Integrated Resource Plan Public Advisory Group Meeting 5 – September 7, 2017

Siting and Environmental Considerations, L&R Table, Generation and Demand Side Resource Options, Renewable Portfolio Standard Impacts



Meeting Agenda

- Welcome and Introduction
- Public Advisory Process and Meeting Schedule
- PAG Written Input and Requests
- Renewable & Conventional Power Plant Siting and Environmental Considerations
- L&R Table
- Strategist Introduction
- Conventional Capacity and Generation Option Considerations
- Demand Side Resource Options
- Renewable Energy Options
- Operational Considerations for Intermittent Resources and Balancing
- Renewable Portfolio Standard Impacts ("RPS")
- Resource Input Template
- Discussion



Welcome and Introduction

Presenters for this Meeting

- Maritza Perez: NM IRP Case Manager
- Jessica Christianson: Manager of Environmental Department
- Omar Gallegos: Director of Resource Planning and Management



Safety and Basics

- Fire Escape Routes
- Please sign in. You will be added to our PAG distribution list
 - Skype participants can email <u>NMIRP@epelectric.com</u>
- Facilities
- Recording of Meetings
- Acronyms on last slide



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Safe Harbor Statement

Certain matters discussed in this Integrated Resource Plan ("IRP") public advisory group presentation other than statements of historical information are "forward-looking statements" made pursuant to the safe harbor provisions of the Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Such statements are subject to a variety of risks, uncertainties and other factors, most of which are beyond El Paso Electric Company's ("EPE" or the "Company") control, and many of which could have a significant impact on the Company's operations, results of operations, and financial condition, and could cause actual results to differ materially from those anticipated. Additional information concerning factors that could cause actual results to differ materially from those expressed in forward-looking statements is contained in EPE's most recently filed periodic reports. Any such forwardlooking statement is qualified by reference to these risks and factors. EPE cautions that these risks and factors are not exclusive.

Management cautions against putting undue reliance on forward-looking statements or projecting any future assumptions based on such statements. Forward-looking statements speak only as of the date of this IRP public advisory group presentation, and EPE does not undertake to update any forward-looking statement contained herein, except to the extent the events or circumstances constitute material changes in this IRP that are required to be reported to the New Mexico Public Regulation Commission ("NMPRC" or "Commission") pursuant to its IRP Rule, 17.7.3 New Mexico Administrative Code.



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Ground Rules

Meeting Rules and Guidelines

- Meetings will follow the agenda
- Presentations and Discussion
 - Each presentation will be followed by a discussion period that relates to that presentation
 - Please reserve your questions and comments for designated discussion periods
 - Skype attendees may type in questions in the instant message box
- Discussion time at end of meeting can relate to any presentation
 - All public input and requests submitted in writing will be responded to in writing*
- Keep communications respectful and to the point

*Joint Stipulation Case No. 15-00241-UT



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2017-2018 New Mexico IRP Public Advisory Group Schedule

	Meeting	Date	Subject	Location	
	(1)	5/25/2017	Kick-off and Introduction	EPE Office	
		2:00 PM -	Explanation of IRP Process and Goals	555 S. Compress Rd.	
		4:00 PM	Resource Planning Process and Overview	Las Cruces, NM	
			Preliminary Listing of Resource Options to Consider		
				NMPRC Offices	
		6/9/2017		4th Floor Hearing	
	(2)	0/8/2017	Summary of IPP process and introduction to system	Room	
	(2)	3-30 PM	Summary of the process and introduction to system	P.E.R.A. Building	
		3.30 PW		1120 Paseo de Peralta	
				Santa Fe, NM	
	(3)	7/6/2017	Operational Considerations/Requirements for Future Resources	Dona Ana County	
		2:00 PM -	Assessment of need for additional resources	Conference Room 113	
		4:30 PM	System Operations - Reliability, Import Limits and Balancing	845 N. Motel Blvd.	
			Existing Conventional Resources	Las Cruces, NM	
			System generation retirement plan and process		
			Transmission & Distribution Systems Overview and Projects		
	(4)	8/8/2017	Existing Renewable Resources and Distributed Generation (DG)	Dona Ana County	
		2:00 PM -	Demand Response (DR) Programs and Options	Conference Room 113	
		4:30 PM	Energy Efficiency (EE)	845 N. Motel Blvd.	
	(5)	0/7/2017	Load Forecast	Las Cruces, NM	
	(5)	9/7/2017 3:00 PM	Conventional Capacity and Generation Option Considerations	Conference Reem 112	
		2:00 PW -	Penand Side Resource Options	RAS N. Motel Rhyd	
		4.50 PIVI	Operational Considerations for Intermittent Resources and Palansing	Las Cruces NM	
			Renewable Portfolio Standard Impacts		
			I & R Table		
			Strategist Introduction		Additions
			Resource Input Template		
			Renewable & Conventional Power Plant Siting and Environmental Considerations		·
	(6)	10/5/2017	DEADLINE FOR OPTION SUBMITTAL FROM PUBLIC	Dona Ana County	- Re-scheduled Rates
		2:00 PM -	Rate Considerations and Potential Impacts on Resource Planning Decisions	Conference Room 113	
		4:30 PM	Resource Planning Base Case Assumptions	845 N. Motel Blvd.	-
			Initial Cost Estimates for Resource Planning Options	Las Cruces, NM	
			Modeling and risk assumptions and the cost & general attributes of potential additional resources		
				Dona Ana County	
		10/26/2017		Conference Room 113	
	(7)	2:00 PM -	Retirements, Cost Modeling Assumptions, and other topics of interest to PAG	845 N. Motel Blvd.	
		4:30 PM		Las Cruces, NIVI	
	(9)	11/2/2017	CANTA EE - Decourse Diapping Quartiew and Modeling for Cost of Detential Additional Descurses	Santa Fe	4
	(0)	11/2/2017	Preliminant Resource Planning Overview and Modeling for Cost of Potential Additional Resources	Dona Ana County	•
	(9)	2:00 PM -	Presentation of Resulting 20-year Evancion Plan	Conference Room 113	
		4:30 PM	Development of the most cost-effective portfolio of resources for utility's IRP	845 N. Motel Blvd.	4.5
		4.50110	bereichten eine most eine eine portono of resources for dancy sind	Las Cruces, NM	Sec. 1
	(10)-(11)	lan 19. Feb 16	Informational Meetings or Discussions as Requested	LC/Santa Fe	87 Localitie
	(12)	4/30/2018	IRP Draft Presentation	Las Cruces	Maria
	(13)	5/16/2018	Follow-up meeting to receive and respond to public feedback	Las Cruces	omponii
	(14)	6/8/2018	Final IRP presentation showing new load forecast	Las Cruces	
	(15)	6/29/2018	Follow-up meeting to receive and respond to public feedback	Las Cruces	
	11	7/15/2018	IRP Filing Date		El Paso Electric

Integrated Resource Plan

Public Advisory Process

 The purpose of the public advisory process is to receive public input and solicit public commentary concerning resource planning and related resource acquisition issues

• - NM Rule 17.7.3.9 (H)

Meeting Schedules and Agendas

 Participants may add their own presentations to the agendas for the January and February meetings



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PAG Written Input and Requests

Follow up Discussion



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Integrated Resource Plan

Renewable & Conventional Power Plant Siting and Environmental Considerations

Jessica Christianson

Manager of Environmental Department



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IRP Rule 17.7.3.6 Objective

The purpose of this rule is to set forth the commission's requirements for the preparation, filing, review and acceptance of integrated resource plans by public utilities supplying electric service in New Mexico in order to identify the most cost effective portfolio of resources to supply the energy needs of customers. For resources whose costs and service quality are equivalent, the utility should prefer resources that minimize environmental impacts.



IRP Rule 17.7.3.9 Integrated Resource Plans for Electric Utilities:

G. Determination of the most cost effective resource portfolio and alternative portfolios

• (2) Each electric utility shall provide a summary of how the following factors were considered in, or affected, the development of resource portfolios:

(C) Existing and anticipated environmental laws and regulations, and if determined by the commission, the standardized cost of carbon emissions;



Environmental Considerations

- <u>Process</u> by which environmental impacts are assessed
 - National Environmental Policy Act (NEPA) as a guidance standard
- <u>Resources</u> considered under the environmental umbrella



Environmental Considerations

- In general, environmental considerations for siting renewables, conventional generation, and transmission and distribution facilities are similar.
- The environmental regulatory guidance and review varies depending on the degree of impact and location of the project.
- In all cases, impacts to environmental resources must be considered.



Environmental Assessment Procedures The NEPA Process

- National Environmental Policy Act
 - NEPA directs all federal agencies to consider the environmental impacts of proposed actions
 - NEPA is intended to help public officials make informed decisions based on an understanding of the environmental consequences



Environmental Assessment Procedures

The NEPA Process

- What Triggers NEPA?
 - Proposed Actions that are:
 - Directly carried out or funded by a federal agency.
 - Financed or *permitted* by a federal agency.
 - Connected actions.

Although not all EPE projects trigger NEPA, the procedures which it prescribes are guidance for all projects.



Environmental Assessment Procedures

Three Levels of NEPA Evaluation



Environmental Assessment Procedures The NEPA Process

• When is an impact Significant?

- Must consider the *context* and *intensity* of an impact to determine significance
 - Public health and safety
 - Unique characteristics of a geographic area
 - Eligibility for the National Register of Historic Places (NRHP)
 - Sensitive species and/or habitats
 - Cumulative effects
 - Federal, state, and local laws



Environmental Assessment Procedures

Steps in the NEPA Analysis

- Purpose and Need for the Project
- Scoping
- Alternatives
- Affected Environment and Consequences
- Review and Consultation Coordination
- Draft Document
- Final Document
- Record of Decision



- What resources fall under the purview of Environmental analysis?
 - Air Quality
 - Wildlife/Vegetation/Habitats
 - Cultural Resources
 - Water Resources/Wetlands
 - Environmental Justice
 - Special Designations



Air Quality Resources

- Most air emissions result from fuel combustion fuel
 - Natural Gas
 - Nitrogen Oxides
 - Carbon Monoxide
 - Particulate Matter
- Clean Air Act requires EPA to establish National Ambient Air Quality Standards (NAAQS)
 - Regional non-attainment considerations
 - Proposed emissions and ambient air quality factors





Environmental Resource Considerations Wildlife Resources

- Manage effects to Special Status Species or critical habitat designated by:
 - Endangered Species Act
 - Bureau of Land Management (BLM) Sensitive Species
 - US Forest Service (USFS) Sensitive Species
 - New Mexico Department of Game & Fish (NMDGF) Species of Concern
- Reconnaissance and detailed surveys of potential project areas:
 - Avoidance considerations
 - Maintenance timing issues
- Potential issue for expansive or large land area projects:
 - Solar facilities
 - Transmission corridors
 - Access roads
 - Wind Farms
 - Conventional Generation





New Mexico meadow jumping mouse



Avian Resources

- Manage effects to bird species:
 - Migratory Bird Treaty Act (MBTA)
 - Bald and Golden Eagle Protection Act
- Requires pre-construction and maintenance surveys
- Timing considerations for nesting season
- Permitted nest removal and rehabilitations
- Potential issue for expansive and vertical projects:
 - Solar facilities
 - Transmission corridors
 - Access roads
 - Wind Farms

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Conventional Generation

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Cassin's kingbird





Vegetation and Habitat Resources

- Manage effects to Special Status Species or critical habitat designated by:
 - Endangered Species Act
 - BLM Sensitive Species
 - USFS Sensitive Species
 - NMDGF Species of Concern
- Requires reconnaissance and detailed surveys of potential project areas.
 - Avoidance
 - Salvage
- Potential issue for expansive or large land area projects:
 - Solar facilities
 - Transmission corridors
 - Access roads
 - Wind Farms
 - Conventional Generation





Kuenzler's hedgehog

cactus



Environmental Resource Considerations Cultural Resources

- National Historic Preservation Act (NHPA) establishes the National Register of Historic Places (NRHP):
 - Districts
 - Buildings
 - Structures
 - Sites
 - Objects
- Section 106 Review Process
 - Avoidance
 - Data Recovery
- Potential issue for expansive or large land area projects:
 - Solar facilities
 - Transmission corridors
 - Access roads
 - Wind Farms
 - Conventional Generation





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Water Resources

Clean Water Act Protects:

- Water Quality
- Water Quantity
- Wetlands and Other Water of the U.S.
 - Permit required to discharge dredged of fill materials
 - In New Mexico, includes waters with a surface connection to the Rio Grande may include dry arroyos.
 - Requires a jurisdictional determination from the USACE.
 - Impacts require mitigation.







Water Resources

Water Quality Inventory and Monitoring

- Water quality standards must be maintained throughout the life of a project
- National Pollution Discharge Elimination System Permits (NPDES)
- Stormwater Pollution Prevention Plans





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Environmental Justice

Executive Order 12898, issued in 1994:

- Address disproportionately high and adverse human health or environmental effects of proposed projects on minority populations and low-income populations, including tribal populations.
 - Consider population demographics of affected area.
 - Consider the potential for multiple or cumulative exposure to adverse effects or impacts.
 - Recognize interrelated factors that may amplify environmental effects.
 - Develop effective public participation.
 - Seek meaningful community representation early and often in project development.



Specially Designated Areas

National Monuments Wilderness Study Areas Areas of Critical Environmental Concern National Scenic Trails, Wild and Scenic Rivers

- May impose specific protections or restrictions:
 - Roadless areas
 - Visual resource considerations
 - Management strategies or objectives that exclude development or preclude maintenance needs



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Additional Resources

- Visual resources
- Paleontological resources
- Caves and karst
- Floodplains
- Hazardous and solid waste
- Soils and watersheds





Discussion



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Acronym Glossary

BLM	-	Bureau of Land Management	NEPA	-	National Environmental Policy Act
CatEx	-	Categorical Exclusion	NHPA	-	National Historic Preservation Act
CAA	-	Clean Air Act	NMDGF	-	New Mexico Department of Game & Fish
CWA	-	Clean Water Act	NRHP	-	National Register of Historic Places
EA	-	Environmental Assessment	RMP	-	Resource Management Plan
EIS	-	Environmental Impact Statement	SHPO	-	State Historic Preservation Officer
ESA	-	Endangered Species Act	USACE	-	United States Army Corps of Engineers
MBTA	-	Migratory Bird Treaty Act	USFS	-	United States Forest Service



Integrated Resource Plan

Loads and Resources Table

Omar Gallegos

Director of Resource Planning and Management



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Loads and Resources (L&R) Table

- L&R table is utilized to assess resource adequacy to meet peak demand
- L&R is a snap shot of the forecasted peak load

 Compare resource capacity versus forecasted peak load demand



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Loads and Resources Table – Big Picture



* Includes deduction for planned retirements per most recent plans, retirements will be discussed further during the October 26, 2017. Retirement dates will be evaluated via the Capacity Expansion model, as per Joint Stipulation Case No. 15-00241-UT.

** This amount may change depending on portfolio resource mix (e.g. greater amount of renewables may require additional planning reserves).


Loads and Resources Table (Provided July 5, 2017)

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1.0 GENERATION RESOURCES										
1.1 RIO GRANDE	276	276	276	276	276	230	230	230	230	230
1.2 NEWMAN	752	752	752	752	752	602	602	602	602	278
1.3 COPPER	64	64	64	64	64	64	64	64	64	64
1.4 MONTANA	354	354	354	354	354	354	354	354	354	354
1.5 PALO VERDE	633	633	633	633	633	633	633	633	633	633
1.6 RENEWABLES	6	6	6	6	6	6	6	6	6	6
1.7 NEW BUILD (local)	-	-	-	-	-	-	-	-	-	-
1.0 TOTAL GENERATION RESOURCES ⁽¹⁾	2,085	2,085	2,085	2,085	2,085	1,889	1,889	1,889	1,889	1,565
2.0 RESOURCE PURCHASES										
2.1 RENEWABLE PURCHASE (SunEdison & NRG)	29	29	29	29	28	28	28	28	27	27
2.2 RENEWABLE PURCHASE (Hatch)	4	3	3	3	3	3	3	3	3	3
2.3 RENEWABLE PURCHASE (Macho Springs)	35	35	34	34	34	34	34	34	33	33
2.4 RENEWABLE PURCHASE (Newman)	7	7	7	7	7	7	7	7	7	7
2.5 RESOURCE PURCHASE	-	-	-	-	-	-	-	-	-	-
2.0 TOTAL RESOURCE PURCHASES ⁽²⁾	75	74	73	73	72	72	71	71	71	70
3.0 TOTAL NET RESOURCES (1.0 + 2.0)	2,160	2,159	2,158	2,158	2,157	1,961	1,960	1,960	1,960	1,635
4.0 SYSTEM DEMAND										
4.1 NATIVE SYSTEM DEMAND	1,988	2,013	2,035	2,066	2,095	2,126	2,153	2,191	2,223	2,258
4.2 DISTRIBUTED GENERATION	(33)	(35)	(38)	(40)	(43)	(45)	(47)	(50)	(52)	(55)
4.3 ENERGY EFFICIENCY	(10)	(14)	(19)	(24)	(29)	(34)	(39)	(43)	(48)	(53)
4.4 LINE LOSSES	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
4.5 INTERRUPTIBLE SALES	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(52)	(53)
5.0 TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5)) ⁽³⁾	1,889	1,906	1,922	1,945	1,968	1,991	2,010	2,041	2,066	2,093
6.0 MARGIN OVER TOTAL DEMAND (3.0 - 5.0)	271	252	236	213	190	(30)	(49)	(81)	(106)	(457)
·····,						(50)	(10)	(0.)	(196)	()
7.0 PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND	283	286	288	292	295	299	301	306	310	314
8.0 MARGIN OVER RESERVE (6.0 - 7.0)	(13)	(34)	(52)	(79)	(106)	(328)	(351)	(387)	(416)	(771)

* Please reference the following slide for footnotes associated with the above table.



Loads and Resources Table (Provided July 5, 2017)

- 1. Generation unit retirements are per Burns & McDonnell study results dated December 2012 as well as an analysis by Resource Planning with input from Power Generation, Environmental and Financial Planning.
- 2. Purchases based on existing and estimated future purchases including renewable purchases to meet RPS requirements.
- 3. System Demand based on Long-term and Budget Year Forecast issued April 6, 2017.
 - Includes state-required targets for Energy Efficiency.
 - Interruptible load reflects current contracts.
- 4. Long-term resource needs will be evaluated based on system needs and are subject to change.
- 5. The 1x1 Combined Cycle Capacity Expansion in 2023, 2027, 2031 & 2034 may be in combination with renewables and/or others resources.
- 6. Additional small renewable projects being pursued and if implemented, will deduct from the 2022 and/or 2023 requirement.



Demand Forecast Summary (Provided Aug. 8, 2017)

Year	Native System Peak Demand (MW)	Percent Growth
2016	1,892	
2017	1,927	1.83%
2018	1,946	0.99%
2019	1,963	0.88%
2020	1,978	0.78%
2021	2,002	1.18%
2022	2,024	1.11%
2023	2,048	1.17%
2024	2,067	0.94%
2025	2,098	1.49%
2026	2,122	1.17%

* Values provided as part of the load forecast on August 8, 2017.

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1.0 GENERATION RESOURCES	2018 20		Cor	iventional ger	neration net /lay 25, 201	output capacity list 7 page 22.	ed from			
1.1 RIO GRANDE	276	276								
1.2 NEWMAN	752	_		Unit Name	Fuel Type	Summer Net Canacity	Commission Vear			
1.3 COPPER	64			One Name	гисттуре	Summer Net Capacity	commission real			
	354		7	Rio Grande 6	Gas	46	1957			
1.6 RENEWABLES	6	7 I I I		Rio Grande 7	Gas	46	1958			
1.7 NEW BUILD (local)	-			Rio Grande 7	Gas		1070			
1.0 TOTAL GENERATION RESOURCES ⁽¹⁾	2,085	1 1 1 1		RIO Grande 8	Gas	142	1972			
		1 1 1 1		Rio Grande 9	Gas	88	2013			
2.0 RESOURCE PURCHASES		1 1 1 1	1	Newman 1	Gas	74	1960			
2.1 KEINEWABLE PURCHASE (SUNEDISON & NRG) 2.2 RENEWABLE PURCHASE (Hatch)	29	1 1 1 1		Newman 2	Gas	76	1963			
2.3 RENEWABLE PURCHASE (Macho Springs)	35	1 1 1 1			Cas	70	1000			
2.4 RENEWABLE PURCHASE (Newman)	7	1 1 1 1		Newman 3	Gas	97	1966			
2.5 RESOURCE PURCHASE	-	111		Newman 4	Gas	227	1975			
2.0 TOTAL RESOURCE PURCHASES ⁽²⁾	75			Newman 5	Gas	278	2009			
3.0 TOTAL NET RESOURCES (1.0 + 2.0)	2,160		_	Copper	Gas	64	1980			
4.0. SYSTEM DEMAND				MPS 1	Gas	88	2015			
4.1 NATIVE SYSTEM DEMAND	1,988		J	MPS 2	Gas	88	2016			
	(33)			MPS 3	Gas	89	2016			
4.3 ENERGY EFFICIENCY	(10)			MPS 4	Gas	89	2016			
4.4 LINE LOSSES 4.5 INTERRUPTIBLE SALES	(53)	1		Dala Varda 1	Nuclear	211	1096			
				Palo verde 1	Nuclear	211	1980			
5.0 TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5)) ⁽³⁾	1,889	·	_	Palo Verde 2	Nuclear	211	1986			
6.0 MARGIN OVER TOTAL DEMAND (3.0 - 5.0)	271			Palo Verde 3	Nuclear	211	1988			
7.0 PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND 8.0 MARGIN OVER RESERVE (6.0 - 7.0)	283 (13)			* Rio Grande 6	is considered re	tired for resource planning	j purposes.			



1.0 GENERATION RESOURCES 1.1 RIO GRANDE 1.2 NEWMAN 1.3 COPPER	2018 276 752 64	All solar resources to Page nur	rces (except DG) are listed at 70% of nameplate for L&R serve peak load given historical performance for utility scale solar in EPE's territory. mber from Aug. 8, 2017 presentation is referenced.
1.4 MONTANA 1.5 PALO VERDE 1.6 RENEWABLES 1.7 NEW BUILD (local) 1.0 TOTAL GENERATION RESOURCES ⁽¹⁾ 2.0 RESOURCE PURCHASES 2.1 RENEWABLE PURCHASE (SunEdison & NRG) 2.2 RENEWABLE PURCHASE (Hatch) 2.3 RENEWABLE PURCHASE (Hatch)	354 633 6 2,085 29 4		5 MW Holloman (pp 33-34) 3 MW Texas Community Solar (pp 30-31) <u>+ small EPE owned (pp 25-29)</u> 8.2 MW @ 100% Nameplate <u>X 70%</u> 6 MW
2.3 RENEWABLE PURCHASE (Macho Springs) 2.4 RENEWABLE PURCHASE (Newman) 2.5 RESOURCE PURCHASE 2.0 TOTAL RESOURCE PURCHASES ⁽²⁾ 3.0 TOTAL NET RESOURCES (1.0 + 2.0) 4.0 SYSTEM DEMAND 4.1 NATIVE SYSTEM DEMAND 4.2 DISTRIBUTED GENERATION 4.3 ENERGY EFFICIENCY	35 5 7 - 75 2,160 1,988 (33) (10)		20 MW Roadrunner (NRG) (pp 17) 10 MW El Chaparral (Sun Edison) (pp 19) <u>12 MW Las Cruces Centennial (Sun Edison) (pp 18)</u> 42 MW @ 100% Nameplate <u>X 70%</u> 29 MW
4.4 LINE LOSSES 4.5 INTERRUPTIBLE SALES 5.0 TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5)) ⁽³⁾	(4) (53) 1,889		5 MW Hatch @ 70% = 4 MW (pp 16)
6.0 MARGIN OVER TOTAL DEMAND (3.0 - 5.0) 7.0 PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND	271		50 MW Macho Springs @ 70% = 35 MW (pp 20)
8.0 MARGIN OVER RESERVE (6.0 - 7.0)	(13)		10 MW Newman @ 70% = 35 MW (pp 21)



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	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
1.0 GENERATION RESOURCES												
1.1 RIO GRANDE	276	276	276	276	276	230	230	230	230	230		Canacity drops per
1.2 NEWMAN	752	752	752	752	752	602	602	602	602	278		
1.3 COPPER	64	64	64	64	64	64	64	64	64	64		planned retirements.
1.4 MONTANA	354	354	354	354	354	354	354	354	354	354		plainida i dinomonitori
1.5 PALO VERDE	633	633	633	633	633	633	633	633	633	633		
1.6 RENEWABLES	6	6	6	6	6	6	6	6	6	6		
1.7 NEW BUILD (local)	-	-	-	-		-	-	-	-	-		
1.0 TOTAL GENERATION RESOURCES ⁽¹⁾	2,085	2,085	2,085	2,085	2,085	1,889	1,889	1,889	1,889	1,565		
												Forecasted solar
2.4 DENEWARLE DURCHASE (Suredian & NRC)	20	20	20	20	20	20	20	20	07	27		al a sura al a tí a sa
2.1 RENEWABLE PURCHASE (Suffection of NRG)	29	29	29	29	20	20	20	20	21	21		degradation.
2.2 REINEWABLE PURCHASE (Macha Springe)	4	3	34	34	34	3	34	34	22	22		
2.4 PENEWABLE PURCHASE (Newman)	35		34 7	34 7		54	34 7	34				
	1	· ·	'	'	'	,	'	'	'	,		
	75	74	73	73	72	72	71	71	71	70		
2.0 TOTAL RESOURCE FURCHASES												
3.0 TOTAL NET RESOURCES (1.0 + 2.0)	2,160	2,159	2,158	2,158	2,157	1,961	1,960	1,960	1,960	1,635		Forecosted DC encyrth
												Forecasted DG growth.
4 1 NATIVE SYSTEM DEMAND	1 0 8 8	2 013	2 035	2 066	2 005	2 1 2 6	2 153	2 101	2 2 2 3	2 258		
4.2 DISTRIBUTED GENERATION	(33)	(35)	(38)	(40)	(43)	(45)	(47)	(50)	(52)	(55)		Forecasted FE growth
4.3 ENERGY EFFICIENCY	(10)	(14)	(19)	(10)	(29)	(34)	(39)	(43)	(48)	(53)		
4.4 LINE LOSSES	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)		
4.5 INTERRUPTIBLE SALES	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(52)	(53)		
	()	()	()	(/	()	()	(/	()	()	(/		
5.0 TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5)) ⁽³⁾	1,889	1,906	1,922	1,945	1,968	1,991	2,010	2,041	2,066	2,093		
6.0 MARGIN OVER TOTAL DEMAND (3.0 - 5.0)	271	252	236	213	190	(30)	(49)	(81)	(106)	(457)		
												Deficiency of resources
7.0 PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND	283	286	288	292	295	299	301	306	310	314	1	Denciency of resources
												to loads + margin reg't.
8.0 MARGIN OVER RESERVE (6.0 - 7.0)	(13)	(34)	(52)	(79)	(106)	(328)	(351)	(387)	(416)	(771)		J
	L											



EPE Proprietary Material

20-Year Loads and Resources Table

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
1.0 GENERATION RESOURCES																			
1.1 RIO GRANDE	276	276	276	276	276	230	230	230	230	230	230	230	230	230	230	230	88	88	88
1.2 NEWMAN	752	752	752	752	752	602	602	602	602	278	278	278	278	278	278	278	278	278	278
1.3 COPPER	64	64	64	64	64	64	64	64	64	64	64	64	64	-	-	-	-	-	-
1.4 MONTANA	354	354	354	354	354	354	354	354	354	354	352	352	352	352	352	352	352	352	352
1.5 PALO VERDE	633	633	633	633	633	633	633	633	633	633	633	633	633	633	633	633	633	633	633
1.6 RENEWABLES	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
1.7 NEW BUILD (local)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1.0 TOTAL GENERATION RESOURCES ⁽¹⁾	2,085	2,085	2,085	2,085	2,085	1,889	1,889	1,889	1,889	1,565	1,563	1,563	1,563	1,499	1,499	1,499	1,357	1,357	1,357
2.0 RESOURCE PURCHASES																			
2.1 RENEWABLE PURCHASE (SunEdison & NRG)	29	29	29	29	28	28	28	28	27	27	27	27	27	26	26	26	26	26	25
2.2 RENEWABLE PURCHASE (Hatch)	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
2.3 RENEWABLE PURCHASE (Macho Springs)	35	35	34	34	34	34	34	34	33	33	33	33	33	33	32	32	32	32	32
2.4 RENEWABLE PURCHASE (Juwi)	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6
2.5 RESOURCE PURCHASE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.0 TOTAL RESOURCE PURCHASES ⁽²⁾	75	74	73	73	72	72	71	71	71	70	69	69	69	68	68	67	67	67	66
			-	-														-	
3.0 TOTAL NET RESOURCES (1.0 + 2.0)	2,160	2,159	2,158	2,158	2,157	1,961	1,960	1,960	1,960	1,635	1,632	1,632	1,632	1,567	1,567	1,566	1,424	1,424	1,423
4.0 SYSTEM DEMAND																			
4.1 NATIVE SYSTEM DEMAND	1 988	2 013	2 035	2 066	2 095	2 1 2 6	2 1 5 3	2 101	2 223	2 258	2 289	2 3 3 3	2 373	2 4 1 3	2 4 4 7	2 4 9 6	2 540	2 584	2 6 2 3
4.2 DISTRIBUTED GENERATION	(33)	(35)	(38)	(40)	(43)	(45)	(47)	(50)	(52)	(55)	(57)	(59)	(61)	(63)	(66)	(68)	(71)	(73)	(75)
4.3 ENERGY EFECIENCY	(10)	(14)	(00)	(24)	(29)	(34)	(39)	(43)	(48)	(53)	(57)	(63)	(67)	(72)	(77)	(82)	(87)	(92)	(96)
4.4 LINELOSSES	(10)	(4)	(10)	(4)	(20)	(01)	(00)	(10)	(10)	(00)	(01)	(00)	(01)	(12)	(4)	(02)	(01)	(02)	(4)
4.5 INTERRUPTIBLE SALES	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(52)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)
	(55)	(00)	(55)	(55)	(55)	(55)	(55)	(55)	(32)	(55)	(55)	(00)	(00)	(00)	(55)	(55)	(55)	(55)	(55)
5.0 TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5)) ⁽³⁾	1,889	1,906	1,922	1,945	1,968	1,991	2,010	2,041	2,066	2,093	2,118	2,154	2,187	2,220	2,247	2,289	2,325	2,363	2,394
	074	050			400	(00)	(10)	(04)	(100)	(457)	(405)	(504)	(55.4)	(050)	(000)	(700)	(004)	(000)	(074)
6.0 MARGIN OVER TOTAL DEMAND (3.0 - 5.0)	2/1	252	236	213	190	(30)	(49)	(81)	(106)	(457)	(485)	(521)	(554)	(652)	(680)	(723)	(901)	(939)	(971)
7.0 PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND	283	286	288	292	295	299	301	306	310	314	318	323	328	333	337	343	349	354	359
8.0 MARGIN OVER RESERVE (6.0 - 7.0)	(13)	(34)	(52)	(79)	(106)	(328)	(351)	(387)	(416)	(771)	(803)	(844)	(882)	(985)	(1,017)	(1,066)	(1,250)	(1,293)	(1,330)
	,	× 4	,		,	····/					(, , , , , , , , , , , , , , , , , , ,	v. 9	(···-)	(100 M	()	(),	() ((



EPE Proprietary Material

Discussion



El Paso Electric

Integrated Resource Plan

Introduction for Resource Planning and the Capacity Expansion Modeling (Strategist)

Omar Gallegos

Director of Resource Planning and Management



IRP – Rule Goals

The goal of the IRP process is

"to identify the <u>most cost effective portfolio of resources to</u> <u>supply the energy needs of customers</u>. For resources whose costs and service quality are equivalent, the utility should prefer resources that minimize environmental impacts." (17.7.3.6 NMAC)

> Now that we have peak demand and the L&R table, how do we analyze "most cost effective portfolio of resources to supply the energy needs of customers?"

The demand and energy forecast is utilized to create a load profile (profile shown in the subsequent slides) requirement for each month in the 20-year planning horizon. Strategist then looks to satisfy the energy needs.



EPE Proprietary Material

2016 Summer Profile - Peak Day July 14, 2016



- Dispatch of resources to the meet the load profile
- Simplest form, the area under the curve is the energy requirement for that day
- July 14, 2016 was the actual peak load day for 2016



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2016 Low Load Profile – March 2, 2016



Ability to dispatch resources for the load profiles throughout the year

 March 2, 2016 is considered a low load shoulder month



2016 Low Load Profile



Surface chart for the 2016 load profile

Envision the stacking of daily load profiles side-by-side



Fast Forward to 2023 Low Load Profile



 Red denotes capacity deficiency

Strategist determines the most cost effective resource portfolio to fill the resource deficiency and therefore.....





Most Cost Effective Portfolio

"...means those supply-side resources and demand-side resources that <u>minimize the net present value of revenue requirements</u> proposed by a utility to meet electric system demand during the planning period consistent with reliability and risk considerations;" (17.7.3.7.H NMAC)



NPV Costs

- Capital investment
- Return on investment
- O&M through 20 year planning horizon
- Major outage costs through 20 year planning horizon
- Fuel costs per dispatch analysis
- Purchase power costs for existing agreements
- Opportunity purchase power costs per dispatch analysis
- Opportunity sales per dispatch analysis



Strategist Capacity Expansion Model

- Capacity expansion model will be utilized to perform the portfolio analysis
- Resource options will be identified for inclusion in the capacity expansion model
- Capacity expansion model will evaluate various portfolio options:
 - Resource additions to meet peak demand
 - Resource dispatch/utilization to meet the year energy needs





Strategist Capacity Expansion Model

- Model objectives are to meet load requirement plus the reserve margin in the most cost effective manner (i.e. lowest Net Present Value ("NPV")).
- The Model determines how to address the first deficiency identified in the L&R in the most cost effective manner.
 - The Strategist Model performs this analysis internally, Strategist reports do not show portfolio results without the first resource selection for comparison purposes or an analysis of how the first resource was selected.
- After determining the first resource addition(s), it then proceeds to evaluate portfolio options for addressing the subsequent resource needs.



Strategist Capacity Expansion Model

2015 IRP Strategist Report

° 05/01/15 08:10:35 V0	4.0 R04.0						Ventyx Strategist	Page
		PROV	IEW LEAST CO STUDY PERIC Final	DST OPTIMIZA DD PLAN COMP 1 Base Case	TION SYSTEM ARISON		_	The most cost effective resource portfolio ranking.
PLAN RANK	1	2	3	4	5	6		
2015 2016 2017 2018 2019 2020 2021 2021 2022 2023	11GR(1)	11GR(1)	11GR(1)	11GR(1)	11GR(1)	11GR(1)	T resource	The most cost effective resource identified for the first e need was a combined-cycle. The analysis to select the first resource addition is intrinsic to Strategist.
2024 2025	11BR(1) 10PV(1) 20PV(1) LMS (1)	11BR(1) 10PV(1) 20PV(1) LMS (1)	20PV(1) 11BR(1) 20PV(1) LMS (1)	11BR(1) 10PV(1) 20PV(1) LMS (1)	20PV(1) 11BR(1) 20PV(1) LMS (1)	11BR(1) 10PV(1) 20PV(1) LMS (1)	20PV(1) 11B 11BR(1) 10P 20PV(1) 20P LMS_(1) LMS	R(1) V(1) V(1) (1)
2026 2027 2028 2029	LMS (1) 10PV(1) 20PV(1) WIND(1) 11BR(1)	LMS (1) 10PV(1) 20PV(1) WIND(1) 11BR(1)	LMS (1) 20PV(1) WIND(1) 11BR(1)	LMS (1) 10PV(1) 20PV(1) WIND(1) 11BR(1)	LMS (1) 20PV(1) WIND(1) 11BR(1)	LMS (1) 10PV(1) 20PV(1) <u>WIND(1)</u> 11BR(1)	^{20F} WIN The	portfolios beyond the first resource vary in resources.
2030 2031	10PV(1)	10PV(1)	10PV(1)	20PV(1)	10PV(1)	10PV(1)	10PV(1) 20P	V(1)
2032 2033 2034	LMS (1)	LMS (1) 20PV(1) LMS (1)	LMS (1)	LMS (1)	LMS (1) LMS (1) 10PV(1)	LMS (1) 20PV(1) LMS (1)	NPV for e	each respective portfolio. The first portfolio listed has
P.V. UTILITY COST: PLANNING PERIOD % DIFFERENCE	4463903.5	4464396.5 0.01%	4464494.5 0.01%	4464733.0 0.02%	4464741.0 0.02%	4464765.0 0.02%	44	the lowest NPV.
% DIFFERENCE STUDY PERIOD % DIFFERENCE PLANNING PERIOD RANK	0.00% 4463903.5 0.00% 1	0.00% 4464396.5 0.01% 2	0.00% 4464494.5 0.01% 3	0.00% 4464733.0 0.02% 4	0.00% 4464741.0 0.02% 5	0.00% 4464765.0 0.02% 6	0.00% 4464914.5 446 0.02% 7	0.00% 4979.5 0.02% 8
			EPE Prop	orietary Mater	rial			Company

2023– Potential Resource Portfolio Dispatch



Strategist may select a resource that is dispatched more than just for peak hours if it results in a more cost effective portfolio This revised chart illustrates how a selected resource (red) may be an intermediate resource dispatched lower in the stack



Discussion



Integrated Resource Plan

Conventional Capacity and Generation Option Considerations Demand Side Resource Options Renewable Energy Options Operational Considerations for Intermittent Resources and Balancing Resource Input Template

Omar Gallegos

Director of Resource Planning and Management



Preliminary Listing - Resource Options

Preliminary listing of resources to be considered

- Solar*
- Gas Fired CC

• Wind*

- Gas Fired CT
- Biomass*
- Other Renewables*
- Gas Fired
 Reciprocating
- Storage
- Geothermal
- Demand-side
 Options**

Options not to be considered, but may be re-evaluated

- Nuclear
- Coal

*Renewables to be considered are in addition to and above Renewable Portfolio Standard requirements as per Joint Stipulation Case No. 15-00241-UT.

**Demand-side options to be considered are in addition to and above Energy Efficiency requirements, as per Joint Stipulation Case No. 15-00241-UT



Capacity Expansion Modeling

Preliminary listing of resources to be considered

Technology	Capital Costs (\$/kw)**
Solar*	\$1,450
Wind*	\$1,700
Biomass*	\$4,000
Geothermal*	\$6,400
Gas Fired CC	\$1,000
Gas Fired CT	\$1,000
Gas Fired Reciprocating Engines	\$1,100
Storage	\$1,082

*Renewables to be considered are in addition to and above Renewable Portfolio Standard requirements, as per Joint Stipulation Case No. 15-00241-UT.

** Lazard Levelized Cost of Energy Analysis 10.0 and Levelized Cost of Storage 2.0 are the sources for capital costs.



EPE Proprietary Material

PAG Resource Option Input

- PAG may propose alternative resource options to consider and EPE will investigate characteristics or alternatively PAG may provide:
 - Operational profile
 - Technology state of development and viability
 - Cost
- PAG may propose alternative cost to those provided by EPE
 - Request PAG provide supporting source and documentation
 - For example, news publications may denote a PPA at say \$35/MWh when the actual agreement includes yearly escalation that may equate to a fixed price of \$44/MWh
 - EPE agrees to evaluate renewable pricing based on publicly available sources along with consideration for expected market developments. Actual contracts may be evaluated where all contract conditions are available.*
- EPE will review PAG options and pricing to determine if viable
 - EPE will determine if options and/or pricing will be modeled as recommended
 - If modeled, EPE will determine if to model in the base case or if to model as a sensitivity analysis
 - The IRP rule does not require modeling of specific participant program proposals*





Resource Option Template

IRP Generic Resource Option Template									
Basic Project Data	Example	Information							
Generation Technology:	Solar, Wind, Demand Side, etc.								
Resource Description:	Thin-film, single-axis tracking PV Solar								
Resource Type:	Company Owned, PPA, Other								
Resource/Program Location:	TX or NM or Both								
Resource Life or Term:	20 -yr, 40-yr, etc.								
Maximum Net Capacity (MW):	50 MW, 100 MW, 300 MW, etc.								
Minimum Net Capacity (MW):	25 MW, 50 MW, 150 MW, etc.								
Capacity Factor (%):	30%, 50%, 75%, etc.								
		Source							
		(e.g. EIA, NREL, Lazard, NMPRC							
Project Costs Data	Information	Approved projects in operation, etc.)							
Overnight Capital Cost (\$):									
Variable Operation & Maintenance Cost									
(\$/MWh):									
Fixed Operations & Maintenance Cost									
(\$/kW-yr):									
Outage Costs:									
		Source							
		(e.g. EIA, NREL, Lazard, NMPRC							
PPA Costs Data	Information	Approved projects in operation, etc.)							
All-In PPA price (\$/MWh)									
Fixed or Escalating (Yes or No)									
Note:									
Additional detail or data maybe required	based on project information provided	above							





PAG Portfolio Input

- EPE is agreeable to running Strategist with various resource options and/or modified resource characteristics within reasonable parameters (e.g. resource cost, resource dispatchability, capacity factor availability, O&M cost)
- However, forcing the creation of portfolios is not an effective manner of determining the most cost effective portfolio
- The Strategist model will determine the optimal portfolio given the resources it can select from



PAG Portfolio Input

• EPE is agreeable to running the portfolio options for

- A greater amount of renewables
 - However, it may not be feasible to assume only renewables
 - May need to couple with storage and/or smaller conventional generation options
 - We have not decided whether to model this analysis by either eliminating conventional options or simply force a renewable portfolio
- Evaluation of proposed retirements
 - Extension through necessary upgrades
 - We are considering running an alternative portfolio with the extended retirements to compare versus the base case



Discussion



Integrated Resource Plan Renewable Portfolio Standard Impacts ("RPS")

Omar Gallegos

Director of Resource Planning and Management



Renewable Portfolio Standard

Existing RPS Resources

- Existing RPS resources are included as existing resources in the IRP analysis
 - 20 MW Roadrunner Solar (NRG)
 - 5 MW Hatch Solar
 - 10 MW El Chaparral Solar (Sun Edison)
 - 12 MW Las Cruces Centennial Solar (Sun Edison)



Renewable Portfolio Standard

Current RPS Status

- EPE's 2017 RPS plan has been filed and pending a Commission order
 - EPE's 2016 RPS plan was approved as compliant with the RPS rule
- EPE's RPS plan is compliant with the rule in consideration of having exceeded Reasonable Cost Threshold
 - EPE is not forecasted to attain the 15% renewable energy target in 2017-2019



Renewable Portfolio Standard

Renewable Energy Resources in the IRP

- While EPE is not required to add more renewable energy resources for purposes of RPS, additional renewable energy options are introduced in the IRP and the Strategist analysis*
- EPE is not forcing the selection of renewable energy resources, they will be selected only if they result in the most cost effective portfolio
- If renewable energy resources are selected in the IRP plan, they would have the potential to provide additional renewable energy output
 - If they were to be added in the future, the New Mexico allocated portion could be applied towards the New Mexico RPS





Integrated Resource Plan

Operational Considerations for Intermittent Resources and Balancing

Omar Gallegos

Director of Resource Planning and Management



EPE Proprietary Material

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Resource Planning

"...minimize the net present value of revenue requirements proposed by a utility to meet electric system demand during the planning period <u>consistent with reliability and risk considerations</u>"





EPE Proprietary Material

Resource Dispatch Ability

What items may impact the ability to dispatch a resource?

- Fuel source limitations, such as:
 - Access to fuel pipelines
 - Solar and wind profiles
 - Biogas or biomass access to fuel supply and volume
 - Geothermal any limitations on capacity
- Technology limitations
 - Battery storage energy capacity and charge/discharge capacities



Resource Dispatch Ability



- Can a resource be dispatched at will or is it limited in output available?
- Solar and wind have output profiles dictated by solar and wind patterns.
- Output not guaranteed at peak load hour...



Resource Intermittancy



- ... solar output may be intermittent due to cloud cover.
- Wind has a similar characteristic.
- Does not imply solar and wind are not viable; however...



EPE Proprietary Material

Resource Intermittency

- Intermittent resources need consideration of reserve margin or coupling of intermittent resources with firm options
 - Larger planning reserve margin to address potential loss of load due to intermittency of solar or wind
 - Option to evaluate solar/wind coupled with storage or back-up generation



Reliability -- System Support Characteristics

- Resources are an integrated part of the "Bulk Electric System"
- Resource characteristics determine if they provide:
 - Frequency response
 - Load regulation
- EPE will evaluate if the identified most effective portfolio provides adequate system support
 - May be iterative in regards to the IRP analysis



Discussion



EPE Proprietary Material

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El Paso Electric

Acronyms

CC	-	Combined Cycle	kWh	-	kilowatt hour
СТ	-	Combustion Turbine	L&R	-	Loads and Resources
DG	-	Distributed Generation	MW	-	MegaWatts (1,000 kW)
EPE	-	El paso Electric Company, or "EPEC"	MWh	-	Megawatt hours
FERC	-	Federal Energy Regulation Commission	NMAC	-	New Mexico Administrative Code
GT	-	Gas turbine	NMPRC	-	New Mexico Public Regulation Commission
GWh	-	Gigawatt hour	PAG	-	Public Advisory Group
HDD	-	Heating Degree Day	PP	-	Purchased Power
IRP	-	Integrated Resource Plan	PPA	-	Power Purchase Agreement
KV	-	Kilovolt (1,000 volts)	PV	-	Photovoltaic
kW	-	kilowatt (1,000 watts)	RPS	-	Renewable Portfolio Standard
			ST	-	Steam Turbine



For More Information

- EPE's IRP website <u>https://www.epelectric.com/community/2017-18-public-advisory-group-meetings</u>
- E-mail <u>NMIRP@epelectric.com</u> to be added to the Public Advisory Group e-mail distribution list. You will receive updates on available presentation material and future meetings. Questions can also be submitted to this e-mail.

