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
FOR APPROVAL OF A NUMBER OF
STRATEGIC ISSUES RELATING TO
ITS DSM PLAN, INCLUDING MODIFIED
ELECTRIC ENERGY SAVINGS AND DEMAND
REDUCTION GOALS, AND REVISED
INCENTIVES FOR THE PERIOD 2015
THROUGH TO 2020; FOR APPROVAL OF A
DISTRIBUTION VOLTAGE OPTIMIZATION
PROGRAM TOGETHER WITH COST
RECOVERY AND INCENTIVES, AN LED DOCKET NO. 13A-0686EG
STREET LIGHTING PRODUCT AND
APPROVAL TO INCLUDE BEHAVIORAL
CHANGE PRODUCTS IN THE COMPANY’S
DSM PORTFOLIO AND OF THE
METHODOLOGY TO BE USED TO MEASURE
SAVINGS FROM SUCH PRODUCTS; AND
FOR COMMISSION GUIDANCE REGARDING
THE FACTORS TO BE CONSIDERED AND
APPROPRIATE LEVEL OF THE COMPANY’S
GAS DSM PROGRAM IN THE FUTURE.

REBUTTAL TESTIMONY OF KELLY BLOCH
ON
BEHALF OF
PUBLIC SERVICE COMPANY OF COLORADO

December 20, 2013
Corrected on April 11, 2014
BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

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DOCKET NO. 13A-0686EG

REBUTTAL TESTIMONY OF KELLY BLOCH

1 Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.
A. My name is Kelly Bloch. My business address is 1123 W. 3rd Ave Denver,
CO 80223.

4 Q. HAVE YOUR PREVIOUSLY SUBMITTED TESTIMONY IN THIS
PROCEEDING?
A. Yes. On June 17, 2013, I submitted Direct Testimony and Exhibits in this proceeding on behalf of Public Service Company of Colorado (“Public Service” or the “Company”).

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my rebuttal testimony is to respond to the answer testimonies of intervenors that addressed Distribution Voltage Optimization (“DVO”).

Q. CAN YOU SUMMARIZE HOW DVO LOWERS CUSTOMERS’ ENERGY CONSUMPTION?

A. Small changes in voltage can change the amount of energy used by appliances and equipment. As stated in my Direct Testimony, DVO is a method that enhances control of the voltage on the distribution system, which allows for the system to operate at a voltage in the lower portion of the acceptable voltage range established by the American National Standards Institute (“ANSI”) Standard C84.1-1995. As a result of the lower voltage, less energy is used by end-use appliances and equipment to the direct benefit of customers. Customers realize energy savings in an amount similar to improving the efficiency of appliances and equipment by approximately two percent.

Q. CAN YOU PROVIDE MORE DETAILS ON HOW DVO LOWERS CUSTOMERS’ ENERGY CONSUMPTION?

A. Many electric loads are designed to use voltages between 110-127 volts AC. In the simplest terms, energy use can be calculated by the following calculation:
Energy (kWh) = Power (kW) x Time (Hr);

(where Power = Current x Voltage).

Lowering the voltage directly reduces energy use. Generally speaking, DVO utilizes voltage sensing to allow for the operation of the distribution system at a lower voltage that is within the acceptable voltage range and lowers energy consumption by end-use devices. The actual response that specific end-use devices have to changes in voltage is more complex than the simplistic formula. The more complex formulas can be found in a report prepared by Pacific Northwest National Laboratory (“National Laboratories”) for the U.S. Department of Energy (“DOE”). The Electric Power Research Institute (“EPRI”), National Laboratories, and DOE have conducted field trials and utilities have done modeling which demonstrate reduced energy consumption by end-use devices from lowering the voltage supplied to customers.

Q. HOW DOES DVO DIFFER FROM TYPICAL REACTIVE POWER CONTROL AND VOLTAGE CONTROL?

A. In a typical distribution grid, capacitors are used to correct the power factor by supplying the reactive power needs of end-use devices locally at the distribution circuit level as opposed to supplying them from the generating station (as stated in my Direct Testimony on page 4, lines 11-22). This reduces losses, provides grid stability, and improves the efficiency of the utility network. Capacitors also have the benefit of compensating for the normal voltage drop along the feeder by raising the voltage when they are on-
line. Capacitors have been placed in the field to optimize power factor and voltage for peak conditions.

DVO technology now allows the utility to monitor the voltage along the feeder and control line capacitors, line regulators, and load tap changers located at the substation to optimize the voltage year-round as opposed to at a single point in time, as it did in the past. While the actual equipment and the functions of the equipment used as part of DVO have not changed, the ability to control the equipment and utilize additional functionality has changed with DVO. DVO provides new functionality that allows the Company to dynamically control the voltage, enabling us to operate in the lower end of the acceptable voltage range, thereby reducing the energy consumption of customers’ appliances and equipment.

Q. CAN YOU PLEASE EXPLAIN WHAT THE UTILITY AND CUSTOMER BENEFITS OF DVO ARE?

A. Yes. The utility benefit of DVO is that it reduces distribution system losses by improving the power factor, as explained in detail by Colorado Public Utilities Commission Staff (“Staff”) in Mr. Paul Caldara’s Answer Testimony, pages 5-6. Although important, this utility benefit only represents approximately one to two percent of the total benefits derived from the proposed DVO project.

The majority of the benefits derived from DVO, as a direct result of optimizing voltage on a year round basis, occur on the customer side of the meter in the form of reduced energy consumption. As explained by Western Resource Advocates (“WRA”) in Mr. Kenneth Wilson’s Answer Testimony,
pages 5-8, DVO directly impacts the energy load on the customer side of the meter. Lowering the voltage directly reduces the power consumed by customers, resulting in energy savings for customers. The savings for retail customers, once DVO is fully implemented, will be on the order of $50 million per year each year the system is operated with savings increasing as load increases.

Q. WRA, ON PAGE 12 OF MR. WILSON’S ANSWER TESTIMONY, HAS SUGGESTED THAT THE COMPANY LOOK INTO THE USE OF SOLID-STATE SERVICE TRANSFORMERS. HAS THE COMPANY LOOKED INTO THEM?

A. There has not been a study done to look at the cost and benefit to replace fully depreciated transformers with more energy efficient transformers such as solid state transformers as part of the DVO project. While no comprehensive study has been done for a number of years, the Company has considered losses versus replacement costs for smaller transformers, which serve residential customers. The Company found that the average cost for replacement is more than 2.5 times the 30 years loss savings. For larger three phase transformers, the average cost for replacement is more than 1.4 times the 30 year loss savings. If the time value of money is considered, the results are even less favorable. At this time, the Company believes that, while replacing transformers can improve energy efficiency, making the replacements for energy savings alone is not worthwhile.
Q. SWEEP HAS RECOMMENDED THAT THE COMMISSION REQUIRE PUBLIC SERVICE TO CONDUCT FIELD TESTING OF ENERGY SAVINGS FROM A REPRESENTATIVE SAMPLE OF DISTRIBUTION FEEDERS TO VERIFY THAT DVO IS COST-EFFECTIVE, AND TO PROJECT ENERGY SAVINGS, AND DETERMINE THE CORRECT AMOUNT OF LOST REVENUE RECOVERY TO WHICH THE COMPANY IS ENTITLED. DO YOU BELIEVE THAT FIELD TESTING IS NECESSARY?

A. No. As stated on pages 6-7 of my Direct Testimony, the Company has already performed two pilots on DVO and participated in EPRI’s Green Circuits program, which included field testing of six feeders on two different Company substations by EPRI. The pilots and the EPRI testing indicated energy savings of about 2.5 percent, which is consistent with what other studies have found across the industry. The Company has used the energy savings data from the pilots and field testing to forecast energy savings to be realized by customers from the proposed DVO project. Additional information on the Company’s demonstrated experience with DVO can be found in my Direct Testimony on pages 6-8 and additional information on how the Company developed the forecasted savings for this DVO project can be found in my Direct Testimony on pages 8-9 and 11-12.
Q. STAFF HAS STATED, ON PAGE 10 OF MR. CALDARA’S ANSWER TESTIMONY, THAT THE USE OF LARGE FEEDER CONDUCTORS IS A UTILITY-SIDE INVESTMENT COMPARABLE TO DVO. WHAT IS YOUR OPINION?

A. While the use of larger conductors does reduce voltage drop across the distribution system, it is different from DVO because it cannot be controlled to optimize the voltage. Public Service has historically used larger conductor sizes to minimize losses and to mitigate voltage drop along the feeder. The voltage control that the proposed DVO project offers goes beyond traditional utility practice in that it does not solely focus on ensuring that the customers receive voltage between the acceptable range at peak. Rather, it continuously optimizes the voltage to be the lowest acceptable voltage at the feeder necessary to supply energy to all customers served by that feeder. Moving beyond an acceptable voltage to the optimal voltage with DVO actively creates energy savings for the customers.

Thus, the DVO project is less like the use of large feeder conductors and more appropriate as DSM. Additional discussion on the merits of DVO as DSM can be found in Ms. Debra Sundin’s Rebuttal Testimony on pages 35-37.
Q. STAFF HAS STATED, ON PAGE 11 OF MR. CALDARA’S ANSWER TESTIMONY, THAT DVO IS SIMILAR TO THE COMPANY’S IMPLEMENTATION OF ELECTRIC UTILITY INFRASTRUCTURE (“EUI”) BECAUSE IT INCREASES EFFICIENCY ON THE UTILITY-SIDE OF THE METER. DO YOU AGREE?

A. As stated in Ms. Sundin’s Direct Testimony, page 64, EUI projects, like the proposed DVO project, are implemented to save energy on the utility side of a meter. However, unlike the proposed DVO project, customers do not experience any reduction in energy usage and direct energy savings that reduce their monthly energy bills from EUI. As is the case with traditional utility-side investments, customers indirectly benefit from EUI through decreased fuel costs. An example of an EUI project is replacing a turbine at a hydroelectric facility with one that runs more efficiently. However, in such an example, no direct energy savings will occur on the customer side of the meter. In the case of DVO, 97 to 98 percent of the savings will occur on the customer side of the meter. As such, DVO is very different from EUI, departing from traditional utility-side investments like EUI.
Q. THE CITY OF BOULDER, ON PAGE 13 OF MS. KELLY CRANDALL’S ANSWER TESTIMONY, RAISES A CONCERN THAT DVO WAS PRESENTED TO THE COMMISSION AS A GRID MODERNIZATION PROJECT WITH UTILITY-SIDE BENEFITS IN THE SMARTGRIDCITY COST RECOVERY PROCEEDING, INDICATING THAT THE COMPANY MAY BE REQUIRED TO OBTAIN A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY (“CPCN”). WHAT IS YOUR RESPONSE?

A. For the reasons I discuss below we disagree that a CPCN would be required in order for the Company to go forward with DVO. As described above in and in my Direct Testimony, the proposed DVO project is a utility-side investment that is part of our modernization of our electric distribution system. The type of investments involved, specifically the installation of additional capacitors on our distribution feeders, are consistent with the types of investments we make in our distribution system in the ordinary course of business. What distinguishes DVO from other distribution investments we make in the normal course of business is not that the type of investment is unique, but that its benefits are energy savings on the customer-side of the meter that directly benefit customers like Demand Side Management (“DSM”) measures. Moreover, because the type of investments we will be making to optimize the voltage on our distribution system through the DVO projects are consistent with other distribution system investments that Commission rules presume to
be in the ordinary course of business, we do not believe a CPCN is required to go forward with the project.

Q. DOES THE COMPANY AGREE THAT THE COMMISSION SHOULD HAVE THE OPPORTUNITY TO REVIEW AND APPROVE ITS DVO PROPOSAL BEFORE PROCEEDING?

A. Yes. While we believe DVO is a valuable project that has the potential to provide significant benefits to our customers in the form of energy savings and reduced electric bills, and given the magnitude of the investment that will be required to implement DVO across our system, we believe it is very important for the Commission to review and approve our proposal before proceeding. We have sought that approval in this proceeding, because the principal benefits of DVO are, like all of our other energy efficiency investments, the resulting energy savings for our customers. Further, DVO carries the same disincentive as other DSM investments in that the result of such investment will be reduction in our energy sales. For both these reasons, we believe we have appropriately sought approval of our DVO proposal as part of this Strategic Issue proceeding and do not think a separate CPCN application should be required.
Q. STAFF, ON PAGES 16-18 OF MR. CALDARA’S ANSWER TESTIMONY, HAS LIKENED DVO TO THE CONVERSION OF CHEROKEE 2 FROM COAL GENERATION TO A SYNCHRONOUS CONDENSER, STATING THAT THEY BOTH ARE SOURCES OF REACTIVE POWER AND PROVIDE VAR SUPPORT, TAKING THE POSITION THAT THE COMPANY SHOULD APPLY FOR A CPCN. HOW DO YOU RESPOND?

A. Mr. Caldara is correct that DVO will provide reactive power support to the distribution system, which will improve system losses and provide for overall system stability. However, DVO is distinguishable from the conversion of Cherokee to a synchronous condenser because DVO involves distribution system investment which the Commission’s Rule 3207(a) states is deemed to occur in the “ordinary course of business and shall not require a certificate of convenience and necessity.” Further, the benefits of DVO that Mr. Caldera identifies are only ancillary benefits of DVO. He has ignored the primary impact of DVO, which is enhanced voltage control and the ability to lower the voltage most of the year, which results in energy savings on the customer-side of the meter. As stated above, 98 to 99 percent of the savings from the proposed DVO project are associated with energy savings. Accordingly, it is appropriate for the Commission to consider and approve the Company’s DVO proposal in this proceeding.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.