%	-4.5%	-2.8%	0.0%	-2.5%	0.0%	-2.0%	-2.9%	-2.0%	-1.1%	-3.6%

NIPSCO Normalization

Rate **811**
1

Weather Adjustment Calculation

Normal Weather 2002 2021 20 Years

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	Temperature Sensitive KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		314,139,910						314,139,910				
2021	2		278,669,576						278,669,576				
2021	3		265,737,911						265,737,911				
2021	4		220,609,806						220,609,806				
2021	5	421,516	199,632,170	474	16.74	474	-		199,632,170				28.3
2021	6	422,750	311,952,015	738	24.17	511	227	679	287,112,170	-24,839,845	166	123	30.5
2021	7	423,062	380,598,367	900	29.38	513	387	913	386,124,295	5,525,928	237	245	30.6
2021	8	423,375	408,226,630	964	31.74	509	456	964	408,226,630	0	248	248	30.4
2021	9	423,327	415,105,808	981	31.44	522	458	855	361,827,927	-53,277,881	244	177	31.2
2021	10		265,334,988						265,334,988				
2021	11		217,452,834						217,452,834				
2021	12		267,745,945						267,745,945				

NIPSCO Normalization

Rate **811**

3

Weather Adjustment Calculation

Normal Weather 2002 2021 20 Years

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	'emperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		287,064						287,064				
2021	2		261,365						261,365				
2021	3		246,091						246,091				
2021	4		205,069						205,069				
2021	5	256	179,280	700	24.76	700	-		179,280				28.3
2021	6	256	267,277	1,044	34.20	756	288	969	248,157	-19,120	166	123	30.5
2021	7	256	322,233	1,259	41.11	758	501	1,276	326,559	4,326	237	245	30.6
2021	8	258	338,485	1,312	43.18	752	560	1,312	338,485	0	248	248	30.4
2021	9	255	351,167	1,377	44.15	772	605	1,211	308,812	-42,355	244	177	31.2
2021	10		280,797						280,797				
2021	11		249,255						249,255				
2021	12		273,460						273,460				

NIPSCO Normalization
Rate **821**
4
Weather Adjustment Calculation

Normal Weather 2002 2021 20 Years

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	'emperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		117,740,610						117,740,610				
2021	2		111,809,293						111,809,293				
2021	3		114,391,460						114,391,460				
2021	4		103,904,399						103,904,399				
2021	5	52,353	95,059,774	1,816	64.19	1,816	-		95,059,774				28.3
2021	6	52,295	120,199,836	2,298	75.30	1,959	339	2,211	115,606,571	-4,593,265	166	123	30.5
2021	7	52,356	131,672,872	2,515	82.14	1,966	549	2,533	132,643,862	970,990	237	245	30.6
2021	8	52,551	140,701,435	2,677	88.13	1,950	727	2,677	140,701,435	0	248	248	30.4
2021	9	52,544	147,222,188	2,802	89.83	2,002	800	2,582	135,684,469	-11,537,719	244	177	31.2
2021	10		120,461,985						120,461,985				
2021	11		108,039,474						108,039,474				
2021	12		117,883,390						117,883,390				

NIPSCO Normalization

Rate **823**

4

Normal Weather 2002 2021 20 Years

Weather Adjustment Calculation

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	ˈemperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		67,629,042						67,629,042				
2021	2		63,155,499						63,155,499				
2021	3		66,056,474						66,056,474				
2021	4		62,313,004						62,313,004				
2021	5	2,898	57,543,126	19,856	701.99	19,856	-		57,543,126				28.3
2021	6	2,910	72,155,220	24,796	812.34	21,427	3,368	23,923	69,616,176	-2,539,044	166	123	30.5
2021	7	2,903	76,964,925	26,512	865.87	21,494	5,018	26,682	77,456,655	491,730	237	245	30.6
2021	8	2,881	78,466,299	27,236	896.48	21,327	5,909	27,236	78,466,299	0	248	248	30.4
2021	9	2,876	83,566,988	29,057	931.59	21,895	7,161	27,090	77,911,461	-5,655,527	244	177	31.2
2021	10		68,697,623						68,697,623				
2021	11		58,798,652						58,798,652				
2021	12		63,011,636						63,011,636				

NIPSCO Normalization

Rate **724**

4

Normal Weather 2002 2021 20 Years

Weather Adjustment Calculation

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	emperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		45,404,828						45,404,828				
2021	2		42,409,475						42,409,475				
2021	3		47,307,275						47,307,275				
2021	4		43,950,745						43,950,745				
2021	5	282	41,345,170	146,614	5183.33	146,614	-		41,345,170				28.3
2021	6	283	50,384,333	178,037	5832.71	158,215	19,822	172,902	48,931,263	-1,453,070	166	123	30.5
2021	7	284	52,596,455	185,199	6048.48	158,709	26,490	186,093	52,850,404	253,949	237	245	30.6
2021	8	281	54,987,319	195,684	6441.02	157,474	38,210	195,684	54,987,319	0	248	248	30.4
2021	9	279	55,965,915	200,595	6431.28	161,670	38,924	189,906	52,983,901	-2,982,014	244	177	31.2
2021	10		48,856,533						48,856,533				
2021	11		43,284,005						43,284,005				
2021	12		45,697,188						45,697,188				

NIPSCO Normalization **Normal Weather** 2002 2021 20 Years

Rate **824**
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Weather Adjustment Calculation

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	'emperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		12,848,493						12,848,493				
2021	2		12,005,563						12,005,563				
2021	3		12,900,483						12,900,483				
2021	4	28	12,169,273						12,169,273				
2021	5	27	10,716,467	396,906	14032.04	396,906	-		10,716,467				28.3
2021	6	27	13,220,433	489,646	16041.43	428,311	61,334	473,758	12,791,461	-428,972	166	123	30.5
2021	7	27	13,976,085	517,633	16905.58	429,648	87,985	520,603	14,056,274	80,189	237	245	30.6
2021	8	28	14,234,554	508,377	16733.41	426,307	82,070	508,377	14,234,554	0	248	248	30.4
2021	9	28	17,147,778	612,421	19634.86	437,666	174,755	564,435	15,804,172	-1,343,606	244	177	31.2
2021	10	28	14,617,997						14,617,997				
2021	11	28	12,115,018						12,115,018				
2021	12		12,329,692						12,329,692				

NIPSCO Normalization

Rate **826**

4

Weather Adjustment Calculation

Normal Weather 2002 2021 20 Years

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	Temperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		40,343,888						40,343,888				
2021	2		30,303,436						30,303,436				
2021	3		33,588,754						33,588,754				
2021	4		33,843,380						33,843,380				
2021	5	150	31,171,547	207,810	7346.83	207,810	-		31,171,547				28.3
2021	6	152	40,971,093	269,547	8830.70	224,253	45,293	257,814	39,187,732	-1,783,361	166	123	30.5
2021	7	153	41,616,033	272,000	8883.37	224,953	47,047	273,588	41,859,011	242,978	237	245	30.6
2021	8	152	43,581,211	286,718	9437.44	223,204	63,515	286,718	43,581,211	0	248	248	30.4
2021	9	154	42,248,807	274,343	8795.73	229,151	45,192	261,934	40,337,787	-1,911,020	244	177	31.2
2021	10		36,472,757						36,472,757				
2021	11		32,228,339						32,228,339				
2021	12		33,037,973						33,037,973				

NIPSCO Normalization
Rate 826
5
Weather Adjustment Calculation

Normal Weather 2002 2021 20 Years

		1	2	3 = 2/1	4 = 3/12	5 = 4 (May#) *12	6 = 3-5	7 = 5+(6*(11/10))	**8 = 1*7**	**9= 8-2**	10	11	12
		Customers	Actual KWH	Actual KWH/Cus	Actual KWH/Cus/Day	Base KWH/Cus	'emperature Sensitiv KWH/Cus	Normal KWH/Customer	Normal KWH	Weather Adjustment	CDD Actual	CDD Normal	Days
2021	1		17,768,432						17,768,432				
2021	2		16,154,650						16,154,650				
2021	3		17,679,956						17,679,956				
2021	4		17,004,610						17,004,610				
2021	5	21	16,106,098	766,957	27114.64	766,957	-		16,106,098				28.3
2021	6	23	20,073,928	872,779	28593.40	827,642	45,137	861,087	19,805,008	-268,920	166	123	30.5
2021	7	21	20,759,128	988,530	32284.80	830,225	158,305	993,874	20,871,344	112,216	237	245	30.6
2021	8	21	21,836,970	1,039,856	34227.23	823,769	216,087	1,039,856	21,836,970	0	248	248	30.4
2021	9	21	20,519,752	977,131	31327.87	845,719	131,412	941,046	19,761,976	-757,776	244	177	31.2
2021	10		17,894,154						17,894,154				
2021	11		14,735,904						14,735,904				
2021	12		17,930,466						17,930,466				