

Integrated Resource Plan Public Advisory Group

Meeting 13 – February 23, 2018

Modeling Inputs, Strategist, and
Follow-up Discussions



El Paso Electric

Meeting Agenda

- Welcome and Introduction
- Public Advisory Process and Meeting Schedule
- Strategist and Modeling Inputs
- Resource Planning - How to Reliably Integrate Renewables
- PAG's January Presentation

Welcome and Introduction

Presenters for this Meeting

- Maritza Perez: NM IRP Case Manager
- Omar Gallegos: Director of Resource Planning and Management
- Myra Segal: Facilitator

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 forward-looking 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.

Ground Rules

Meeting Rules and Guidelines

- Discussion
 - Meeting format will be open discussion style
 - Skype attendees: may type in a question or comments in instant message box
 - Facilitator will assist during discussion
 - **All public input and requests submitted in writing will be responded to in writing***
- Keep communications respectful and to the point

2018 PAG Meeting Schedule

(12)	1/11/2018	PAG Presentations and Discussions as Requested	Dona Ana County Conference Room 117
	2/2/2018	Last Resource Input Submittals from PAG Due	
(13)	2/23/2018	PAG Presentations and Discussions as Requested	Dona Ana County Conference Room 117 845 N. Motel Blvd. Las Cruces, NM
(14)	4/30/2018	IRP Draft Presentation	Las Cruces
(15)	5/16/2018	Follow-up meeting to receive and respond to public feedback	Las Cruces
(16)	6/8/2018	Final IRP presentation showing new load forecast	Las Cruces
(17)	6/29/2018	Follow-up meeting to receive and respond to public feedback	Las Cruces
	7/16/2018	IRP Filing Date	

Integrated Resource Plan

Strategist and Modeling Inputs

Omar Gallegos

In-depth Presentation of Strategist

- Strategist overview and responses to Strategist questions
- Discussion of any additional Strategist questions

Strategist Overview

- Strategist is a resource planning tool used to evaluate expansion resource options while optimizing a portfolio of resources to determine the most cost effective portfolio
- Strategist utilizes multiple modules, each responsible for a different function to capture all of the appropriate assumptions
- PROVIEW is the module that is responsible for the optimization methodology. This module utilizes dynamic programming to determine the most cost effective portfolio

Strategist Overview

Strategist has been used by multiple entities for many years to evaluate various supply-side and demand-side resources. These resources include

- Conventional resources such as nuclear, coal, natural gas and others
- Renewable resources like solar, wind, hydro, biomass and others
- Demand-side resources such as DR programs, interruptible programs, and load management programs
- Battery and other storage resources

Strategist Overview

EPE models renewables as a transaction utilizing the Strategist transaction modeling functionality of the generation and fuel (GAF) module. This feature allows for suitable and efficient modeling of renewable resources because the model can easily accept the associated hourly load profile, resource capacity and characteristics, and applicable costs.

Strategist Inputs

- The following Strategist inputs have been discussed and provided during previous IRP meetings:
 - EPE's System (Zones), includes transmission limits ([7/6/17 meeting slides 11-12, 72](#))
 - Load Forecast ([8/8/17 meeting, slide 88-89](#))
 - Existing Generation Resources ([7/6/17 meeting, slide 42, 46](#))
 - Fuel Resources and Forecasts ([written responses 11/16/17 meeting](#))
 - Generic Resource Options and Capital Cost ([10/5/17 meeting, slide 48](#))
 - O&M ([10/5/17 meeting, slide 48](#))
 - Reserve Margin ([9/7/17 meeting, slides 36, 37, 41](#))
 - Emissions Data (pending – to be provided in draft IRP on 4/30/18)
 - Market Price Forecast (pending – to be provided in draft IRP on 4/30/18)

For more information on Strategist, [See 10/5/17 meeting slides 44-53](#)

Strategist Inputs

- The following list identifies items that are not inputs into Strategist
 - Capacity Factor is not an input into the model. Capacity Factor is an output based on expected dispatch. However, Strategist is an expansion plan optimization tool, not a production cost model. A production cost model is the appropriate tool for determining dispatch and capacity factor.
 - Levelized Cost is not a Strategist input or output. Strategist uses the input assumptions as previously discussed to determine the most cost effective portfolio.
 - Coincident Peak is not an explicit input into the model. However, this is captured in the hourly profile as previously provided.

Strategist – How is energy storage modeled?

- EPE is modeling energy storage utilizing a similar technique to how solar generation is modeled
- An anticipated dispatch of the storage is modeled using a hourly profile
- This is based on early morning charging of the battery with discharge occurring during peak hours (4 hour duration)
- Total battery cost for the resource and its charging are modeled on an annual basis

Strategist – Does the model account for Maintenance Costs?

- Yes, Strategist does account for Maintenance Costs for both existing and generic resource options
- Maintenance Costs are captured in the model as Fixed Operation and Maintenance (O&M) Costs
- EXAMPLE:

Fixed O&M Costs (\$000/YR)	2018	2019	2020	2021	2022	2023	2024	2025	2026
Battery (50 MW)	4,800	4,900	5,000	5,100	5,200	5,300	5,410	33,520	5,630
Combined Cycle (300 MW)	5,000	7,500	5,202	5,306	9,700	9,200	5,631	5,743	8,300

- Costs reflect ownership of resources.
- PPA Costs will differ based on structure of agreement.
- Increase of Fixed O&M in 2025 reflects battery replacement

Strategist – How are Energy Efficiency Resource Modeled?

- The Energy Efficiency resource that will be included in the upcoming IRP Strategist runs will capture a commercial program centered around summer peak load reduction
- In Strategist, this can be modeled either by utilizing the load modifier module or treated as a supply side resource
 - firm MW load reduction, or
 - firm supply side capacity during appropriate hours by utilizing an hourly profile

Questions from PAG - Discussion

- What inputs are needed to define the environment in which all resources are considered?
- Pre-screening Process? Eliminated Resource?

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Resource Planning - How to Reliably Integrate Renewables

Omar Gallegos

Renewable Integration

- Higher integration of renewables requires appropriate reliability considerations
- How can reliability be addressed and allow higher integration of renewables
- Assume “Modified Scenario” from November 16, 2017 meeting as a basis for discussion (400 MW of additional solar in 2022 and 2023)

Preliminary Results for Modified Scenario

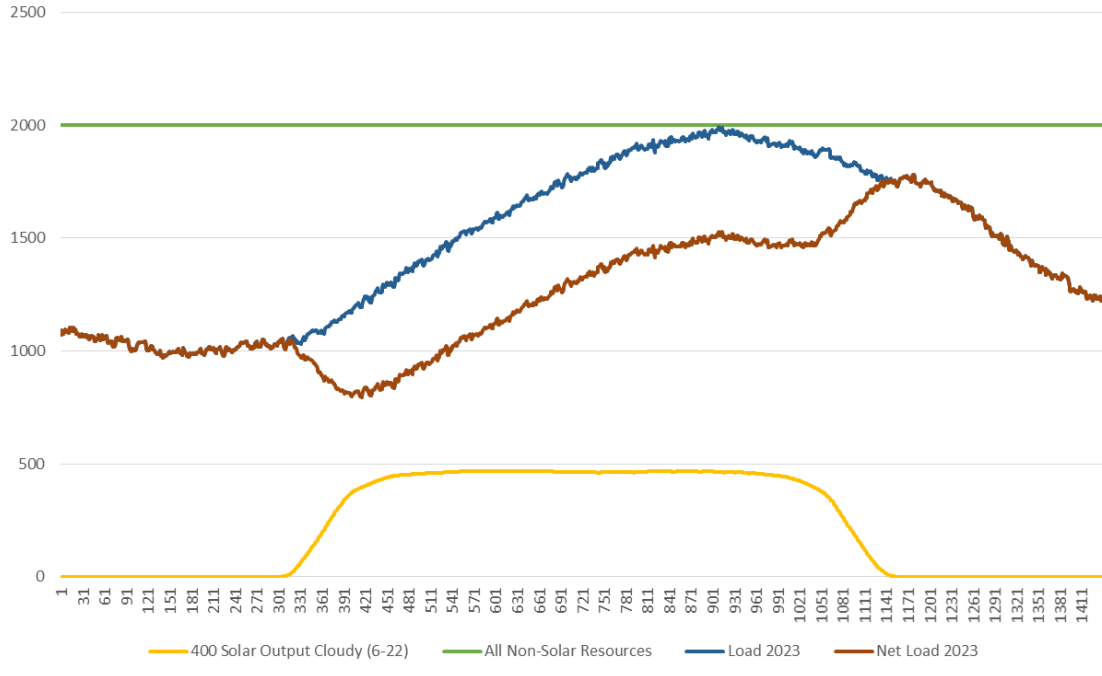
PROVIEW LEAST COST OPTIMIZATION SYSTEM PLANNING PERIOD PLAN COMPARISON								
PLAN RANK	1	2	3	4	5	6	7	8
2017								
2018								
2019								
2020								
2021								
2022	100S(2)	100S(2)	100S(2)	100S(2)	100S(2)	100S(2)	100S(2)	100S(2)
2023	100S(2)	100S(3)	100S(2)	100S(3)	100S(2)	100S(2)	100S(2)	100S(2)
	CT_L(1)		CT_L(1)		CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)
2024								
2025		25PV(1)		25PV(1)				
2026	25PV(1)	75PV(1)	25PV(1)	75PV(1)	25PV(1)	25PV(1)	25PV(1)	25PV(1)
2027	75PV(1)	CC_M(1)	75PV(1)	CC_M(1)	75PV(1)	CC_M(1)	75PV(1)	100S(1)
	CC_M(1)		CC_M(1)		CC_M(1)	CT_L(1)	CC_M(1)	CC_M(1)
2028	75PV(1)	75PV(1)	75PV(1)	75PV(1)	25PV(1)		25PV(1)	
2029		25PV(1)		25PV(1)	75PV(1)	25PV(1)	75PV(1)	75PV(1)
2030	CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)	CT_L(1)
2031								
2032								
2033	CC_M(1)	CC_M(1)	CC_M(1)	CC_M(1)	CC_M(1)	CC_M(1)	CC_M(1)	CC_M(1)
2034								
2035	CT_L(1)	CT_L(1)	RECP(1)	RECP(1)		CT_L(1)		
2036					CT_L(1)		RECP(1)	CT_L(1)
2037								
P.V. UTILITY COST:								
PLANNING PERIOD	3958166.5	3958421.2	3959225.5	3959480.2	3959938.8	3960261.5	3960629.0	3961186.5
% DIFFERENCE	0.00%	0.01%	0.03%	0.03%	0.04%	0.05%	0.06%	0.08%
STUDY PERIOD RANK	1	2	3	4	5	6	7	8

Scenario Discussion

- This illustration is purely for discussion
- This is a discussion of reliability topics with no consideration for cost at this time – rather a discussion of operational considerations
- Assume June 22, 2016 load profile with ratio up to 2023 load projection

Sunny Day Expectation

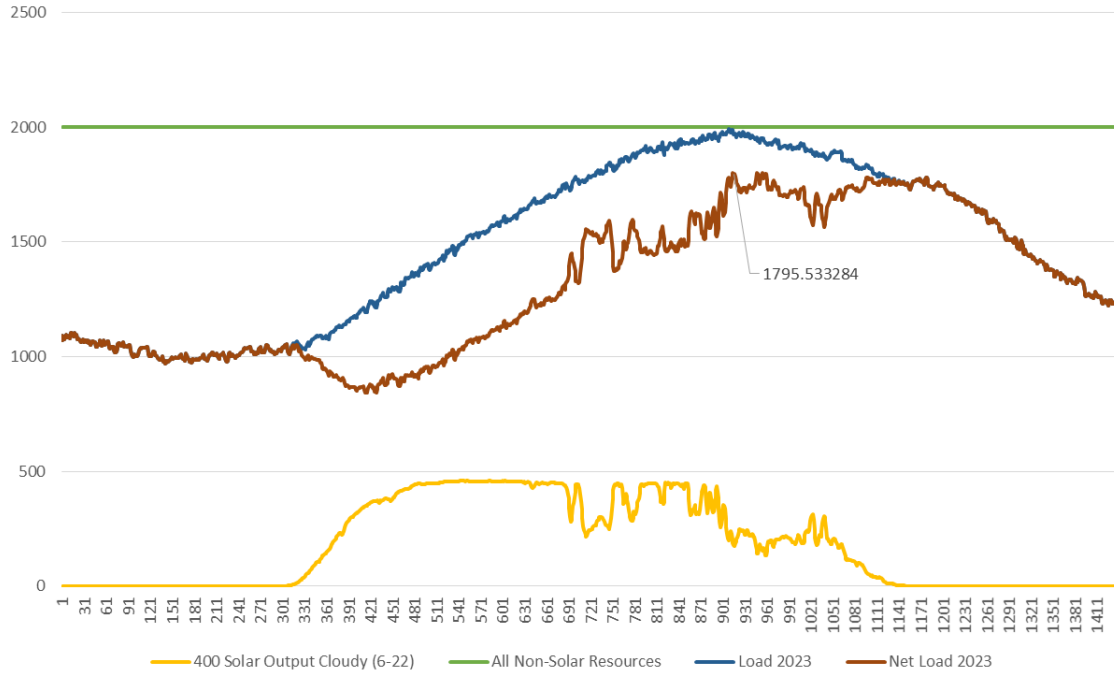
Total 500 MW Solar - Sunny Day Scenario (per 6/22/2016)



- **Expectation on typical sunny day in June**

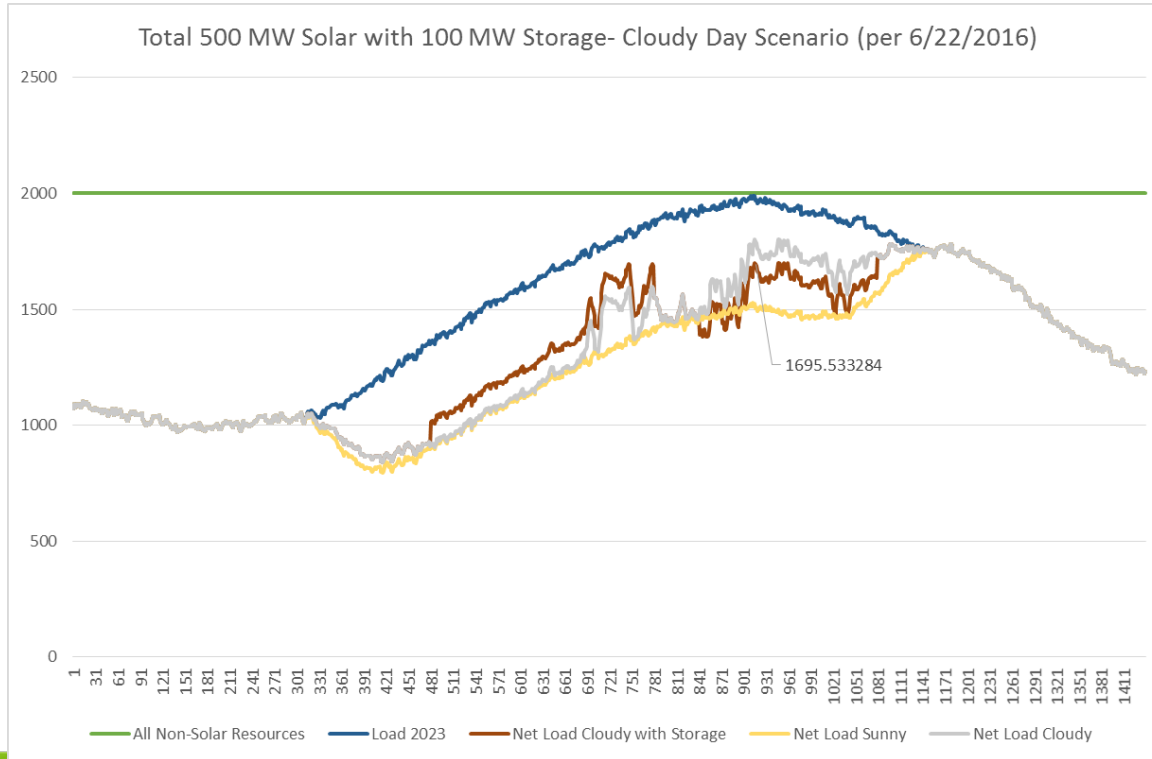
Cloudy Day Expectation

Total 500 MW Solar - Cloudy Day Scenario (per 6/22/2016)



- June 22, 2016 was actually a cloudy day
- Given cloud impact, solar output would be per this plot

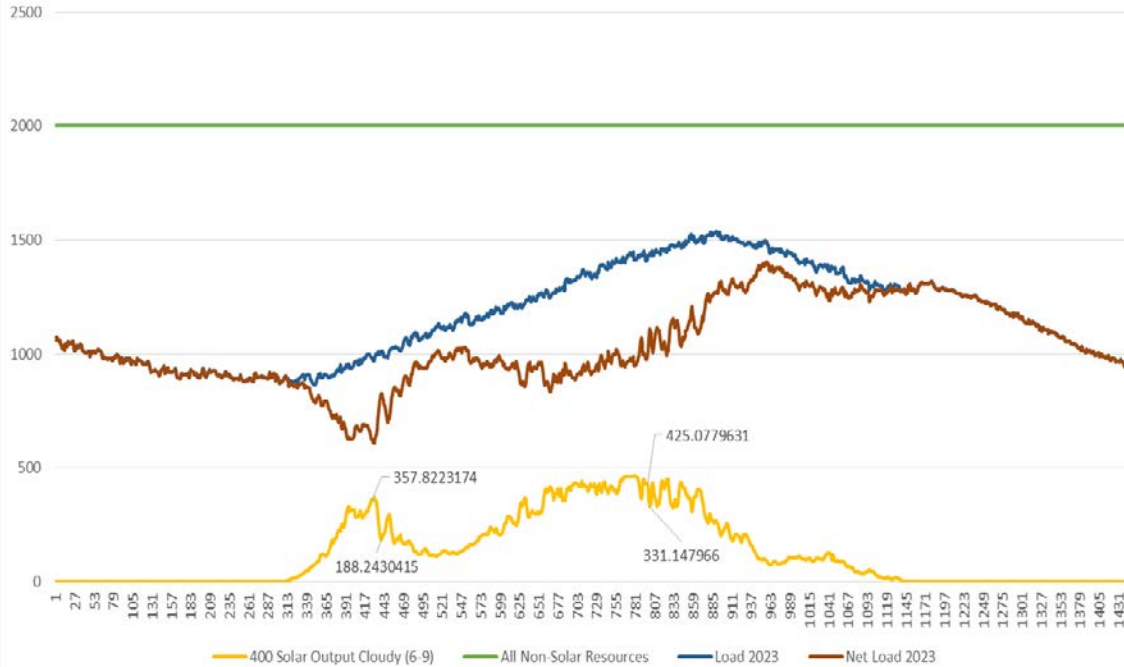
Consideration for Battery Storage



- How would storage assist with solar shortfall?
- It helps bring output closer to expected output levels, but significant more required to address full shortfall

Consideration for Regulating Requirements

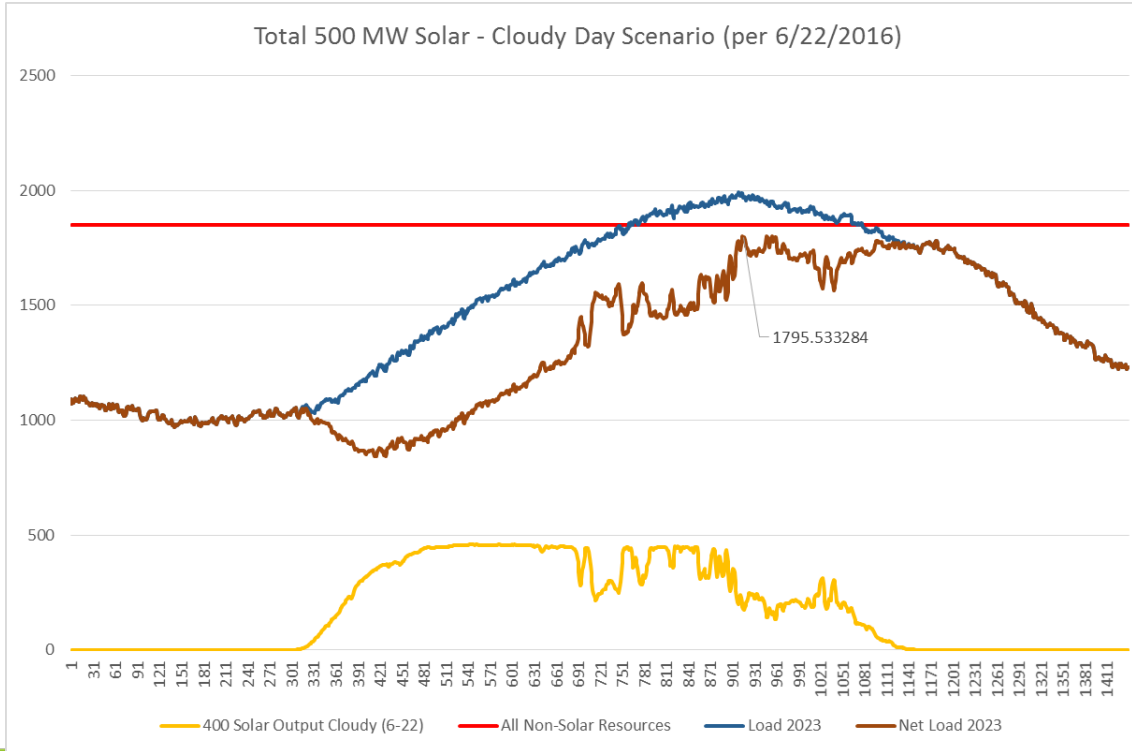
Total 500 MW Solar - Cloudy Day Scenario (per 6/11/2016)



- **June 11 was a lower load day, however there was a lot of solar output variability**
- **Require adequate regulating reserves to balance load**

Consideration for N-1 Loss

Total 500 MW Solar - Cloudy Day Scenario (per 6/22/2016)



- Reliability discussion also includes consideration for loss of transmission for imports or loss of generation unit
- Illustration if loss of 150 MW resource

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Discussion on PAG's January presentation

Omar Gallegos

For More Information

- EPE's IRP website
<https://www.epelectric.com/community/2017-18-public-advisory-group-meetings>
- E-mail NMIRP@epelectric.com 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.