Public Advisory Group Special Session on Analysis for 2018 IRP

September 22, 2017

Presented by PAG Participants Merrie Lee Soules and Don Kurtz

Agenda

1) Summary of PRC requirements for the Integrated Resource Plan
2) Discussion of the current energy environment
3) Strategic Implications
4) Defining “equivalent” and “minimize environmental impacts”
5) Assumptions that feed the Loads & Resources Table

Summary of PRC requirements for the Integrated Resource Plan

From the Rule on Integrated Resource Plans for Electric Utilities

1) The purpose of the IRP process is **"…to identify the most cost effective portfolio of resources to supply the energy needs of customers."** (17.7.3.7)
2) "most cost effective resource portfolio means **those supply-side resources and demand-side resources that minimize the net present value of revenue requirements proposed by the utility** to meet electric system demand during the planning period consistent with reliability and risk considerations" (17.7.3.7)
3) **"For resources whose costs and service quality are equivalent, the utility should prefer resources that minimize environmental impacts."** (17.7.3.7)
4) In addition to the detailed description of what the utility determines to be the most cost-effective resource portfolio, **"…the utility shall develop a reasonable number of alternative portfolios by altering risk assumptions and other parameters developed by the utility and the public advisory process."** (17.7.3.9)
5) In addition, (17.7.3.9) the utility is required to provide **a summary of how "existing and anticipated environmental laws and regulations" were "considered in, or affected, the development of resource portfolios."**

Discussion of the Current Energy Environment

The Current Dynamic Energy Environment

1) Plummeting costs for renewable energy
    A. 85% reduction in the cost for utility scale solar over the last 7 years
    B. 66% reduction in the cost for wind for same period

       (Source: Lazard's Levelized Cost of Energy – 10.0)
2) Steadily increasing preference for distributed solar options by individual ratepayers: commercial, residential, and government
    A. Historical growth in interconnected capacity has been exponential
    B. Costs are forecast to continue to decrease, while fuel costs are expected to increase
    C. Storage will be a viable option for all distributed users
3) Rapid emergence of storage options for both utility and consumer-scale use
    A. Rapidly improving technologies
    B. Rapidly decreasing costs

The Current Dynamic Energy Environment (cont.)

4) Clear impact of energy efficiency and demand response on reducing resource needs

Using modeling to test how well different resources would perform under a wide range of future conditions, energy efficiency consistently proved the least expensive and least economically risky resource. In more than 90 percent of future conditions, cost-effective efficiency met all electricity load growth through 2030 and in more than half of the futures all load growth for the next 20 years. It's not only the single largest contributor to meeting the region's future electricity needs; it's also the single largest source of new peaking capacity. (page 1-1)

(Source: Executive Summary, Northwest Power and Conservation Council Seventh Northwest Power Plan, adopted February, 2016.

https://www.nwcouncil.org/energy/powerplan/7/plan/)

The Current Dynamic Energy Environment (cont.)

5) Inevitability of future limitations on carbon emissions
   A. Federal or state regulation
   B. Regulatory rulemaking
   C. Judicial decisions
6) Real concern about stranded assets that might become the responsibility of utility ratepayers
7) Increased pressure for regulatory reform, including movement toward competitive energy market models

Strategic Implications

Strategic Implications of this Dynamic Context for the IRP

1) The importance of addressing carbon emissions in all future planning
2) Understand the value of buying time to let new supply side technologies emerge
   A. Stop all investments in new fossil fuel power plants
      i. Fossil fuel power plants are the riskiest and least cost effective way to address load management
      ii. They are expensive, have long use and payback periods, are carbon intensive, are subject to fuel cost volatility, and face danger of rapid obsolescence
   B. Keep current generating facilities in active service instead of retiring them and replacing them with new fossil fuel generating facilities
   C. Invest in lowering peak demand through
      i. Energy efficiency
      ii. Demand response
      iii. Utilizing power purchase agreements during peak periods
      iv. Investing in non-wire and other alternatives for distribution and transmission

A Comparison of Peak Demand Projections for El Paso Electric and the Northwest Power and Conservation Council (NWPCC)

	EPE Peak MW	Percent change		NWPCC Winter Peak MW	Percent change		NWPCC Summer Peak MW	Percent change
2017	1792			29736			26767	
2018	1889	5.41		29696	-0.13		26781	0.05
2019	1906	0.90		29426	-0.91		26657	-0.46
2020	1922	0.84		29087	-1.15		26489	-0.63
2021	1945	1.20		28732	-1.22		26311	-0.67
2022	1968	1.18		28361	-1.29		26138	-0.66
2023	1991	1.17		27982	-1.34		25977	-0.62
2024	2010	0.95		27604	-1.35		25833	-0.55
2025	2041	1.54		27225	-1.37		25723	-0.43
2026	2066	1.22		26865	-1.32		25633	-0.35
2027	2093	1.31		26531	-1.24		25586	-0.18
2028	2118	1.19		26225	-1.15		25586	0.00
2029	2154	1.70		26003	-0.85		25722	0.53
2030	2187	1.53		25991	-0.05		25983	1.01
2031	2220	1.51		26126	0.52		26249	1.02
2032	2247	1.22		26314	0.72		26572	1.23
2033	2289	1.87		26516	0.77		26912	1.28
2034	2325	1.57		26728	0.80		27261	1.30
2035	2363	1.63		26948	0.82		27633	1.36
Average annual % Change		1.77			-0.52			0.18
Total Change		31.86			-9.38			3.24

Sources: EPE figures from Written Question responses from 8-8-17: https://www.epelectric.com/files/html/Written_Questions_for_8-8-17_meeting.pdf

Northwest Power and Conservation Council figures supplied by Tom Karier, NWPCC commissioner in email of March 10, 2016

Strategic Implications of this Dynamic Context for the IRP (cont.)

3) Recognize the clear advantage of utilizing energy efficiency and demand response for satisfying projected resource needs
4) Invest in renewable energy if new generation is needed
   A. Lower cost, less risk no fuel costs, less cost volatility, low environmental impact, no carbon emissions
   B. Storage is already viable for round-the-clock renewable sufficiency
5) Factor in a sufficiently high risk premium for long-term, high-capital investments, specifically the cost to ratepayers for
   A. Emergence of much cheaper technologies over the facilities' projected use period
   B. Higher than projected fuel costs
   C. High probability of carbon regulation and pricing requirements
   D. Possibility of early obsolescence leading to stranded assets
6) The serious challenge posed by current energy environment to EPE's customary way of doing business, and to the future of the regulatory process itself

Defining “equivalent” and “minimize environmental impacts”

These definitions are critical to how various outputs of the analysis are considered

Definition of “Equivalent”

1) **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.

2) Examples
   A. +/- 2-3% - used by the study “Estimating the Economically Optimal Planning Reserve Margin” prepared for EPE by Energy Environmental Economics and submitted May 2015
   B. +/- 14% and increasing is the range used by George Novela regarding Demand forecast (from George Novela information pg 88-89)
   C. -5.08% to +2.29% was the range of forecast accuracy reported by George Novela in 2014 (see presentation pg 30)

3) Proposal - Use **+/- 3%** as the range for “equivalent”

Definition of "minimize environmental impacts"

1) **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**.

2) Energy Efficiency and Demand Management have ***<u>no</u>*** environmental impacts
3) Solar, Wind, Geothermal, and some Storage resources have ***<u>minimal</u>*** environmental impacts
4) Biomass and Gas Fired Generation resources have ***<u>more</u>*** environmental impacts

Assumptions that Feed the Loads & Resources Table

From the Rule on Integrated Resource Plans for Electric Utilities

1) “Topics to be discussed as part of the public participation process include, but are not limited to,
   A. **The utility’s load forecast;**
   B. **Evaluation of existing supply- and demand-side resources;**
   C. **The assessment of need for additional resources;**
   D. Identification of resource options;
   E. Modeling and risk assumptions and the cost and general attributes of potential additional resources;
   F. Development of the most cost-effective portfolio of resources for the utility’s IRP.” (17.7.3.9)

Base Loads & Resources Table

1) The L&R Table contains the base assumptions for the modeling analysis
2) The Base Assumption is "If nothing changes…"
   A. Evaluation of existing supply- and demand-side resources
   B. The utility's load forecast
   C. The assessment of need for additional resources
3) There seem to be problems with the L&R Table
   A. Not all existing supply side resources included
   B. Math calculations in the Purchased Energy section
   C. Calculation of the forecast for Native System Demand
   D. Assumptions for growth in Distributed Generation
   E. Assumptions for growth in Energy Efficiency
   F. Others?

Resources Section – Assume no changes from current state unless contractual

1) Total Generation Resources = 2131 MW throughout the planning period
   A. Include Rio Grande 6 (46MW)
      i. RG 6 was placed in "Inactive Reserve" status in March of 2015 and removed from the L&R Table
      ii. RG 6 was in operation on the peak day of 2015 and 2016.
      iii. RG 6 has been operational in 2017.
      iv. RG 6 is being utilized as an available resource
   B. Do not assume retirement of Rio Grande 7 (46MW) at the end of 2022
   C. Do not assume retirement of Newman 1 (74MW) and Newman 2 (76MW) at the end of 2022
   D. Do not assume retirement of Newman 3 (97MW) and Newman 4 (227 MW) at the end of 2026
   E. Do not assume retirement of Copper (64MW) at the end of 2030
   F. Do not assume retirement of Rio Grande 8 (142MW) at the end of 2033
2) Process for evaluating Retirements to be discussed at the October 26 meeting
3) Total Resource Purchases modified slightly to reflect math corrections – e.g.72 MW in 2024
   A. Forecasted Solar Degradation was represented as being per the Purchased Power Agreement contracts

Changes to System Demand Forecast

1) Add a line 4.45 Native System Peak Demand
   A. This becomes the actual demand served by the system
2) Add a column for 2017
   A. Clarify the actual starting point for the forecasted assumptions
3) Start with 2017 Actual Peak Native System Demand
   A. 1935 MW on June 22, 2017
   B. This would have included the effects of
      i. Distributed Generation (DG)
      ii. Energy Efficiency (EE)
      iii. Line Losses (LL)
4) Add back the effects in 2017 of DG (33MW) and EE (10MW) and LL (4MW) to get 2017 Native System Demand
   A. 1982 MW for 2017
5) Forecast future Native System Demand (Line 4.1) using George Novela's factors from pg 39

Demand Forecast Assumptions

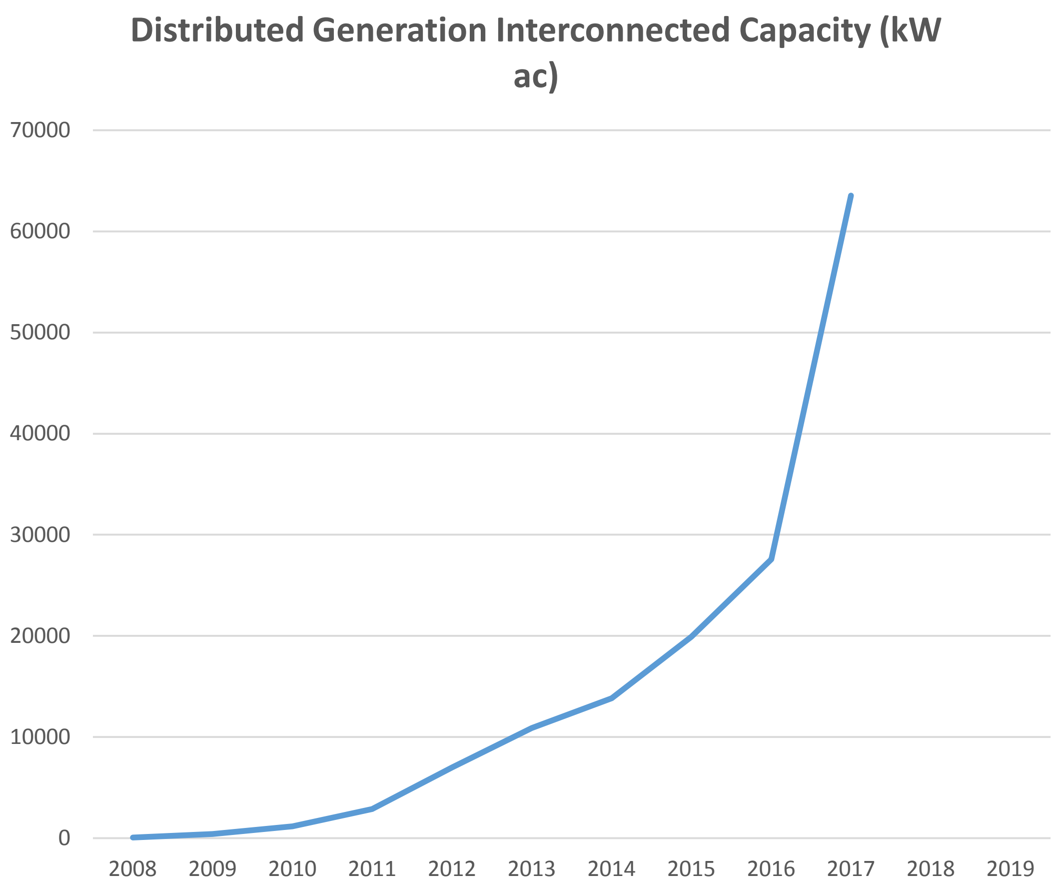
Year	Native System Peak Demand (MW)	Native System Demand (Line 4.1 in MW)	Growth (in %)
2017	1935	1982	
2018		2002	0.99
2019		2019	0.88
2020		2035	0.78
2021		2059	1.18
2022		2082	1.11
2023		2106	1.17
2024		2126	0.94
2025		2158	1.49
2026		2183	1.17
2027		2205	1.00
2028		2227	1.00
2029		2249	1.00
2030		2272	1.00
2031		2294	1.00
2032		2317	1.00
2033		2340	1.00
2034		2364	1.00
2035		2387	1.00
2036		2411	1.00
2037		2435	1.00

1) 1935 MW was 2017 actual peak demand on June 22, 2017
2) 2017 Native System Demand (Line 4.1) = 1935 MW + 33MW DG + 10 MW EE +4 MW LL = 1982 MW
3) Forecasted percentage growth is from George Novela's material pg 39
4) Native System Demand thereafter is calculated as increasing by the forecasted percentage growth
5) **This Forecast of Native System Demand is applied in the new L&R Table**

Changes to Distributed Generation Forecast

1) The growth in Distributed Generation Interconnected Capacity has been exponential
   A. On average, the growth has been over 97% year over year
   B. Using only the most modest increases, the growth has been over 40% year over year
2) The current L&R Table assumes an unrealistic constant increase of only 3MW per year
3) A more realistic forecast of DG growth is required
4) If there are issues or constraints regarding significant growth in DG they should be addressed

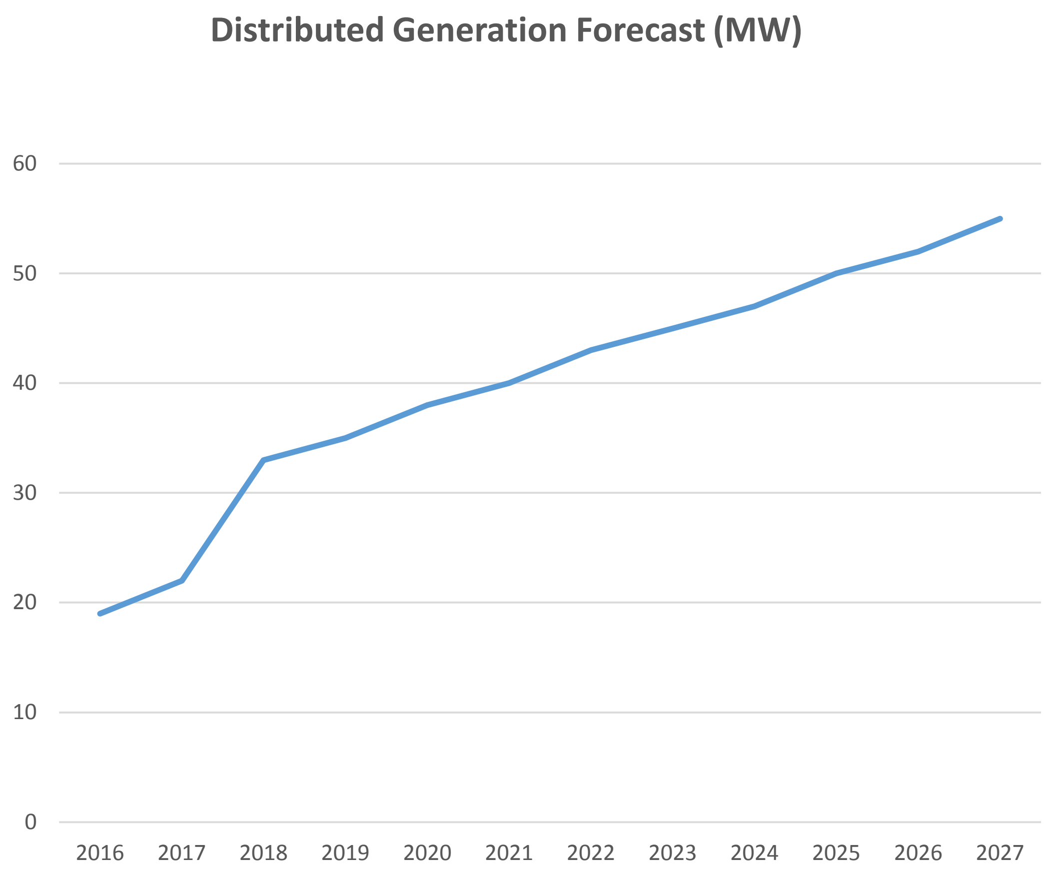
Distributed Generation Forecast Assumptions



1) Data from the Distributed Generation chart on pg 35
2) Not including the increase from 2008 to 2009, average increase is over 95% each year.
3) Using only the 4 most modest years, the average annual increase is over 41%

Year	Cumulative Interconnected Capacity (kWac)	Percent Increase		
2008	57	616%		
2009	408	182%		
2010	1152	151%		
2011	2886	142%		
2012	6991	56%		96.25%
2013	10881	27%		
2014	13822	44%	41.25%	
2015	19924	38%		
2016	27588	130%		
2017	63554			

Distributed Generation Forecast (Unrealistic)

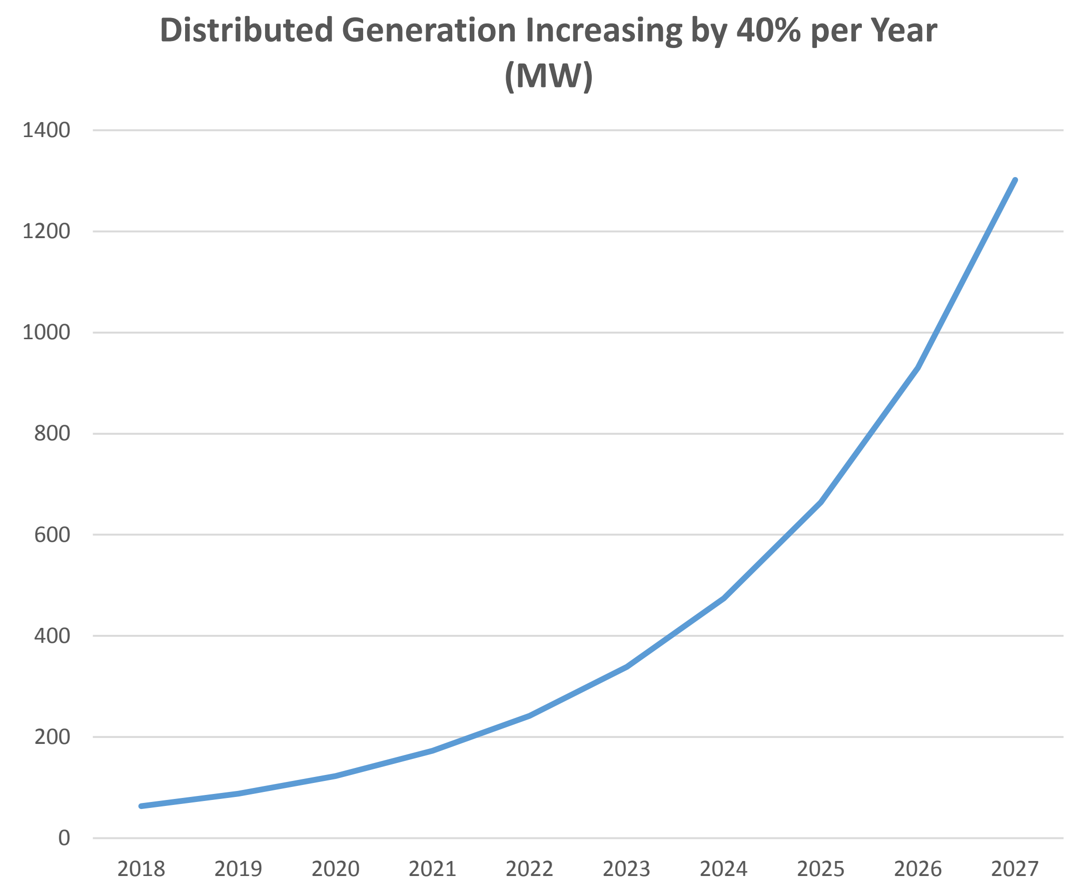


1) 2016 and 2017 from L&R Table in 2015 IRP submission
2) 2018 forward is from the L&R Table pg 37

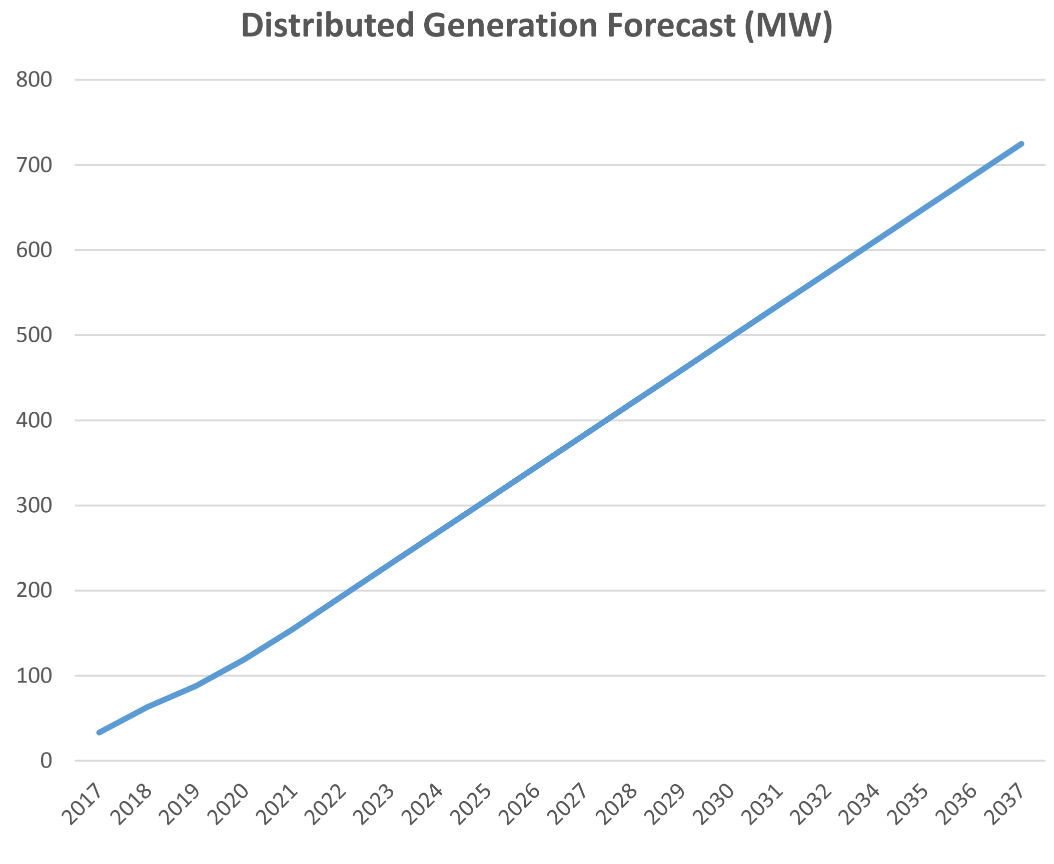
Year	Distributed Generation (MW)	Percent Increase
2016	19	16%
2017	22	50%
2018	33	6%
2019	35	9%
2020	38	5%
2021	40	8%
2022	43	5%
2023	45	4%
2024	47	6%
2025	50	4%
2026	52	6%
2027	55	

Realistic Distributed Generation Forecast

Year	Distributed Generation (MW)	Percent Increase
2016		
2017		
2018	63	40%
2019	88	40%
2020	123	40%
2021	173	40%
2022	242	40%
2023	339	40%
2024	474	40%
2025	664	40%
2026	930	40%
2027	1302	



Distributed Generation Forecast to be used in the L&R Table



1) 63 MW is the anticipated interconnected capacity at the end of 2017
2) Assume a 40% increase reduced by 5% each year until 2023. Then assume 38 MW additional each year thereafter.

Year	Distributed Generation (MW)	Percent Increase
2016		
2017		
2018	63	40%
2019	88	35%
2020	119	30%
2021	155	25%
2022	193	20%
2023	231	16%
2024	269	14%
2025	307	12%
2026	345	11%
2027	383	

Energy Efficiency Forecast

Year	Current L&R Table Energy Efficiency Forecast (MW)	Energy Efficiency Forecast in EPE System Expansion Plan 2018-2027 (MW)	New Energy Efficiency Forecast in Revised L&R Table (MW)
2017	10		
2018	10	16.8	17
2019	14	21.5	22
2020	19	26.8	27
2021	24	32.2	32
2022	29	37.6	38
2023	34	43	43
2024	39	48.3	48
2025	43	53.7	54
2026	48	53.7	59
2027	53	53.7	64
2028	57		69
2029	63		74
2030	67		79
2031	72		84
2032	77		89
2033	82		94
2034	87		99
2035	92		104
2036	96		109

1) The Energy Efficiency Forecast in EPE's System Expansion Plan for 2018-2027, Table 1, shows a greater impact from energy efficiency than the current L&R Table.
2) The forecasts in both the System Expansion Plan and the L&R Table increase by ~5MW/yr
3) The new forecast uses the System Expansion Plan values (rounded) and an annual increase of 5MW/yr after 2025

2017 Baseline Loads & Resources Table

		2017	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		322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322
	1.2 NEWMAN		752	752	752	752	752	752	752	752	752	752	752	752	752	752	752	752	752	752	752
	1.3 COPPER		64	64	64	64	64	64	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	354	354	354	354	354	354	354	354	354
	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																				
1.0	**TOTAL GENERATION RESOURCES**		**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**	**2131**
2.0	**RESOURCE PURCHASES**																				
	2.1 RENEWABLE PURCHASE (SunEdison & NRG)		29	29	29	29	28	28	28	28	28	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 (Newman)		7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6
	2.5 RESOURCE PURCHASE																				
2.00	**TOTAL RESOURCE PURCHASES**		**75**	**74**	**73**	**73**	**72**	**72**	**72**	**72**	**71**	**70**	**70**	**70**	**70**	**69**	**67**	**67**	**67**	**67**	**66**
3.0	**TOTAL NET RESOURCES (1.0 + 2.0)**		**2206**	**2205**	**2204**	**2204**	**2203**	**2203**	**2203**	**2203**	**2202**	**2201**	**2201**	**2201**	**2201**	**2200**	**2198**	**2198**	**2198**	**2198**	**2197**
4.0	**SYSTEM DEMAND**																				
	4.1 NATIVE SYSTEM DEMAND	**1982**	**2002**	**2019**	**2035**	**2059**	**2082**	**2106**	**2126**	**2158**	**2183**	**2205**	**2227**	**2249**	**2272**	**2294**	**2317**	**2340**	**2364**	**2387**	**2411**
	4.2 DISTRIBUTED GENERATION	(33)	(63)	(88)	(119)	(155)	(193)	(231)	(269)	(307)	(345)	(383)	(421)	(459)	(497)	(535)	(573)	(611)	(649)	(687)	(725)
	4.3 ENERGY EFFICIENCY	(10)	(17)	(22)	(27)	(32)	(38)	(43)	(48)	(54)	(59)	(64)	(69)	(74)	(79)	(84)	(89)	(94)	(99)	(104)	(109)
	4.4 LINE LOSSES	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
	4.45 NATIVE SYSTEM PEAK DEMAND	**1935**	**1918**	**1905**	**1885**	**1868**	**1847**	**1828**	**1805**	**1793**	**1775**	**1754**	**1733**	**1712**	**1692**	**1671**	**1651**	**1631**	**1612**	**1592**	**1573**
	4.5 INTERRUPTIBLE SALES		(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)	(53)
5.0	**TOTAL SYSTEM DEMAND (4.1-(4.2+4.3+4.4+4.5))**		**1865**	**1852**	**1832**	**1815**	**1794**	**1775**	**1752**	**1740**	**1722**	**1701**	**1680**	**1659**	**1639**	**1618**	**1598**	**1578**	**1559**	**1539**	**1520**
6.0	**MARGIN OVER TOTAL DEMAND (3.0 - 5.0)**		341	353	372	389	409	428	451	463	480	500	521	542	562	582	600	620	639	659	677
7.0	**PLANNING RESERVE 15% OF TOTAL SYSTEM DEMAND**		280	278	275	272	269	266	263	261	258	255	252	249	246	243	240	237	234	231	228
8.0	**MARGIN OVER RESERVE (6.0 - 7.0)**		61	75	97	117	140	162	188	202	222	245	269	293	316	339	360	383	405	428	449

This Material and Information is the Work Product of the Public Advisory Group Presented by Merrie Lee Soules and Don Kurtz. This is not an El Paso Electric Company Work Product.

Conclusions

1) There is no looming capacity shortage
2) There are challenges with this L&R Table
   A. How to evaluate and justify retirement opportunities? (Hold until after the October 26 meeting?)
   B. What are the implications of the growth in Distributed Generation?
   C. How does Energy Storage fit into the forecast?
3) EPE's generating fleet is aging and there needs to be a plan for retirements
   A. Renewable resources including energy storage, energy efficiency, and demand response should be put in place to enable retirements when they are needed and justified
   B. Retirements should not be replaced with fossil fuel based generation but only with resources that minimize environmental impacts
4) Given the significantly different picture painted by this L&R Table, how assure regulators and the public that true, reasonable, responsible values are being assumed?