

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

**IN THE MATTER OF PUBLIC SERVICE)
COMPANY OF NEW MEXICO'S)
CONSOLIDATED APPLICATION FOR)
APPROVALS FOR THE ABANDONMENT,) 19-_____-UT
FINANCING, AND RESOURCE REPLACEMENT)
FOR SAN JUAN GENERATING STATION)
PURSUANT TO THE ENERGY TRANSITION ACT)**

DIRECT TESTIMONY

OF

ROGER W. NAGEL

July 1, 2019

**NMPRC CASE NO. 19-____-UT
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ROGER W. NAGEL**

**WITNESS FOR
PUBLIC SERVICE COMPANY OF NEW MEXICO**

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AFFIDAVIT

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I. INTRODUCTION AND PURPOSE

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

A. My name is Roger W. Nagel. I am a Vice President for the HDR Engineering Inc. (“HDR”) Power Generation Practice. My business address is 315 E. Robinson Street, Suite 400, Orlando, Florida 32801.

Q. ON WHOSE BEHALF IS YOUR TESTIMONY BEING SUBMITTED?

A. My testimony is submitted in this proceeding before the New Mexico Public Regulation Commission (“NMPRC” or “Commission”) on behalf of Public Service Company of New Mexico (“PNM” or “Company”).

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL QUALIFICATIONS.

A. I have over 27 years of experience in the power generation industry with 7 years working as an engineering, procurement and construction (“EPC”) contractor on the development and execution of natural gas, biomass, coal, and waste-fired generating units, both nationally and internationally; 3 years working for an original equipment manufacturer supplying equipment to coal and natural gas fueled facilities; and 17 years with HDR serving as an Owner’s Engineer and power generation consultant engaging with coal, natural gas, biomass, biogas, solar, wind, various forms of energy storage including batteries, compressed air energy storage, and pumped hydro energy storage, waste-to-energy, geothermal,

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1 and other power generation technologies. During this time with HDR, I have
2 served as an Owner’s Engineering Project Manager, Project Development Section
3 Manager, Power Generation Consulting Lead, and most recently Power
4 Generation Practice Leader since September 2017. I graduated with distinction
5 from Purdue University in May, 1992, with a bachelor’s degree in Mechanical
6 Engineering. I am a Registered Professional Engineer in the State of Michigan.
7 My experience and education are more fully described in PNM Exhibit RWN-1.

8

9 **Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?**

10 **A.** My testimony:

- 11 1. Describes HDR’s relevant capabilities and experience
- 12 2. Describes HDR’s role and involvement in PNM’s 2023 Generation RFP
13 (“Replacement Resource RFP”) process, including the supplemental Energy
14 Storage RFP process
- 15 3. Describes the goals of the RFP process
- 16 4. Provides an overview of the RFP process
- 17 5. Provides an overview of the new generation resource selection process
- 18 6. States my opinion as to the fairness of the RFP process

19

20 **Q. WHAT WAS THE PRIMARY RESULT OF HDR’S INVOLVEMENT IN**
21 **THE RFP PROCESS?**

22 **A.** Through the implementation of the RFPs and subsequent Phase One bid evaluation
23 processes, HDR, in conjunction with the bid evaluation team, developed a shortlist

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1 of bids to be considered for more in-depth system portfolio modeling to determine
2 the reliable economic plan portfolio. The shortlist resulting from both the
3 Replacement Resource RFP and the supplemental Energy Storage RFP contained
4 51 bids to proceed into the Phase Two evaluation with some of the bids including
5 alternative offerings for varying project capacities. PNM Table RWN-1 provides
6 a summary of the types of projects shortlisted as a result of the Phase One
7 evaluation.

PNM Table RWN-1. Shortlist Content Summary

Technology	Quantity of Projects (some involve multiple size offerings)	Project Structure	Total Potential Capacity (MW/MWh)
Solar	9	8 PPA / 1 EPC	1,195 MW
Wind	5	PPA	1,500 MW
Battery	10	6 PPA / 4 EPC	784 MW / 2,935 MWh
Frame Combustion Turbine	4	EPC	800 MW
Aeroderivative Turbine	5	EPC	420 MW
Reciprocating Engines	3	2 EPC / 1 PPA	500 MW
Combined Solar / Battery	13	PPA	1,400 MW
Combined Wind /Battery	1	PPA	480 MW
Combined Solar/Wind	1	PPA	150 MW

8

9 **Q. HAS YOUR FIRM PERFORMED SIMILAR RFP SERVICES AND**
10 **RESPONSIBILITIES FOR OTHER UTILITIES IN THE PAST?**

11 **A.** Yes. HDR is very active in integrated resource planning and RFP support for
12 regulated utilities. Representative recent experience includes the following:

- 13 • NorthWestern Energy – South Dakota 2019 Capacity RFP
- 14 • NorthWestern Energy – Montana 2018 Capacity RFI
- 15 • NorthWestern Energy – Montana 2017 Capacity RFP

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- 1 • Alliant Energy – Iowa Marshalltown Solar RFP
- 2 • Alliant Energy – Wisconsin 2018 Wind RFP
- 3 • Alliant Energy – Wisconsin Rock River Solar PPA RFP
- 4 • Alliant Energy – Wisconsin 2014 Non-Intermittent RFP
- 5 • Detroit Edison
- 6 • Louisville Gas & Electric|Kentucky Utilities

7

8 Furthermore, HDR has provided new generation resource technology
9 characteristics to be used for Integrated Resource Plan (“IRP”) system modeling
10 purposes for utility clients including, but not limited to NVEnergy, Puget Sound
11 Energy, Portland General Electric, Consumers Energy, and Holland Board of
12 Public Works.

13

14 Additional background regarding HDR’s capabilities and experience in the Power
15 Generation industry is included in PNM Exhibit RWN-2.

16

17 **Q. PLEASE DESCRIBE THE PROCESS BY WHICH PNM CAME TO**
18 **CONTRACT WITH YOUR FIRM FOR OWNER’S ENGINEERING**
19 **SUPPORT SERVICES FOR THE REPLACEMENT RESOURCES RFP**
20 **PROCESS.**

21 **A.** HDR responded to PNM’s RFP for Integrated Resource Plan Owners Engineer
22 dated March 15, 2017, for the IRP Non SJGS Alternative RFP Project and was
23 selected via PNM’s competitive bid process.

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1 **Q. PLEASE DESCRIBE IN MORE DETAIL THE SCOPE OF SERVICES**
2 **THAT HDR PERFORMED UNDER THE CONTRACT WITH PNM.**

3 **A.** HDR maintained a robust and active role throughout the implementation of
4 PNM's replacement resource RFP process and the supplemental Energy Storage
5 RFP process as an external and independent resource to PNM. PNM Exhibit
6 RWN-3 is a summary of the HDR scope of services outlining specific tasks and
7 deliverables throughout the RFP process. In summary, HDR was responsible for:

- 8 • Support of RFP development including development of a high level bid
9 strategy, instructions to bidders, proposal forms, and bid evaluation
10 methodology to facilitate a fair and equivalent bid evaluation process
- 11 • Preparation of technical specifications for the PNM issued RFP including
12 field investigations to characterize the existing sites offered for EPC bids
- 13 • Support of a pre-bid conference and pre-bid site visits
- 14 • Participation in the review and development of the commercial RFP
15 documentation
- 16 • Development and maintenance of an RFP process schedule
- 17 • Participation in the bid screening, bid clarifications, financial analysis, and
18 technical analysis of bids
- 19 • Independent evaluation and ranking of bids received from the RFP process
20 with subsequent compilation of evaluation inputs from the bid evaluation
21 team
- 22 • Participation in bid evaluation meetings, contract negotiations, and
23 commercial agreement structuring

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- 1 • Development of an energy storage technology assessment and support of a
- 2 public meeting
- 3 • Preparation of a geotechnical specification
- 4 • Participation in due diligence site visits to shortlisted bidder projects and
- 5 facilities
- 6 • Preparation of NMPRC and other regulatory required testimony
- 7 • Leading the “best-in-class” evaluation of proposed technology alternatives
- 8

9 **Q. PLEASE EXPLAIN WHY A SUPPLEMENTAL RFP WAS ISSUED**
10 **AFTER BIDS WERE RECEIVED FROM THE REPLACEMENT**
11 **RESOURCES RFP.**

12 **A.** A supplemental RFP, the Energy Storage RFP, was issued in April of 2019 to
13 obtain additional bids for utility-owned energy storage resources. The April 2019
14 RFP was issued in response to the enactment of the Energy Transition Act in
15 March 2019 which includes specific requirements for energy storage systems,
16 including, among other considerations, that the energy storage must provide the
17 “public utility with the discretion, subject to applicable laws and rules, to operate,
18 maintain and control energy storage systems so as to ensure reliable and efficient
19 service to customers[.]” As originally presented, the non-utility-owned storage
20 bids, which were in the form of proposed PPAs, imposed operational restrictions
21 that appeared inconsistent with certain of the Energy Transition Act provisions
22 relating to energy storage. Utility-owned storage would afford greater flexibility
23 with respect to the operation, maintenance and control of energy storage in

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1 conformity with the Energy Transition Act provisions relating to energy storage.
2 However, the PPA energy storage bids remained under active consideration. A
3 number of the bids for proposed utility-owned storage projects submitted in
4 response to the All Resource RFP were disqualified from consideration because
5 the bidders did not have the requisite license from the New Mexico Construction
6 Industries Division. Therefore, PNM issued the April 2019 RFP to develop
7 utility-owned bids that would meet the foregoing provisions of the Energy
8 Transition Act relating to energy storage and to appropriately evaluate the full
9 value of options of utility ownership versus the battery PPA options. PNM
10 Witness Kemp from Enovation Partners, LLC provides a detailed discussion on
11 the need for this full value consideration.

12
13 **Q. PLEASE DESCRIBE THE GOALS ESTABLISHED FOR THIS RFP**
14 **PROCESS AND THE BIDDING STRATEGY USED.**

15 **A.** The primary goals of the RFP process were to establish a fair and unbiased bid
16 and bid evaluation process under an “All-Source” bid structure to identify
17 sufficient resources to satisfy PNM’s forecasted capacity and energy demand,
18 plus reserves, identified in PNM’s 2017 Integrated Resource Plan considering the
19 need for a nominal 456 MW of replacement generating resources for the San Juan
20 Generating Station. The objective of the RFP process was to identify the
21 replacement resources based upon current market information and bids that
22 provide the needed capacity, energy, and system reliability for PNM’s customers,

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1 while continuing to expand PNM’s renewable and carbon-free footprint. All
2 generation was to be available and delivered to PNM load within WECC Path 48.

3

4 **Q. PLEASE EXPLAIN THE ROLE OF HDR AS THE OWNER’S ENGINEER**
5 **IN THIS PROCUREMENT PROCESS.**

6 **A.** HDR’s participation in the PNM procurement sourcing effort included providing
7 industry experience, market-based knowledge and insights, and a perspective of
8 similar power projects, contracting strategies, and bid evaluation processes and
9 considerations. With respect to the bid evaluation process, as the Owner’s
10 Engineer, HDR independently evaluated the bids and prepared summaries of the
11 bid evaluation results and bid rankings for review by the bid evaluation team.
12 The results were shared and reviewed with the bid evaluation team with any
13 adjustments or modifications incorporated at that time to result in bid evaluation
14 results that incorporated input from the bid evaluation team participants. Our
15 participation was structured as an independent resource providing bid evaluation
16 analysis and results to the PNM team in support of their overall evaluation and
17 final assessment of the competing bids.

18

19 **Q. PLEASE IDENTIFY THE MEMBERS OF THE RFP BID EVALUATION**
20 **TEAM.**

21 **A.** The bid evaluation team consisted of representatives of HDR as the Owner’s
22 Engineer, Astrape Consulting, LLC (“Astrape”) as the electric system modeling
23 consultant, and the following groups from within PNM: Generation, Wholesale

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1 Power Marketing, Environmental Services, Corporate Risk Management,
2 Insurance, Tax, Resource Planning, Treasury, Law Department, Accounting,
3 NERC Compliance, Audit Services, Regulatory and Case Management, FERC
4 Compliance, Financial Planning & Risk Management, Generation Services,
5 Sourcing, Utility Margin, and Transmission Planning.

6
7 **Q. PLEASE EXPLAIN YOUR COMPANY’S ROLE IN DESIGNING AND**
8 **ISSUING THE RFP FOR THE REPLACEMENT RESOURCES AND THE**
9 **SUPPLEMENTAL ENERGY STORAGE RFP.**

10 **A.** HDR prepared the majority of the RFP documentation including the instructions
11 to bidders, proposal forms, and technical specifications, while PNM prepared the
12 initial commercial term sheets. All of HDR’s documents were prepared and
13 provided to the PNM team for review and comment prior to issuance. PNM
14 issued the documentation via the PowerAdvocate sourcing platform. Our role
15 was to establish a fair and unbiased RFP process and documentation that was
16 consistent with other utility industry RFP processes.

17
18 **Q. PLEASE EXPLAIN THE RFP PROCESS AND THE MARKET**
19 **RESPONSES RECEIVED IN RESPONSE TO THE RFP PROCESS.**

20 **A.** The RFP process was structured as an “All-Resource” RFP allowing bids utilizing
21 any generation technology, with the exception of coal-fired generation, or
22 combination of generating technologies and allowing bids under various
23 ownership structures including power purchase agreements (“PPA”), build-

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1 transfer (“BT”) arrangements, asset purchase agreements (“APA”), and
2 engineering, procurement, and construction (“EPC”) contracts. Minimum
3 requirements for facility operation and capacity were established for some
4 technology configurations to facilitate integration into PNM’s system.

5

6 PNM received 345 bids in response to the initial Replacement Resources RFP
7 including wind, solar, energy storage, and natural gas fueled technologies.
8 Subsequently, an additional 45 bids were received in response to the supplemental
9 Energy Storage RFP. The bids received are summarized in PNM Table RWN-2.

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PNM TABLE RWN-2 SUMMARY OF BID RESPONSES							
Technology	Quantity of Bidders	Power Purchase Agreement		Build-Transfer		EPC Contract	
		Quantity of Bid Options	Potential Capacity (MW/MWh)	Quantity of Bid Options	Potential Capacity (MW/MWh)	Quantity of Bid Options	Potential Capacity (MW/MWh)
Solar	16	74	2293 MW	7	593 MW	6	227 MW
Wind	7	16	2099 MW	4	840 MW	-	-
Battery	11	50	834 MW / 3,336 MWh	-	-	17	560 MW / 1,949 MWh
Flywheel Energy Storage	1	-	-	-	-	6	100 MW / 400 MWh
Frame Combustion Turbine	5	3	355 MW	4	804 MW	6	1,233 MW
Aeroderivative Turbine	2	-	-	-	-	7	461 MW
Reciprocating Engines	6	9	987 MW	1	220 MW	7	621 MW
Mixed Gas Resources	2	2	190 MW	-	-	1	279 MW
Combined Gas / Battery	5	9	557 MW (Gas) 170 MWh (Battery)	3	220 MW (Gas) 5 MWh (Battery)	5	318 MW (Gas) 17.2 MWh (Battery)
Combined Cycle	1	-	-	1	439 MW	-	-
Combined Solar / Battery	18	84	2,009 MW (Solar) 4,423 MWh (Battery)	9	545 MW (Solar) 844 MWh (Battery)	5	164 MW (Solar) 360 MWh (Battery)
Combined Solar / Flywheel	1	-	-	-	-	6	200 MW (Solar) 320 MWh (Battery)
Combined Wind/Battery	1	1	479 MW (Wind) 400 MWh (Battery)	-	-	-	-
Combined Solar/Wind	1	2	150 MW	-	-	-	-
Total Bids	345	250		29		66	
Supplemental Energy Storage RFP Responses							
Battery Energy Storage	4	-	-	5	150 MW / 600 MWh	40	850 MW / 3,400 MWh
Total Bids	390	250		34		106	

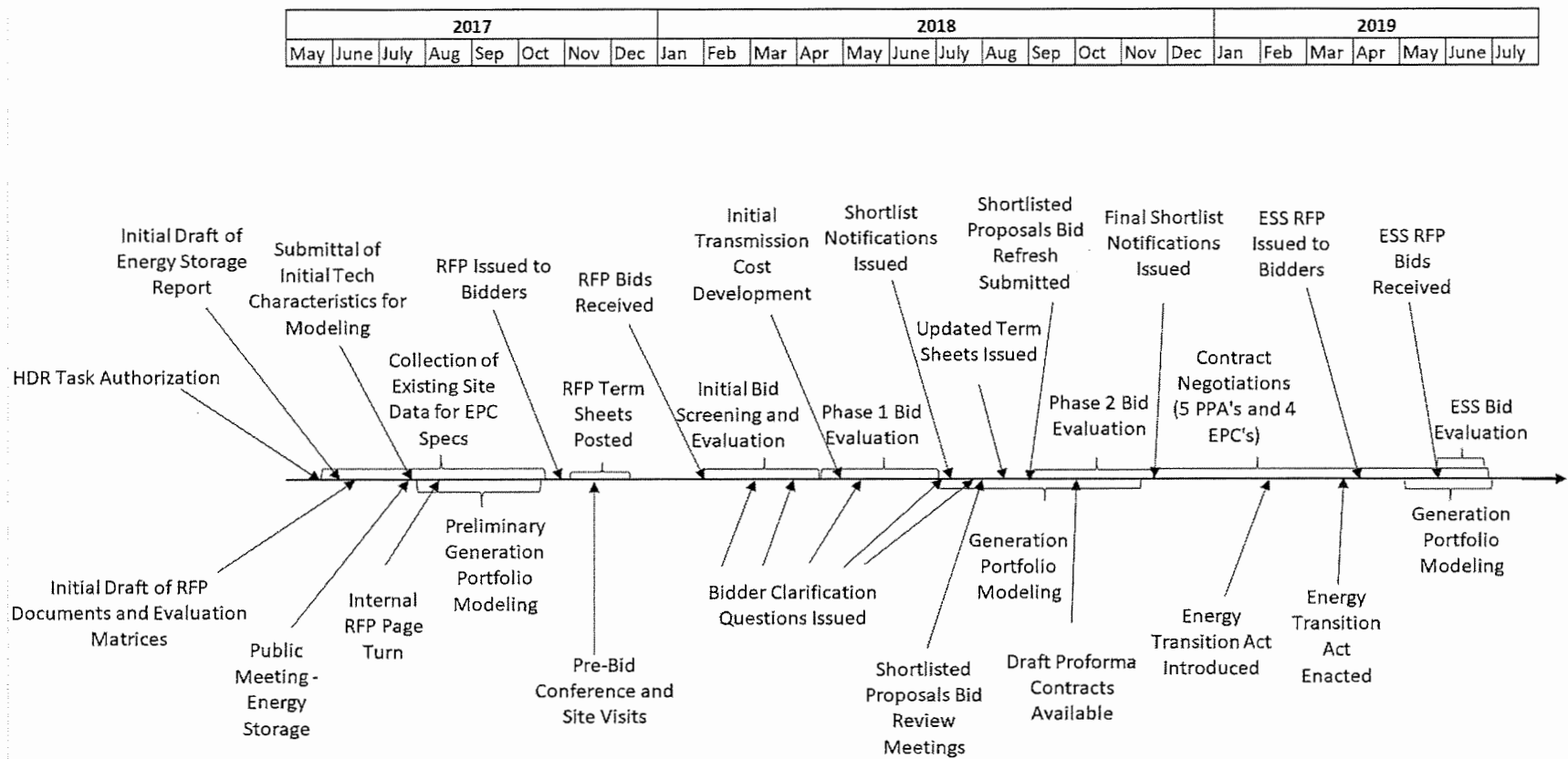
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1 **Q. PLEASE PROVIDE AN OVERVIEW OF THE SEQUENCE OF**
2 **ACTIVITIES AND THE OVERALL TIMELINE ASSOCIATED WITH**
3 **THE RFP PROCESS.**

4 **A.** A timeline outlining the sequence of milestone activities associated with the RFP
5 process is included as PNM Figure RWN-1.

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PNM Figure RWN-1. RFP Process Timeline



1

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1 **Q. PLEASE EXPLAIN THE BID EVALUATION AND SELECTION**
2 **PROCESS.**

3 **A.** Prior to the receipt of bids, HDR drafted the bid evaluation methodology that
4 would be utilized to evaluate the bids on a consistent and comparable basis and
5 collected input from the bid evaluation team. The bid evaluation was split into
6 three phases:

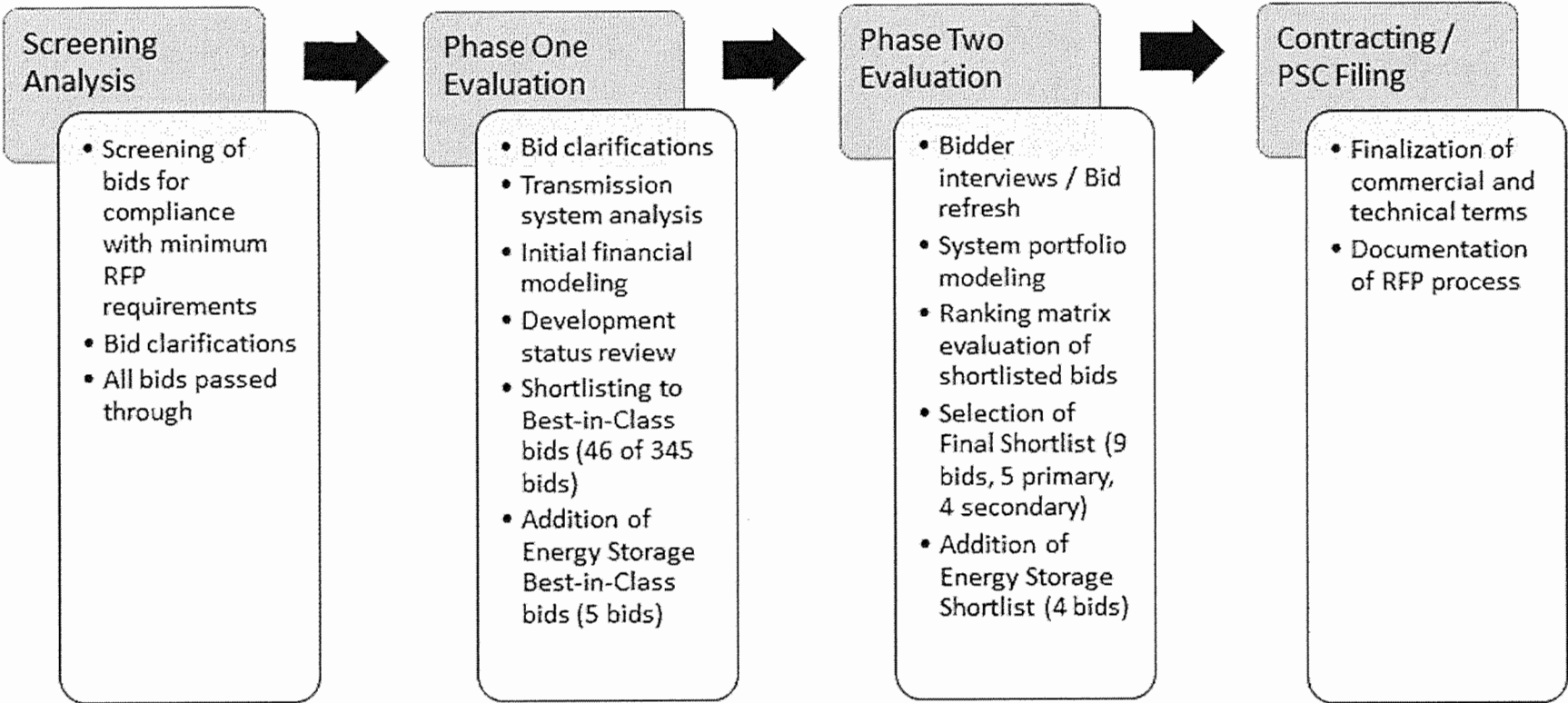
- 7 • Initial Screening: initial screening of bids for compliance with the
8 minimum requirements of the RFP.
- 9 • Phase One Evaluation: detailed evaluation of screened bids to shortlisting
10 of bids to the best-in-class within the technologies proposed; bids
11 evaluated individually for both quality and likelihood of achieving
12 successful commercial operation using both price and non-price criteria.
- 13 • Phase Two Evaluation: further detailed evaluation of shortlisted bids
14 including analysis of combinations of bids to support a preferred
15 alternative or combination of alternatives.

16 A flow diagram of the bid evaluation process is presented in PNM Figure RWN-
17 2.

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1

PNM Figure RWN-2. RFP Bid Evaluation Process Flow



2

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1 **Q. PLEASE EXPLAIN HDR'S INITIAL SCREENING PROCESS IN MORE**
2 **DETAIL.**

3 **A.** HDR's initial bid screening process was structured to screen RFP responses for
4 fatal flaws and for factors that did not comply with the intent of the RFP. Upon
5 receipt and initial evaluation of the bids, the bid evaluation team decided to carry
6 all of the bids into the Phase One bid evaluation to allow for the opportunity to
7 obtain further clarification of the bid offerings, to make the evaluation as
8 thorough and complete as possible and to more fully understand the potential
9 value of each project to PNM and the stakeholders.

10

11 **Q. PLEASE IDENTIFY WHAT METRICS OR EVALUATION FACTORS**
12 **WERE REVIEWED DURING THE BID EVALUATION PROCESS.**

13 **A.** As part of the Initial Screening and Phase One evaluation, the evaluation team
14 initiated a side-by-side comparative analysis of the bids that assessed several
15 factors including, but not limited to, the following bidder and bid characteristics:

- 16 • Performance
- 17 • Development Status
- 18 • Environmental and Permitting Status
- 19 • Land Acquisition Status
- 20 • Credit Quality
- 21 • Safety Metrics
- 22 • Construction Contractor License Applicability
- 23 • Bid Quality / Completeness

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- 1 • Point of Delivery
- 2 • Transmission Losses/Fees
- 3 • Achievable In-Service Dates
- 4 • Total Delivered Cost

5

6 **Q. PLEASE DESCRIBE THE OBJECTIVES AND METHODOLOGY USED**
7 **IN THE PHASE ONE EVALUATION PROCESS.**

8 **A.** The Phase One bid evaluation process was structured to establish a shortlist of
9 bids based upon the previously noted evaluation factors. The Phase One
10 evaluation was focused on selecting the best-in-class bids for each generation
11 technology to allow more in-depth analysis and system modeling of these projects
12 during the Phase Two evaluation process. The Phase One process involved, but
13 was not limited to the following activities:

- 14 • Bid clarifications
- 15 • Assessment of electrical interconnection and transmission system network
16 upgrade costs
- 17 • Assessment of operations and maintenance costs
- 18 • Determination of delivered fuel costs
- 19 • Development of Owner's costs
- 20 • Computation of revenue requirements for capital cost recovery
- 21 • Accounting for transmission wheeling fees and losses
- 22 • Development of total delivered cost of electricity

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- 1 • Evaluation of redlines to terms and conditions
- 2 • Evaluation of bidder experience

3

4 Additional detail regarding these bid evaluation activities are discussed below and
5 can be found in HDR’s Bid Evaluation Process Overview Report included in
6 PNM Exhibit RWN-4.

7

8 **Q. WHAT IS MEANT BY A "BEST-IN-CLASS" BID?**

9 **A.** As previously noted, the purpose of the Phase One evaluation was to develop a
10 shortlist of best-in-class bids for each generation technology. For this purpose,
11 “best-in-class” is defined as bids providing both the lowest total evaluated
12 delivered cost of energy and presenting the lowest risk to the timely and
13 successful execution of the project. Project characteristics and risks associated
14 with technology, permitting, land acquisition, and transmission interconnection
15 and network upgrades were considered for this best-in-class characterization. As
16 previously indicated, the shortlist included 51 best-in-class bids representing
17 solar, wind, energy storage, frame combustion turbine, aeroderivative combustion
18 turbine, reciprocating engines, combined solar/battery, combined wind/battery,
19 and combined solar/wind technologies. These bids were then carried into the
20 Phase Two evaluation for detailed system modeling by Astrape and PNM’s
21 resource planning team.

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1 **Q. PLEASE EXPLAIN THE BID CLARIFICATION PROCESS**
2 **IMPLEMENTED DURING THE EVALUATION OF BIDS.**

3 **A.** To get a thorough understanding of the characteristics of the bid(s) offered and to
4 promote a comparable bid evaluation process, the bid evaluation team
5 implemented a thorough bid clarification process during the Phase One and Phase
6 Two evaluations. Specific bid clarifications were requested from individual
7 bidders focusing on numerous topics, including, but not limited to electrical
8 interconnection and network upgrades, application of federal tax credits and
9 tariffs, technology characteristics, pricing structure details, project schedule
10 challenges, performance expectations, and status of environmental permitting and
11 land acquisition.

12
13 **Q. PLEASE DESCRIBE THE METHODOLOGY FOR ASSESSMENT OF**
14 **ELECTRICAL INTERCONNECTION AND TRANSMISSION SYSTEM**
15 **MODIFICATIONS FOR THE BIDS OFFERED.**

16 **A.** Bidders were asked to include costs in their proposal for electrical transmission
17 interconnection, system network upgrades required to support the export of
18 generated electricity from each site, transmission system losses, and any required
19 wheeling fees. This information was reviewed for completeness. However, due
20 to the fact that many bidders had not yet entered into the generator
21 interconnection queue on PNM's system, detailed estimates were generally not
22 available for analysis from most bidders. Some bidders had a final
23 interconnection agreement or had transmission system studies with estimated

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1 costs for necessary upgrades. Similarly, some of those interconnecting to PNM's
2 transmission system via a third-party transmission provider had accounted for the
3 appropriate wheeling fees while others had not.

4
5 PNM solicited follow-up information and supporting data through the Power
6 Advocate question and answer process to gain additional information from the
7 bidders to validate supplied transmission cost information.

8
9 To provide an assessment of electrical interconnection and infrastructure upgrade
10 viability and costs, the PNM Transmission Planning team reviewed the
11 characteristics of each bid and provided information regarding the scope, timeline,
12 and estimated cost for necessary electrical interconnection and transmission
13 system upgrades to support the export of electricity from each project. Any costs
14 not accounted for in the bidders' bids were treated as a PNM capital cost and were
15 incorporated into the estimates of the total delivered costs considered in the bid
16 evaluation. The status of each bidder's electrical interconnection application and
17 expected schedule for implementation of necessary upgrades was considered in
18 the viability of each project. PNM Witness Jeff Mechenbier further addresses the
19 evaluations performed by PNM's Transmission Planning Department with respect
20 to the responses to the RFP.

21

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1 **Q. PLEASE DESCRIBE THE METHODOLOGY FOR ESTABLISHING**
2 **OPERATIONS AND MAINTENANCE COST ESTIMATES FOR THE**
3 **BIDS.**

4 **A.** Operations and maintenance costs for each of the PPA bids were included in the
5 proposed PPA pricing. Operations and maintenance costs for EPC and BT bids
6 were estimated by HDR based upon information in the bidders' bids for long-term
7 maintenance agreements, prior quotations received by HDR, or otherwise
8 estimated based upon HDR's database of cost information; estimates of staffing
9 and associated wage rates were provided by the PNM team; and consumables,
10 consumption rates, and unit costs were estimated based upon HDR's prior
11 experience and database of information. For renewable projects, this information
12 was supplemented by operations and maintenance costs as reported in National
13 Renewable Energy Laboratory (NREL), Sandia National Labs, and other industry
14 related documentation.

15

16 **Q. PLEASE EXPLAIN HOW THE DELIVERED COST OF FUEL FOR THE**
17 **NATURAL GAS FUELED BIDS WAS DETERMINED.**

18 **A.** Commodity costs for natural gas were as provided by PNM's resource planning
19 team to be consistent with the IRP development and the system modeling
20 activities. Costs for gas transmission were provided by PNM's Wholesale Power
21 Marketing team. Total natural gas costs included the commodity cost at the
22 source with adders for fuel surcharges, transport charges, and taxes as well as

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1 costs for any required gas lateral or additional infrastructure costs to obtain gas
2 pricing specific to individual project sites.

3

4 **Q. PLEASE DESCRIBE HOW THE OWNER'S COSTS ASSOCIATED WITH**
5 **EACH OF THE BIDS WERE ESTABLISHED.**

6 **A.** Owner's costs for development, management, and oversight of the execution of
7 the projects were estimated by the bid evaluation team. These costs for EPC
8 projects included costs for permitting, project management and operations
9 personnel, information technology, land acquisition, Owner's engineering, startup
10 fuel and consumables, permanent plant equipment and furnishings, maintenance
11 agreement mobilization costs, an initial stock of spare parts, a credit for energy
12 sold during the commissioning tests, legal and regulatory costs, general and
13 administrative costs, an allowance for funds used during construction, and
14 contingency. The scope and magnitude of these costs allocated to PNM for PPA
15 and BT projects were significantly reduced as the bidder would be responsible for
16 many of these activities. Owner's costs for PPA projects were estimated at
17 approximately 1 percent of the estimated project cost, BT projects were estimated
18 at approximately 2 to 2.5 percent, and EPC projects were estimated at
19 approximately 8 to 12 percent of the EPC project cost.

20

21 **Q. PLEASE EXPLAIN HOW COSTS FOR RECOVERY OF PNM'S**
22 **CAPITAL INVESTMENTS WERE DETERMINED IN THE BID**
23 **EVALUATION PROCESS.**

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1 **A.** Capital cost recovery for EPC and BT offerings as well as scope (e.g.
2 transmission network upgrades) not included in the PPA offers was determined
3 utilizing PNM’s financial modeling parameters from their revenue requirements
4 models. HDR developed an annual capital recovery fixed charge rate for all
5 capital costs, including New Mexico Gross Receipts Taxes allocated to PNM.
6 While values were calculated considering the application of Production Tax
7 Credits and Investment Tax Credits, these values were not utilized in the initial
8 evaluation for EPC or BT offerings as PNM advised that they would not be able
9 to recognize the benefits of these tax credits.

10

11 **Q.** **PLEASE EXPLAIN HOW ANY RENEWABLE GENERATION TAX**
12 **CREDITS AND TARIFFS ARE CONSIDERED IN THE EVALUATION**
13 **PROCESS.**

14 **A.** The Production Tax Credit for wind energy and the Investment Tax Credit for
15 solar projects, allow renewable energy providers to reduce the cost of energy on
16 their bids due to government tax subsidies. In contrast, import and other tariffs
17 have been placed on certain materials such as solar panels and steel that can drive
18 increased costs for the projects. Individual bidders were responsible for
19 incorporating or considering how renewable tax credits as well as applicable
20 tariffs would impact their proposals. This included defining the timeline for
21 proposed projects that would allow for the tax benefits to be captured and
22 incorporation of costs, if applicable, to address solar, steel, or other tariffs
23 applicable to their project.

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1 **Q. HOW WERE COSTS FOR ELECTRICAL TRANSMISSION FEES AND**
2 **TRANSMISSION LINE LOSSES TO PNM'S LOAD CENTER**
3 **CONSIDERED IN THE EVALUATION?**

4 **A.** If not included in the bidder's proposed pricing, electrical transmission wheeling
5 fees were determined for projects outside of PNM's territory in accordance with
6 Open Access Transmission Tariff ("OATT") guidelines as defined by PNM's
7 transmission planning team. For projects beyond counties surrounding
8 Albuquerque, including Bernalillo, Valencia, Torrance, McKinley, Sandoval,
9 Santa Fe, Lincoln, and Cibola counties, an allocation consistent with expectations
10 from PNM's transmission planning team for electrical losses from the facility to
11 PNM's load center in Albuquerque were considered.

12
13 **Q. PLEASE EXPLAIN HOW COMPARABLE TOTAL DELIVERED COST**
14 **OF ELECTRICITY WAS DETERMINED FOR THE COMPARISON OF**
15 **TECHNOLOGY BIDS.**

16 **A.** Using all of the above discussed cost factors, HDR estimated a total delivered cost
17 of energy from each project such that an equivalent comparison of bids could be
18 presented. The total delivered cost information was presented as a levelized cost
19 of energy per delivered megawatt-hour over the term of the proposed contract for
20 renewable (solar, wind, and energy storage offers). For natural gas fired offers,
21 total delivered costs were developed on a first-year cost basis with escalation to
22 be applied for fuel and variable operations and maintenance costs. The first year
23 costs considered future year major maintenance activities. This approach

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1 provided a fair comparison of like technologies to assist in the selection of best-
2 in-class bids for each technology that were subsequently more fully evaluated in
3 the Phase Two system modeling activities accounting for noted escalation, as
4 required, over the life of the project.

5
6 **Q. PLEASE DESCRIBE HOW BIDDER EXCEPTIONS TO THE PROPOSED**
7 **PROJECT TERMS AND CONDITIONS WERE CONSIDERED IN THE**
8 **EVALUATION PROCESS.**

9 **A.** A side-by-side comparison of the exceptions and comments offered on the
10 proposed terms and conditions was prepared to identify major discrepancies or
11 cost factors between bids. Many of these exceptions revolved around renewable
12 project curtailment, liquidated damages, developer security provisions, and
13 performance guarantees. This information was considered in the qualitative
14 ranking and selection of shortlisted bids during the Phase Two evaluation.

15
16 **Q. PLEASE DESCRIBE HOW BIDDER EXPERIENCE WITH THE**
17 **TECHNOLOGY(IES) PROPOSED WAS CONSIDERED IN THE BID**
18 **EVALUATION PROCESS.**

19 **A.** For renewable and energy storage bids, a side-by-side comparison of each
20 bidder's experience with the type of project(s) proposed was prepared and
21 considered in the bid selection process. This information was considered in the
22 qualitative ranking and selection of shortlisted bids during the Phase Two
23 evaluation.

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1 **Q. FOR THE SUPPLEMENTAL ENERGY STORAGE RFP, PLEASE**
2 **EXPLAIN WHY THE SHORTLISTED PROJECTS WERE SMALLER IN**
3 **CAPACITY THAN THOSE REQUESTED IN THE RFP.**

4 **A.** To minimize technology risk associated with battery energy storage technologies,
5 the bid evaluation team determined that it would be prudent to limit the
6 application of any single energy storage technology at any site to no more than 40
7 MW. For this reason, energy storage offers from both the Replacement Resource
8 RFP and the supplemental Energy Storage RFP were revisited, modified, and
9 adjusted in capacity, if necessary, to comply with this limitation. PNM Witness
10 Kemp will provide additional background regarding this decision.

11

12 **Q. PLEASE DESCRIBE THE SHORTLIST OF BIDS THAT RESULTED**
13 **FROM THE PHASE ONE EVALUATION PROCESS.**

14 **A.** Due to the fact that more detailed analysis and selection of the final generation
15 portfolio was highly dependent upon system modeling activities to be performed
16 in the Phase Two evaluation, the shortlist maintained the most favorable bids in
17 each generation technology category while also maintaining offers in each
18 technology category with sufficient capacity (when available) to deliver the full
19 replacement need for the San Juan Generating Station. The shortlist was also
20 intended to maintain maximum resource flexibility with respect to
21 implementation schedules, applicability of Investment Tax Credits (ITCs) and
22 Production Tax Credits (PTCs), and to incorporate and allow for future increased
23 integration of renewable energy resources.

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1 The intent of considering the above in the selection of the shortlisted bidders was
2 to provide sufficient information to allow Astrape and PNM's resource planning
3 team to perform and evaluate a wide range of generation portfolios in an effort to
4 develop the Replacement Resources for PNM going forward while maintaining
5 system reliability objectives.

6
7 **Q. PLEASE EXPLAIN THE PHASE TWO BID EVALUATION PROCESS.**

8 **A.** The Phase Two bid evaluation process was focused upon evaluating alternative
9 generation portfolios utilizing the selected shortlist bids and project characteristics
10 to obtain the replacement resources that satisfied the PNM system capacity,
11 energy, and reliability objectives. On this basis, for the initial Replacement
12 Resource RFP, the shortlisted RFP bidders were invited to meet with the bid
13 evaluation team to further discuss the details of their bids and to allow the PNM
14 team to gather necessary data for further evaluation. At this time the bidders were
15 requested to provide additional clarifications as well as a bid refresh based upon a
16 firm project in-service date of December 31, 2021, and considering a complete
17 commercial agreement template provided by PNM.

18
19 Information gathered from the bid refresh request was summarized and utilized
20 for system modeling activities performed by the PNM resource planning staff as
21 well as Astrape. Further details of this modeling process will be summarized by
22 witnesses from Astrape and PNM.

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1 **Q. HOW WAS THE FINAL SHORTLIST DERIVED?**

2 **A.** The final shortlist resulting from the initial Replacement Resource RFP and the
3 supplemental Energy Storage RFP, consisting of thirteen bids, was derived as a
4 result of the detailed system modeling and system optimization performed by
5 Astrape and PNM’s Resource Planning team in conjunction with a weighted bid
6 ranking matrix compiled by HDR for the initial Replacement Resource RFP and
7 reviewed with the bid evaluation team. The bid ranking matrix was utilized to
8 rank both qualitative and quantitative measures of the bids included in the Phase
9 One shortlist on a consistent basis. The final shortlist included the bids
10 summarized in PNM Table RWN-3. In some cases, this final shortlist involved
11 refinements in the originally proposed project capacities and/or locations that
12 resulted from the Phase Two bid evaluation, the system optimization process, and
13 the efforts to minimize battery technology risk as previously noted.

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PNM Table RWN-3. Final Shortlist Content Summary

Location	Project Structure	Capacity	Strengths	Challenges
Primary Bids				
Rio Arriba County	Solar PPA	50 MW Solar / 20 MW (80 MWH) BESS	<ul style="list-style-type: none"> - Favorable solar pricing for capacity of facility - Involvement of Jicarilla Apache Nation and use of land 	<ul style="list-style-type: none"> - Limited team development experience - Electrical interconnection via JANPA
McKinley County	Solar + Storage PPA	300 MW Solar / 40 MW (160 MWH) BESS	<ul style="list-style-type: none"> - Favorable pricing - Private land with lease option - Entered DISIS in July, 2018 - POI is on the project site 	<ul style="list-style-type: none"> - Limited battery storage experience - Largest solar facility is 200 MW
San Juan County	Natural Gas EPC	280 MW	<ul style="list-style-type: none"> - Flexible natural gas technology - Favorable evaluated delivered cost - Existing interconnection 	<ul style="list-style-type: none"> - Fuel sourcing to site
Torrance County ^a	Wind PPA	140 MW	<ul style="list-style-type: none"> - Favorable evaluated delivered cost of energy for Wind - Significant development experience - 100% site control - Executed LGIA 	<ul style="list-style-type: none"> - Best pricing would be for a 2020 COD - Completion of BB2 transmission line
Bernalillo County	BESS EPC	30 MW / 60 MWH	<ul style="list-style-type: none"> - Located near PNM load center - Significant battery technology experience - modularized - Local contractor experience – 100% New Mexico construction labor 	
Bernalillo County	BESS EPC	40 MW / 80 MWH	<ul style="list-style-type: none"> - Located near PNM load center - Significant battery technology experience - modularized - Local contractor experience – 100% New Mexico construction labor 	<ul style="list-style-type: none"> - Technology park location
San Juan County	Solar EPC	20 MW	<ul style="list-style-type: none"> - Favorable solar pricing for capacity of facility - Local contractor experience – 100% New Mexico construction labor 	<ul style="list-style-type: none"> - Plant configuration to utilize existing land availability

1 a. This bid selected for its contribution to satisfying PNM’s Renewable Portfolio Standard commitments.

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PNM Table RWN-3. Final Shortlist Content Summary

Location	Project Structure	Capacity	Strengths	Challenges
Alternative Bids				
Bernalillo County	Solar + Storage PPA	100 MW Solar / 20 MW (80 MWH) BESS	<ul style="list-style-type: none"> - Favorable evaluated delivered cost - Avoiding federal land and not subject to NEPA - Significant development experience - Long-term ownership role 	<ul style="list-style-type: none"> - Critical path is Western Spirit transmission line and ROW needs
Lincoln / Torrance County	Wind PPA	200 MW	<ul style="list-style-type: none"> - Significant development experience - Long-term ownership role 	<ul style="list-style-type: none"> - Critical path is Western Spirit transmission line and ROW needs
Rio Arriba County	Solar + Storage PPA	150 MW Solar / 40 MW (160 MWH) BESS	<ul style="list-style-type: none"> - Favorable solar pricing - Involvement of Jicarilla Apache Nation and use of land - Engagement of New Mexico State University in study work - Submitted into DISIS in July, 2018 	<ul style="list-style-type: none"> - Long-term ownership unknown as development would be sold - Limited solar experience - Electrical interconnection via JANPA
San Juan County	Natural Gas EPC	180 to 360 MW	<ul style="list-style-type: none"> - Flexible natural gas technology - Favorable evaluated delivered cost - Existing interconnection 	<ul style="list-style-type: none"> - Fuel sourcing to site
Bernalillo County	BESS EPC	40 MW / 80 MWH	<ul style="list-style-type: none"> - Located near PNM load center - Significant battery technology experience - modularized - Local contractor experience – 100% New Mexico construction labor 	<ul style="list-style-type: none"> - More significant electrical interconnection and network upgrade modifications required
San Juan County	BESS EPC	40 MW / 80 MWH	<ul style="list-style-type: none"> - Significant battery technology experience - modularized - Local contractor experience – 100% New Mexico construction labor 	<ul style="list-style-type: none"> - Distance to load center

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1 **Q. PLEASE DESCRIBE ANY FACTORS THAT INFLUENCED THE BID**
2 **EVALUATION RESULTS IN THE MIDST OF THE EVALUATION**
3 **PROCESS.**

4 **A.** There were some alterations made during the bid evaluation process that did result
5 in adjustments from the early evaluation results to the final results. These factors
6 can be described as follows:

7 1) Upon selection of the Phase One shortlist of projects, updated commercial
8 term sheets with defined expectations were provided for the bidders'
9 consideration for a bid refresh that was submitted on August 31, 2018.

10 2) The cost of delivered fuel was updated during the evaluation process to
11 remain consistent with the basis of PNM's ongoing IRP process and
12 updating of assumptions.

13 3) Upon selection of the Phase One shortlist of projects, a more detailed
14 model of battery utilization or battery use case was developed through the
15 generation portfolio modeling. This dispatch profile was forwarded to the
16 shortlisted bidders for consideration in their August 31, 2018 bid refresh.

17 4) EPC projects at the San Juan Generating Station site were originally
18 assumed to utilize existing facility infrastructure to the greatest extent
19 possible. The final evaluation basis structured any EPC project with very
20 limited interface to existing San Juan infrastructure.

21 5) Early cost of generation calculations treated capital cost recovery for
22 Owner's costs and electrical interconnection and transmission upgrade
23 costs for renewable projects as if they were part of the renewable project

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1 with advantages of federal tax credits. This was subsequently adjusted to
2 be calculated in accordance with PNM's revenue requirements
3 methodology without the benefit of federal tax credits.

4 6) Owner's contingency, included in the Owner's Costs on the EPC projects
5 was increased during the bid evaluation process to more accurately
6 account for the level of development of the projects being considered.

7 7) Natural gas fired installations located at the San Juan Generating Station
8 site were evaluated both with and without selective catalytic reduction
9 systems for NOx emissions control. Evaluated costs were developed for
10 each.

11 8) Implementation of the Energy Transition Act after completion of the
12 project shortlist development resulting in the issuance of the supplemental
13 Energy Storage RFP.

14
15 **Q. PLEASE EXPLAIN HOW THE VALIDITY OF THE EVALUATION**
16 **RESULTS WAS MAINTAINED GIVEN THE INFLUENCING FACTORS**
17 **NOTED ABOVE.**

18 **A.** Throughout the process, as changes or factors influenced the evaluation, the
19 selection of bids was reviewed and again validated to maintain the integrity of the
20 process. This validation was performed on not only the total delivered cost of
21 energy and bid rankings as delivered from the Phase One evaluation, but also the
22 overall portfolio modeling performed by Astrape and PNM.

23

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1 **Q. DO YOU BELIEVE THAT THE TERMS AND CONDITIONS SET FORTH**
2 **IN THE RFP WERE REASONABLE?**

3 **A.** Yes. From HDR's experience, the terms and conditions were typical of such
4 RFPs. At PNM's preference, some aspects were initially left open for the bidders
5 to provide in their bids associated with factors such as liquidated damage values,
6 limits of liability, contract security provisions, and others. Upon receipt of the
7 bids and throughout the bid clarification process, these terms and conditions were
8 assessed by HDR relative to typical market considerations and negotiated
9 amongst the bidders which resulted in commercial provisions that we believe are
10 consistent with the range of current market expectations and offerings.

11

12 **Q. HAVE YOU INCLUDED COPIES OF THE ALL RESOURCES RFP AND**
13 **THE SUPPLEMENTAL ENERGY STORAGE RFP AS EXHIBITS TO**
14 **YOUR TESTIMONY?**

15 **A.** For the ready reference of the Commission and the parties, I have attached copies
16 of the bidders' instructions sections from both of the RFPs as PNM Exhibit
17 RWN-5 (All Resources RFP) and RWN-6 (Supplemental Energy Storage RFP).

18

19 **Q. PLEASE EXPLAIN YOUR COMPANY'S PARTICIPATION IN THE**
20 **SELECTION PROCESS AND THE NEGOTIATIONS WITH SHORT-**
21 **LISTED BIDDERS.**

22 **A.** HDR served as an independent resource to review, summarize, and evaluate bid
23 information in a consistent and controlled manner to facilitate PNM modeling and

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1 decision making, as well as to provide support for the later phases of the
2 evaluation and negotiation. Astrape performed generation system portfolio
3 modeling to evaluate the overall system reliability and costs for varying
4 generation portfolios.

5
6 Our role was structured as a participant and resource to PNM in the selection and
7 negotiation process associated with the technical, evaluated capital cost, evaluated
8 cost of electric generation, long term service agreement, and commercial aspects
9 of the short-listed bidders' bids. HDR's participation in these areas was
10 conducted independently with subsequent collaboration between HDR and PNM
11 resulting in a single, conformed bid evaluation that supported PNM's final
12 negotiation activities.

13

14 **Q. DID YOU HAVE A ROLE IN THE FINAL SELECTION OF THE**
15 **SUPPLIER OF THE GENERATION RESOURCES?**

16 **A.** In conjunction with Astrape and the remainder of the bid evaluation team, HDR
17 was an active participant in the final selection of the PPA provider and EPC
18 contractor candidates by serving in evaluation support and independent advisor
19 roles. Our activities supported the definition of seven primary and six alternative
20 short-listed, market competitive bids such that PNM could subsequently select
21 and pursue final negotiations. HDR's role in the final selection was also to assist
22 PNM in the conformance of the agreement(s) with the final selected bidder(s).

23

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1 **Q. DO YOU BELIEVE THE PROCUREMENT PROCESS AND**
2 **PROCEDURES SPECIFIED WERE REASONABLE AND**
3 **COMPETITIVELY FAIR?**

4 **A.** Yes. The overall RFP and procurement approach was robust and consistent with
5 market based bidding of all-source projects. The RFP process resulted in a strong
6 list of viable and competitive bids that offered options and competitive
7 opportunities for well-defined and low cost generating resource alternatives.

8 **II. CONCLUSION**

9 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

10 **A.** Yes, it does.

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