BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

*****

RE: IN THE MATTER OF THE
APPLICATION OF PUBLIC SERVICE
COMPANY OF COLORADO FOR
APPROVAL OF A NUMBER OF
STRATEGIC ISSUES RELATING TO ITS
ELECTRIC AND GAS DEMAND SIDE
MANAGEMENT PLAN

DIRECT TESTIMONY OF DAVID G. HORNECK

ON

BEHALF OF

PUBLIC SERVICE COMPANY OF COLORADO

July 3, 2017
Mr. David G. Horneck is Manager, Generation Modeling Services at Xcel Energy Services Inc. ("XES"). In this position he is responsible for managing the preparation of computer modeling of the power supply system for Public Service Company of Colorado ("Public Service" or the "Company"), one of four utility operating company subsidiaries of Xcel Energy Inc. Mr. Horneck’s duties include, among other things: managing the use of the computer model to develop system generation costs and other power supply data such as hourly marginal energy prices.

In his testimony, Mr. Horneck presents the computer model that the Company is currently using to forecast energy supply costs, called PLEXOS®. He also discusses hourly marginal energy price, which is an output of the software, and why it is an appropriate parameter to use for determining the energy value of demand side management programs.
Mr. Horneck recommends the Commission approve the use of hourly marginal energy price output from the PLEXOS® software for evaluating the avoided energy cost of DSM programs.
BEFORE THE PUBLIC UTILITIES COMMISSION
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RE: IN THE MATTER OF THE )
APPLICATION OF PUBLIC SERVICE )
COMPANY OF COLORADO FOR )
APPROVAL OF A NUMBER OF ) PROCEEDING NO. 17A-___EG
STRATEGIC ISSUES RELATING TO ITS )
ELECTRIC AND GAS DEMAND SIDE )
MANAGEMENT PLAN )

DIRECT TESTIMONY OF DAVID G. HORNECK

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## GLOSSARY OF ACRONYMS AND DEFINED TERMS

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<td>Demand Side Management</td>
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<td>ERP</td>
<td>Electric Resource Plan</td>
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<tr>
<td>MWh</td>
<td>Megawatt hour</td>
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<td>PPA</td>
<td>Purchase Power Agreement</td>
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<td>Public Service or the Company</td>
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DIRECT TESTIMONY OF DAVID G. HORNECK  

I. INTRODUCTION, QUALIFICATIONS, PURPOSE OF TESTIMONY, 
RECOMMENDATIONS  

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.  

A. My name is David G. Horneck. My business address is 1800 Larimer, Suite 1300, Denver, Colorado 80202.  

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

A. I am employed by Xcel Energy Services Inc. (“XES”) as Manager, Generation Modeling Services. XES is a wholly owned subsidiary of Xcel Energy Inc. (“Xcel Energy”), and provides an array of support services to Public Service Company of Colorado (“Public Service” or the “Company”) and the other utility operating company subsidiaries of Xcel Energy on a coordinated basis.  

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

A. I am testifying on behalf of Public Service.
Q. PLEASE SUMMARIZE YOUR RESPONSIBILITIES AND QUALIFICATIONS.

A. As the Manager of Generation Modeling Services, I manage the preparation of computer modeling for the Public Service power supply system. This modeling is used to develop system generation costs and other power supply data such as hourly marginal energy prices. A description of my qualifications, duties, and responsibilities is set forth after the conclusion of my Direct Testimony in my Statement of Qualifications.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my direct testimony is to discuss the production modeling software the Company currently uses to represent Public Service’s generation system. The software, called PLEXOS®, is used to develop forecasts of generation costs, including hourly marginal energy prices. I provide an overview of determining hourly marginal energy prices and support the Company’s proposal in determining these values going forward.

Q. WHAT RECOMMENDATIONS ARE YOU MAKING IN YOUR TESTIMONY?

A. I recommend the Commission approve the Company’s proposed method of determining the hourly marginal energy price used to determine the avoided energy benefit from Demand Side Management (“DSM”) programs and measures, through the use of hourly marginal energy price output from the software product PLEXOS®.
II. BACKGROUND

Q. YOU STATED THAT YOUR TESTIMONY CONCERNS SOFTWARE USED TO DEVELOP FORECASTS OF GENERATION COSTS, INCLUDING HOURLY MARGINAL ENERGY PRICES. HOW ARE AVOIDED GENERATION COSTS USED IN THE COMPANY’S DSM PORTFOLIO?

A. Avoided costs are one component of the cost-effectiveness analysis used in evaluating which energy efficiency measures should be included as part of the Company’s DSM portfolio. C.R.S. § 40-1-102(5)(b) specifies cost-effectiveness of DSM programs as the following:

(5)(b) In calculating the benefit-cost ratio, the benefits shall include, but are not limited to, the following as applicable:
(I) The utility’s avoided generation, transmission, distribution, capacity and energy costs;
(II) The valuation of avoided emissions; and
(III) Nonenergy benefits as determined by the commission.

The Company uses this avoided cost input as part of its cost-effectiveness testing discussed further by Mr. Shawn M. White in his Direct Testimony.

Q. IS MARGINAL ENERGY PRICE DISCUSSED IN OTHER TESTIMONY IN THIS FILING?

A. Yes. As discussed in Section IV of the Direct Testimony of Company witness Scott B. Brockett, the changing electric generation system has changed the benefits from DSM achievements. This testimony proposes using hourly marginal energy price to determine the electric energy cost avoided by individual DSM measures.
Q. PLEASE EXPLAIN HOW AVOIDED ENERGY COSTS WERE ADDRESSED IN

THE COMPANY’S LAST DSM PLAN, PROCEEDING NO. 16A-0512E.

A. As noted in Mr. Brockett’s Direct Testimony, under the Company’s Unopposed Settlement Agreement in Proceeding No. 16A-0512EG, the Settling Parties agreed to use Strategist® modeling with the input assumptions approved by the Commission in Proceeding No. 11A-869E to calculate avoided energy costs.

Q. WHAT METHOD IS THE COMPANY PROPOSING TO USE TO DETERMINE AVOIDED ENERGY COST IN THIS PROCEEDING?

A. The Company proposes to use the Hourly Marginal Energy method through PLEXOS® modeling software, which determines the marginal energy price.

Q. PLEASE DEFINE MARGINAL ENERGY PRICE AND DESCRIBE HOW IT RELATES TO DSM.

A. The term marginal energy price means the price of electricity at the current hourly operating point of the power supply system. PLEXOS® computes the price of electricity for that hour as load and generation are balanced. This price is reported as the marginal energy price of the system and represents the marginal cost of supplying an additional megawatt hour (“MWh”) to the system. As such, the marginal energy price can be used as an appropriate measure of the energy benefits resulting from DSM achievement as it represents the price of electricity that will be avoided for a change in customer load. The concept of marginal energy is discussed further in the Direct Testimony of Mr. Brockett.
As noted above, the marginal energy price represents the avoided cost of energy the Company expects to achieve from implementing DSM measures, and is used as part of the cost-effectiveness tests.
III. PROPOSED HOURLY MARGINAL ENERGY SOURCE

Q. HOW IS THE COMPANY PROPOSING TO CALCULATE THE AVOIDED ENERGY VALUES?

A. The Company proposes using hourly marginal energy prices produced by the PLEXOS® software to calculate the avoided energy values. The PLEXOS® model will use appropriate Commission-approved assumptions and methodologies available at the time the DSM plan is filed.

Q. CAN YOU BRIEFLY DESCRIBE HOW THE PLEXOS® MODEL WORKS TO CALCULATE THE MARGINAL ENERGY PRICE?

A. In each hour, PLEXOS® computes the marginal energy price for the Public Service system. The marginal energy price is a direct output of the PLEXOS® simulation and represents the price of electricity associated with balancing supply and demand for each hour given the operating characteristics of the power system and assumed market prices for each hour. As such, the marginal energy price represents the marginal cost of supplying an additional MWh of energy to the Public Service system in each hour.

Q. IS THE HOURLY MARGINAL ENERGY PRICE FROM PLEXOS® THE BEST NUMBER TO USE FOR DETERMINING THE COST OF ELECTRICITY FOR MARGINAL CHANGES IN ENERGY FOR THE COMPANY’S ELECTRIC SYSTEM?

A. Yes. PLEXOS® is a well-accepted software program widely used throughout the electric industry. The hourly marginal energy price is a direct output from the
PLEXOS® optimization of supply and demand for the Public Service system, and
requires no further adjustment or manipulation to determine energy value.

Q. PLEASE DESCRIBE INPUTS USED IN THE PLEXOS® MODEL.

A. The PLEXOS® model utilizes inputs that describe generation unit operating
characteristics such as heat rate, minimum and maximum capacities, forced
outage rates, planned maintenance, fuel contracts, and other various inputs.
Purchase Power Agreements (“PPAs”), including wind and solar contracts, are
also modeled in PLEXOS® using representative inputs. In addition, forward
market prices for natural gas, coal, and short-term market electricity purchases or
sales are included in the simulation. The model uses an hourly load based on the
most recent energy and demand forecast available. Generating unit retirements
and additions, as well as new and terminated PPAs, are also included according
to the Company’s most recently approved electric resource plan (“ERP”). Each of
these inputs is provided by business areas within the Company with the most
expertise at determining suitable input. For example, the input for generating
plant heat rates are determined by the Company’s Energy Supply business unit
based on generator performance tests for respective plants.

Q. WHAT IS THE OBJECTIVE OF THE PLEXOS® SIMULATION?

A. The objective of the PLEXOS® simulation is to determine the lowest cost supply
from generating resources that will meet the system load requirement while
adhering to all system operating constraints and inputs. PLEXOS® uses a linear
program to optimize supply to meet demand at the lowest system cost for the
given model inputs and constraints. The hourly marginal energy price output is
the price of electricity resulting from the PLEXOS® optimization of the modeled
system.

Q. **IS PLEXOS® USED FOR OTHER PURPOSES BY THE COMPANY?**

A. Yes. The PLEXOS® model is used to generate forecasts of fuel and purchased
power costs for internal planning and budgeting. PLEXOS® is also used in the
Company’s Electric Cost Adjustment, Fuel Clause Adjustment, Phase II rate
filings, and studies such as Effective Load Carrying Capability studies.

Q. **HAS THE COMPANY DISCUSSED THE PLEXOS® MODEL IN OTHER
PROCEEDINGS BEFORE THE COMMISSION?**

A. The Company described the PLEXOS® software and model in detail in the
proceeding to implement a new methodology to derive payments to Qualifying
Facilities (“QF”), Proceeding No. 13AL-0958E.¹ In the QF Proceeding, the
Commission approved the use of marginal energy prices from PLEXOS® for use
in determining the energy component of the rate the Company would use to set
the tariff for small QFs.² The Company is now proposing to use PLEXOS® in the
same fashion to determine marginal energy prices to evaluate DSM plans.

¹ Proceeding No. 13AL-0958E, In Re: Advice No. 1649 Electric Filed by Public Service Company of
Colorado to Implement a New Methodology to Derive Payment Rates to Qualified Facilities (QFs) with a
Design Capacity between 10 and 100 kW (“QF Proceeding”).
² See, Proceeding No. 13AL-0958E, Decision Nos. R15-1177 (Mailed Nov. 5, 2015), C16-0005 (Mailed
Jan. 5, 2016), and C16-0136 (Mailed Feb. 22, 2016).
Q. **WHAT IS THE BENEFIT TO USING PLEXOS® FOR THE PROPOSED METHOD AS COMPARED TO STRATEGIST®?**

A. The benefit of the PLEXOS® model is that it provides more granular marginal energy data and thus better captures the hourly patterns of the energy savings that are produced by different DSM measures. While Strategist® can provide a marginal energy price for a typical week for each month of the year (2,016 hours per year); the PLEXOS® model can provide a price for every hour of the year (8,760 hours per year).

Q. **HOW DO THESE BENEFITS TIE INTO THE COMPANY’S NEW DSM STRATEGY DISCUSSED BY MR. WHITE IN HIS DIRECT TESTIMONY?**

A. The new DSM strategy expands the DSM portfolios with measures that shift energy usage between hours. These measures result in some hours of increased usage. This is in contrast to the current strategy of portfolios composed only of energy-efficiency measures, which do not increase energy consumption in any hour. The energy benefits from the new measures are more dependent on the differences in energy cost between hours than prior energy-efficiency measures and require hourly energy price data to properly assess the effects of the new energy-shifting measures.

Q. **HOW FREQUENTLY DOES THE COMPANY PROPOSE TO UPDATE MARGINAL PRICES WITH PLEXOS® MODELING?**

A. The Company proposes to update the marginal energy prices from PLEXOS® in each DSM plan filing.
IV. CONCLUSION

1 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

2 A. Yes, it does.
Statement of Qualifications

David G. Horneck

I have twenty-four years of experience at Xcel Energy Services, Inc. in a variety of areas and positions. These include nuclear power engineering, nuclear core design and reactor safety analysis, nuclear fuel procurement, and risk management.


As Manager of Generation Modeling Services, I am responsible for managing the modeling of generation assets and purchased power agreements in order to produce production cost forecasts for corporate budgeting purposes, rate cases, and other regulatory filings for Xcel Energy's operating companies, including the Public Service Company of Colorado system.

I have a Bachelor of Science degree in Nuclear Engineering from the University of Wisconsin – Madison.

I have testified before state utility regulatory authorities in Colorado, Minnesota, and Wisconsin, and have submitted pre-filed direct testimony with the Public Utility Commission of Texas, the New Mexico Public Regulation Commission, and the Michigan Public Service Commission.