



SOUTHWESTERN PUBLIC SERVICE COMPANY 2023 New Mexico integrated resource plan

August 29, 2023



IRP Modeling - SPS Scenarios

Key Modeling Takeaways

SPS Scenarios

STRENGTHS

- A continued and substantial need for new, low-cost, renewable generation through the end of the decade and beyond
- The build-out of new renewable generation requires additional dispatchable capacity that conforms with New Mexico's Energy Transition Act

WEAKNESSES

- Currently, lithium-ion battery energy storage is the predominate, commercially-available carbon-free, dispatchable technology – However, its duration is relatively limited (i.e., 4 – 8 hours)

OPPORTUNITIES

- There's an increasing need for alternative, carbon-free, dispatchable, and economic technologies over the 20-year planning period
- SPS's 2023 IRP analysis evaluated long-duration storage and hydrogen-fired combustion turbines technologies, however, alternative, carbon-free, and dispatchable technologies are/will become available and are encouraged to bid into RFP

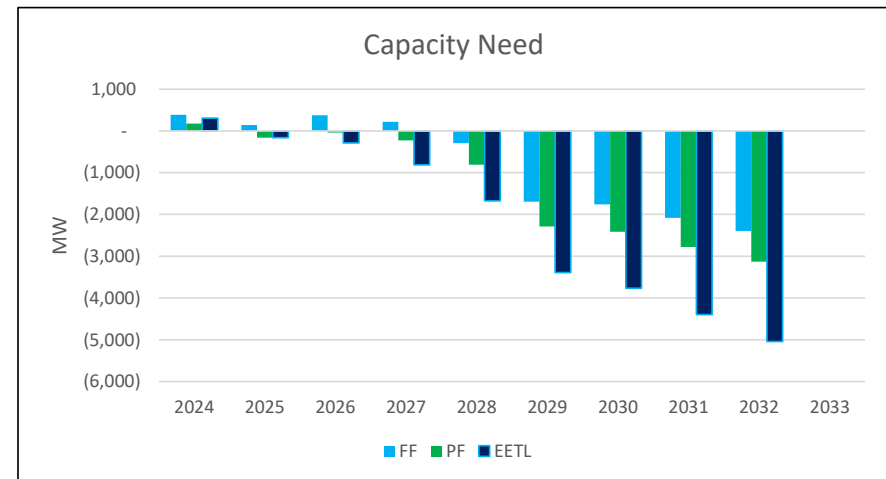
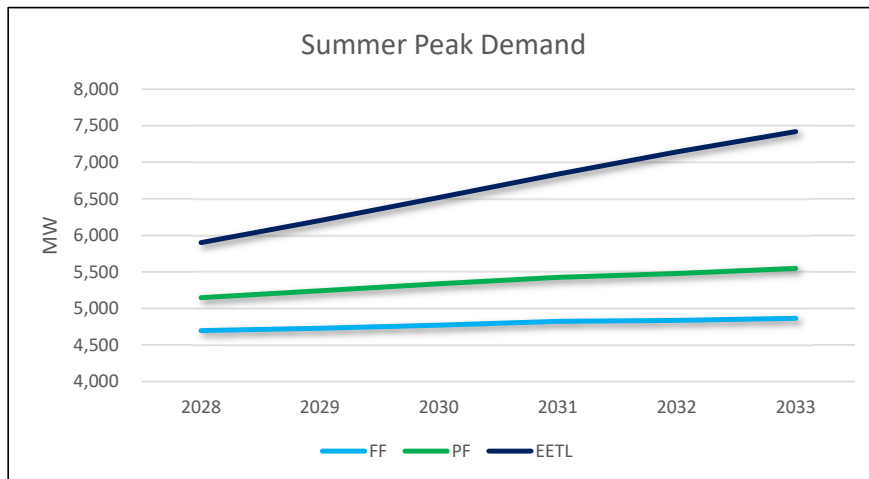
THREATS

- Relying solely on wind, solar, and short-duration battery energy storage is not economical and presents reliability challenges

Capacity Need Summary

Load Growth, Retirements, & Resource Adequacy Requirements

- SPS is forecasting a Summer peak demand of between 4,771MW and 6,517MW by 2030
- Assuming the existing Southwest Power Pool PRM of 15%, SPS's capacity need is between 1,760MW and 3,768MW in 2030
- Capacity need increases to 1,903MW and 3,963MW under a hypothetical 18% summer PRM requirement
- Includes retirement of 1,825 MW of thermal retirements by 2030



IRP Modeling Results

New Resources Added: 2028 - 2030

1. All 3,500MW of available wind generation selected in 2028 – 2030 in most scenarios analyzed

SPS included an annual cap of 1,000MW of new wind generation per year, plus an additional 500MW of surplus wind generation

*Wind selection is biased by generic pricing**

2. Between 1,021MW and of 3,131MW of new solar generation added

SPS allowed 1,021 MW of new solar to replace retiring thermal units without incurring transmission network upgrade costs (i.e., replacing retiring existing generation with new solar and utilizing existing interconnection facilities)

3. Added the following range of dispatchable resources

- *Planning Forecast: 1,637MW – 2,530MW (15% PRM, MJB → 18%, Existing Technologies)*
- *Electrification Forecast: 3,260MW – 4,290MW (15%, Long-Duration Storage → 18%, Existing Technologies)*

**Important Note: SPS anticipates actual pricing and availability of resources bid into a competitive RFP will result in a more balanced portfolio of resources*

IRP Modeling Results

New Resources Added: 2028 - 2030

	PVRR DELTA			Resources Added 2028-2030 (Nameplate Capacity)						
	2024-2030 NPV	2024-2040 NPV	2024-2043 NPV	Dispatchable			Variable Energy Resources			
	\$(M)	\$(M)	\$(M)	Firm Peaking	CC	Storage	Total	Wind	Solar	Total
Financial Forecast										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	933	-	130	1,063	3,390	1,021	4,411
Existing Technologies	\$205	\$1,829	\$2,556	-	-	1,380	1,380	3,500	1,021	4,521
Long Duration Storage	\$186	\$1,023	\$1,136	-	-	1,280	1,280	3,500	1,091	4,591
Hydrogen Conversion	\$130	\$1,292	\$1,763	933	-	110	1,043	3,260	1,021	4,281
18%/20% PRM										
Existing Technologies	\$304	\$2,169	\$2,927	-	-	1,670	1,670	3,500	1,021	4,521
Long Duration Storage	\$279	\$1,332	\$1,472	-	-	1,540	1,540	3,500	1,091	4,591
Hydrogen Conversion	\$188	\$1,571	\$2,097	933	-	410	1,343	3,500	1,021	4,521
Planning Forecast										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	700	837	100	1,637	3,500	1,301	4,801
Existing Technologies	\$381	\$2,753	\$4,149	-	-	2,220	2,220	3,500	1,021	4,521
Long Duration Storage	\$320	\$1,348	\$1,629	-	-	1,980	1,980	3,500	1,831	5,331
Hydrogen Conversion	\$240	\$1,630	\$2,255	933	837	170	1,940	3,500	1,071	4,571
18%/20% PRM										
Existing Technologies	\$479	\$3,156	\$4,577	-	-	2,530	2,530	3,500	1,021	4,521
Long Duration Storage	\$433	\$1,709	\$2,000	-	-	2,310	2,310	3,500	1,771	5,271
Hydrogen Conversion	\$316	\$1,982	\$2,667	933	837	360	2,130	3,500	1,021	4,521
Electrification & Emerging Technologies										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	933	2,511	10	3,454	3,500	1,211	4,711
Existing Technologies	\$554	\$4,208	\$5,066	-	-	3,810	3,810	3,500	2,271	5,771
Long Duration Storage	\$471	\$2,125	\$2,242	-	-	3,260	3,260	3,500	3,011	6,511
Hydrogen Conversion	\$289	\$2,657	\$3,185	933	837	1,570	3,340	3,500	1,341	4,841
18%/20% PRM										
Existing Technologies	\$707	\$4,849	\$5,813	-	-	4,290	4,290	3,500	2,371	5,871
Long Duration Storage	\$674	\$2,695	\$2,863	-	-	3,580	3,580	3,500	3,131	6,631
Hydrogen Conversion	\$427	\$3,228	\$3,838	933	837	1,990	3,760	3,500	1,021	4,521

*Multi-jurisdictional baseline provides information for SPS's other jurisdictions and does not incorporate New Mexico's Energy Transition Act. ET, LDS, HC as shown in this table are all NM ETA compliant.

IRP Modeling Results

New Resources Added: 2028 - 2040

	PVRR DELTA			Resources Added 2028-2040 (Nameplate Capacity)						
	2024-2030 NPV	2024-2040 NPV	2024-2043 NPV	Dispatchable				Variable Energy Resources		
	\$(M)	\$(M)	\$(M)	Firm Peaking	CC	Storage	Total	Wind	Solar	Total
Financial Forecast										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	3,733	-	130	3,863	4,330	2,429	6,759
Existing Technologies	\$205	\$1,829	\$2,556	-	-	6,290	6,290	6,780	2,429	9,209
Long Duration Storage	\$186	\$1,023	\$1,136	-	-	3,560	3,560	7,460	2,499	9,959
Hydrogen Conversion	\$130	\$1,292	\$1,763	933	837	3,050	4,820	6,120	2,429	8,549
18%/20% PRM										
Existing Technologies	\$304	\$2,169	\$2,927	-	-	6,730	6,730	6,850	2,429	9,279
Long Duration Storage	\$279	\$1,332	\$1,472	-	-	3,870	3,870	7,390	2,499	9,889
Hydrogen Conversion	\$188	\$1,571	\$2,097	933	837	3,520	5,290	6,220	2,429	8,649
Planning Forecast										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	3,966	837	200	5,003	5,450	3,589	9,039
Existing Technologies	\$381	\$2,753	\$4,149	-	-	8,430	8,430	8,600	2,429	11,029
Long Duration Storage	\$320	\$1,348	\$1,629	-	-	4,920	4,920	9,160	3,239	12,399
Hydrogen Conversion	\$240	\$1,630	\$2,255	933	837	5,230	7,000	8,130	2,479	10,609
18%/20% PRM										
Existing Technologies	\$479	\$3,156	\$4,577	-	-	8,970	8,970	8,660	2,429	11,089
Long Duration Storage	\$433	\$1,709	\$2,000	-	-	5,350	5,350	9,130	3,179	12,309
Hydrogen Conversion	\$316	\$1,982	\$2,667	933	837	5,810	7,580	8,170	2,429	10,599
Electrification & Emerging Technologies										
15% PRM										
Multi-Jurisdictional Baseline*	\$0	\$0	\$0	3,500	2,511	570	6,580	5,700	3,529	9,229
Existing Technologies	\$554	\$4,208	\$5,066	-	-	11,200	11,200	8,730	3,340	12,070
Long Duration Storage	\$471	\$2,125	\$2,242	-	-	6,750	6,750	9,080	4,419	13,499
Hydrogen Conversion	\$289	\$2,657	\$3,185	933	837	8,130	9,900	8,740	2,410	11,150
18%/20% PRM										
Existing Technologies	\$707	\$4,849	\$5,813	-	-	11,870	11,870	8,760	3,440	12,200
Long Duration Storage	\$674	\$2,695	\$2,863	-	-	7,120	7,120	9,070	4,539	13,609
Hydrogen Conversion	\$427	\$3,228	\$3,838	933	837	8,820	10,590	8,980	2,090	11,070

*Multi-jurisdictional baseline provides information for SPS's other jurisdictions and does not incorporate New Mexico's Energy Transition Act. ET, LDS, HC as shown in this table are all NM ETA compliant.

IRP Modeling Results

Present Value Revenue Requirements

PVRR Production Cost	Delta (\$M)	NPV (\$M) 2024-2029	Delta (\$M)	NPV (\$M) 2024-2033	Delta (\$M)	NPV (\$M) 2024-2043
PL-15RA-MJB	\$0	\$6,648	\$0	\$ 14,034	\$0	\$ 15,737
PL-15RA-ET	\$381	\$7,029	\$2,753	\$ 16,787	\$4,149	\$ 19,887
PL-15RA-LDS	\$320	\$6,968	\$1,348	\$ 15,382	\$1,629	\$ 17,367
PL-15RA-HC	\$240	\$6,888	\$1,630	\$ 15,665	\$2,255	\$ 17,992
PL-18RA-ET	\$479	\$7,127	\$3,156	\$ 17,191	\$4,577	\$ 20,315
PL-18RA-LDS	\$433	\$7,081	\$1,709	\$ 15,743	\$2,000	\$ 17,738
PL-18RA-HC	\$316	\$6,964	\$1,982	\$ 16,017	\$2,667	\$ 18,404
FF-15RA-MJB	\$0	\$5,843	\$0	\$ 11,733	\$0	\$ 13,039
FF-15RA-ET	\$205	\$6,048	\$1,829	\$ 13,562	\$2,556	\$ 15,595
FF-15RA-LDS	\$186	\$6,029	\$1,023	\$ 12,755	\$1,136	\$ 14,175
FF-15RA-HC	\$130	\$5,973	\$1,292	\$ 13,025	\$1,763	\$ 14,802
FF-18RA-ET	\$304	\$6,148	\$2,169	\$ 13,902	\$2,927	\$ 15,966
FF-18RA-LDS	\$279	\$6,123	\$1,332	\$ 13,065	\$1,472	\$ 14,511
FF-18RA-HC	\$188	\$6,031	\$1,571	\$ 13,304	\$2,097	\$ 15,136
EETL-15RA-MJB	\$0	\$6,930	\$0	\$ 16,431	\$0	\$ 18,125
EETL-15RA-ET	\$554	\$7,484	\$4,208	\$ 20,639	\$5,066	\$ 23,191
EETL-15RA-HC	\$289	\$7,219	\$2,657	\$ 19,088	\$3,185	\$ 21,310
EETL-15RA-LDS	\$471	\$7,401	\$2,125	\$ 18,557	\$2,242	\$ 20,367
EETL-18RA-ET	\$707	\$7,637	\$4,849	\$ 21,281	\$5,813	\$ 23,938
EETL-18RA-HC	\$427	\$7,358	\$3,228	\$ 19,659	\$3,838	\$ 21,963
EETL-18RA-LDS	\$674	\$7,604	\$2,695	\$ 19,126	\$2,863	\$ 20,988

- Relying *solely* on today’s commercially available, carbon-free technologies (i.e., wind, solar and 4-8 hours lithium-ion batteries) is not an economically viable solution
- To be clear, lithium-ion batteries will likely be crucial for achieving New Mexico’s ETA, however, alternative emerging technologies are necessary in the future
- The actual cost and capabilities of alternative emerging technologies will become clearer over time and in future IRPs

PL – Planning Load, FF – Financial Load, EETL – Electrification & Emerging Technologies,

15RA – 15% PRM, 18RA 18% PRM,

MJB – Multi-jurisdictional baseline, ET – Existing Technologies, LDS – Long Duration Storage, HC – Hydrogen Conversion

IRP Modeling Results

New Generating Resources: Cost and Technical Capability Certainties

- SPS relied upon generic cost estimates and projected performance capabilities
- The level of accuracy is dependent upon the maturity of the technology
- Actual cost estimates and performance capabilities will be determined by future competitive solicitations
- SPS's 2023 IRP analysis concentrated on long-duration storage and hydrogen-fired combustion turbines technologies, however, other technologies are available and are encouraged to bid into RFPs

Commercially Available (Costs are well known)

- Wind
- Solar
- Battery Energy Storage
- Combustion Turbine Generators
- Combined Cycle Generation

Emerging Technologies (Costs are less known)

- Long-Duration Energy Storage
- Hydrogen Infrastructure & Costs

IRP Modeling Results

Statement of Need Inputs

- All scenarios included a substantial build out of new renewable generation ranging from 4,281MW to 6,631MW of wind and solar generation between 2028 and 2030
- New dispatchable additions ranged from 1,043MW to 4,290MW during the same period
- Total resource additions ranged from 5,324MW to 10,211MW
- For context, SPS currently has ~7,500MW of installed capacity with an accredited capacity of 5,400 and a system peak of ~4,200MW