THE STATE OF NEW HAMPSHIRE

BEFORE THE

PUBLIC UTILITIES COMMISSION

DG-18-_____

DIRECT TESTIMONY OF

CINDY L. CARROLL

AND

DAVID L. CHONG

EXHIBIT CCDC-1

Table of Contents

Exhibits

I. INTRODUCTION

Q. Ms. Carroll, please state your name and business address.

A. My name is Cindy L. Carroll. My business address is 325 West Road, Portsmouth, New Hampshire.

Q. What is your position and what are your responsibilities?

A. I am Director of Customer Energy Solutions at Unitil Service Corp. ("Unitil Service"), an affiliate of Northern Utilities, Inc. ("Northern" or the "Company"). Unitil Service provides, at cost, a variety of administrative, managerial and professional services on a centralized basis to its affiliated Unitil companies. My primary responsibilities are the development, implementation, and advancement of the Unitil Corporation's distribution utilities' business expansion and economic development programs, energy efficiency programs, and critical customer management.

Q. **Please describe your professional and educational background.**

A. I possess more than twenty years of experience in the natural gas industry, working on matters directly related to the expansion of the natural gas distribution system. I joined Unitil Service in October 1997 and was promoted to Director in May 1999. I hold a Master's Degree in Business Administration from Southern New Hampshire University and a Bachelor of Arts degree in Communications from the University of New Hampshire.

Q. Have you ever testified before the New Hampshire Public Utilities Commission ("Commission") or any other regulatory body?

A. Yes. I testified before this Commission on behalf of Unitil Energy Systems, Inc. in DE 09-137 regarding the Company's investment in and rate recovery for Distributed Energy Resources as well as on behalf of Northern in DG 14-154 regarding Northern's request for authorization to provide natural gas service within the Town of Brentwood. I have also testified before the Maine Public Utilities Commission and the Massachusetts Department of Public Utilities in various proceedings related to, among other things, business expansion and economic development programs and energy efficiency programs.

Q. Mr. Chong, please state your name and business address.

A. My name is David L. Chong, and my business address 6 Liberty Lane West, Hampton, New Hampshire 03842.

Q. What is your position and what are your responsibilities?

A. I am Director of Finance and Treasurer for Unitil Service. I am also the Treasurer of Northern Utilities and Unitil Corporation's other utility subsidiaries. My responsibilities are primarily in the areas of financial planning and analyses, regulatory projects, treasury operations and banking relationships.

Q. Please describe your business and educational background.

A. I have approximately seventeen years of professional experience in the energy and utilities industries. From 2001 through 2005, I worked for Exxon Mobil Corporation in various facilities engineering roles with my last position as a Senior Project Engineer. From 2005 through 2008, I worked for RBC Capital Markets Corporation in the energy investment banking group, where I provided corporate finance and mergers and acquisitions advisory services. While at RBC, I raised equity and debt capital on numerous occasions for various energy companies. I also advised on several buy-side and sell-side mergers and acquisitions transactions. From 2008 through 2009, I worked for El Paso Exploration & Production Company in its business development group as an Acquisition & Divestiture Principal. I began working for Unitil Service Corp. in August 2009 as Director of Finance. I hold a Master's Degree in Business Administration from Tulane University and a Bachelor of Science degree in Mechanical Engineering with Honors from the University of Texas at Austin.

Q. Have you previously testified before the Commission or other regulatory agencies?

A. Yes, I have testified before the Commission on various financial, ratemaking and utility regulation matters, including utility cost of service and revenue requirements analysis. I have also testified before the Maine Public Utilities Commission and Massachusetts Department of Public Utilities on similar matters on several occasions.

Q. What is the purpose of your joint testimony?

A. The purpose of our testimony is to support the Company's Petition seeking to provide natural gas service as a public utility in the Town of Epping. We will provide an overview of Company's plan for expansion into Epping, including the phased construction plan and marketing plan. We will explain the discounted cash flow ("DCF") model Northern used to evaluate its expansion plan, including the chief assumptions upon which that analysis is based. Finally, our testimony addresses the Company's technical, managerial and financial ability to serve Epping, and how the proposed expansion is in the public good.

Q. Are there other witnesses who are supporting the Company's Petition?

A. Yes. Christopher LeBlanc and Kevin Sprague are sponsoring joint testimony that provides the Company's design and operations plans for Northern's proposed expansion into Epping.

II. OVERVIEW OF NORTHERN'S PLAN TO PROVIDE NATURAL GAS SERVICE IN THE TOWN OF EPPING

Q. Please explain why Northern seeks authorization from the Commission to provide natural gas service in the Town of Epping.

A. Currently, Northern provides natural gas service to approximately 33,000 customers in 21 towns located in New Hampshire's seacoast region. Exhibit CCDC-2 is a map published by the New Hampshire Public Utilities Commission that depicts the service territories of

the State's natural gas utilities. Northern has been steadily expanding its service territory westward in the vicinity of Routes 27 and 101. Most recently, the Commission approved the Company's request to provide service in the Town of Brentwood in 2014. *Northern Utilities, Inc.*, Order No. 25,700 (Aug. 1, 2014). That expansion of service brought Northern's main within about one mile of the Epping town line. Although the Company has been urged by the development community to expand natural gas service to Epping in the past, Northern recently concluded that such an expansion would be economically viable.

Q. How does Northern plan to extend service to Epping?

A. Exhibit CCDC-3 is a map showing where Northern intends to initially expand service through Brentwood and into Epping. The Company intends to extend the existing main in Brentwood (in the vicinity of Route 27 and Pine Road) about one mile westerly along Route 27 to the Epping town line. Within Epping, Northern plans to install about 3.5 miles of new main to serve customers along Route 27 as well as along Route 125, including the commercial development that has clustered near the intersection of Routes 125 and 101. Details concerning the design and construction of the main extension are provided in the testimony of Messrs. LeBlanc and Sprague.

Q. Why did Northern select this route for expansion into Epping?

A. Northern selected this route because it will allow the Company to efficiently provide service to many potential customers located along Route 27 and the heavily developed

Route 125 corridor that are currently without access to natural gas. As noted above, Northern already operates mains in Brentwood in close proximity to Epping, and this expansion into Epping is the next logical expansion of the Company's distribution system.

Q. Has Northern discussed the Company's proposed expansion with Town of Epping officials?

A. Yes, Northern's representatives made a presentation to the Epping Board of Selectmen during the Board's February 12, 2018 meeting. During that meeting, the Board members were receptive to and supportive of the availability of natural gas service in Epping. A video replay of the Company's presentation to the Selectmen can be accessed here: https://etv22.viebit.com/player.php?hash=KI3tuld5LKqn. The Town is interested in attracting further economic development, and the development community views the availability of natural gas as a desirable utility service. Letters from the Exeter Area Chamber of Commerce and Senator William Gannon in support of the Company's expansion into Epping are provided in Exhibit CCDC-4.

Q. Are there any future system benefits for expanding to Epping?

A. Yes. [redacted]

[redacted]

III. NORTHERN'S CONSTRUCTION AND MARKETKING PLANS

Q. Has Northern developed a construction plan for its proposed expansion into Epping?

A. Yes. Northern plans to perform construction in two phases. The map provided in Exhibit CCDC-3 depicts the areas planned for construction during those phases as Zones 1 and 2. Zone 1, which generally follows Route 27 from Brentwood through Epping to Route 125, is planned for construction during 2019. Zone 2, which is generally the Route 125 corridor in the vicinity of the Route 101 intersection, is planned for construction during 2020. Additional details concerning the Company's construction plan are provided in the prefiled direct testimony of Messrs. LeBlanc and Sprague.

Q. Are there any licenses or approvals that Northern must obtain to use the route selected by Northern?

A. Yes, Northern believes that it may be necessary to obtain from the Commission certain licenses to cross public waters (Piscassic River) and state-owned lands pursuant to RSA 371:17 *et seq*. The Company will file a separate Petition with the Commission requesting those licenses. In addition, Northern is currently working with the New Hampshire DOT Bureau of Rail and Transit and New Hampshire Department of Natural and Cultural

Resources on the potential of using 1.3 miles of the Rockingham Rail Trail corridor from the intersection of the trail and Route 27 westerly to where the trail intersects Route 125. Northern believes that this may be the most cost-effective route to expand to Route 125.

Q. Please describe how Northern has identified the size of the potential market in Epping.

A. The methodology used by the Company to identify the potential size of the Epping market starts with [redacted]

Q. Please describe the Company's marketing plan for its proposed expansion into Epping.

A. The marketing strategy will focus on differentiating natural gas from other energy alternatives by communicating the benefits of having natural gas service from the consumer's point of view. These benefits include, among other things, affordability, efficiency, reliability and versatility of the product. Moreover, because many of the commercial properties currently burn propane, it will also be important to emphasize the ease of converting propane equipment to natural gas. Finally, we will emphasize the

environmental benefits of natural gas and its domestic abundance as important to national energy independence.

Our marketing challenge will be to focus marketing to the areas in Epping where the Company plans to construct new mains while avoiding confusion among customers outside those areas. The Company will utilize media strategies that reach the identified areas of targeted gas expansion with minimal reach into those areas outside the target zones. We will also employ a high-touch approach in the targeted areas by engaging civic and community groups, business leaders and municipal officials in our outreach efforts. Finally, we will communicate with plumbing and heating contractors who serve the region to help them understand our expansion plans so they can help customers whose equipment is approaching end of life to make decisions about conversion to natural gas.

Q. When would your marketing campaign begin?

A. Our marketing will commence immediately upon receiving Commission authorization to provide natural gas service in Epping.

Q. What assumptions have you made concerning conversion rates for new customers?

A. The conversion rates used to calculate the estimated revenues are important assumptions in determining the economic feasibility of an expansion. The Company relied on three sources of information for the conversion estimates: (a) the price of natural gas relative

to heating oil, (b) the results of a 2014 survey of potential customers, and (c) experience with natural gas conversions.

With regard to price, the Company relied in part on last winter's relative price of natural gas to heating oil, as included in Exhibit CCDC-5, for determining the conversion rate. This Exhibit shows that natural gas prices in the Northeast were forecast to be approximately 45 percent less than the US average for heating oil.

In addition, during 2014, the Company retained a market researcher to survey potential customers about their likelihood of conversion to natural gas based on various energy offerings. Although this survey was not focused on Epping, Northern believes that its results are generally indicative of consumer attitudes. The survey provides the percentage of consumers who responded with answers of seven through 10 (out of 10) when asked about their likelihood of conversion to natural gas if the price of natural gas were [redacted] percent less than the price of heating oil. The Company assumed the percentage of customers with answers of seven or higher would convert to natural gas with the expansion. This assumption is based on a published study which states, "Studies that calibrate CV [Contingent Valuation] data have consistently concluded that the certainty threshold that performs best lies between 7 and 10."[1]

[1] *See* Ready, Richard C., Patricia A. Champ, and Jennifer L. Lawton, "Using Respondent Uncertainty to Mitigate Hypothetical Bias in a Stated Choice Experiment" *Land Economics*, May 2010, at 363-381.

The survey shows that approximately [redacted] percent of the homeowners surveyed and [redacted] percent of businesses surveyed would likely switch to natural gas if the price of natural gas price were [redacted] percent less than the price of heating oil. As noted above, the favorable price differential in the Northeast was approximately 45 percent, which is considerably higher than the [redacted] percent differential upon which the survey was based. Accordingly, for the purposes of financial modeling, the Company is applying a [redacted] percent conversion rate to residential customers and a [redacted] percent conversion rate to G40 customers.

In terms of larger commercial customers, Northern estimates there are approximately [redacted] potential G41 customers in the Epping area that the Company is immediately targeting. These large customers include big box retailers and grocers. The Company estimates that [redacted] percent of these customers will convert based on experience with these customers at other locations and initial conversations with them about converting to natural gas. Therefore, [redacted] percent conversion rate is being applied to G41 customers.

Finally, there [redacted] G42 [redacted] and, based on the Company's experience [redacted], Northern is applying a [redacted] percent conversion rate to [redacted].

IV. NORTHERN'S ECONOMIC ANALYSIS

A. Overview of Northern's DCF Analysis and Summary of Results

Q. How has the Company evaluated the economics of the proposed expansion into Epping?

A. Northern has evaluated the Epping expansion using a discounted cash flow ("DCF") analysis. To perform this analysis, the Company used its existing and long-standing customer contribution models which conform to its Line Extensions tariff. Under this approach, a DCF analysis is performed that compares the estimated distribution revenues (*i.e.*, excluding revenues attributed to the gas commodity) to the estimated cost of service. The cost of service reflects the incremental costs associated with the main and service extension, including investment in facilities, depreciation expense, and property and income taxes. The distribution revenues reflect estimated customer usage applied to the respective distribution rates for each customer class. The annual cost of service and revenue cash flows are discounted to the present value at the Company's after tax real weighted average cost of capital. If the Net Present Value ("NPV") of the cash flows is zero or greater, then the proposed expansion is considered economically feasible and should be accepted. A copy of the Company's evaluation model is provided in CONFIDENTIAL Exhibit CCDC-6.

Q. Please briefly summarize the results of the model.

A. The Company's Line Extension tariff specifies a 10-year discount window for commercial and industrial customers and a 20-year discount window for residential customers. Based on these criteria, the NPV of this project is $[redacted] as shown in CONFIDENTIAL Exhibit CCDC-6. This result shows that the project should be accepted from a financial perspective because the NPV is greater than zero.

Q. Do the discount windows specified in the Company's Line Extension tariff that were applied in your DCF analysis adequately capture the economic potential of this expansion into Epping?

A. No, in this circumstance the discount windows are quite conservative and substantially understate the true economics of this expansion. This expansion opportunity is targeted to enter a new franchise territory and install new pipeline facilities from which Northern will likely serve hundreds, and potentially even thousands, of customers over the long-term. Due to the long-term nature of these investments, the Company believes that a long-dated view and assessment of the project cash flows would be appropriate to properly assess a new franchise, which is a permanent and perpetual source of cash flows for the Company. Although shorter discount windows in the range of 10-20 years may be appropriate for short, incremental line extensions to serve the next few customers on an existing main, applying the same discount period to a franchise expansion would significantly understate and distort the permanence of the cash flow streams from which the Company and its customers will benefit for many decades. For example, lengthening

the discount window to 20 years for commercial and industrial customers (like residential customers) significantly increases the net present value of the project to $[redacted]. Nonetheless, since this project satisfies the Company's Line Extension criteria, the Company is not proposing any changes to its economic evaluation criteria at this time, but may do so in the future.

B. Determination of Rate Base

Q. How does the model calculate rate base for the Epping expansion project?

A. Determining rate base begins with gross plant, which for this project is the estimated capital spending for mains expansion and services. Net plant is then calculated as gross plant less accumulated depreciation. Finally rate base is determined by reducing net plant by accumulated deferred income taxes.

Q. What is being modeled for capital spending for this proposed expansion?

A. The model incorporates forecasted capital expenditures for both mains expansion and services, which are described in greater detail in the testimony of Messrs. LeBlanc and Sprague at pages 9 through 12. As stated in their testimony, the estimated mains spending for this expansion is $2,034,555 on an incremental project cost ("IPC") basis.[2] The average costs per service have been estimated at $[redacted] for residential customers, $[redacted] for G40 and G41 customers, and $[redacted] for G42 customers. The total forecasted capital spending for services for this project is $751,744. It is important to note that a

new customer's service will not be installed until after a contract has been signed with the Company.

Q. What is the total capital spending modeled for this project?

A. The total capital spending modeled for this expansion is the sum of estimated mains and services investments, or $2,786,300. As noted above, this capital spending serves as gross plant in the rate base calculation.

Q. How is net plant calculated?

A. Net plant is determined by reducing gross plant by accumulated depreciation.

Q. How is book depreciation calculated in the model?

A. Book depreciation is calculated by applying the currently approved weighted-average depreciation rates for mains and services from Docket No. DG 17-070 to the forecasted capital spending discussed above.

Q. How is accumulated depreciation calculated in the model?

A. The model uses the depreciation method discussed above and keeps a cumulative reserve for each period. This reduces gross plant in the rate base calculations to calculate net plant.

[2] IPC refers to base cost plus direct overheads and is the cost used for the Company's internal rate of return calculations. The IPC does not include general construction overheads. All cost estimates referenced in this testimony were performed on an IPC

Q. How are accumulated deferred income taxes calculated in the model?

A. Accumulated deferred income taxes are the difference between book and tax depreciation, multiplied by the effective tax rate. Book depreciation is calculated as discussed above. Tax depreciation is calculated using the federal Modified Accelerated Cost Recovery System rates. There is no bonus depreciation used in this model as it was removed for utilities per the Tax Cuts and Jobs Act signed into law by the President in 2017. The effective tax rate is calculated using a federal income tax rate of 21% and a state income tax rate of 7.9%. Thus, accumulated deferred income taxes are the difference between book and tax depreciation multiplied by 27.24%.

Rate base is derived in the model by reducing the net plant by the accumulated deferred income taxes.

C. Estimated Market Size and Forecasted Revenue

Q. How does the Company's model forecast revenue attributable to the proposed Epping expansion?

A. The revenue forecast is based on a variety of factors that include a market size estimate, customer conversion assumptions by customer class and forecasted sales based on average historical gas consumption by customer class.

basis.

Q. What does the Company estimate the market size of this expansion to be?

A. Based on the methodology discussed previously in our testimony, the Company estimates the market potential to be [redacted] customers.

Q. How many customers does the model forecast the Company will add due to this proposed expansion?

A. The Company does not expect that the entire market potential of [redacted] customers will contract with the Company for natural gas service. Instead, the model uses estimated conversion rates to determine the percentage of potential customers that will become natural gas customers. After applying the conversion rates, the model forecasts that this project will add [redacted] customers. The table below provides a breakdown of the estimated number of meters the Company projects to add by residential and commercial and industrial ("C&I") customer class.

Customer Class	Estimated Customers
Residential	[redacted]
C&I – G40	[redacted]
C&I – G41	[redacted]
C&I – G42	[redacted]
Total	[redacted]

Q. How are revenues calculated in the model?

A. Revenues in the model are comprised of customer charge revenue and volumetric distribution revenue. This calculation relies on customer counts that were discussed above and customer charge and volumetric rates. Customer charge revenue is calculated based on the number of customers added per rate class, multiplied by the corresponding customer charge for that rate class. Consumption revenue is based on a weather normalized five-year historical average usage per customer class, multiplied by the added number of customers for that class, multiplied by the forecasted volumetric distribution rates for that class. Revenue attributable to gas commodity sales is not included in the model.

D. Expenses

Q. What expenses are calculated and included in the model?

A. The model includes calculations for property tax expense, depreciation expense, interest expense, and income tax expense.

Q. How is property tax expense calculated?

A. Property tax expense is calculated on an annual basis by multiplying net plant by the property tax rate.

Q. How is depreciation expense calculated?

A. As discussed previously in this testimony, book depreciation is calculated by multiplying capital spending by the weighted average depreciation rate.

Q. How is interest expense calculated?

A. Interest expense in the model is a function of the Company's incremental weighted cost of long term debt multiplied by rate base. This calculation does not impact the discounted cash flow analysis, but is included in the net income calculation for illustrative purposes.

Q. How is income tax expense calculated?

A. Income tax expense is calculated as revenues less property tax expense, less depreciation, less interest expense multiplied by the effective tax rate of 27.24% (discussed previously).

E. Discounted Cash Flow Model and Results

Q. Please provide an overview of the discounted cash flow analysis being performed in the model.

A. The model discounts free cash flows by the after-tax real weighted average cost of capital. The net present value and internal rate of return are calculated from the discounted cash flows. Internal rate of return is the discount factor that results in a net

present value of zero. If the internal rate of return is greater than the Company's after-tax real weighted cost of capital, the project should be accepted.

Q. Please explain the cost of capital used to discount the cash flows.

A. The Company is using a real weighted after-tax cost of capital to discount the cash flows. This equation is weighted based on the weights established in Docket No. DG 17-070. The cost of equity reflects 9.5% as last authorized. Cost of debt reflects the incremental cost at 3.52% per the Company's last financing completed in November of 2017.

Q. What were the results of the model discounting cash flows over the discount ranges specified in the Line Extensions tariff?

A. The model calculates a positive net present value of $[redacted]. These are strong results that indicate this project should be accepted from a financial perspective. Furthermore, a 20-year discount window for commercial and industrial customers (like residential customers) provides a significantly higher net present value of $[redacted].

V. RATEMAKING AND CUSTOMER IMPACTS

Q. Does Northern intend to request the imposition of a surcharge or other specialized cost recovery mechanism for its investments in the expansion into Epping?

A. No. The Company intends to include the expansion program in rate base and recover its costs through ordinary ratemaking principles consistent with the application of its Line Extensions tariff.

Q. Would Northern's expansion into Epping have negative consequences for its existing customers in New Hampshire?

A. No. The Company's expansion into Epping would not result in any harm to existing customers. Northern has sufficient transport capacity on the Brentwood system to support the expansion, and the Company has sufficient gas supplies for the new customer load that will be served from the planned system expansion. Moreover, the Company's DCF analysis demonstrates that the project is expected to have strong financial performance during the discount period and the potential for unfair cross-subsidization by other customers is very low. Epping has experienced impressive commercial growth over the past decade, and the Company expects development in the area to continue. Finally, as Messrs. LeBlanc and Sprague note in their testimony, the new pipelines being installed in Epping will have sufficient capacity to serve other communities should the Company continue to expand its distribution network. Accordingly, the cash flows that this expansion would ultimately support is greater than just those from the Epping customers modeled in the present financial analysis.

Q. Does Northern have the technical, managerial and financial capability to provide service in Epping?

A. Yes. As discussed earlier in our testimony, Northern currently operates natural gas plant in 21 New Hampshire towns serving approximately 33,000 customers. The Company is also the largest natural gas utility in Maine and has an affiliate that operates a natural gas utility in Massachusetts. The Company's culture emphasizes public safety and

operational reliability and we are proud of the quality of service we provide the customers in our New England service territories. We look forward to delivering that same level of service in Epping for many decades.

Q. Would Northern's provision of service to Epping be in the public good?

A. Yes. Epping has experienced strong growth over the past decade and it would benefit from the availability of natural gas service. Compared to other fuels that have historically been used in New Hampshire, natural gas is a desirable alternative due to its abundance, domestic availability, and low environmental impact. Moreover, the Company's existing New Hampshire customers will benefit from having more customers over which the Company's fixed costs can be spread.

VI. CONCLUSION

Q. Please summarize the key points from your testimony.

A. Northern currently operates a natural gas distribution network in the seacoast region and has steadily expanded its system westward along the Route 27/101 corridor. The Company's distribution mains are already within about a mile of Epping, and Northern has designed a phased system expansion to serve the regions in Epping that have recently experienced strong growth and are poised for further development. Based on the Company's DCF model, the project has a positive net present value and an internal rate of return that surpasses the Company's cost of capital. Finally, Northern possesses the

technical, managerial and financial expertise to serve Exeter, and extending service to this town will promote the public good.

Q. Does this conclude your testimony?

A. Yes, it does.