BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO
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IN THE MATTER OF THE APPLICATION OF	**)**	
PUBLIC SERVICE COMPANY OF COLORADO	**)**	**DOCKET NO. 11A-869E**
FOR APPROVAL OF ITS 2011 ELECTRIC	**)**	
RESOURCE PLAN	**)**	

REBUTTAL TESTIMONY OF SEAN CONNOLLY

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

July 16, 2012

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REBUTTAL TESTIMONY OF SEAN CONNOLLY

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Sean Connolly. My business address is 1800 Larimer, Suite 1300, Denver, CO 80202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT POSITION?

A. I am employed by Xcel Energy Services Inc., the service company subsidiary of Xcel Energy, Inc., the holding company parent of Public Service Company of Colorado ("Public Service" or the "Company"). My title is Manager, Risk Analytics.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of Public Service.

Q. HAVE YOU INCLUDED A DESCRIPTION OF YOUR QUALIFICATIONS, DUTIES, AND RESPONSIBILITIES?

A. Yes. A description of my qualifications, duties, and responsibilities is included as Attachment A.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my Rebuttal Testimony is to describe the purpose of the study entitled "Wind Induced Coal Plant Cycling Costs and the Implications of Wind Curtailment for Public Service Company of Colorado" ("Coal Cycling Study") filed in Docket No. 11M-710E as required by Decision No. C11-0710, issued in Docket No. 10A-377E and address concerns regarding the proposed use of the study results for purposes of resource evaluation that were raised in Answer Testimony presented by Interwest Energy Alliance witnesses Mr. Falkenberg and Mr. Cox. In addition, I will address concerns regarding the natural gas price forecast raised by Colorado Gas Producers witness Mr. Fishman.

Q. DID PUBLIC SERVICE RECEIVE COMMENTS REGARDING DOCKET NO. 11M-710E?

A. No. The Commission solicited stakeholder input regarding the study and asked interested parties to file comments on the study within 20 days of the study's September 6, 2011 submission date. However, no party provided comments in the docket.

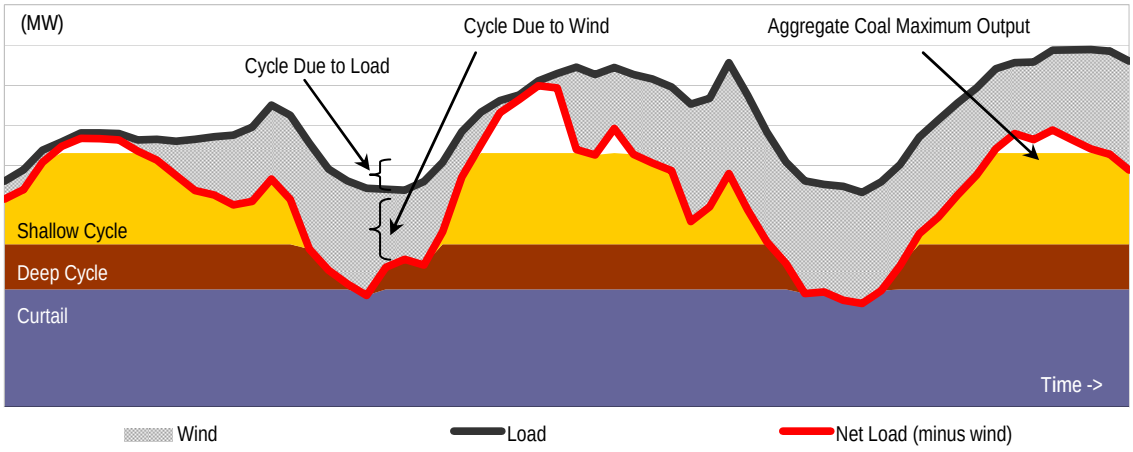
Q. PLEASE DESCRIBE THE PURPOSE OF THE COAL CYCLING STUDY.

A. The purpose of the Coal Cycling Study is to allow us to quantify the incremental integration costs associated with cycling baseload coal units and the curtailing of wind generation to avoid system bottoming events as a result of the addition of incremental wind or other generation on the Public Service system.

Q. WHAT DOES THE TERM "SYSTEM BOTTOMING" MEAN?

A. System bottoming refers to conditions when the net system load (demand less wind generation) decreases to a level that is equal to the system minimum generation level (all baseload units are at minimum generation levels). A further decrease in net load would require one or more on-line units to come off-line, either wind or other generation, in order to balance net load and generation. Coal cycling is caused by a similar effect. When net load decreases to levels below the top of the coal stack – the system level of output when coal units are operating at maximum output inclusive of must take capacity – coal units are backed down, or cycled, to balance net load and generation. The chart below which was taken from the Coal Cycling Study illustrates the effect of changing net load on the generation stack

Figure 1.



Q. WHAT DOES THE TERM "COAL CYCLING" MEAN?

A. The term "coal cycling" refers to changes in the generation output of coal units, both increases and decreases in output. Types of cycles listed from lowest to highest cost are as follows: Automatic Generation Control ("AGC")

regulation, shallow load follow, deep load follow, hot on/off, warm on/off and cold on/off cycles. The coal cycling study quantifies the costs associated with load follow cycles as the costs of other types of cycles made were determined to be uneconomic (on/off cycles) or relatively small (AGC cycles) when compared with other load follow cycles.

Q. WHY IS IT IMPORTANT TO STUDY COAL CYCLING?

A. Temperature and pressure changes caused by ramping unit output up and down increase the stresses on unit components which eventually cause component failures, driving maintenance costs up. Given that increases in the cycling of coal units will cause increased maintenance costs, it is prudent for Public Service to study and take into account the incremental cycling costs it expects to incur when adding new generation resources as part of its evaluation of such resources in this proceeding.

Q. ARE YOU AWARE OF ANY OTHER COAL CYCLING STUDIES THAT HAVE BEEN COMPLETED BY THE UTILITY INDUSTRY?

A. No. Although I have not completed an exhaustive search of industry studies related to coal cycling. However, I am aware of one in-progress study jointly sponsored by the National Renewable Energy Lab ("NREL") and WestConnect called the "Western Wind and Solar Integration Study 2" ("WWSIS 2") that is including cycling costs in their renewable integration study. As noted in the phase 1 WWSIS study, cycling costs were excluded from the study due to lack of data. Among other goals, the phase 2 study seeks to remedy this omission as noted further in my testimony.

Q. PLEASE SUMMARIZE THE CONCERNS OF MR. FALKENBERG THAT YOU WILL BE ADDRESSING.

A. Mr. Falkenberg proposes that coal cycling costs identified in the Coal Cycling Study not be considered in the 2011 Electric Resource Plan Phase 2 bid evaluation process. Mr. Falkenberg believes that many specific issues within the broad categories listed below effectively invalidate the Coal Cycling Study results and the results should therefore be excluded from the bid evaluation process:

1. The model developed for the study does not adequately represent coal cycling costs on the Public Service system. Only a detailed production simulation would capture details required for a proper coal cycling study.
2. Some model input assumptions are incorrect or outdated.
3. Per cycle costs used in the study are outdated, uncertain and applied incorrectly.
4. Public Service does not consider mitigation options that would reduce coal cycling costs.

Q. DO YOU AGREE WITH THE CONCERNS LISTED ABOVE WHICH ARE DETAILED IN MR. FALKENBERG'S ANSWER TESTIMONY AND ECHOED IN THE TESTIMONY OF MR. COX?

A. Mr. Falkenberg raises some valid concerns as well as some that I do not agree with. I will address specific issues associated with the four issues listed above.

Q. DO YOU AGREE WITH MR. FALKENBERG THAT THE MODEL DEVELOPED FOR THE STUDY DOES NOT ADEQUATELY REPRESENT COAL CYCLING COSTS ON THE PUBLIC SERVICE SYSTEM AND THAT ONLY A DETAILED PRODUCTION SIMULATION WOULD CAPTURE DETAILS REQUIRED FOR A PROPER COAL CYCLING STUDY?

A. No. I acknowledge in the Coal Cycling Study, the production simulation models (Strategist and ProSym) currently used by the Company "…do not have the ability to track and report the number of times a coal unit is cycled as a result of wind generation or assign a cost for each cycle." (page 10 of the Coal Cycling Study). As a result, cycling costs are not considered during the unit commitment and dispatch optimization within those models.

However, the spreadsheet tool that Public Service developed to estimate the impact of incremental wind (or other incremental resources) on the cycling of coal units provides a reasonable estimate of future coal cycling costs. While not a production simulation, the model is a simplified hourly representation of the Public Service system that is capable of counting coal unit cycles while taking into account major drivers such as load, wind generation, outages and resource changes. I believe the model reasonably estimates future incremental coal cycling costs on the Public Service system.

Q. WAS THE METHODOLOGY USED IN THE MODEL REVIEWED BY THIRD PARTY EXPERTS?

A. The methodology used in the spreadsheet model was reviewed by a Technical Review Committee ("TRC") consisting of industry experts from

NREL and the Utility Wind Integration Group (UWIG) among others. The purpose of the TRC was to review the methodology proposed by Public Service to count coal cycles and account for the cost of those cycles and to review and comment on the input assumptions to ensure that that both the methodology and assumptions were reasonable.

Q. DID THE TRC MEMBERS REVIEW THE SPEADSHEET MODEL AND DATA INPUTS?

A. No. The TRC members did not have access to the spreadsheet model for review. The methodology, input assumptions and results of the study were discussed openly primarily using drafts of the coal cycling study as a basis for those conversations.

Q. DID ANY TRC MEMBERS FEEL THAT THE STUDY SHOULD NOT BE PUBLISHED DUE TO SIGNIFICANT ISSUES WITH THE METHODOLOGY OR INPUT ASSUMPTIONS?

A. No. TRC members encouraged Public Service to publish the study since this aspect of wind integration costs had not previously been studied.

Q. DO YOU AGREE WITH MR. FALKENBERG'S ASSERTION THAT PUBLIC SERVICE IGNORES ECONOMICS WHEN DETERMINING LOAD FOLLOW ORDER AND THAT AN OPTIMIZATION IS REQUIRED TO PERFORM A FAIR ANALYSIS?

A. No. When determining the load follow order used in the coal cycling study, Public Service considered factors including unit dispatch cost (economics), cycling capability, unit age and unit ownership as stated in the Company's

response to Interwest 4-13. The order was based on current operations at the time of the study. The load follow order, as well as other input assumptions, will be reviewed and updated if necessary before the Phase 2 bid evaluation process. The fact that the spreadsheet model is not a full production cost simulation does not suggest that the model is unfair. The model reasonably estimates future incremental coal cycling costs on the Public Service system with a fixed load following order that was reviewed during the model development.

Q. MR. FALKENBERG ASSERTS THAT COAL CYCLING COSTS COULD BE REDUCED IF A MORE OPTIMAL SCHEDULE OF BACKDOWNS WERE INCLUDED.

A. Mr. Falkenberg's claim of a more optimal load follow order "optimizes" only on coal cycling costs and ignores other factors that he claims Public Service should consider when developing the load follow order. This statement is intentionally misleading and ignores the principles Mr. Falkenberg claims the Company does not follow itself.

Q. IS THE METHOD EMPLOYED TO COUNT CYCLES IN THE COAL CYCLING STUDY REASONABLE?

A. Yes. Public Service took a conservative approach to counting cycles. When units are required to back down to accommodate wind, a cycle is counted taking into account the load follow order and the depth in MW of the backdown required. Depending on that depth, a cycle may be counted for one

or more units. The model only counts a maximum of one cycle per unit per day even though a unit could, in reality, cycle more that once per day.

Q. HOW DOES THE MODEL COUNT PARTIAL CYCLES (CYCLES THAT DO NOT COVER THE FULL RANGE OF A UNIT)?

A. The model counts partial cycles as a full cycle and are assigned the full per cycle cost. Based on the method for counting cycles this will occur a maximum of once per day for one unit. This method may over estimate cycling costs if one assumes that partial cycles incur partial costs but we do not have partial cycle cost and any overestimation is offset by counting no more than one cycle per day.

Q. DOES MR. FALKENBERG HAVE SPECIFIC CONCERNS WITH INPUT ASSUMPTIONS IN THE SPREADSHEET MODEL THAT HE CLAIMS INVALIDATE THE STUDY RESULTS?

A. Yes. Mr. Falkenberg identifies several concerns, some of which are valid, with the model inputs and methodology. I will address these specific concerns below.

Q. DO YOU AGREE WITH MR. FALKENBERG'S ASSERTION THAT THE METHOD USED TO ACCOUNT FOR UNIT FORCED OUTAGES IN THE MODEL OVERSTATES COAL CYCLING COSTS?

A. No. The spreadsheet model uses a weighted average forced outage rate to derate coal plus must-take capacity. I agree that this method will overstate cycling costs in some hours but it will also understate costs in others. On an annual basis these positive and negative affects will largely cancel out

resulting in a good estimate of the impact of forced outages on cycling costs. In addition, the method for handling forced outages is conservative in as much as the forced outage derates reduce the system capacity even for units that are on a scheduled outage which has the affect of understating cycling costs. The weighted average outage rate is applied to the system capacity before that capacity is reduced for scheduled outages; therefore a unit that is under a scheduled outage is also derated. I believe the method used to account for forced outage is reasonable.

Q. DOES MR. FALKENBERG HAVE ANY OTHER CONCERNS WITH THE FORCED OUTAGE ASSUMPTIONS OR CALCULATIONS?

A. Yes. Mr. Falkenberg correctly identified that the handling of the forced outage for the IREA and Holly Cross backup energy for Comanche 3 is incorrect and overstates system capacity by about 20MW. Public Service acknowledges this error in its response to Interwest 4-6 and will correct the error before the Phase 2 bid evaluation process. In addition, Mr. Falkenberg, correctly identified the omission of outage rates for two combined cycle units. Again, these omissions will be corrected before the Phase 2 bid evaluation process.

Q. YOU STATED THAT THE IDENTIFIED ERRORS IN THE FORCED OUTAGE RATES WILL BE CORRECTED BEFORE THE PHASE 2 BID EVALUATION PROCESS. WHAT DOES THAT MEAN?

A. Public Service expects to review and update all input assumptions prior to the Phase 2 evaluation process to ensure that the most current and accurate assumptions are used to estimate coal cycling costs. Our review will

specifically include obligations, outage rates, planned resource additions and retirements, the coal unit load following sequence, the hourly load forecast and wind profiles among others. The intent is to use the most up to date input assumptions possible which is consistent with the Company's other modeling efforts.

Q. MR. FALKEBERG IDENTIFIED ISSUES WITH THE MODELING OF CERTAIN CONTRACTS. CAN YOU COMMENT ON THE CONTRACT MODELING?

A. Contracts for the delivery of energy to the Public Service system were modeled as must-take capacity which effectively raises the system capacity level and, all else equal, would increase coal cycling costs. While many of these contracts are relatively small compared with Public Service's own generation, they do impact the results of the coal cycling study.

The Foote Creek Agreement was modeled as 39MW of must take energy through 2019. Public Service will update the contract end date to 2014 and we believe that modeling the contract as a flat delivery schedule reasonably approximates the effect on coal cycling costs since the model is counting cycles only once daily and these generally occur during low load hours which correspond to the delivery period of 1AM to 7AM as noted by Mr. Falkenberg.

Q. DOES PUBLIC SERVICE INTEND TO CHANGE THE MODELING OF CONTRACTS IN THE COAL CYCLING MODEL?

A. Again. Public Service intends to update the input assumptions in the coal cycling model to ensure all contract periods and contract capacities are correct before the Phase 2 bid evaluation process.

Q. SHOULD THE PACIFICORP EXCHANGE AGREEMENT BE EXCLUDED FROM THE COAL CYCLING MODEL AS PROPOSED BY MR. FALKENBERG?

A. No. Mr. Falkenberg is correct in that the terms of the Energy Exchange Agreement with PacifiCorp include PacifiCorp delivering 150 MW of capacity and energy from their shares in the Craig and Hayden coal plant to Public Service for all hours during the year. But, Mr. Falkenberg is incorrect in his assertion that the Company arbitrarily purchases rather than generates the firm power for PacifiCorp as part of this agreement.

The Company is required to provide transmission from Craig and Hayden to PacifiCorp through its Power and Transmission Service Agreement ("PTSA") with PacifiCorp but the Company does not have sufficient transmission rights to be able to deliver firm power produced in Public Service's system to PacifiCorp at other points. Accordingly the parties entered into the Energy Exchange Agreement as a substitute for the obligation to provide transmission service. Pursuant to the Exchange Agreement, PacifiCorp delivers capacity and associated energy to Public Service at Craig and Hayden generating stations and Public Service purchases capacity and energy from the market and delivers an equal amount of capacity and energy at specified delivery points remote from the Public Service system where

PacifiCorp will be able to use the power but points to which Public Service cannot acquire transmission service to deliver power generated on the Public Service system. The specified delivery points are liquid market points where Public Service is able to buy power in the market. Therefore, Mr. Falkenberg's claim that the Company should be delivering power generated on its own system to PacifiCorp as a means of mitigating coal cycling costs has no merit – the delivery from Craig and Hayden to Four Corners cannot be made on a firm basis.

Mr. Falkenberg also claims that the company incorrectly modeled the PacifiCorp LTPSA agreement through 2022 when the contract was terminated early in 2011. Public Service did continue to show the LTPSA through 2022 for reasons included within the PacifiCorp Energy Exchange Agreement extension application (Docket No. 12A-256E). Essentially, even if the LTPSA was terminated, Public Service has an obligation to deliver firm power to PacifiCorp through the companion PTSA that expires in 2022. Earlier this year, PacifiCorp and the Company agreed in Docket No. 12-256E to meet the obligations of the Transmission Service agreement through extension of the Energy Exchange Agreement instead of reinstating the LTPSA or other method. The Commission approved the Exchange Agreement on June 29, 2012. Therefore, the one update that is needed in the coal cycling study that will be done in time for the Phase 2 bid evaluation will be to take into account the new Energy Exchange Agreement (150 MW) rather than the LTPSA (176 MW).

Q. SHOULD THE PROPOSED CABIN CREEK PUMPED STORAGE UPGRADE BE INCLUDED IN THE STUDY AS SUGGESTED BY MR. FALKENBERG?

A. The Cabin Creek upgrade has not yet been approved and should not be included in the study.

Q. DOES THE FACT THAT SOME OF THE MODEL INPUTS AND ASSUMPTIONS USED IN THE SPREADSHEET MODEL ARE INCORRECT OR OUTDATED UNDERMINE THE VALIDITY OF THE COAL CYCLIING STUDY METHODOLOGY AS MR. FALKENBERG SUGGESTS?

A. No. While Mr. Falkenberg has correctly identified some issues with the model input assumptions including the modeling of must-take contracts and changes that have occurred since the model was first developed, neither of these issues undermines the validity of the model or its use in the Phase 2 bid evaluation process.

Q. IS MR. FALKENBERG'S ASSERTION THAT "APTECH USED QUARTERLY DATA TO DEVELOP REGRESSIONS ANALYZING THE COST OF COLD STARTS, WARM STARTS, HOT STARTS AND LOAD FOLLOWING." CORRECT?

A. No. APTECH collected and used annual hourly data for their regression analyses and minute data was collected and used to study specific cycling events.

Q. IS MR. FALKENBERG'S ASSERTION THAT THE USE OF QUARTERLY DATA TO DISCERN LOAD FOLLOWING IMPACTS "…CLEARLY

EXPLAINS THE ENORMOUS UNCERTAINTY IN THE COST ESTIMATES PROVIDED BY APTECH." CORRECT?

A. No. Mr. Falkenberg's assertion is unfounded as he assumes APTECH used only quarterly data in their Public Service studies which is an incorrect assumption.

Q. IS MR. FALKENBERG'S ASSERTION THAT PUBLIC SERVICE'S UNDERLYING CYCLING COST DATA IS "…QUITE DATED, …" CORRECT?

A. No. Mr. Falkenberg points out the 1996 Study as justification for this position. However, the unit cycling costs identified in the 1996 study were not the basis for the incremental cycling costs identified in the Public Service Coal Cycling Study. The APTECH 2008 study determined a 2008 present value cycling cost for the Pawnee unit which was then related to other Public Service coal units based on the gross capacity ratings of those coal units. The 2008 cycling costs were then escalated using typical Public Service escalation rates to fit the needs of the Coal Cycling Study.

Q. IS MR. FALKENBERG'S ASSERTION THAT PUBLIC SERVICE "…ASSUMED LARGER UNITS WOULD HAVE HIGHER CYCLING COSTS THAN SMALLER ONES." CORRECT?

A. No. Public Service did not assume this relationship but tested this relationship by undertaking studies of specific Public Service units to investigate if such a relationship exists.

Q. DID ANY OF THE PREVIOUS APTECH CYCLING STUDIES FOR PUBLIC SERVICE SUGGEST A RELATIONSHIP EXISTED?

A. Yes, every APTECH cycling study done for Public Service describes the APTECH approach to damage modeling which forms the basis for their estimates of cycling costs. APTECH clearly states that the "ideal way" to model cycling-related damage for any component of a fossil power plant is by direct damage modeling. This type of modeling combines physical measurements, taken while the unit is on line (i.e. temperature, strain, and heat flux), with state-of-the-art stress analyses and damage algorithms to produce a detailed estimate of the amount of damage suffered by the particular component.

Q. DID APTECH FORMALLY ADOPT THE "IDEAL WAY" TO MODEL CYCLING-RELATED DAMAGE FOR THE PUBLIC SERVICE CYCLING STUDIES?

A. No. APTECH actually used a "general damage" model to conduct the Public Service cycling studies.

Q. WHY DID APTECH USE A "GENERAL DAMAGE" MODEL AND NOT AN "IDEAL WAY" TO PREPARE ESTIMATES OF CYCLING DAMAGE AND THEIR RELATED COSTS?

A. APTECH indicated that the "ideal way" of analysis would require substantial time, data collection and funding and would still be subject to the uncertainties of component life analysis. To limit the cost of analyzing all critical components of a unit and to improve the accuracy of cost estimates,

APTECH used the “general damage” model for the Public Service cycling studies.

Q. WHAT MODELING VARIABLE(S) DRIVES THE APTECH “GENERAL DAMAGE” MODEL?

A. APTECH relies solely on only one variable to drive their regression-based estimates of damage. It is defined as the unit hourly MW output. APTECH has indicated that using hourly MW unit load data has an inherent advantage due to the fact that this type of data is readily available and provides an accurate history of past unit operations.

Q. DID THIS UNDERSTANDING OF THE APTECH METHOD OF DAMAGE ASSESSMENT AND ANALYSIS SUGGEST A RELATIONSHIP BETWEEN UNIT CAPACITY AND CYCLING COSTS?

A. Yes. Based on the APTECH approach to cycling studies, Public Service tested the relationship between unit capacity and the respective cycling costs from the 1996 study using basic regression analysis.

Q. WHAT DID THIS ANALYSIS SHOW?

A. The analysis demonstrated a reasonable relationship existed between unit size and the respective unit cycling costs.

Q. HAS APTECH PUBLISHED ANY RECENT CYCLING COST STUDIES THAT WOULD REINFORCE THE PUBLIC SERVICE FINDINGS FROM ITS REGRESSION STUDIES?

A. Yes. APTECH (now called Intertek APTECH) authored an April 2012 study for NREL titled “Power Plant Cycling Costs”. In this report, APTECH presents

cycling costs for eight (8) plant types including small coal-fired sub-critical and large coal-fired sub-critical plants. Their report findings indicate that typical load follow costs (as defined in the Public Service studies) would show higher load follow costs per cycle for larger plants. The relationship between large and small plant load follow cycle costs was found to be approximately 3:1. The Public Service coal cycling studies and resulting load follow regression equation demonstrate in a similar relationship between large and small Public Service unit load following cycling costs.

Q. IS MR. FALKENBERG'S CONTENTION THAT PUBLIC SERVICE "…DID NOT FULLY CONSIDER THE IMPLICATIONS OF THE ESTIMATION RANGE OF DATA SUPPLIED BY APTECH." CORRECT?

A. No. The APTECH regression analysis that produced the High, Best and Low cycling cost values (i.e. "Top-Down" studies) was only part of the total APTECH cycling study for Public Service. APTECH also performed a "Bottom Up" cost of cycling study for the PAWNEE unit as a calibration of the Top-Down findings. Using different techniques, each method worked to define the cost of an "equivalent hot start" (EHS) or idealized load transient. EHS provides a means for comparing the cycling damage and costs of different units under the same loading pattern. EHS is used only as a convenient reference for damage calculations.

Q. DID APTECH FIND REASONABLE CORRELATION BETWEEN THE TOP-DOWN AND BOTTOM-UP EHS COSTS?

A. Yes. This finding reinforces the validity and use of the “Best” Top-Down based cycling costs for Public Service.

Q. DO YOU AGREE WITH MR. FALKENBERG’S OPINION THAT OUR CONCEPT OF LOAD FOLLOWING COSTS SUGGESTS THAT DECREASING PLANT OUTPUT INCREASES COSTS WHICH IS COUNTER TO INDUSTRY PRACTICE?

A. No. The concept of load following costs relates to the change in output, both up and down, that cause wear and tear damage. We accept the APTECH approach/definition of cycling costs which is driven by metal creep and fatigue damage and their interaction under changing temperature and pressure conditions. Damage occurs when plant output is increasing or decreasing.

Q. DO MR. COX AND MR. FALKENBERG EXPRESS ANY OTHER CONCERNS WITH THE USE OF COAL CYCLING COSTS IN THE PHASE 2 BID EVALUATION PROCESS?

A. Yes. Mr. Falkenberg and Mr. Cox essentially assert that Public Service’s proposal is “discriminatory” or “one-sided” and applies the coal cycling study results to only wind resources.

Q. DO YOU AGREE WITH THIS CONTENTION?

A. No, I do not agree that Public Service proposes to apply the Coal Cycling Study results to penalize only wind resources in the bid evaluation process.

Q. HOW DOES PUBLIC SERVICE INTEND TO USE COAL CYCLING COSTS IN THE PHASE 2 BID EVALUATION PROCESS?

A. While studying the incremental coal cycling costs, we noted that the addition of new generation of any type, not only wind, could impact the cycling of existing coal units and increase cycling costs (Coal Cycling Study, page 11). As a result, during the evaluation process, we intend to consider the incremental coal cycling costs imposed by any new generation resource that is expected to impact the cycling of Public Service's existing coal fleet, whether that is a wind resource, baseload or must-take resources. In addition, we intend to apply a coal cycling credit to any electricity storage resources that will reduce cycling costs.

Q. DO THESE COAL CYCLING COSTS APPLY TO EXISTING GENERATION RESOURCES?

A. While there are coal cycling costs associated with the operation of our existing fleet of resources, the purpose of the Coal Cycling Study was to allow us to identify the incremental coal cycling cost expected to be incurred with the addition of new generation resources. We will be including only the incremental coal cycling costs we expect to incur with the addition of new resources in our bid evaluation analysis.

Q. SHOULD PUBLIC SERVICE HAVE CONSIDERED MITIGATION OPTIONS THAT WOULD REDUCE COAL CYCLING COSTS AS MR. FALKENBERG ARGUES?

A. No. It is true that Public Service evaluated coal cycling costs on the existing generation system and did not consider mitigation opportunities as stated in the Coal Cycling Study and reiterated by Mr. Falkenberg in his Answer

Testimony. However, cycling cost mitigation opportunities come with a cost themselves. The benefit/cost of potential mitigations can be evaluated within the framework of the analysis completed for the Coal Cycling Study but the intent of the study was to reasonably quantify only the incremental cycling costs expected to be incurred on the existing system with the addition of new generation resources.

Q. DO YOU HAVE ANY FINAL COMMENTS ON THE COAL CYCLING STUDY?

A. Yes. Public Service believes that it is prudent to consider the incremental coal cycling costs incurred with the addition of new generation resources when evaluating potential new resources as part of the 2011 ERP. Mr. Falkenberg raised some valid concerns regarding the modeling of contracts and forced outage input assumptions that we will address and correct if necessary before the Phase 2 bid evaluation process. These minor issues do not invalidate the Coal Cycling Study results. Public Service intends to consider the incremental coal cycling costs associated with any potential new generation resource that exacerbates coal cycling and will not unfairly burden only new wind resources that are proposed. As described in my testimony, the use of APTECH coal cycling costs is appropriate, the modeling methodology is sound and the use of results to aid in the evaluation of new resource bids is prudent.

Q. PLEASE SUMMARIZE THE CONCERNS OF MR. FISHMAN REGARDING THE NATURAL GAS PRICE FORECAST THAT YOU WILL BE ADDRESSING.

A. Mr. Fishman is concerned that the natural gas price forecasts that Public Service is using as part of its Four-Source Blend are outdated and that the annual forecasts do not properly account for important seasonal variations in natural gas prices.

Q. ARE SEASONAL GAS PRICE VARIATIONS INCORPORATED INTO IN YOUR RESOURCE MODELING AND BID EVALUATION PROCESS?

A. Yes. The natural gas price forecast that is used for resource modeling IN Strategist and in the bid evaluation process is a monthly forecast. The Four-Source Blend is developed using monthly forecasts and monthly NYMEX futures prices. In years beyond the forecasts published by NYMEX and the third party forecasting services (PIRA, IHS CREA and Wood Mackenzie) where the natural gas price forecast is escalated, the monthly pattern in the final year of the forecast is continued through the end of the forecast period. The annual price forecast pictured in the 2011 Electric Resource Plan filing was a simple average of the monthly prices and is for illustrative purposes only.

Q. ARE THE NATURAL GAS PRICE FORECAST USED IN THE FOUR-SOURCE BLEND UPDATED?

A. Yes.

Q. HOW OFTEN ARE THEY UPDATED?

A. The three third party forecasting services generally update their forecasts semiannually in the spring and fall. The NYMEX forward price curve is updated daily with market closing prices.

Q. WILL PUBLIC SERVICE UPDATE THE FOUR-SOURCE BLEND PRIOR TO PHASE 2?

A. Yes. Public Service intends to update the Four-Source Blend with the most recent third party forecasts available and current NYMEX prices before the Phase 2 bid evaluation process begins in order to capture current views of the long term natural gas market.

Q. IS THE METHOD USED BY PUBLIC SERVICE FOR DETERMINING HIGH AND LOW GAS PRICE SENSITIVITY CASES REASONABLE?

A. Yes. Public Service calculates high and low gas price sensitivities based on one standard deviation above and below the base forecast. The standard deviation is calculated based on historical prices. This method is provides high and low forecasts that encompass a reasonable range of forecasts and is transparent in its formulation. Mr. Fishman does not have a specific issue with the approach to calculating sensitivities.

Q. DOES MR. FISHMAN RECOMMEND ANY ALTERNATIVE METHODS FOR DETERMINING A GAS PRICE FORECAST SENSITIVITY RANGE?

A. Yes. Mr. Fishman proposes two alternative methods. The first method is intended to be market based and requires Public Service set a seasonable short-term price ceiling and request a price quote for a costless collar that would set the floor price. The ceiling and floor prices would be escalated

through the end of the forecast period. The second method involves the solicitation of high and low price forecasts or methods from our third party forecasters.

Q. DO YOU AGREE WITH THESE RECOMMENDATIONS?

A. Both recommendations have merit as alternative approaches for setting sensitivity ranges but would be difficult to implement in practice. An objective price for a “reasonable” ceiling would be difficult to determine with the varying interests of stakeholders in the ERP process. Any selection by the Company would be very contentious. None of the three forecasting services currently publish sensitivity ranges for their gas forecasts. Using only currently available information, the sensitivities would need move away from the established concept of using three independent forecasts. While it may be possible to request development of high and low forecasts at some additional cost, I do not believe that this would result in a meaningful improvement over the current method that uses historical standard deviations.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Attachment A

SEAN CONNOLLY

Statement of Qualifications

I am the Manager in Xcel Energy Service Inc.'s Risk Analytics group in Denver, Colorado. My team is responsible for determining the fair value of derivative and exotic financial instruments; developing commodity price forecasts for use in internal analyses including resource planning, production costing, and asset management; and monitoring market developments and daily price movements for the calculation of portfolio risk metrics. I have served in my current role at Xcel Energy for two years following four years as an analyst in the Risk Analytics group. Prior to joining Xcel energy, I worked for AG Edwards & Sons and the Bank of Montreal analyzing oil and gas equities. I also spent over 10 years as an Industrial Engineer and Financial Analyst at Fedex Express where I focused on operational planning and optimization, expansion planning and budgeting.

I earned a Bachelor of Science degree in Aerospace Engineering and a Masters of Business Administration from the University of Colorado.