BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF NEW MEXICO FOR APPROVAL OF ELECTRIC ENERGY EFFICIENCY PROGRAMS AND PROGRAM COST TARIFF RIDER PURSUANT TO THE NEW MEXICO PUBLIC UTILITY AND EFFICIENT USE OF ENERGY ACTS	)	**Case No. 12-00317-UT**
PUBLIC SERVICE COMPANY OF NEW MEXICO,	)	
Applicant.	)	

DIRECT TESTIMONY

OF

PATRICK J. O'CONNELL

OCTOBER 5, 2012

DIRECT TESTIMONY OF
PATRICK J. O'CONNELL
CASE NO. 12-00317-UT

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Patrick J. O'Connell. I am Director, Planning and Resources for Public Service Company of New Mexico ("PNM" or "Company"). My business address is Public Service Company of New Mexico, Main Offices, Albuquerque, NM 87158.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL QUALIFICATIONS.

A. Since 1996 I have worked at the Public Service Company of New Mexico leading planning efforts in several areas of the Company. From 1998 through 2007 I was a gas supply planner in PNM's gas utility; from 2007 until recently I worked on strategic planning projects in PNM's Integrated Resource Planning ("IRP") group and PNM's Generation group. I began my current position as Director, Planning and Resources in July 2012. I graduated with distinction and magna cum laude in General Honors from the University of New Mexico in May, 1990, with a bachelor's degree in Civil Engineering and am a Registered Professional Engineer in the State of New Mexico.

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS DIRECTOR, PLANNING AND RESOURCES.

A. As Director I oversee PNM's IRP and Energy Efficiency Design teams. The IRP team is responsible for developing PNM's resource plans and the regulatory filings to support the resource plans, including the annual renewable energy procurement plan ("REPP") and the IRP which is required to be filed every three years. The IRP team also conducts requests for

proposals to procure PNM's generation resources. The Energy Efficiency Design team develops PNM's energy efficiency and load management program plans and the regulatory filings to support them. The Energy Efficiency Design team also oversees the energy efficiency and load management program budget and prepares the annual reports that are filed with the New Mexico Public Regulation Commission ("NMPRC" or "Commission").

Q. HAVE YOU PREVIOUSLY PROVIDED TESTIMONY IN COMMISSION PROCEEDINGS?

A. No.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. The purpose of my testimony is to explain the methodology PNM used to calculate the value of capacity and energy savings expected from PNM's proposed 2012 Energy Efficiency and Load Management Program Plan ("2012 Plan"). These values are used in the total resource cost ("TRC") calculations that demonstrate the cost effectiveness of each of the energy efficiency and load management programs. The 2012 Plan and the TRC calculations are presented by PNM witness Steven Bean. The value of capacity and energy savings is also used in the derivation of the appropriate incentive payment by PNM witness Frank Graves.

Q. WHAT ARE ENERGY EFFICIENCY AVOIDED COSTS AND HOW WERE THEY USED IN DEVELOPING THE 2012 PLAN?

A. Energy efficiency avoided costs are the capacity and energy costs that a utility avoids or defers due to implementation of energy efficiency and load management programs that result in customers consuming less energy and requiring less peak demand capacity than would otherwise be used or required. PNM calculates these avoided costs whenever new energy efficiency programs are filed with the Commission to determine the net benefits and cost-effectiveness, as demonstrated by the TRC, of the energy efficiency programs.

Q. HOW ARE THE AVOIDED COSTS USED IN THE CALCULATION OF THE COST-EFFECTIVENESS OF ENERGY EFFICIENCY PROGRAMS?

A. The avoided costs from energy efficiency and load management programs are used to determine the benefit portion of the cost-benefit ratio of each energy efficiency program. Benefits are determined over the effective useful life of the particular program measures. For example, replacing lighting with new high-efficiency lighting delivers savings over a period of several years. The cost-benefit analysis for the 2012 Plan is described in further detail by Mr. Bean. The majority of the benefits of the programs proposed in the 2012 Plan are derived from avoided costs of capacity and energy.

Q. WHAT VALUE OF EXPECTED CAPACITY SAVINGS DID PNM USE TO CALCULATE THE SYSTEM BENEFITS OF ENERGY EFFICIENCY PROGRAMS IN THE 2012 PLAN?

A. The value of deferred capacity costs due to the energy efficiency measures in PNM's 2012 Plan is $124.04 per kilowatt-year.

Q. HOW WAS THE VALUE OF EXPECTED CAPACITY SAVINGS CALCULATED?

A. PNM compared capacity needs on its system with and without the proposed programs. This comparison identified reductions in capacity needs attributable to the energy efficiency programs. PNM calculated expected savings by quantifying the capacity savings projected for the 2012 Plan measures, first by identifying the amount of deferred capacity, then by determining the economic value of deferring that amount of capacity, and finally by allocating the savings to the planned program measures. Deferred capacity was identified by comparing least-cost portfolios for two cases: one that included the projected impact of the 2012 Plan and one without that impact. The value of the deferred capacity was calculated as the net present value of the annual differences in revenue requirements for capital and fixed operations and maintenance expense ("O&M") between the two cases.

Q. HOW WERE THE GENERATION CAPACITY DEFERRALS ASSOCIATED WITH THE 2012 PLAN DETERMINED?

A. Future generation resource additions were developed utilizing the Strategist™ modeling tool to identify least cost resource requirements for two cases. In both cases, all inputs were the same with the exception of the energy efficiency forecast. The first case assumes that implementation of the currently approved programs cease, that is PNM stops spending money to implement energy efficiency programs, at the end of 2012, and

no new energy efficiency programs are implemented in the future. The second case assumes that the energy efficiency programs in the 2012 Plan are implemented as proposed. Implemented as proposed means two years of spending on the energy efficiency programs included in the 2012 plan, which is appropriate because PNM will make a new plan filing two years from now. As described in Mr. Bean's testimony, most program measures have lives that last more than two years. As a result the energy efficiency measures in both cases provide a reduction in demand after implementation stops. The estimate of available load management capacity for both cases is based on the continuation of PNM's existing contracts with Comverge and EnerNOC through the term of the contracts. The cumulative generation resource additions for each case are shown in columns A and B of PNM Exhibit PJO-1. The first case is identified as the Baseline and the second as the 2012 Plan on PNM Exhibit PJO-1.

Q. WHAT INPUTS WERE USED IN THE STRATEGIST™ MODELING PERFORMED FOR THE 2012 PLAN?

A. In addition to load forecasts with and without the effects of the 2012 Plan, the primary inputs to Strategist™ for this analysis are PNM's existing portfolio of resources and a natural gas price projection. The assumed resource portfolio consists of PNM's existing resources, the renewable energy resources proposed in PNM's 2013 REPP (NMPRC Case No. 12-00131-UT) and additional renewable energy resources needed to meet future renewable portfolio standard compliance targets. Natural gas price assumptions are summarized on PNM Exhibit PJO-2. The prices used were based on New York

Mercantile Exchange ("NYMEX") natural gas futures contract settlement prices on July 20, 2012, for futures contracts through 2016 and escalated annually at 3.5% thereafter. The delivered natural gas prices start at $3.26/MMBtu and increase to $7.68/MMBtu in 2031.

Q. HOW WAS THE VALUE OF DEFERRED CAPACITY COSTS DUE TO ENERGY EFFICIENCY MEASURES IN PNM'S 2012 PLAN CALCULATED?

A. The Strategist™ modeling identified a portfolio of optimal resource additions for both the base case and the 2012 Plan case. PNM calculated the annual capital and fixed O&M revenue requirements for each of the resource additions in both portfolios. The value of the deferred capacity costs is the net present value of the annual difference in capital and fixed O&M revenue requirements between the two cases. The annual capital and fixed O&M revenue requirements for the two cases are shown in columns C and D of PNM Exhibit PJO-1. The annual difference between the two is shown in column E, and the present value of the annual differences is $52.4 million using PNM's weighted average cost of capital ("WACC") of 8.20% as the discount rate. This is the same WACC PNM used in the calculation of the revenue requirement for the renewable rider and is lower than the WACC approved by the Commission in PNM's last rate case. In order to use this value of $52.4 million for the total deferred capacity costs in the TRC test for each of the program measures, the value must be allocated to the capacity savings associated with each of the programs. The total capacity savings associated with the 2012 Plan are 422 MW-year; dividing $52.4 million by 422 MW-year results in a value of deferred capacity

costs of $124.04/kW-year as shown on PNM Exhibit PJO-1. This avoided capacity cost is used in the TRC calculations presented in Mr. Bean's testimony.

Q. WHAT AVOIDED ENERGY AND CARBON COSTS DID PNM USE TO EVALUATE THE SYSTEM BENEFITS OF ENERGY EFFICIENCY PROGRAMS IN THE 2012 PLAN?

A. The annual energy efficiency avoided energy costs and avoided carbon costs for the residential and commercial programs are shown on PNM Exhibit PJO-3.

Q. HOW WERE THE AVOIDED ENERGY COSTS DETERMINED?

A. The avoided energy costs are based on two items: avoided fuel and avoided variable O&M ("VOM"). The avoided energy calculation assumes that, if not for the energy efficiency programs, PNM would generate the kWh saved as a result of the programs from the generation unit that is on the margin of the economic dispatch stack at the time the energy is avoided. Avoided fuel and VOM was calculated for two time periods: on-peak hours and off-peak hours. For the peak load hours of 8:00 am to 8:00 pm Monday through Friday, the marginal generation unit is assumed to be a combined cycle unit - either Afton Generating Station ("Afton") or the Luna Energy Facility ("Luna"). For the off-peak hours, the marginal generation unit is assumed to be the Four Corners Power Plan ("Four Corners"). These assumptions are reasonable because PNM typically meets demand by dispatching only its baseload resources during the off-peak period and adds intermediate and peaking resources during the on-peak period. Due to Four Corners fuel

pricing, Four Corners is the baseload unit most likely to be turned up or down to meet jurisdictional load during the off-peak period. It is assumed that Afton or Luna will typically be used to balance load variations during the on-peak period. The use of just Afton and Luna in the model is a conservative assumption because, during the summer on-peak period, PNM will also be dispatching gas units with higher heat rates than Afton and Luna.

Avoided energy costs are determined by adding the cost of fuel and VOM. On-peak avoided energy costs were calculated assuming the energy would be generated at a 7,500 Btu/kWh heat rate, which is the average of the rates for Afton and Luna as reported in PNM's 2011 IRP. On-peak VOM rates are based on calculating the O&M rate for Afton in 2012 and escalating at 2.5 percent per year thereafter. Off-peak avoided energy costs were calculated assuming the marginal energy would be generated at Four Corners. Four Corners fuel pricing and heat rate are as reported in the 2011 IRP. VOM costs at Four Corners are limited to items like reagents for the pollution control systems. Those costs are negligible compared to fuel and scheduled maintenance costs, so PNM did not assign any costs to the VOM category in its modeling of off-peak avoided energy. PNM Exhibit PJO-2 shows the annual calculation for peak and off-peak avoided energy.

Q. WHY WAS THE AVOIDED ENERGY COST ALLOCATED BETWEEN PEAK AND OFF-PEAK PERIODS FOR THE RESIDENTIAL AND COMMERCIAL PROGRAMS?

A. The residential and commercial programs differ in their impacts during the peak and off-peak periods. The avoided energy cost per MWh differentiated by peak and off-peak periods provides a more accurate estimate of the future energy savings of the different programs and of the portfolio TRC results. A good example is the comparison of residential lighting to commercial lighting. Residential lighting will be on predominantly in the evening, at the end or after the end of the peak period. Commercial lighting is on predominantly during the peak period. Hourly avoided energy profiles for the residential and commercial energy efficiency programs also illustrate the differences. In both summer and winter, the avoided energy profiles for the residential programs show a small peak in the morning and a higher peak after the on-peak period. The avoided energy profile for the commercial programs peaks during the on-peak period. The avoided energy benefit should be calculated to account for the differences in the effects of residential and commercial programs during the peak and off-peak periods. Figures PJO-1 and PJO-2 show unitized hourly demand reduction impacts for residential and commercial energy efficiency programs respectively. The figures illustrate that the greatest demand reductions occur at different times of the day for the two customer categories.

Figure PJO-1
Residential EE Program Unitized Hourly Demand Reduction

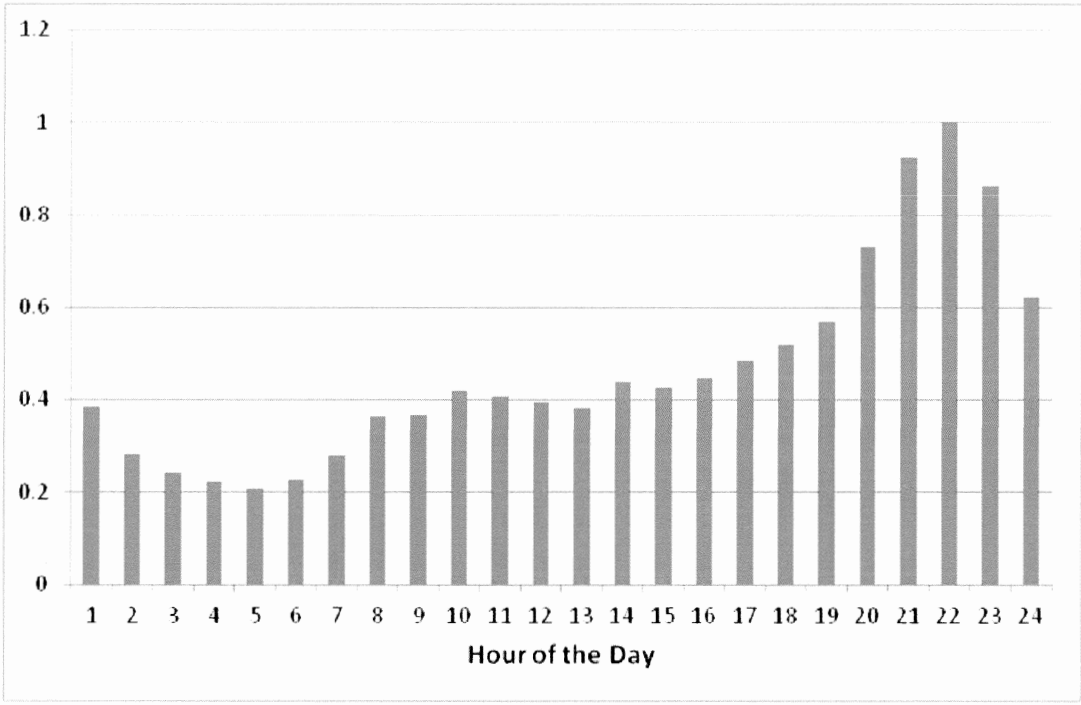
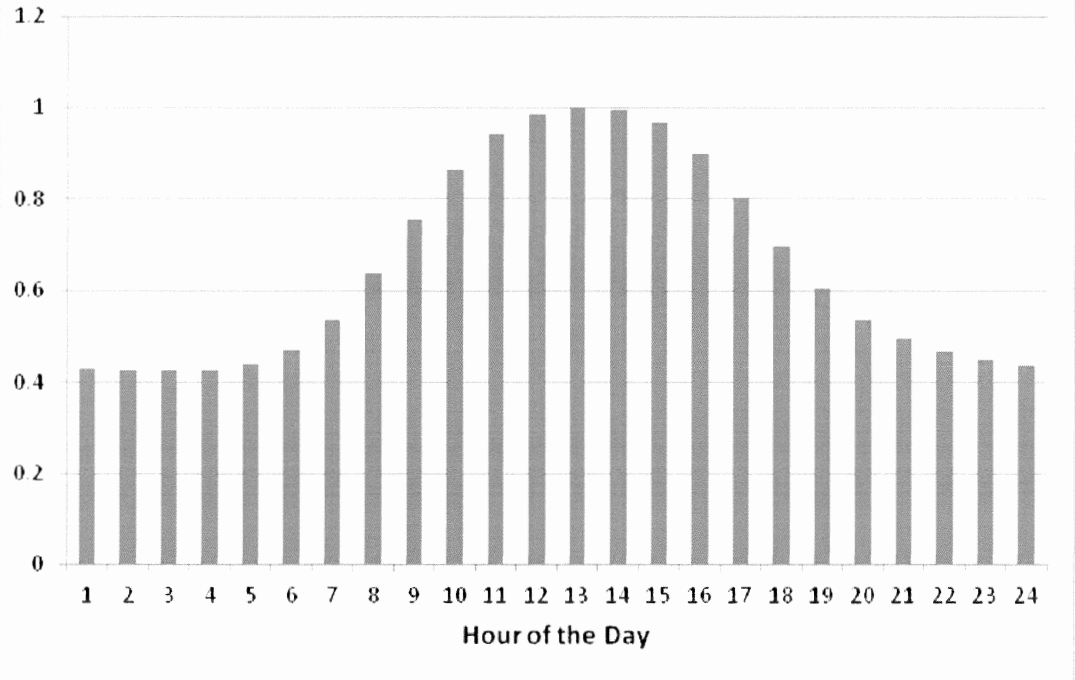


Figure PJO-2
Commercial EE Program Unitized Hourly Demand Reduction



Q. HOW WAS THE AVOIDED ENERGY COST CALCULATED FOR THE RESIDENTIAL AND COMMERCIAL PROGRAMS?

A. The annual avoided energy benefit for the residential and commercial programs was calculated as shown on Page 1 of PNM Exhibit PJO-3. The peak and off-peak percentages shown for the residential and commercial programs are the average distribution of hourly avoided energy over program lifetime savings. On-peak and off-peak costs are derived from PNM Exhibit PJO-2. The avoided cost for the residential and commercial programs are the sum of the on-peak cost times the on-peak percentage and the off-peak cost times the off-peak percentage for each customer class.

Q. HOW SENSITIVE ARE THE AVOIDED ENERGY COSTS TO CHANGES IN NATURAL GAS PRICES?

A. The avoided energy cost calculation uses July 20 NYMEX gas futures prices as a reasonable set of assumptions for modeling purposes in determining the avoided capacity cost savings of the 2012 Plan. On September 7, 2012, I did a check and found that gas prices were down by an average of $0.17/ MMBtu for 2013 and $0.12/MMBtu for 2014, which decreases the avoided cost for 2013 by $0.51/MWh for the residential programs and by $0.62/MWh for the commercial programs and decreases the avoided cost for 2014 by $0.33/MWh for the residential programs and by $0.41/MWh for the commercial programs. The 5% decrease in gas prices between July 20 and September 7 would decrease the avoided energy cost by less than 3%, and decrease the program portfolio

TRC presented in Mr. Bean's testimony from 1.70 to 1.68 or by about 1%. So, a large, unexpected gas price reduction is necessary to impact the cost-effectiveness of the programs in the 2012 Plan.

Q. WHY IS PNM USING THE APPROACH DESCRIBED ABOVE INSTEAD OF A PROMOD™ CALCULATION TO DETERMINE THE AVOIDED ENERGY COST BENEFIT OF THE PROGRAMS IN THE 2012 PLAN?

A. PNM's avoided energy benefit calculation for the energy efficiency programs in this case is based on the same system dispatch principles and same basic assumptions as would be used in PROMOD™. PROMOD™ is a modeling tool that utilizes an hourly simulation of generation system dispatch to meet hourly system demands and is an effective tool for avoided energy benefit calculations. However, the approach presented in this case is more transparent and can be more readily updated if input assumptions change, due to the relative simplicity of the calculation.

Q. HOW WOULD A PROMOD™ SIMULATION DIFFER FROM THE RESULTS PRESENTED HERE?

A. A PROMOD™ simulation would be based on an hourly calculation of the avoided cost rather than an annual average on-peak and off-peak calculation. The hourly calculation would produce a higher avoided energy cost than the result of the on-peak, off-peak approach. This is because the approach used in this case makes the conservative assumption that the on-peak heat rate is 7,500 Btu/kWh. When PNM adds peaking units

to the system dispatch the on-peak heat rate will be higher than 7,500 Btu/kWh, resulting in a higher avoided energy cost. I verified this relationship by completing some PROMOD™ modeling prior to preparing this testimony. Using the on-peak, off-peak approach is appropriate here because it demonstrates the cost effectiveness of the energy efficiency programs proposed in a more conservative and transparent manner.

Q. HOW WERE THE AVOIDED CARBON COSTS DETERMINED?

A. Similar to the avoided energy calculation, the avoided carbon cost calculation assumes that, if not for the energy efficiency programs, carbon dioxide ("CO_2") emissions will result from running the generation unit that is on the margin of the economic dispatch stack at the time the energy is avoided. The avoided carbon cost calculation also assumes that in the future there will be a cost associated with those CO_2 emissions. The on-peak and off-peak marginal generation assumptions for the carbon cost calculation are the same as those used for the avoided energy cost calculation. On-peak carbon emissions were calculated assuming the energy would be generated at an emission rate of 786 pounds per MWh CO_2, which is the average rate for Afton and Luna as reported in PNM's 2011 IRP. Off-peak carbon emissions were calculated assuming an emission rate of 1,995 pounds per MWh CO_2, which is the rate for Four Corners as reported in the 2011 IRP. Carbon pricing is assumed to start in 2018 at $10 per metric ton and escalate at 2.5 percent per year. This carbon pricing approach is based on the assumptions that 2018 is the soonest legislation creating carbon pricing at the federal level could become effective and that the $10 starting price is high enough to cause some reduction in GHG

emissions. The carbon pricing assumptions required in the IRP rule are carbon prices starting at $8, $20 and $40 per metric ton starting in 2010 and escalating at 2.5%. The $8 starting price from the IRP rule escalates to $9.75 per metric ton in 2018. Using a higher carbon price assumption will further reinforce the cost-effectiveness of the 2012 Plan as described by Mr. Bean. On-peak and off-peak CO_2 costs were allocated to commercial and residential programs using the percentages as used for the avoided energy calculation. PNM Exhibit PJO-2 shows the annual calculation for peak and off-peak CO_2 emission prices. PNM Exhibit PJO-3, Page 2, shows how those prices were allocated to the energy balance for residential and commercial programs. The annual avoided energy and CO_2 emission prices shown on PNM Exhibit PJO-3 were applied to each program's TRC calculation as described in Mr. Bean's testimony.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

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