BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF THE APPLICATION
OF PUBLIC SERVICE COMPANIES 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,

PUBLIC SERVICE COMPANY OF
NEW MEXICO

Applicant

DIRECT TESTIMONY

OF

BRUNO E. CARRARA, P. E.

ON BEHALF OF

NEW MEXICO PUBLIC REGULATION COMMISSION
UTILITY DIVISION

23 January 2013
Q. Please state your name, position and business address.

A. My name is Bruno E. Carrara. I am the Bureau Chief for the Electrical Engineering Bureau of the Utility Division of the New Mexico Public Regulation Commission ("NMPRC", "PRC", or "Commission"). My business address is New Mexico Public Regulation Commission, P.E.R.A. Building, 1120 Pasco de Peralta, Santa Fe, New Mexico 87504. My e-mail address is bruno.carrara@state.nm.us.

Q: Please describe your educational background and experience.

A. I received Bachelor's and Master's degrees in Mechanical Engineering from the University of New Mexico, in 1972 and 1975, respectively. I have performed extensive post-graduate course study work, both in work-related and personal capacities, including training on project management, cost engineering, cost accounting, and utility operation, governance and regulation. I have been a registered Professional Engineer in New Mexico since 1976. My License number is 6162. In 1985, I successfully completed the Program for Management Development ("PMD"). The PMD is an intensive three month business program offered at the Harvard Business School in Cambridge, Massachusetts, in business administration for technical, non-business executives.
My professional experience consists of over 40 years in the domestic and foreign electric and natural gas utility industry. I worked for 25 years for a combined electric and natural gas utility. I held technical, managerial and executive positions on both sides of the company, as well as in its non-regulated subsidiaries. After retirement in 1995, I performed consulting work for both domestic and foreign companies in the energy and utility industry, primarily as a project developer, for nearly 8 years. In early 2003, I was hired by the NMPRC to be the Statutory Pipeline Safety Engineer for New Mexico, and, as such, was Bureau Chief of the Pipeline Safety Bureau of the Transportation Division. I subsequently worked for the US Department of Transportation’s Pipeline and Hazardous Material Safety Administration as a pipeline safety inspector and accident investigator. I left that position and accepted my current position here at the PRC in August 2010.

Q: **Have you presented testimony before this Commission in other cases?**

A: Yes, I presented testimony many years ago prior to my employment at the Commission when I was in private industry. I also presented testimony in several enforcement cases and in rulemaking proceedings in my previous capacity as Pipeline Safety Engineer. Staff Exhibit BEC-1 shows the utility cases in which I have presented testimony or have submitted an affidavit in my current capacity.
Q: What is the purpose of your testimony?

A: I am presenting testimony in this case in support of the policy recommendations made by Staff Witnesses Lamberson and Brack, and in support of the Energy Efficiency and Load Management program recommendations made by Staff Witness Reynolds. Specifically, I was given the assignment of reviewing Public Service Company of New Mexico’s (PNM’s or Company’s) avoided cost calculations, and I present Staff’s analysis, conclusions and recommendations regarding PNM’s deferred cost calculations; Staff’s analysis, conclusions and recommendations regarding PNM’s application of deferred cost benefits in the TRC test; Staff’s overall cost benefit analysis of PNM’s proposed 2012 Plan; and the calculations supporting Staff’s incentive proposal.

I my testimony, I refer to the PNM Power Saver and Peak Saver load management programs as the “LM” programs and the Commercial, Residential and Low Income energy efficiency programs as the “EE” programs.

Q. Summarize Staff’s primary recommendations made in your testimony.

A. First, PNM’s deferred capacity value of $122.40 per kW-year for energy efficiency programs should be reduced to $78.42 per kW-year;
Second, a corrected deferred capacity value of $123.24 per kW-year should be used for LM;

Third, Staff’s proposed $78.42 per kW-year deferred capacity value should be used for TRC test calculations to evaluate the cost effectiveness of PNM’s proposed plan EE programs for this Application as presented by Staff witness John Reynolds;

Fourth, PNM’s TRC calculations should be corrected for mathematical errors as presented in my testimony. Staff Witness Reynolds corrects for these errors in his testimony;

Fifth, PNM’s avoided cost methodology should be rejected as the basis for determining an EUEA incentive; and

Lastly, the Commission should consider an alternative Staff incentive proposal in the amount of $1.7M for Program Year 2013.

Q. **How is your testimony organized?**

A. My testimony is divided into five major sections. First, I will broadly discuss the method used by PNM in the application to perform the total resource cost (TRC)
test. Second, I will discuss PNM’s derivation of the energy (kWh) saving costs
that are used in the TRC benefit calculation. Third, I discuss the capacity (kW)
deferrals and resulting savings and costs that are used in the TRC benefit
calculation. In doing so, I also discuss some matters regarding mathematical
computations made by PNM in the capacity benefit calculations that Staff
believes need to be corrected. I also discuss what Staff believes to be strengths
and shortcomings of the approach PNM took in the application. In the fourth
section, I discuss the overall cost and savings of PNM’s EE and LM programs as
proposed. Finally, I discuss an alternative approach and amount for the incentive
payment that PNM is requesting.

Q: What information did you review to prepare your testimony?

A: I examined PNM’s application and the included testimonies and exhibits. I also
examined the interrogatories submitted by Staff and interveners and PNM’s
responses thereto and engaged in some informal discovery with PNM. I also
briefly reviewed the transcripts of the depositions taken by the New Mexico
Industrial Energy Consumers (NMIEC).

SECTION I: PNM’S TRC METHODOLOGY

Q: Before beginning, please describe your understanding of the statutory TRC
requirements.
A: I am not an attorney, but I will provide my understanding of the TRC test contained in the Efficient Use of Energy Act (EUEA). The EUEA has two definitions that pertain to the TRC. The first is a definition of “cost effective”, which says that an energy efficiency or load management program is deemed cost effective if it meets the TRC test. Section 62.17-4.C NMSA 1978. The second definition of “total resource cost test” states that the TRC is “…a standard that is met if the monetary costs that are borne by the utility and the participants and that are incurred to develop, acquire and operate energy efficiency or load management resources on a life-cycle basis are less than the avoided monetary costs associated with developing, acquiring and operating the associated supply-side resources …” (emphasis added). Section 62.17-4.J NMSA 1978.

Q: How is the TRC generally calculated?

A: It is my understanding the TRC is generally stated as a ratio, where the numerator is the present value of avoided monetary costs associated with the avoided energy and deferred capacity and the denominator is the present value of costs “borne by the utility and the program participants”. If the ratio is less than 1.0, or if the ratio is negative (that is, the numerator is negative because the programs result in net costs rather than net benefits), the TRC is not met and a program is not cost effective.
Section 62.17-4.J states that the costs in the denominator should be the costs borne by the utility and the program participants, and the statute later goes on to authorize the utility to recover such costs from general customers, both participants and non-participants. The statute at this section also specifically limits benefits and/or costs in the numerator to benefits and/or costs associated with developing, acquiring, and operating supply side resources. Because these benefits and/or costs are associated with supply-side resource development, it is assumed that these benefits or costs will be borne by the utility and passed completely on to all customers, participating and non-participating, in future rates. Experience has shown that utilities, at least for rate base, make decisions about when to file rate cases based on its overall rate considerations, not the singular decision to install generating units. It is doubtful that customers will see in the future rate changes solely arising from singular generation unit installations. Rate case timing notwithstanding, the statute language contemplates that cost effective programs, in the aggregate, must be of net benefit to all and each customer, whether or not they are participants.

Q: Please describe your understanding of how PNM calculated the EE programs’ TRCs.

A: PNM used the ratio technique described above on a program-by-program basis, by taking: 1) the sum of a) present value of the kWh savings and b) the present...
value of the deferred kW savings and costs; and 2) dividing the sum by the present value of the program costs. The present value of costs and benefits was calculated by PNM using their weighted cost of capital, currently 8.20%, as the discount rate. Staff Witness Brack discusses this further.

Q: How did PNM calculate the present value of the kWh savings and the present value of deferred kW savings and costs used in the TRC calculations?

A: PNM did not use a single modeling tool to estimate the kWh savings and the deferred kW savings and costs. Rather, PNM calculated separate kWh unit energy cost values (depending on whether the program was a commercial or residential program) and applied them to the program’s avoided kWh estimates. PNM Exhibits PJO-2 and PJO-3 show the kWh energy cost values that were applied in the TRC calculations in PNM Witness Bean’s testimony. Staff Witness Reynolds discusses Staff’s review of PNM Witness Bean’s testimony.

To estimate the deferred kW savings or costs, PNM used a resource portfolio approach, as modeled using the Strategist modeling tool, to determine the timing of when generating units would need to be added to PNM’s system. The Strategist tool is also used by PNM to perform its Integrated Resource Plan (IRP). Strategist is very powerful at “optimizing” the generation mix portfolio, but it cannot do hour by hour calculations for 20 years of load forecast due to the
number of permutations involved in the optimization process. PNM therefore
developed simplified load profiles to account for EE and LM programs. The kW
savings or costs were determined by estimating annual capital return, depreciation
and other fixed operating costs (Capital and FOM) for the new generating units as
selected by Strategist over a 2012-2031 timeframe (20 years). This was
accomplished by comparing the results from two scenarios: the “baseline
scenario”, which included the effects of previously-approved EE programs (which
have effective lives beyond 2012) and LM programs through 2017, and the
comparison scenario which added the proposed 2013 and 2014 EE programs to
the baseline scenario. In other words, PNM included future LM program
impacts (in 2013, 2014, 2015, 2016, and 2017) in both scenarios. The last step
performed by PNM was to calculate an average present value of the difference in
the annual Capital and VOM between the two scenarios, expressed as $ per kW-
year, and applied that value to the EE programs’ estimated kW capacity savings in
the TRC calculation. I will discuss this in more detail later in my testimony.

Q: **You have used the phrase “kW savings or costs”, rather than the more
common “avoided capacity”. Why?**

A: It is clear from PNM Exhibit PJO-1 that future capacity additions are not avoided.
Timing and size of planned capacity additions may change, depending on what
one expects the future load to be. The term “kW savings and costs” better reflects
what happens when the future mix of planned additions change; in some years the
Capital and FOM may be higher (a cost) and in some years it may be lower (a
saving).

SECTION II: PNM’S AVOIDED KWH ENERGY CALCULATIONS IN THE
TRC

Q: Does Staff agree with PNM’s avoided kWh energy calculations used in the
TRC test calculations?

A: As stated earlier, statute is clear that the TRC must be a life-cycle analysis, but it
is unclear and indeed is confusing about which perspective the TRC should
represent. Staff believes that the TRC should be performed from the perspective
of the impact on the general customer; not from the perspective of participating
customers solely or the company. It is also Staff’s position, as addressed by Staff
Witness Lamberson, that CO2 credits should not be included and that natural gas
usage credits are questionable. Despite the inclusion of CO2 costs and avoided
natural gas costs, it is Staff’s position that PNM generally calculated avoided
energy savings appropriately, but Staff recommends that guidance to the utilities
should be provided in a Commission rule. As addressed by Staff Witness
Reynolds, the status of Rule 17.7.2 NMAC is unclear, and both the 2007 and 2010
versions of Rule 17.7.2 NMAC are practically silent on this subject.
SECTION III: PNM'S DEFERRED KW CAPACITY SAVINGS AND COSTS CALCULATIONS IN THE TRC

Q: Does Staff agree with PNM's deferred kW capacity savings and costs calculations used in the TRC?

A: No. Staff generally agrees with the resource portfolio approach used by PNM but has identified a number of errors which call into question the reliability of the deferred kW capacity savings and cost calculations performed by PNM and used in the TRC.

Q: Why does Staff base its general agreement with the portfolio approach?

A. Because the statute requires a life-cycle approach, Staff agrees with PNM that a portfolio approach is the most appropriate approach for TRC purposes, and that any life-cycle analysis requires assumptions to be made. The TRC is similar to the IRP in many ways, but dissimilar in some very important ways. The IRP process recognizes that forecasting is imprecise at best, and the IRP process incorporates measures to account for the imprecision, and incorporates a large range of possible outcomes. For example, the many IRP scenarios model varying load growth assumptions, varying technology assumptions, varying escalation rates, etc. The 20-year IRP outcome is itself a four-year "road-map" plan, rather
than a specific conclusion, and is revisited every three years. Staff Exhibit BEC-2 is one example of just how complicated forecasting is. Staff Exhibit BEC-2 clearly demonstrates the inherent inaccuracy in PNM’s load forecasts. Forecasting is a very fluid process; over the course of five years, the 2012 predicted load forecast ranged from 1903 to 2080 MW (weather normalized). That is a variance of 177 MW or 9.3%. The actual peak demand for 2012 was 1924 MW weather normalized or an actual of 1948 MW (un-normalized). The lack of certainty increases as the look into the future increases. The TRC, for practical reasons, is much less rigorous than the IRP and it follows that it should be used only for TRC program justification purposes primarily because statute requires it. However, as discussed by Staff Witness Lamberson, it would also be wise to use multiple tests as a “check” for the reasonableness of EE and LM program costs. I also discuss this more later. Again, there is no significant or specific additional guidance on the TRC method prescribed by statute or Commission rule, and Staff Witnesses Lamberson and Brack make recommendations on this topic as well as discuss the history of past utility calculations.

NOTE: On December 21, 2012 and on January 15, 2013, PNM updated PNM Exhibit PJ0-1 in response to Staff’s Interrogatory 1-18. I shall refer to the revised exhibit as PNM Exhibit PJ0-1R (attached as Staff Exhibit BEC-3), and
will use that information in the rest of my discussion. PNM Exhibit PJO-1R resulted in a slightly lower deferred capacity credit (of $123.24 per kW-year in the revision vs. $124.04 per kW-yr in the original), but because the difference is slight, PNM did not recalculate the TRCs in PNM Exhibit SMB-1.

Also, as stated earlier and as discussed by Staff Witness Brack, Staff has a concern with using 8.20% as the discount rate, but because we do not have another number to recommend at this time, I and Staff Witness Reynolds continued to use 8.20%.

Q: What main concerns has Staff identified with PNM’s avoided cost methodology and calculations as presented in the Application at this time?

A: Specifically, Staff has identified the following three main concerns with PNM’s application:

- PNM has derived the $/kW-year number in PNM Exhibit PJO-1R inappropriately.

- PNM has included 20 years’ worth of portfolio benefits during the first four program years (2013 through 2016) in program TRC calculations, when no difference in installed capacity is expected under any scenario, as shown in PNM Exhibit PJO-1R, thus overstating individual programs’ TRC.
PNM has made three inappropriate adjustments to the calculated $/kW-yr value in the individual program TRC calculations. Two of the inappropriate adjustments overstate the benefit and one inappropriate adjustment understates the benefit.

Q: Please explain Staff’s first concern.

A: PNM’s baseline scenario includes the effects of previously approved energy efficiency programs whose lives extend beyond 2012, and also includes the impacts of load management programs through 2017. The comparison scenario adds the proposed 2013 and 2014 (two years) of energy efficiency programs. Since the baseline scenario already includes the 2013 through 2017 load management programs, the difference between the two scenarios should represent the incremental effects of the 2013 and 2014 EE programs only. The difference in Capital and FOM between the two scenarios is a net present value of approximately $60.7 million, as shown at the bottom of the first table in PNM Exhibit PJO-1R. The bottom table shows that the EFFECTIVE capacity deferral impact is 186 MW-year due to EE programs and the LM capacity deferral is 307 MW-year, for a total of 493 MW-year. The sum of the program-by-program “deferred” kW-yr savings for EE programs from PNM Exhibit SMB-1 add up to approximately 292 MW-yr, much more than PNM Exhibit PJO-1R. When asked about this discrepancy, PNM responded that there is an apparent
“shrinkage” between the 493 MW-yr derived by PNM Witness O’Connell and the
599 MW-yr derived by PNM Witness Bean (292 MW-yr for the EM programs
and 307 MW-yr for five years’ of LM programs), and that the 2013 and 2014
programs are not additive when considering previously approved programs (see
Staff Exhibit BEC-3, attached). This discrepancy, however, has not been
adequately explained or accounted for by PNM. PNM then divides $60.7 million
by 493 MW-yr to arrive at an average present value of the deferred kW savings
and costs of $123.24 per kW-yr (was $124.04 in the original exhibit). The
$124.04 value is passed on to the program TRC calculations in Exhibit SMB-1 (as
stated earlier, PNM did not update the programs TRCs because the credit value is
only slightly changed).

The $123.24 per kW-year is an average 2012 present value, not a “levelized” cost.
Also, the baseline scenario already includes the LM program through 2017, and
that the deferred capacity of 493 MW-yr also includes the LM impacts. Yet the
$60.7 million Capital and FOM present value is the difference between the two
scenarios. It therefore is more appropriate for the $60.7 million to be divided by
only 186 MW-yr (the deferred capacity attributable to the EE programs only);
however, that division yields $455.40 per kW-yr, which is unreasonably high and
therefore suspect and unusable. It is also important to note that the 2031
cumulative capacity numbers are 991 MW for the baseline case and 1043 MW for
the EE case (a difference of 52 MW in the EE case), and I discuss this more later.

Q: Please discuss Staff's second concern.

A: PNM Exhibit PJ0-1R shows no capacity deferral occurs until 2017, so that there
is no capacity kW savings or costs difference until then. PNM Exhibit PJ0-1R
also shows that most of the kW deferral savings occur after 2021, although their
present value impact is diminished because of the discount rate. By 2021, most
the 2013 and 2014 programs have either expired or are in the last few years of
their lives. So using a 2012 net present value applied to all programs' deemed
kW savings for their entire lives also is inappropriate when there is no deferred
capacity savings until 2017 or after the program lives have exhausted.

Q: Please describe Staff's third concern.

A: PNM has made three mathematical errors in the TRC calculations. My
supporting calculations described below are shown in Staff Exhibit BEC-4. The
first mathematical error deals with applying the $123.24 per kW-yt to deemed
program kW annual savings. As stated earlier, the $123.24 figure was derived by
dividing the $60.7 million by 493,000 kW-yt. But in the TRC calculations, the
$123.24 (ignoring the recalculation would have resulted from the corrected PJ0-
1R) is applied to a total of approximately 292,000 kW-yr of deemed savings, or a
total of approximately $36.0 million for the EE programs. Carrying this logic
further, the LM capacity deemed savings is approximately $37.8 million (307,000
kW-yr times $123.24 per kW-yr). The sum of $36.0 million and $37.8 million is
$73.8 million, which is $13.1 million more than the $60.7 million PNM started
with, an overstatement of savings. PNM should have attributed to the EE
programs only the amount contributed by the EE’s programs to the total ($60.7
million times 186 kW-yr divided by 493 kW-yr or $22.90 million). On a
program-by-program basis, this amounts to $78.42 per kW-yr of deemed savings
($22,900,000 divided by 292,000 kW-yr of total program deemed savings) for the
EE programs. PNM has overstated the deemed capacity savings in the TRC in
PNM Exhibit SMB-1. The $78.42 per kW-yr figure is used by Staff Witness
Reynolds in his EE program-by-program TRC review.

The second mathematical error that occurred in the TRC calculations is that PNM
grosses up the $123.24 figure for systems losses at 7% and for reserve margin of
13%. The TRC calculations should not have done so, since the $123.04 figure is
already at the generation level, and thus systems losses and reserve margin
consideration are already included in the figure. For example, $123.24 per kW-yr
times 1.07 (system loss factor) times 1.13 (reserve margin) equals $149.01 per
kW-yr. $149.01- per kW-yr times 493,000 - kW-yr is $73.5 million, or about
$12.8.2 million more than PNM started with, a second overstatement of savings.

These two errors have overstated the overall TRC by about $13.1 million plus
$12.8 million, or about $25.9 million.

The third mathematical error identified by Staff is that PNM erroneously present
valued the annual kW-yr deemed program savings again in the TRC calculations.
However, present valuing again is unnecessary, since the capacity value is already
a present value expressed in 2012 dollars. This error requires a TRC spreadsheet
programming change, and Staff was not able to calculate the impact of this
understatement.

SECTION IV: OVERALL COST AND SAVINGS OF PNM'S EE AND LM
PROGRAMS

Q: What is Staff's general reaction to PNM's proposal given the numerous
errors and concerns Staff has identified in PNM' deferred capacity costs
methodology, calculations and application to the TRC?

A: To get a general sense and to confirm or dispel observations made during Staff's
examination of PNM's application, Staff decided to perform a general cost/benefit
analysis of PNM’s proposed EE and LM programs in the aggregate, as shown in
Staff Exhibit BEC-5.

Staff Exhibit BEC-5 shows much of the same information as PNM Exhibit PJO-
1R. No incentive payments in 2013 and 2014 were included in these
calculations, and the fuel and variable O&M savings did not include CO2 or
natural gas credits. Staff Exhibit BEC-5 is cast in the same general form as PNM
Exhibit PJO-1R, but the starting point is the fundamental decision before this
Commission: whether the EE AND LM programs as proposed should be
approved. Therefore, the base case in this exhibit is no more EE or LM programs
past 2012 (previously approved programs that have lives that extend beyond 2012
continue, however), as opposed to PNM’s baseline case which included LM past
2012 through 2017. Column A, labeled “No EE/No LM” displays the incremental
capacity that Strategist identified as being necessary, given the same load growth
and capacity options as in the baseline case of PNM Exhibit PJO-1R. Column B
shows the incremental installed capacity determined by Strategist with EE and
LM (2013 and 2014 of EE and 2013-2017 of LM). This column is the same as
the comparison column (Column B) in PNM Exhibit PJO-1R. After 2020, unlike
PNM Exhibit PJO-1R, the incremental capacity is the same in both cases. This
confirms that, other than what gets institutionalized, load “rebounds” to previous
profiles after program lives are exhausted. (See Exhibit BEC-6, PNM response to AG Interrogatory 1-01). Columns C and D show PNM’s estimate of the Capital and FOM on a year by year basis for each of the two scenarios, and Column E is the difference between the two. A positive value in Column E means a benefit, and a negative value means a cost. Columns F and G show 2013 and 2014 EE and LM programs costs, as proposed by PNM, and assumes that annual costs for LM for 2015, 2016, and 2017 are the same as PNM proposes in 2014. Column H is the sum of Columns F and G. Columns I and J show the energy savings, exclusive of CO2 and natural gas credits, for the EE and LM programs. Column K is the sum of Columns I and J. Below Columns E (the deferred resource benefit values), H (the program cost amounts) and K (the program energy savings), are the net present values of the numbers in each column, at several different discount rates. PNM used 8.20% as the discount rate in its TRC analyses, and I show 4% and 12%, just to see how changing the discount rate affects the result. The amounts in the right hand boxes below the table is the total NPV (that is, the sum of the deferred resource benefit NPV, and the total program cost NPV, and the total energy savings NPV).

Q: What does Staff’s overall cost/benefit analysis demonstrate?
A: No matter what discount rate is used, the present value of the proposed programs costs is greater than the present value of the benefits received from the proposed EE and LM programs, costing customers some $16 million to $20 million more if the programs are implemented.

Q: What does Staff conclude from this analysis?

A: This analysis reinforces Staff's apprehensions that the justification method proposed by PNM as applied to the TRC calculations is inherently flawed and may not represent an accurate or complete picture. Staff has recommended some mathematical corrections which can account for some of the apparent discrepancies, but Staff at this time has not been able to fully resolve the differences. For this reason, Staff Witness Lamberson is recommending that the Commission needs to undertake an initiative with the goal of identifying and describing a well-founded, uniform method to be used by all utilities for quantifying avoided costs and for properly calculating the TRC.

Q: Is there any other observation that Staff can make?

A: It is clear, given all the above and as further described by Staff Witness Lamberson, that relying on the deferred capacity method as proposed by PNM in this case is not a valid foundation for establishing an incentive.
SECTION V: STAFF’S PROPOSED INCENTIVE CALCULATIONS

Q: Please explain Staff’s incentive calculations.

A: Staff has decided to calculate the incentive using two components. One component would provide an incentive based on the cost-sharing of a proxy regulatory asset approach. The second component provides an incentive based on cost-sharing of energy saved. Staff Exhibit BEC-7 shows the incentive calculations.

Q: Please describe the first component.

A: This component addresses what the equity return would be if PNM funded the program costs and was able to recover the program costs through a regulatory asset.

Q: Please explain the regulatory asset proxy calculation in Staff Exhibit BEC-7.

A: Staff Exhibit BEC-7 uses the 2012 Plan program costs for the 2013 and 2014 programs contained PNM Exhibit SMB-1. PNM’s weighted cost of equity was used to calculate the return that would be available if such costs were allowed to be booked as regulatory assets. Staff used an 8 year amortization period, which coincides with the average lives of the proposed programs of 7.8 years (see PNM
Witness Graves testimony, page 31, Figure 8). A discount rate of 8.2% was used, and, as stated by Staff Witness Brack a 90/10 cost sharing split was deemed appropriate. This first component of Staff's proposed incentive calculates out to $780,839 for the 2013 and 2014 programs, or $390,419 per year.

Q: Please describe the second component.

A: The second component shares the avoided energy deemed savings to be received between customers and the company, also on a 90/10 basis. This calculation is shown on page 2 of Staff Exhibit BEC-7. The calculation is fairly straightforward. Deemed annual kWh energy savings derived from PNM Exhibit SMB-01, are multiplied by the arithmetic average energy and variable O&M savings as projected in PNM Exhibit PJO-2. The resulting annual amounts are discounted by the same 8.2% discount rate. The saved energy and variable O&M costs are then shared between customers and PNM on a 90/10 basis. This component amounts to $2,620,527 for the 2013 and 2014 programs, or $1,310,263 per year, for shared energy saving.

Q: What is the total incentive Staff recommends?

A: Staff recommends an incentive be given to PNM of $1,700,703 for the 2013 plan year and of $1,700,703 for the 2014 plan year. These amounts should not be continued beyond Plan Year 1 and Plan Year 2, as future programs may not
necessarily afford customers the same level of benefit, even if their budgets are
the same.

Q: Does this conclude your testimony?
A: Yes.
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As of 12/31/2012
## PNM SYSTEM PEAK DEMAND AND ENERGY FORECAST COMPARISON

### Peak Demand (MW)

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Range for 2012: 1903 to 2080 MW
% of lowest forecast: 100% to 109.3%
% of actual: 98.9% to 108.1% (weather normalized)

### Energy Sales (GWh)

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Range for 2011: 9,360 to 10,610 GWh
% of lowest forecast: 100% to 113.3%
% of actual: 99.2% to 112.5% (weather normalized)

Source:
PNM Response to Interrogatory Staff 1-8
PNM 2011-2030 IRP, Table 8-1, p. 77
STAFF INTERROGATORY/REQUEST FOR PRODUCTION 1-18:

Please provide a summary table listing the projected lifecycle savings impact by year and by program based on Appendix C of PNM Exhibit SMB-1 (2012 Energy Efficiency and Load Management Plan) for two years of implementation of the energy efficiency portion of the 2012 program plan only. This table should also provide the sum of projected lifecycle savings impacts by year and across all programs (except load management). If the sum of projected lifecycle savings impacts by year and across programs differs from that shown on Column F of PNM Exhibit PJO-1, describe the reasons for the difference.

REVISED RESPONSE
Steven M. Bean/ Patrick J. O'Connell

Please refer to PNM Exhibit Staff 1-18(A) previously provided for the data requested in table format.

The sum of projected lifecycle savings impacts shown in the exhibit differ from those shown in PNM Exhibit PJO-1 Column F primarily because the calculation of avoided costs was necessarily completed before the 2012 Plan was finalized. PNM has prepared a supplemental analysis of avoided costs in which the final program details as submitted in the 2012 Plan are incorporated. The result of this analysis is shown in PNM Exhibit Staff 1-18(B), previously provided. PNM Table Staff 1-18 compares the sum of projected lifecycle savings impacts by year for all programs in the 2012 Plan compared to the values from the supplemental avoided cost analysis shown in PNM Exhibit Staff 1-18(B) column F.

The sum of projected lifecycle savings impacts in PNM Exhibit Staff 1-18(B) Column F are less than the demand savings shown in PNM Exhibit Staff 1-18(A) to account for:

- the end of the effective lives of prior energy efficiency measures that will occur during the period and
- the energy efficiency savings that are already embedded in the load forecast.
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Sum: 291,693 / 185,800
PNM Exhibit Staff 1-18(B)
2012 Plan Avoided Supply Side Capacity Benefit Calculation – Revised

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NPV of Benefit = $50,733.14
Discount Rate = 8.20%

Calculate 2012 Plan Capacity

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Sum of 2012 Plan Capacity = 493
Avoided Capacity Benefit for 2012 Plan (S/kW) = $123.24
SUMMARY OF MATHEMATICAL ERRORS

First Mathematical Error:

PNM approach:

Net Present Value of Resource Deferral ($ million): $ 60.7 Source: PJO-1R

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<tr>
<td>LM MW-year:</td>
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</table>

TOTAL MW-Yr 493 Line 8 + line 9

Average NPV Deferral ($/kW-yr): $ 123.24 Line 5 + line 11 Source: PJO-1R

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<th>MW-Yr</th>
<th>%</th>
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<td>EE MW-year:</td>
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<tr>
<td>LM kW-year:</td>
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TOTAL MW-Yr 599 Line 17 + line 18

As Calculated in the TRCs

EE programs ($ million): $ 36.0 Line 17 + line 13
LM Programs ($ million): $ 37.8 Line 18 + line 13

Total $ 73.8 Line 23 + line 24

Overstatement ($ million): $ 13.1 Line 26 - line 5

Apportioned approach:

EE Portion of Resource Deferral ($ million) $ 22.9 Line 8 * line 5
LM Portion of Resource Deferral ($ million) $ 37.8 Line 9 * line 5

EE Resource Deferral Rate for TRC purposes ($/kW-yr): $ 78.43 Line 31 + line 17
LM Resource Deferral Rate for TRC purposes ($/kW-yr): $ 123.12 Line 32 + line 18

Check:

<p>| | |</p>
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<td>LM</td>
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$ 60.7
Second Mathematical Error:

PNM Approach:

Net Present Value of Resource Deferral ($ million): $ 60.7 Source: PJO-1R

Average NPV Deferral ($/kW-yr): $ 123.24 Line 5 + line 11 Source: PJO-1R

Gross up rate for system loss: 7% Source: PNM Exhibit SMB-1

Gross up rate for reserve capacity: 13% Source: PNM Exhibit SMB-1

Grossed up NPV value $ 149.01 Line 50 * line 52 * line 53

Calculated Value of Resource Deferral ($ million) $ 73.45 Line 55 * line 11

Overstatement ($ million): $ 12.8 Line 55 - line 46

TOTAL OVERSTATEMENT ($ million): $ 25.9 Line 28 + line 57
### OVERALL COST AND BENEFIT ANALYSIS

#### STAFF EXHIBIT BEC-5

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<td>8 $</td>
<td>18 $</td>
<td>2 $</td>
<td>20 $</td>
</tr>
<tr>
<td>2028</td>
<td>0 ($MW)</td>
<td>12 $</td>
<td>50 $</td>
<td>7 $</td>
<td>11 $</td>
<td>10 $</td>
<td>8 $</td>
<td>18 $</td>
<td>2 $</td>
<td>20 $</td>
</tr>
<tr>
<td>2029</td>
<td>0 ($MW)</td>
<td>12 $</td>
<td>50 $</td>
<td>7 $</td>
<td>11 $</td>
<td>10 $</td>
<td>8 $</td>
<td>18 $</td>
<td>2 $</td>
<td>20 $</td>
</tr>
<tr>
<td>2030</td>
<td>0 ($MW)</td>
<td>12 $</td>
<td>50 $</td>
<td>7 $</td>
<td>11 $</td>
<td>10 $</td>
<td>8 $</td>
<td>18 $</td>
<td>2 $</td>
<td>20 $</td>
</tr>
<tr>
<td>2031</td>
<td>0 ($MW)</td>
<td>12 $</td>
<td>50 $</td>
<td>7 $</td>
<td>11 $</td>
<td>10 $</td>
<td>8 $</td>
<td>18 $</td>
<td>2 $</td>
<td>20 $</td>
</tr>
</tbody>
</table>

### NPV Calculations

- **NPV = $12,029**
  - Discount Rate = 8.20%
  - **TOTAL NPV = $27,000**

- **NPV = $12,795**
  - Discount Rate = 4.00%
  - **TOTAL NPV = $23,856**

- **NPV = $10,750**
  - Discount Rate = 12.00%
  - **TOTAL NPV = $22,438**

*Do not include CO2 or natural gas credits*
### Table: Demand and Supply Comparison

<table>
<thead>
<tr>
<th>Year</th>
<th>Demand</th>
<th>Supply</th>
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<tbody>
<tr>
<td>2012</td>
<td>1230</td>
<td>456</td>
</tr>
<tr>
<td>2013</td>
<td>2340</td>
<td>567</td>
</tr>
<tr>
<td>2014</td>
<td>3450</td>
<td>678</td>
</tr>
<tr>
<td>2015</td>
<td>4560</td>
<td>789</td>
</tr>
</tbody>
</table>

### Notes
- Demand significantly exceeds supply in each year.
- Measures to increase supply are under consideration.

---

**Figure:**

- A bar chart showing the trend of demand over the years, with a notable increase each year.
- A line graph illustrating the impact of economic factors on demand and supply fluctuations.
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RESERVES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL RESERVE (MW)</td>
<td>288</td>
<td>285.2</td>
<td>260.7</td>
<td>204.9</td>
<td>360.8</td>
<td>318.2</td>
<td>385.8</td>
<td>429.3</td>
<td>384</td>
<td>417.5</td>
<td>371.7</td>
<td>500.2</td>
<td>402.9</td>
<td>528</td>
<td>457.7</td>
<td>448.2</td>
<td>429.5</td>
<td>523.7</td>
<td>542.2</td>
<td></td>
</tr>
<tr>
<td>CAPACITY MARGIN PERCE%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>589</td>
<td>247.8</td>
<td>185.2</td>
<td>208.1</td>
<td>350.7</td>
<td>329.2</td>
<td>322.6</td>
<td>247.7</td>
<td>304.3</td>
<td>245.1</td>
<td>266.4</td>
<td>404.6</td>
<td>302.6</td>
<td>291.6</td>
<td>445.1</td>
<td>307.6</td>
<td>268.4</td>
<td>443.6</td>
<td>412.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>589</td>
<td>11.07</td>
<td>8.82%</td>
<td>10.97%</td>
<td>12.43%</td>
<td>10.79%</td>
<td>13.02%</td>
<td>10.82%</td>
<td>12.17%</td>
<td>14.67%</td>
<td>12.88%</td>
<td>17.81%</td>
<td>14.68%</td>
<td>13.29%</td>
<td>17.94%</td>
<td>16.07%</td>
<td>14.12%</td>
<td>13.32%</td>
<td>17.82%</td>
<td>15.82%</td>
</tr>
</tbody>
</table>

Page 2 of 2
4. **Component 1 - Present value of earnings for program cost (Regulatory Asset Proxy)**

   - **Year 1 Program cost:** $22,493,227
   - **Year 2 Program cost:** $23,343,630
   - **Discount rate:** 8.20%

   *Exhibit SMB-1, p. 9, Table 3-1
   *Exhibit SMB-1, p. 9, Table 4-4
   *Exhibit PJO-1

   **Cap structure:**

<table>
<thead>
<tr>
<th></th>
<th>Ratio</th>
<th>Rate</th>
<th>Weighted Rate</th>
<th>Response to AG1-07</th>
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</thead>
<tbody>
<tr>
<td>Debt</td>
<td>48.89%</td>
<td>6.39%</td>
<td>3.12%</td>
<td></td>
</tr>
<tr>
<td>Preferred</td>
<td>0.50%</td>
<td>4.62%</td>
<td>0.02%</td>
<td></td>
</tr>
<tr>
<td>Common</td>
<td>50.61%</td>
<td>10.00%</td>
<td>5.06%</td>
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<tr>
<td>WCC</td>
<td></td>
<td></td>
<td>8.21%</td>
<td></td>
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</table>

   **Amortization:** 8 years

<table>
<thead>
<tr>
<th>Year</th>
<th>2013 Asset value</th>
<th>2014 Asset value</th>
<th>Total Asset Value</th>
<th>Equity return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$22,493,227</td>
<td>-</td>
<td>$22,493,227</td>
<td>$1,138,382</td>
</tr>
<tr>
<td>2</td>
<td>$19,681,574</td>
<td>$23,343,630</td>
<td>$43,025,204</td>
<td>$2,177,506</td>
</tr>
<tr>
<td>3</td>
<td>$16,869,920</td>
<td>$20,425,676</td>
<td>$37,295,597</td>
<td>$1,887,530</td>
</tr>
<tr>
<td>4</td>
<td>$14,058,267</td>
<td>$17,507,723</td>
<td>$31,565,989</td>
<td>$1,597,555</td>
</tr>
<tr>
<td>5</td>
<td>$11,246,614</td>
<td>$14,589,769</td>
<td>$25,836,382</td>
<td>$1,307,579</td>
</tr>
<tr>
<td>6</td>
<td>$8,434,960</td>
<td>$11,671,815</td>
<td>$20,106,775</td>
<td>$1,017,604</td>
</tr>
<tr>
<td>7</td>
<td>$5,623,307</td>
<td>$8,753,861</td>
<td>$14,377,168</td>
<td>$727,628</td>
</tr>
<tr>
<td>8</td>
<td>$2,811,653</td>
<td>$5,835,908</td>
<td>$8,647,561</td>
<td>$437,653</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>$2,917,954</td>
<td>$2,917,954</td>
<td>$147,678</td>
</tr>
</tbody>
</table>

**NPV** $7,808,394

| Shared incentive to company | $780,839 | @ | 10.0% | Line 27 * 10% |
| Shared incentive to customers | $7,027,555 | @ | 90.0% | Line 27 * 90% |
Staff Exhibit DEC-7

PNM Energy Efficiency and Load Management Incentive

Component 2 - Based on Lifetime kWh saved (Fuel & VOM only)

Discount rate: 8.20%

Average Fuel prices per PJ-2

KWh Savings from SM-1, Appendix C

<table>
<thead>
<tr>
<th>Year</th>
<th>kWh Saved</th>
<th>Fuel price + VOM</th>
<th>$ Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>82,379,347</td>
<td>$0.02194</td>
<td>$1,807,403</td>
</tr>
<tr>
<td>2014</td>
<td>157,317,588</td>
<td>$0.02421</td>
<td>$3,808,659</td>
</tr>
<tr>
<td>2015</td>
<td>148,272,588</td>
<td>$0.02510</td>
<td>$3,869,915</td>
</tr>
<tr>
<td>2016</td>
<td>148,272,588</td>
<td>$0.02715</td>
<td>$4,025,601</td>
</tr>
<tr>
<td>2017</td>
<td>148,272,588</td>
<td>$0.02842</td>
<td>$4,213,907</td>
</tr>
<tr>
<td>2018</td>
<td>140,900,384</td>
<td>$0.03460</td>
<td>$4,875,153</td>
</tr>
<tr>
<td>2019</td>
<td>132,580,917</td>
<td>$0.03775</td>
<td>$5,004,930</td>
</tr>
<tr>
<td>2020</td>
<td>98,439,319</td>
<td>$0.03882</td>
<td>$3,860,234</td>
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<tr>
<td>2021</td>
<td>68,165,778</td>
<td>$0.03997</td>
<td>$2,724,586</td>
</tr>
<tr>
<td>2022</td>
<td>64,687,467</td>
<td>$0.04110</td>
<td>$2,658,655</td>
</tr>
<tr>
<td>2023</td>
<td>62,687,029</td>
<td>$0.04231</td>
<td>$2,652,288</td>
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<tr>
<td>2024</td>
<td>34,835,301</td>
<td>$0.04354</td>
<td>$1,516,729</td>
</tr>
<tr>
<td>2025</td>
<td>5,017,150</td>
<td>$0.04481</td>
<td>$227,507</td>
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<tr>
<td>2026</td>
<td>5,077,150</td>
<td>$0.04611</td>
<td>$234,107</td>
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<tr>
<td>2027</td>
<td>2,941,407</td>
<td>$0.04744</td>
<td>$139,540</td>
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<tr>
<td>2028</td>
<td>378,516</td>
<td>$0.04881</td>
<td>$18,475</td>
</tr>
<tr>
<td>2029</td>
<td>378,516</td>
<td>$0.05021</td>
<td>$19,005</td>
</tr>
<tr>
<td>2030</td>
<td>378,516</td>
<td>$0.05170</td>
<td>$19,569</td>
</tr>
<tr>
<td>2031</td>
<td>189,258</td>
<td>$0.05322</td>
<td>$10,072</td>
</tr>
<tr>
<td>2032</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,302,231,407</td>
<td>NPV $26,205,672</td>
<td></td>
</tr>
</tbody>
</table>

Shared savings incentive to company $2,620,567 @ 10.0% Line 70 * 10%

Shared savings incentive to customers $23,585,104 @ 90.0% Line 70 * 90%

Total Incentive to Company for 2013 and 2014 Programs $3,401,407 Line 31 + line 73

Total Incentive to Company per Year $1,700,703 Line 77 + 2

Page 2 of 2
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,

PUBLIC SERVICE COMPANY OF NEW MEXICO,

APPLICANT.

Case No. 12-00317-UT

AFFIDAVIT OF BRUNO E. CARARRA, P.E.

STATE OF NEW MEXICO )
COUNTY OF SANTA FE ) ss.

I, BRUNO E. CARARRA, P.E., do hereby swear, depose and state as follows:

I hereby attest that I have read the foregoing DIRECT TESTIMONY OF BRUNO E. CARARRA, P.E., and the statements contained therein are true and accurate to the best of my knowledge and information.

[Signature]
BRUNO E. CARARRA, P.E.
1-25-2013
DATE

SUBSCRIBED, SWORN TO AND ACKNOWLEDGED before me this 23rd day of January 2013.

[Signature]
NOTARY PUBLIC

My Commission Expires:

9/15/2013
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,

PUBLIC SERVICE COMPANY OF NEW MEXICO, APPLICANT. Case No. 12-00317-UT

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Direct Testimony of Bruno E. Carrara, P.E., issued January 23, 2013, was sent by electronic mail to the individuals listed below.

Benjamin Phillips
Mark Fenton
Rebecca Dempsey
Peter Gould
Thomas Domme
Mary Homan
Steven Michel
Charles Noble
Carmela Starace
Jami Porter Lara
Rick Chamberlain
Lewis Campbell
Jay Kumar
Anastasia Stevens
Mona Tierney-Lloyd
Joanne Reuter
Ed Reyes
Jeffrey Albright
Howard Geller
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And Mailed to:
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Los Lunas, NM 87031

James and Nichol Brown
6104 Bancroft Ct., NE
Albuquerque, NM 87111

DATED this 23rd day of January, 2013.

NEW MEXICO PUBLIC REGULATION COMMISSION

Carmella Apodaca, Paralegal