



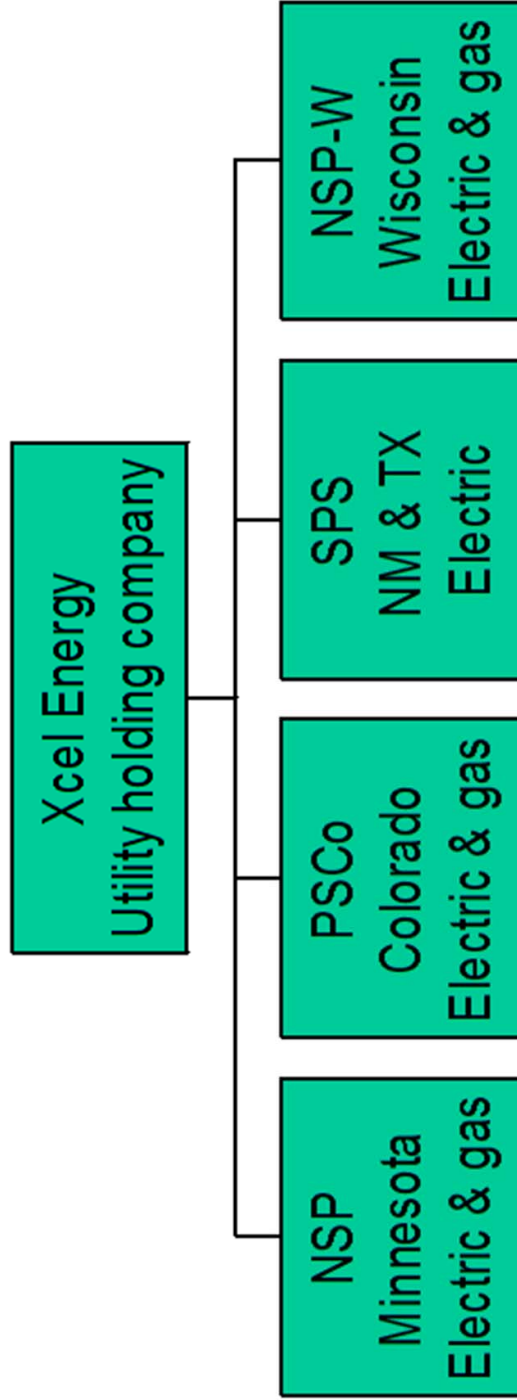
Overview of Xcel Energy and SPS in New Mexico and Texas

Brian Fleming
Analyst – Resource Planning

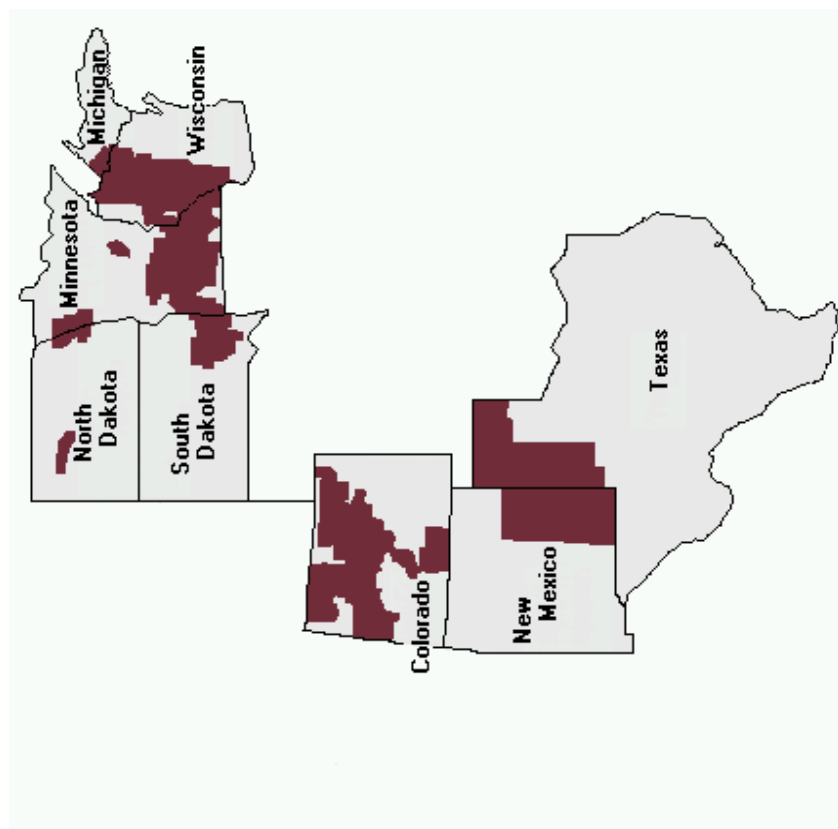
Overview of SPS

- Southwestern Public Service Company (SPS) is registered in New Mexico
- Electric investor-owned electric utility operating in Texas & New Mexico
- SPS is a wholly-owned subsidiary of Xcel Energy Inc.
- SPS does business under the 'Xcel Energy' brand

Corporate Structure



Xcel Energy Operations

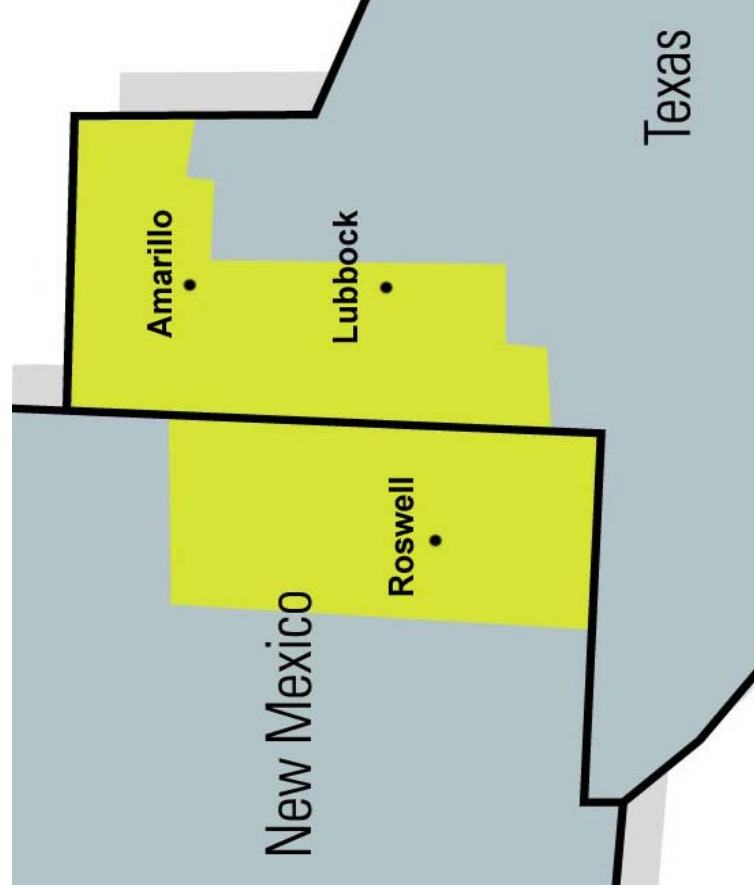


XCEL ENERGY

Electric Customers	3.4 million
Gas Customers	1.9 million

SPS Today

- **Customers: 383,000**
 - ◆ 267,000 in Texas
 - ◆ 116,000 in New Mexico
- **Employees: 1,000**
- **Communities Served:**
 - ◆ 80 in Texas
 - ◆ 14 in New Mexico
- **Low Rates**
- **High Reliability**

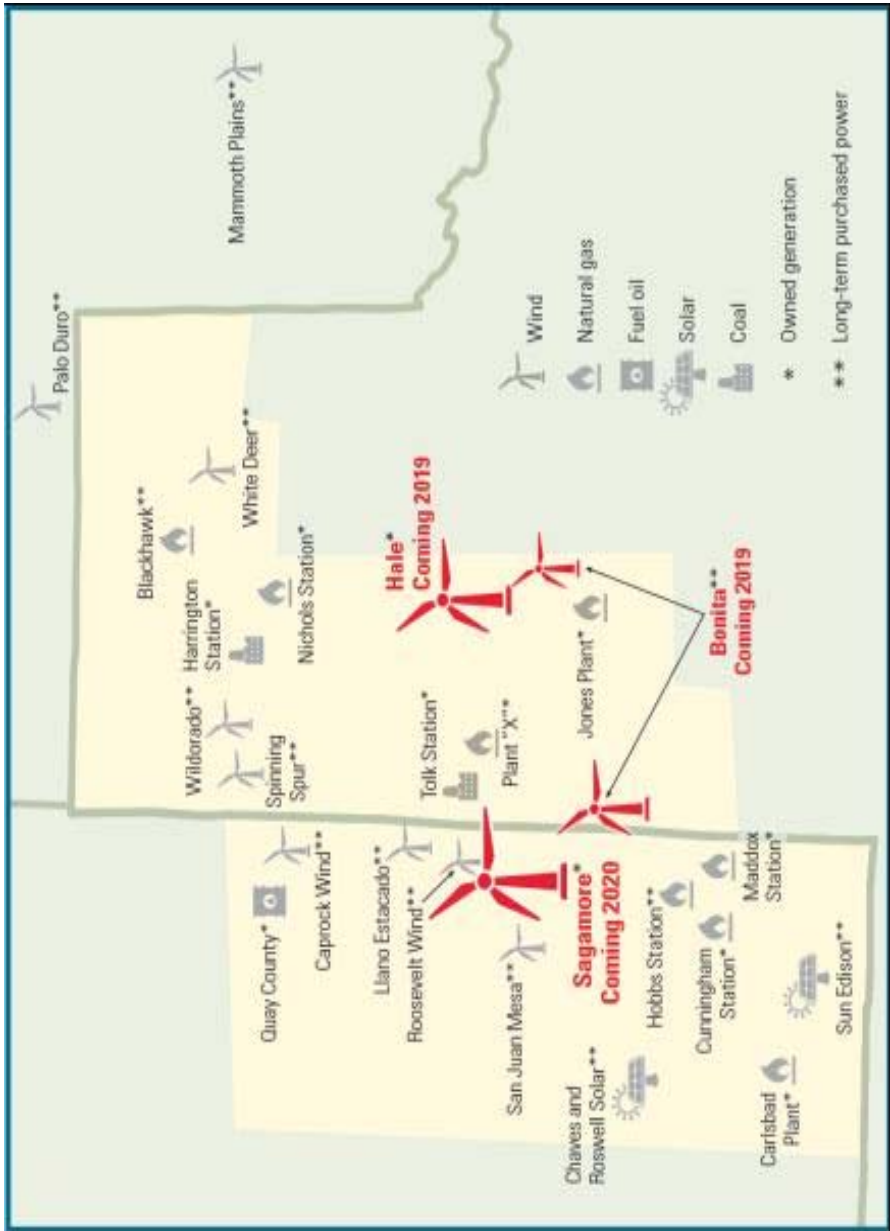


Jurisdictional Composition

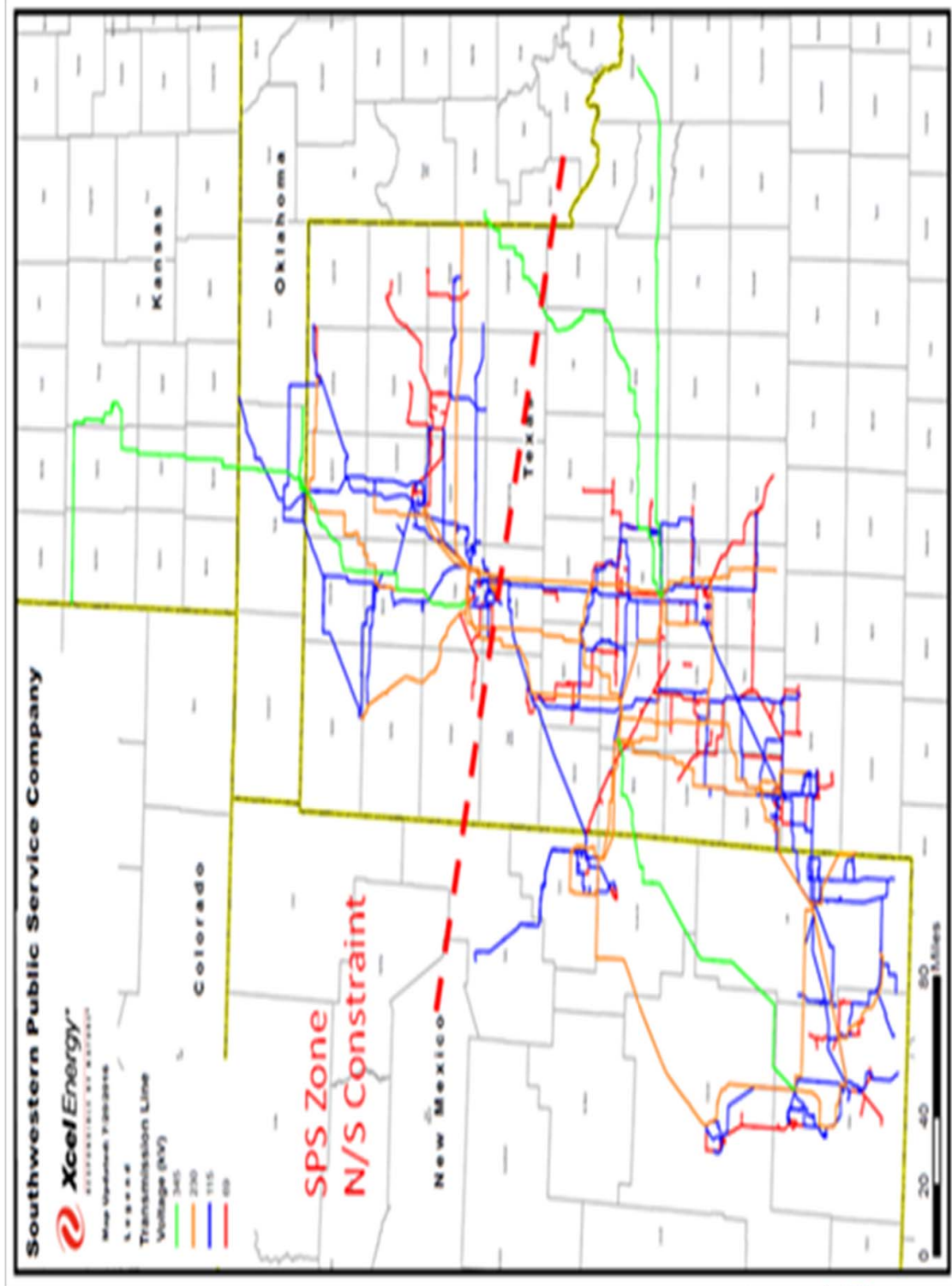
- SPS operates its production and transmission system as an integrated whole and allocates costs to all system customers
- New Mexico distribution activities are assigned to New Mexico
- SPS serves in three customer jurisdictions:
 - ◆ Texas retail – 50.8%
 - ◆ Wholesale – 29.8%
 - ◆ New Mexico retail – 19.4%
- SPS is substantially reducing its wholesale power sales in accordance with the settlement in NM Case No. 10-00074-UT



Power Plants/Renewable Energy



SPS Transmission System



SPS Sources of Renewable Energy

New Mexico

- 80 MW Caprock Wind – Quay Co, NM
- 120 MW San Juan Mesa Wind – Chaves Co, NM
- 250 MW Roosevelt Wind – Roosevelt Co, NM
- 50 MW SunEd Solar – Lea Co & Eddy Co, NM
- 140 MW NextEra Solar Facilities – Chaves Co, NM
- 1.5 MW FERC Qualifying Facility Wind

Total New Mexico renewable – 641.5 MW

Texas & Oklahoma

- 160 MW Wildorado Wind – Oldham Co, TX
- 160 MW Spinning Spur Wind – Oldham Co, TX
- 250 MW Palo Duro Wind – Hansford Co, TX
- 200 MW Mammoth Plains Wind – Dewey Co, OK
- 281.5 MW FERC Qualifying Facility Wind

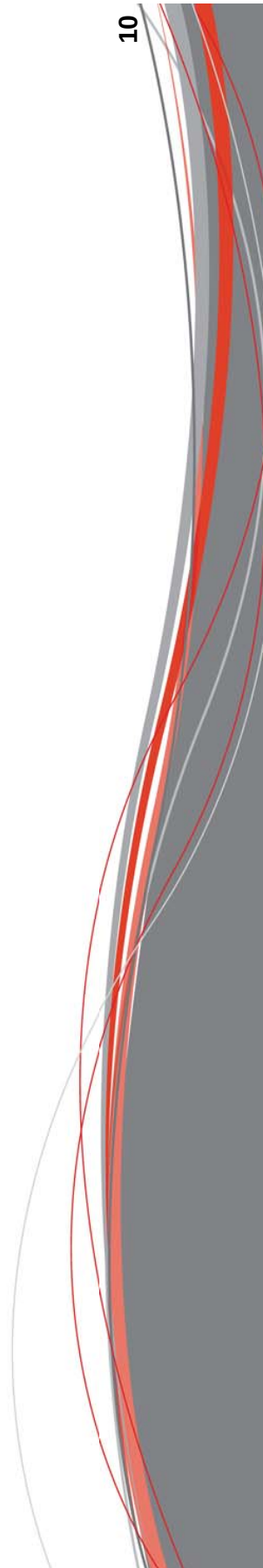
Total Texas & Oklahoma renewable – 1,051.5 MW



SPS Landscape

Bennie Weeks
Manager – Resource Planning

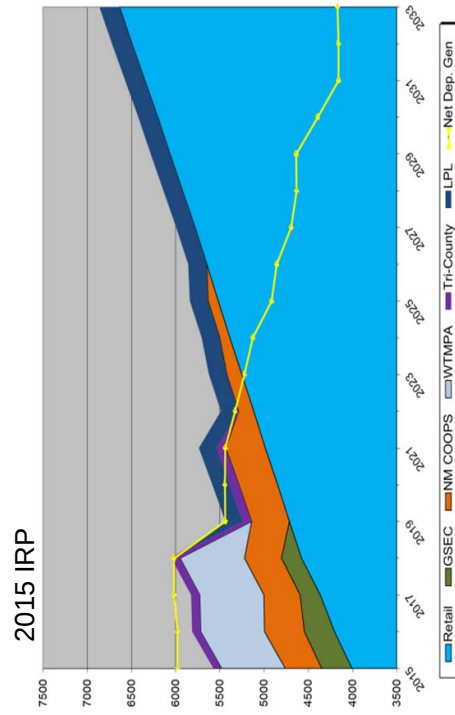
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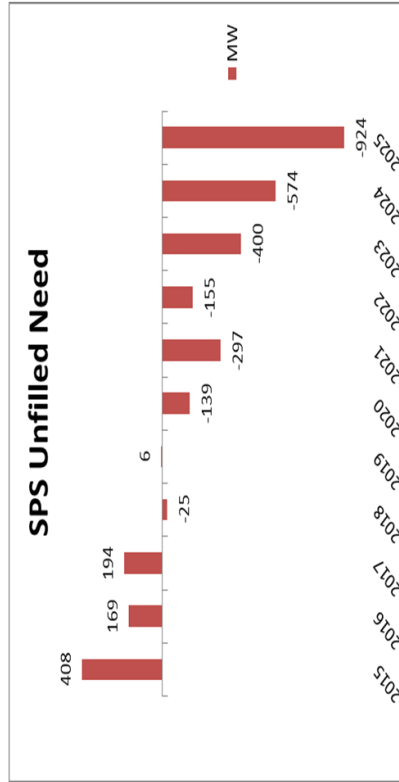
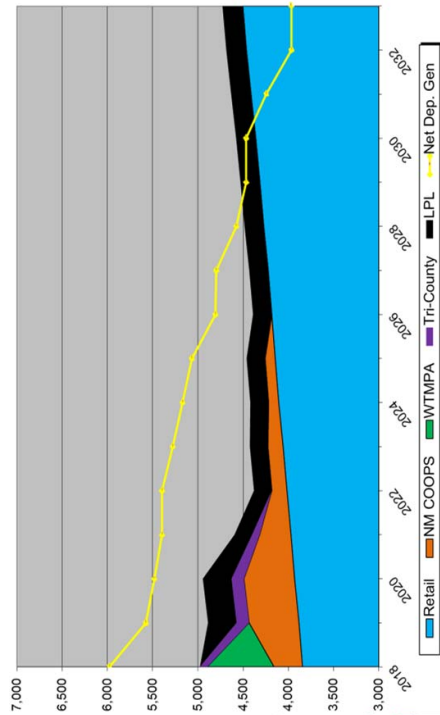
Updates Since 2015 IRP

- Decreased Load Growth Rate
- ◆ Load heavily dependent on industrial activity which is volatile based on commodity prices
- Production Tax Credit (“PTC”) extended
- Approval of solar PPAs
- Clean Power Plan has been stayed
- No current need for new combustion turbine generator in the 2018-2020 timeframe
- SPS filed an update to it IRP Action Plan in March 2017.

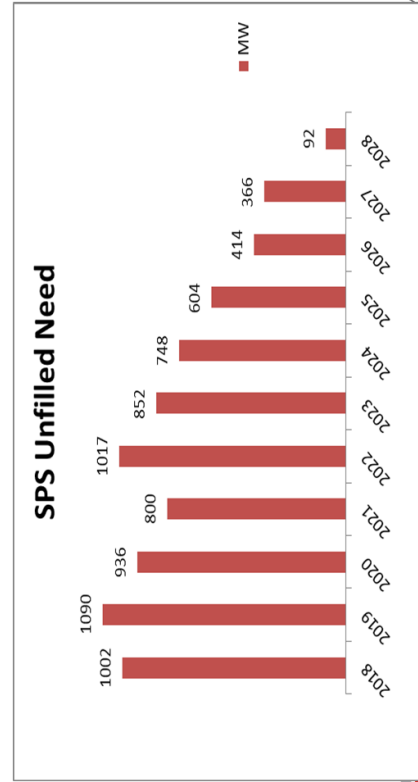
SPS Load and Resources



Current



SPS can actively manage the volatility if loads start increasing



SPS Generation Fleet

Steam Units		
Unit	Emergency Capability (Net - MW)	Total by Plant (MW)
Cunningham 1	71	
Cunningham 2	192	263
Harrington 1	340	
Harrington 2	340	
Harrington 3	351	1031
Jones 1	243	
Jones 2	243	486
Maddox 1	112	112
Nichols 1	113	
Nichols 2	111	
Nichols 3	249	473
Plant X 1	41	
Plant X 2	90	
Plant X 3	95	
Plant X 4	190	416
Tolk 1	537	
Tolk 2	539	1076
Steam Subtotal	3857	
Simple Cycle CT Units		
Unit	Emergency Capability (Net - MW)	
Carlsbad	0	0
Cunningham 3	106	
Cunningham 4	106	212
Jones 3	168	
Jones 4	170	338
Maddox 2	61	61
Quay Co	17	17
CT Subtotal	628	

**SPS System Total
Capability – 4485 MW**

SPS Landscape

- System length due to slower load growth; resource need in 2028
 - ◆ Declining wholesale firm power sales
 - ◆ Decreasing oil and gas load growth rates until world supply rebalances
- Water availability and environmental regulations
 - ◆ Regional Haze, CPP, NAAQS
 - ◆ Tolk Station base load groundwater input constraint

SPS Landscape (cont'd)

- Coal plant situation
 - ◆ All five coal generating units do not have scrubbers
 - Harrington has NAAQS monitor installed by the Texas Commission on Environmental Quality
 - Tolk has been designated under regional haze. The regional haze case has been stayed
 - ◆ Harrington uses city affluent for cooling water; Tolk uses groundwater
 - ◆ Units were originally planned and certificated for a 35-year life; extended to 60 years in rate case settlements

Coal Generation	Year		NDC	Book Retirement	
	Installed				
Harrington 1	1976		339 MW		2036
Harrington 2	1978		339 MW		2038
Harrington 3	1980		340 MW		2040
Tolk 1	1982		521 MW		2042
Tolk 2	1985		524 MW		2045

SPS Landscape (cont'd)

- Market Structure & Transmission Planning/Ownership
 - ◆ Transmission investment dependent upon SPP
 - ◆ Increasing wind in northern sub-zone impacts Harrington coal plant operations
 - ◆ Congested market, long in generation

SPS Landscape (cont'd)

- Managed operation of two coal plants
 - ◆ Harrington is now in last third of life
 - No major pollution control investment
 - ◆ Tolk Station is now 32-35 years old
 - Groundwater operational considerations
 - No major pollution control investment
- Managed decline of old high heat-rate NG units
 - ◆ Minimized capital investment
 - ◆ Minimized O&M closer to retirement date
- Substantial generation expansion required in the late 2020's

Renewable Energy Landscape

- Significant merchant renewable investment (older QF market wind winding down as PTC's expire)

Existing renewable generation		MW
wind in SPS footprint		2,586
PPA wind outside SPS footprint		550
solar in SPS footprint		217
TOTAL		3,353

New renewables under study in SPS		MW
wind in SPS footprint		1,230
wind by others		2,224
solar by others		1,211
TOTAL		4,665

SPS Generation Transition Opportunities

- Complete SPS Wind Initiative
 - ◆ Develop other renewable opportunities
- Explore Tolk Station operating plan given groundwater costs
- Develop environmental plan for Harrington dependent on NAAQS determination
- Mindful of long-term environmental pressure



Summary of SPS's 2017 RPS Filing Filed July 3, 2017

Ruth Sakya
Manager, Regulatory Policy

2016 Compliance Position

Line No.	Description	Solar	Other	DG	Wind - Remaining	Total
1	2016 NM Retail Sales					5,279,147
2	Less Qualifying Large Customer Sales (Total)					2,231,085
3	Adjusted NM Retail Sales (L1 - L2)					3,048,062
4	Overall RPS Requirement (%)					15%
5	RPS Obligation, Excluding Qualifying Large Customers (L3 * L4)					457,209
6	Qualifying Large Customer MWh for the RPS (Appendix F)					137,632
7	Final RPS Obligation (L5 + L6)					594,842
8	Diversity Requirement (% of RPS)	20.0%	5.0%	3.0%	72.0%	100.0%
9	RPS Obligation (L7 * L8)	118,968	29,742	17,845	428,287	594,842
10						
11	Beginning REC Balance	-	-		1,515,699	1,515,699
12						
13	Caprock Wind Generation	-	-	-	324,238	324,238
14	San Juan Wind Generation	-	-	-	397,581	397,581
15	Mesalands Wind Generation	-	-	-	2,990	2,990
16	SunEdison Solar Generation	108,879	-	-	-	108,879
17	Company Owned Solar Generation	-	-	154	-	154
18	SolarRewards (Distributed Generation) Generation	-	-	13,102	-	13,102
19	Total Annual Generation (Sum L13-L18) (Page 3)	108,879	-	13,256	724,808	846,943
20	Less Transfers to Wholesale Customers	-	-	-	157,820	157,820
21	Less REC Sales (all vintages) (Page 2)	-	-	-	-	-
22	Less Expiring RECs	-	-	-	-	-
23	Less Annual RPS Obligation (L9)	118,968	29,742	17,845	428,287	594,842
24	REC Adjustments from Prior Years	-	-	102	(3)	99
25	Annual Excess/(Deficiency) (L19 - L20 - L21 - L22 - L23 + L24)	(10,089)	(29,742)	(4,487)	138,699	94,380
26						
27	Cumulative Excess/(Deficiency) (L11 + L25)	(10,089)	(29,742)	(4,487)	1,654,398	1,610,079
28	Replace Solar, DG & Other with Wind for Overall RPS Compliance1	10,089	29,742	4,487	(44,318)	-
29	Impact of Replacements (Ending REC Balance)	-	-	-	1,610,079	1,610,079

Forecasted RPS Need & Position - 2018

Line No.	Description	Solar	Other	DG	Wind/Remaining	Total
1	2018 NM Retail Sales					5,396,067
2	Less Qualifying Large Customer Sales (Total)					2,231,085
3	Adjusted NM Retail Sales (L1 - L2)					3,164,982
4	Overall RPS Requirement (%)					15%
5	RPS Obligation, Excluding Qualifying Large Customers (L3 * L4)					474,747
6	Qualifying Large Customer MWh for the RPS (Page 3)					80,554
7	Final RPS Obligation (L5 + L6)					555,302
8	Diversity Requirement (% of RPS)	20%	5%	3%	72%	100%
9	RPS Obligation (L7 * L8)	111,060	27,765	16,659	399,817	555,302
10						
11	Beginning REC Balance	-	-	-	1,709,301	1,709,301
12						
13	Caprock Generation	-	-	-	311,122	311,122
14	San Juan Generation	-	-	-	400,407	400,407
15	Mesalands Generation	-	-	-	-	-
16	SunEdison Solar Generation	108,556	-	-	-	108,556
17	Company Owned Solar Generation	-	-	151	-	151
18	SolarRewards (Distributed Generation)	-	-	13,866	-	13,866
19	Total Annual Generation (Sum L13:L18)	108,556	-	14,017	711,529	834,102
20	Less Transfers to Wholesale Customers	-	-	-	140,955	140,955
21	Less REC Sales (all vintages)	-	-	-	-	-
22	Less Expiring RECs	-	-	-	-	-
23	Less Annual RPS Obligation (L9)	111,060	27,765	16,659	399,817	555,302
24	REC Adjustments from Prior Years	-	-	-	-	-
25	Annual Excess/(Deficiency) (L19 - L20 - L21 - L22 - L23 - L24)1	(2,504)	(27,765)	(2,642)	170,756	137,845
26						
27	Cumulative Excess/(Deficiency) (L11 + L25)	(2,504)	(27,765)	(2,642)	1,880,057	1,847,146
28	Replace Solar, Other, & DG with Wind for Overall RPS Compliance	2,504	27,765	2,642	(32,911)	-
29	Impact of Replacements (Ending REC Balance)	-	-	-	1,847,146	1,847,146

Forecasted RPS Need & Position - 2019

Line No.	Description	Solar	Other	DG	Wind/Remaining	Total
1	2019 NM Retail Sales					5,483,283
2	Less Qualifying Large Customer Sales (Total)					2,231,085
3	Adjusted NM Retail Sales (L1 - L2)					3,252,198
4	Overall RPS Requirement (%)					15%
5	Unadjusted RPS Obligation (L3 * L4)					487,830
6	Qualifying Large Customer MWh for the RPS (Page 3)					90,118
7	Final RPS Obligation (L5 + L6)					577,948
8	Diversity Requirement (% of RPS)	20%	5%	3%	72%	100%
9	RPS Obligation (L7 * L8)	115,590	28,897	17,338	416,123	577,948
10						
11	Beginning REC Balance	-	-	-	1,847,146	1,847,146
12						
13	Caprock Generation	-	-	-	311,059	311,059
14	San Juan Generation	-	-	-	400,392	400,392
15	Mesaland's Generation	-	-	-	-	-
16	SunEdison Solar Generation	105,723	-	-	-	105,723
17	Company Owned Solar Generation	-	-	151	-	151
18	SolarRewards (Distributed Generation)	-	-	13,795	-	13,795
19	Total Annual Generation (Sum L13:L18)	105,723	-	13,946	711,451	831,120
20	Less Transfers to Wholesale Customers	-	-	-	137,126	137,126
21	Less REC Sales (all vintages)	-	-	-	-	-
22	Less Expiring RECs	-	-	-	-	-
23	Less Annual RPS Obligation (L9)	115,590	28,897	17,338	416,123	577,948
24	REC Adjustments from Prior Years	-	-	-	-	-
25	Annual Excess/(Deficiency) (L19 - L20 - L21 - L22 - L23 - L24)1	(9,866)	(28,897)	(3,393)	158,203	116,046
26						
27	Cumulative Excess/(Deficiency) (L11 + L25)	(9,866)	(28,897)	(3,393)	2,005,349	1,963,192
28	Replace Solar, Other, & DG with Wind for Overall RPS Compliance	9,866	28,897	3,393	(42,157)	-
29	Impact of Replacements (Ending REC Balance)	-	-	-	1,963,192	1,963,192



Questions and Discussion

Topics For Future Meetings

- Environmental Update
- Aging Generation Fleet
- Gas & Power Markets
- Coal Supply
- Demand-side Management and Energy Efficiency
- Storage

Information

For more information on the overall transmission plan and individual projects:



www.powerfortheplains.com

IRP Information

■ Web Page

- ◆ www.xcelenergy.com/About Us/Rates & Regulations/Resource Plans

■ Bennie Weeks – Xcel Energy/SPS Contact

- ◆ Address – 790 Buchanan, Suite 700, Amarillo TX 79101
- ◆ Phone - (806) 378-2508
- ◆ Email – bennie.weeks@xcelenergy.com

Next Meeting

■ **Date:**

- ◆ Thursday, November 9, 2017

■ **Time:**

- ◆ 10:00am to 12:00pm (Mountain Time)

■ **Location:**

- ◆ Webinar meeting

Tolk Water Situation

Alan J. Davidson
Director, Capital Projects



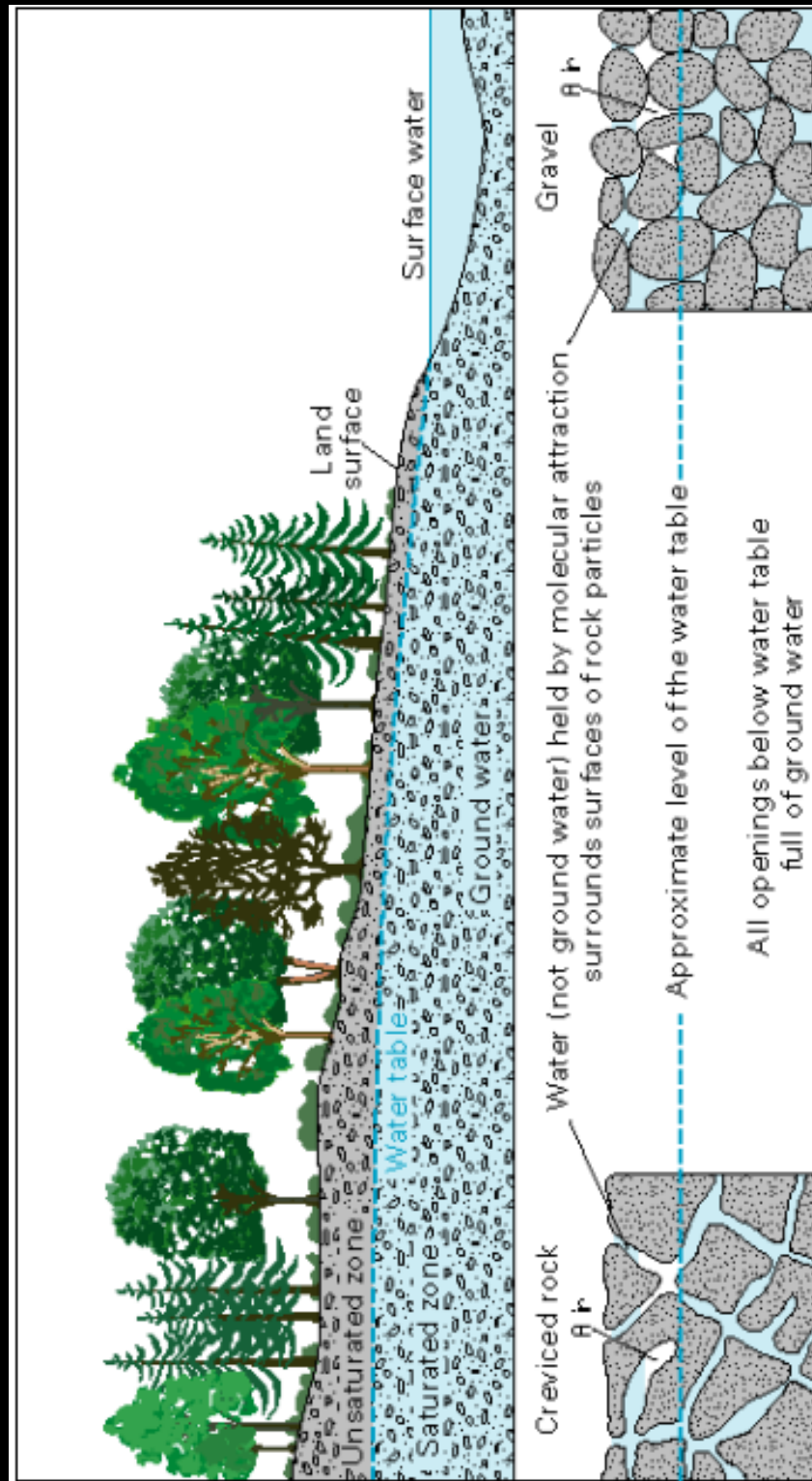
November 9, 2017



What is an aquifer?

- Below a certain depth, the ground, if it is permeable enough to hold water, is saturated with water
- The upper surface of this zone of saturation is called the water table
- The saturated zone beneath the water table containing sediment and rock is called an aquifer, and aquifers are huge storehouses for water
- Wells can be drilled into the aquifers and water can be pumped out
- Precipitation eventually can add water (recharge) into the porous rock of the aquifer if the surface area is adaptive.

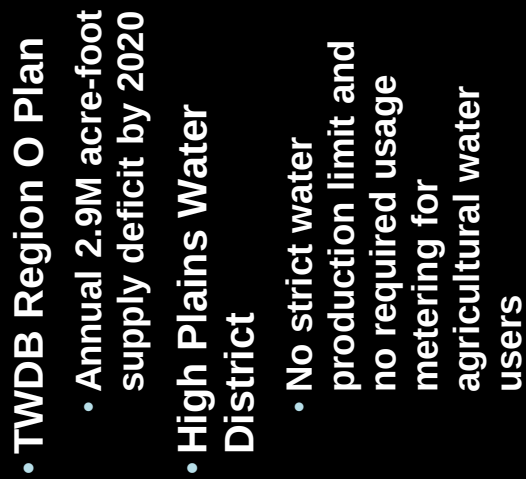
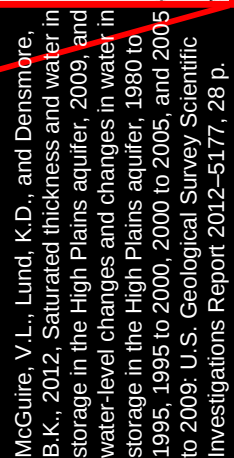
Diagram of an Aquifer



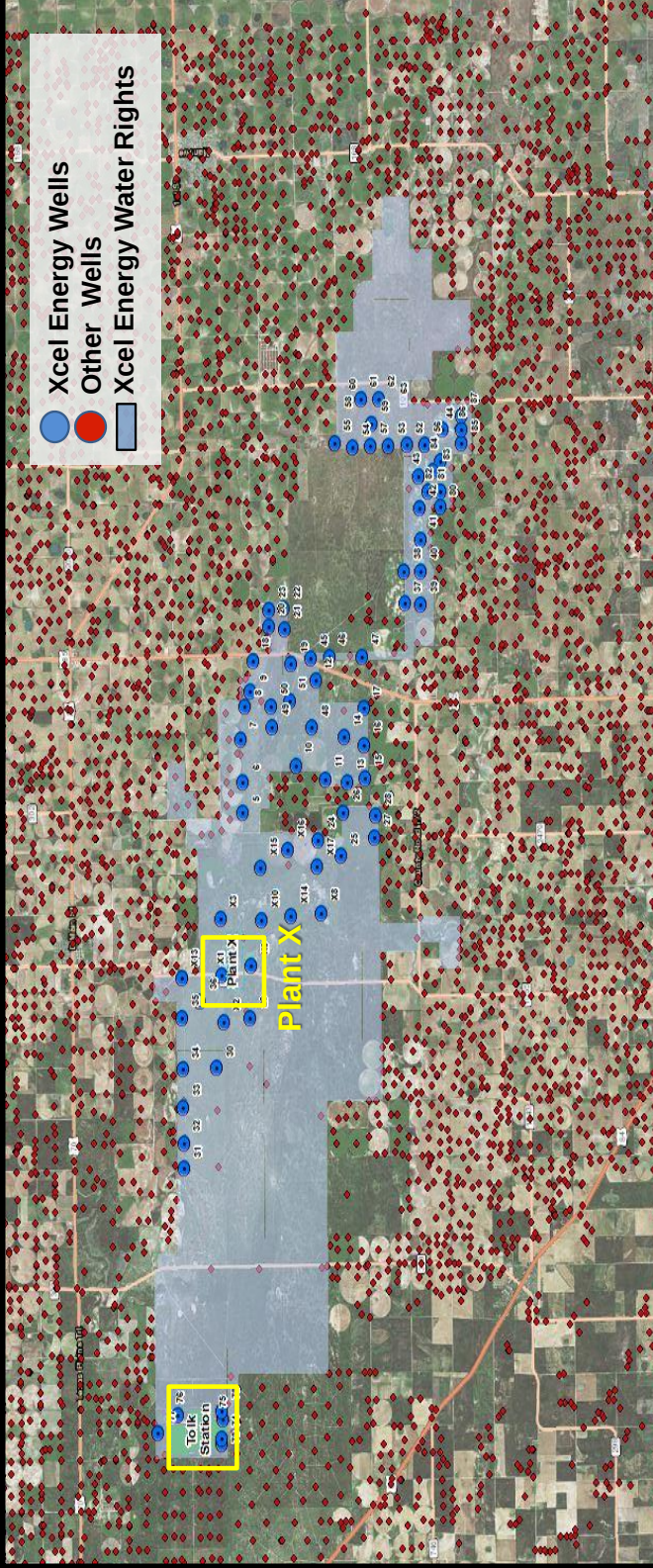
What is Saturated Thickness?



- Saturated thickness is the volume of the aquifer in which the pore spaces are completely filled (saturated) with water.
- For an unconfined aquifer like the Ogallala, the saturated thickness is the distance from the water table surface to the base of the aquifer
- It is the thickness that supplies water to wells. As water levels decline, so does the saturated thickness



Competition for Water



- 90+% of regional water usage for agriculture
- 50K acre wellfield with ~80 wells (Approximately 32 miles to furthest well)
- Both declining wellfield volume & wellfield peak productivity concerns
- Lack of agricultural water use measurement = forecast uncertainty

Operational Issues



Tolk aquifer depletion - 2 issues

Issue 1 - Aquifer longevity

When will the plant run out of water?

- Tolk & X generation
- Aquifer storage
- Aquifer geology
- Water use by others

Issue 2 - Peak production

Can we get the water we need to run the plant?

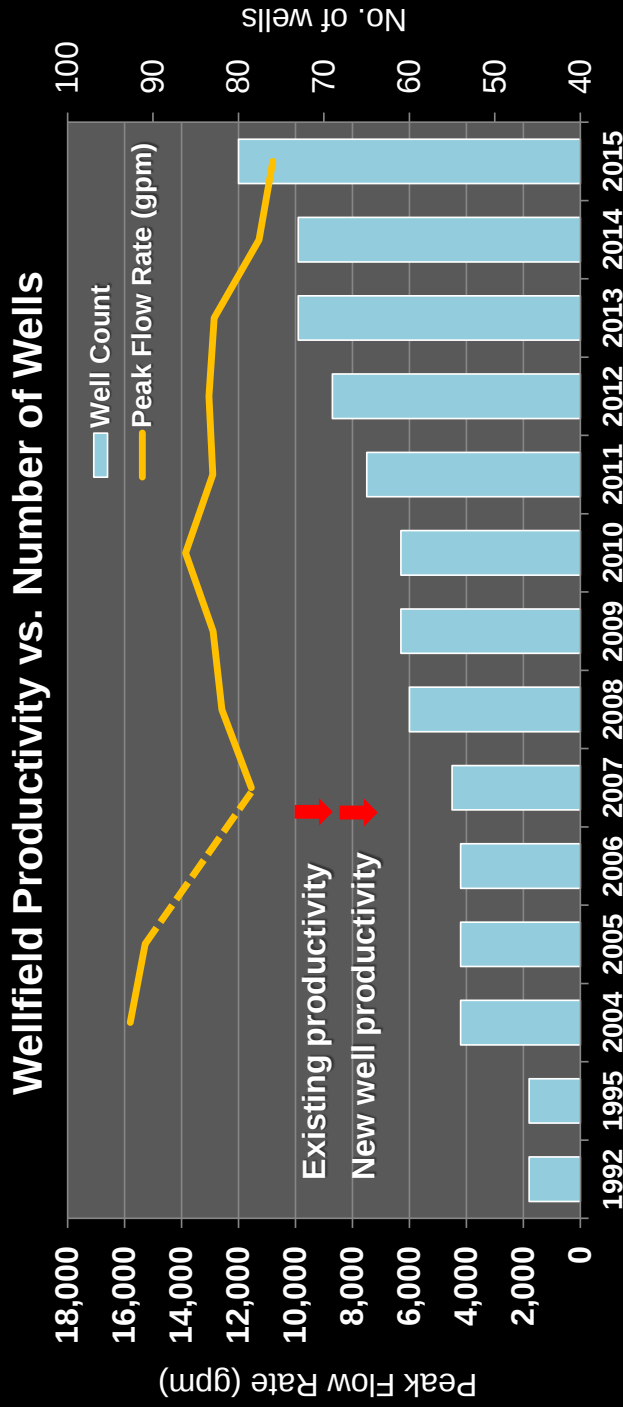
- Tolk & X generation
- Wellfield capacity
- Other plant operations
- Water conveyance
- Production decline

Water balance spreadsheet

- Quickly evaluate changes/interactions between both issues
- Changes in capacity factor/retirement date for subsequent charts



Plant Wellfield Decline

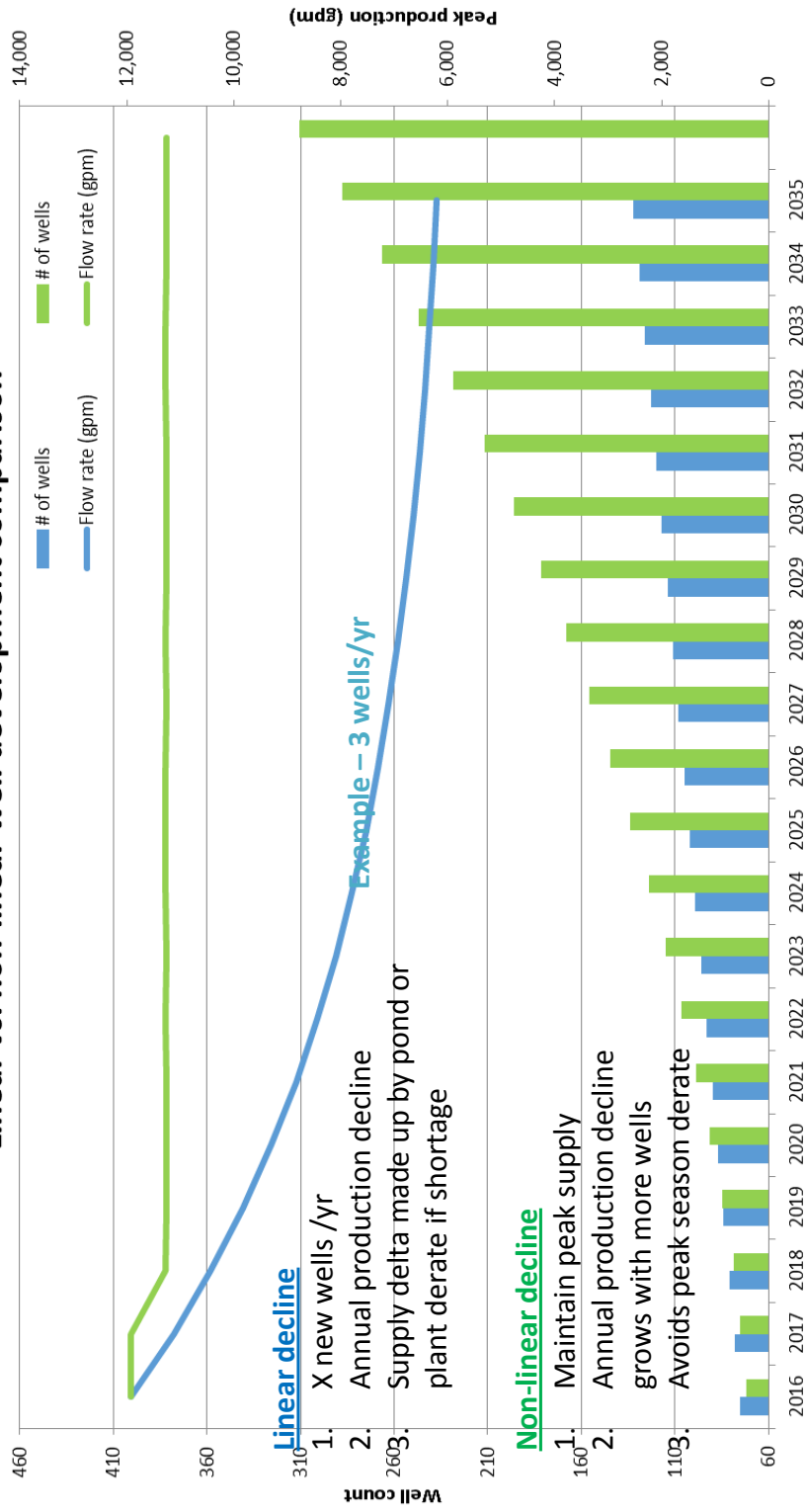


- August 2016 – Tolk/Plant X water supply issues (recovery during short outage)
- Annual groundwater modeling – LBG-Guyton Associates
- Bi-annual total system supply testing

Well Development Approaches



Linear vs. non-linear well development comparison



Future Projections



■ Adequate water supply
■ Concerns, may have peak production challenges
■ Water supply nearly exhausted, peak and annual production challenges

Tolk/X Wellfield - Long-term water supply alternatives

Alternative ID	WR Cost Est. (\$M)	Dev Cost Est. (\$M)	Total Cost (\$M)	Cumulative Cost (\$M)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
<i>Current</i>																									
+ Northern Agriculture II (2,390 acres)	-	-	0.00	0.00																					
+ Barrett East (2,450 acres)	8.34	6.50	14.84	14.84																					
+ Smith, et al. (5,190 acres)	8.58	5.60	14.18	29.02																					
+ future phase 4 (~5,000 acres)	18.20	12.50	30.70	59.72																					
+ future phase 5 (~5,000 acres)	17.50	12.50	30.00	89.72																					
+ future phase 6 (~5,000 acres)	17.50	12.50	30.00	119.72																					
+ future phase 6 (~5,000 acres)	17.50	12.50	30.00	149.72																					
Lubbock pipeline (2019 in-service)	-	-	192.00	192.00																					
+ Northern Agriculture II (2,390 ac)	8.34	6.50	14.84	206.84																					
+ Barrett East (2,450 ac)	8.58	5.60	14.18	221.02																					
+ Smith, et al. (2,690 ac)	9.10	12.50	21.60	242.62																					
Scenario 1 (U1 2020; U2 2022)	-	-	0.00	0.00																					
Scenario 3 (U1 2024; U2 2028)	-	-	0.00	0.00																					
+ Northern Agriculture II (2,390 acres)	8.34	6.50	14.84	14.84																					
+ Barrett East (2,450 acres)	8.58	5.60	14.18	29.02																					
+ Smith, et al. (5,190 acres)	9.10	12.50	21.60	50.62																					
Scenario 4 (U1 & U2 2028)	-	-	0.00	0.00																					
+ Northern Agriculture II (2,390 acres)	8.34	6.50	14.84	14.84																					
+ Barrett East (2,450 acres)	8.58	5.60	14.18	29.02																					
+ Smith, et al. (5,190 acres)	18.20	12.50	30.70	59.72																					
Scenario 5 (2018 derate, U1 2023; U2 2025)	-	-	0.00	0.00																					
Scenario 6a (2018 derate to 47%)	-	-	0.00	0.00																					
+ Northern Agriculture II (2,390 acres)	8.34	6.50	14.84	14.84																					
+ Barrett East (2,450 acres)	8.58	5.60	14.18	29.02																					
+ Smith, et al. (5,190 acres)	18.20	12.50	30.70	59.72																					
Scenario 6b (2020 derate to 47%)	-	-	0.00	0.00																					
+ Northern Agriculture II (2,390 acres)	8.34	6.50	14.84	14.84																					
+ Barrett East (2,450 acres)	8.58	5.60	14.18	29.02																					
+ Smith, et al. (5,190 acres)	18.20	12.50	30.70	59.72																					

- Dynamic operational model created to monitor / predict life remaining of well field
- TWDB and consults confirm that aquifer is dropping with serious future consequence



Mitigation Alternatives Considered

Alternatives	Cost
Hybrid cooling tower retrofit	\$200M+ & technology risk
Wastewater effluent pipeline	~\$200M
Ongoing water right acquisition & wellfield expansion (acquisition challenges due to reluctance to sell farm businesses)	Price is uncertain
Horizontal well development	~\$3M
Reduced Tolk/Plant X generation	Currently being studied

Ongoing Activities



Wellfield Saturation
Thickness and
Production
Monitoring

Plant Process
Review for Water
Conservation/
Production
Optimization

Groundwater
Model Update
(Internal and
External)



Questions and Discussion



IRP Information

- Web Page:

https://www.xcelenergy.com/company/rates_and_regulations/resource_plans/sps_2019-2038_integrated_resource_plan

Note: After navigating to the webpage, in the upper left-hand corner of the page, make sure that “New Mexico” is selected. Click on Public Advisory Meeting then click on the link for the second meeting.

- Ashley Gibbons and Ben Elsey – Xcel Energy/SPS Contact
 - Address: 1800 Larimer Street, Ste, 1600 Denver CO 80202
 - Phone: Ashley (303) 571-2813 and Ben (303) 571-6705
 - Email: ashley.gibbons@xcelenergy.com
ben.r.elsey@xcelenergy.com



Topics For Future Meetings

- Environmental Update
- Aging Generation Fleet
- Gas & Power Markets
- Coal Supply
- Demand-side Management and Energy Efficiency
- Storage



Next Meeting

- **Date:**
 - **Tuesday, January 30, 2018**
- **Time:**
 - **10:00am to 12:00pm (Mountain Time)**
- **Location:**
 - **Webinar meeting**



Gas and Power Market Price Forecasting

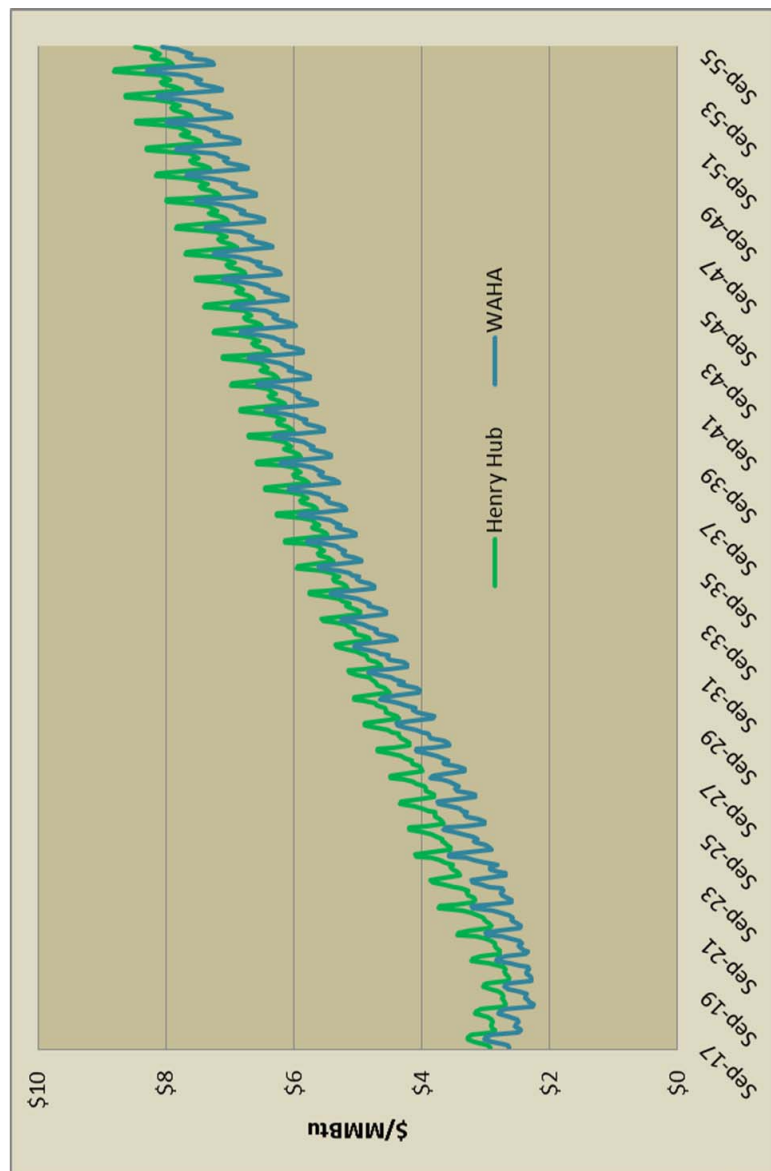
Robin Preston
January 30, 2018



Natural Gas Price Forecasting Methodology

- Xcel creates forecasts semi-annually in Feb/Aug
- Henry Hub forecast “4-Source Blend” is an average of three consultants’ long term forecasts and the current NYMEX strip
- Currently consultants forecasts are...
 - IHS-CERA
 - PIRA
 - Wood Mackenzie

Recent Henry Hub 4-Source Blend Forecast (August 15th, 2017)



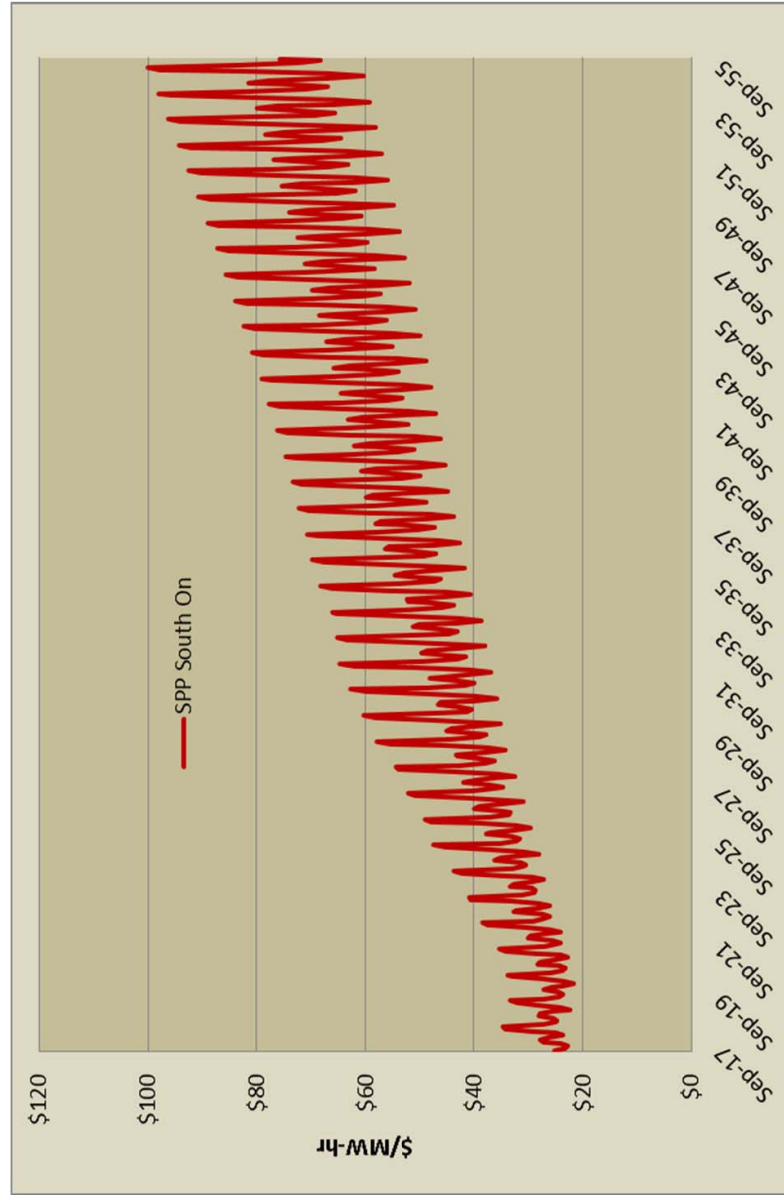
Natural Gas Delivered Price

- **Basis differential is difference in the gas price at a given Hub compared to a benchmark location (i.e. Henry Hub)**
 - Current data sources for basis: IHS-CERA, PIRA & Wood Mackenzie
- **Methodology:**
 - Determine appropriate hub
 - Existing units: Use the hub from where gas is traditionally procured
 - New units: Determine most likely general location of unit and associated hub
 - Add appropriate transportation, storage and fuel surcharges to achieve a delivered price.

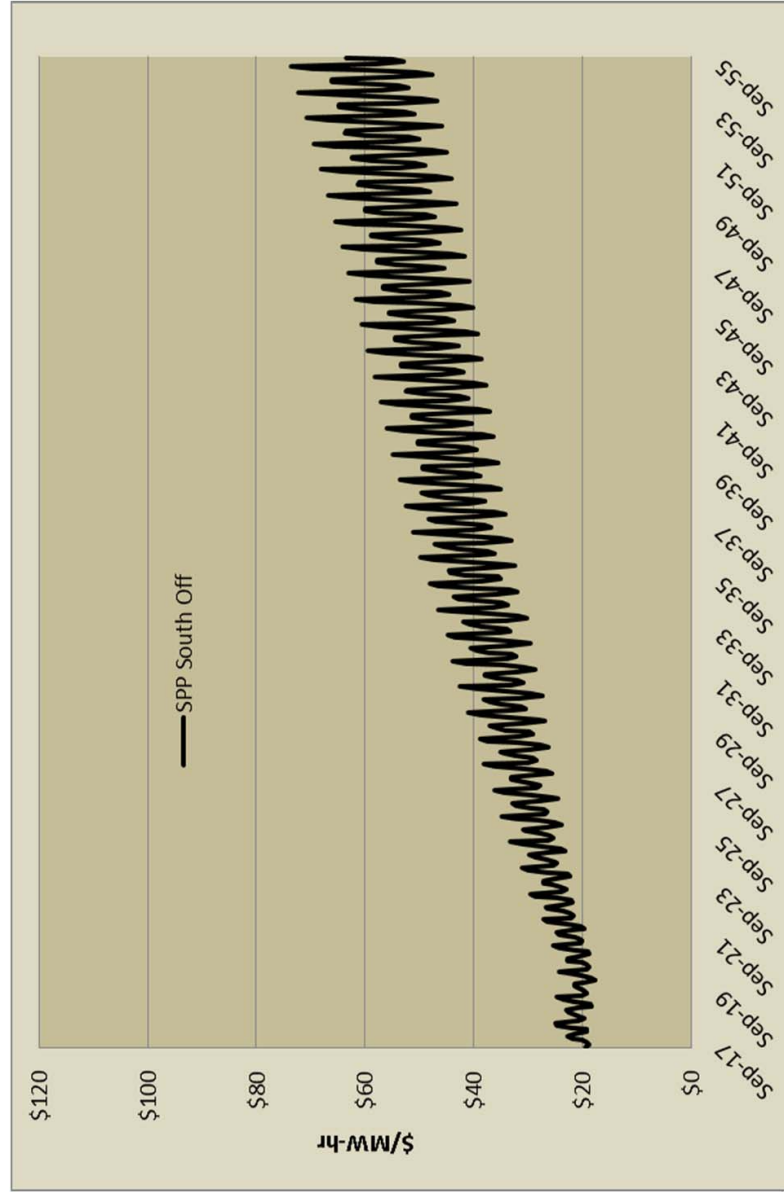
Electricity Market Prices

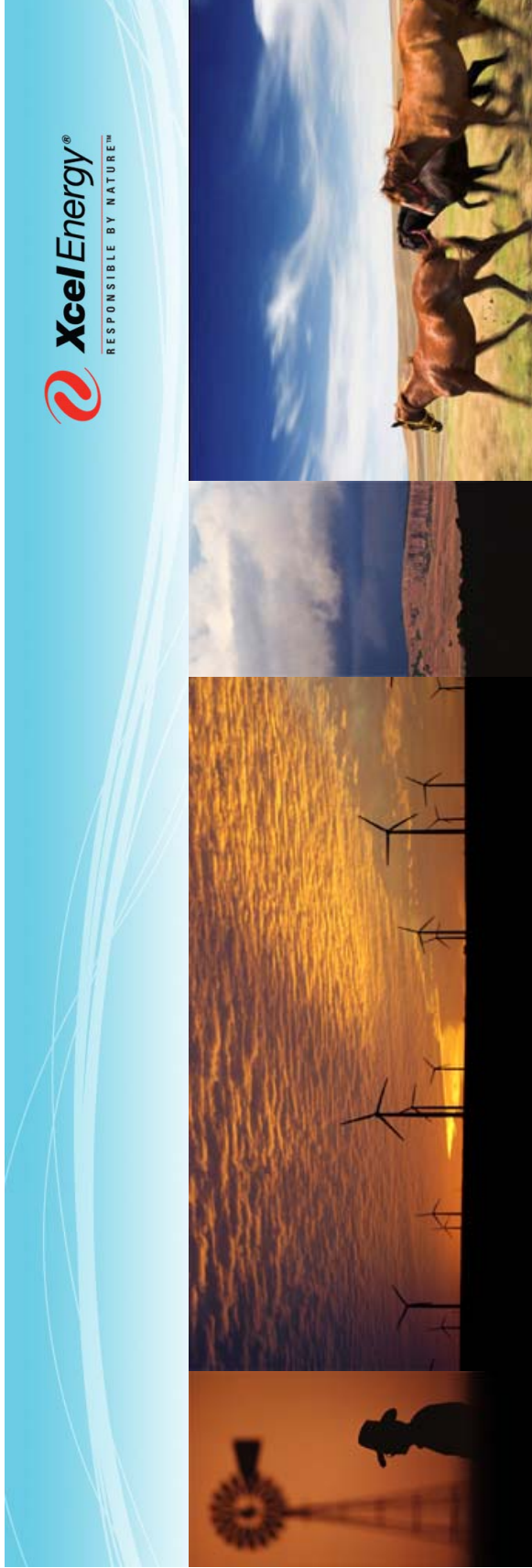
- Calculate the average of IHS-CERA, PIRA, and Wood Mackenzie implied heat rate forecasts to derive the “heat rate” (per MWh) for a given location.
- Multiply the “heat rate” by the “4-Source Blend” natural gas price to get the \$/MWh price for a given location.

Recent SPP Electricity Forecast – On Peak (Aug. 15th, 2017)



Recent SPP Electricity Forecast – Off Peak (Aug. 15th, 2017)





Emerging Environment Impacts for SPS NMIRP

Dean Metcalf
Manager, Environmental Services and Media Compliance
January 30, 2018



Major Regulations Affecting SPS

Cross-State Air Pollution Rule (CSAPR)

- EPA adopted in 2011 (Xcel made comments and sued EPA)
- Two Main Issues – Texas' Inclusion and EPA Disapproval of Texas State Plan
- DC Circuit Court Stayed CSAPR - December 30, 2011
- Litigation went from DC Circuit Court to Supreme Court and back
- CSAPR largely upheld, but Texas emission budgets were found to over-control and were remanded to EPA
- CSAPR program took effect January 1, 2015
- EPA made summer NOx budget tighter, and removed Texas from CSAPR limits for annual NOx and SO2 in 2016-17
- Changes in SPS since 2011 (Added Wind and Transmission)
- Compliance Strategy – Dispatch and Allowance Purchase

Major Regulations Affecting SPS (Cont.)

EGU MACT – MATS Rule Regulates

- Mercury (Hg)
- Particulate Matter (PM) – surrogate for toxic non-mercury metals
- HCl – surrogate for all toxic acid gases
- Compliance Strategy - ACl and PM Averaging Plan for H1, H2, H3.
- 2015 Compliance (Tolk and Harrington)

Major Regulations Affecting SPS (Cont.)

Regional Haze

- BART – Harrington 1 and 2 Eligible
- Reasonable Progress – Can apply to all units
- 2009 Texas submitted RH SIP
- 2014 EPA proposed RH FIP:
 - CSAPR meets BART for Texas
 - Reasonable Progress: proposed scrubbers for Tolk Units
- 2016 EPA adopted final rule:
 - Did not finalize BART due to CSAPR remand
 - Required scrubbers for Tolk Units

Major Regulations Affecting SPS (Cont.)

- SPS appealed rule impacting Tolks to 5th Circuit Court
- In 2016, 5th Circuit Court stayed rule
- In 2017, EPA requested a remand
- Remand granted by 5th Circuit Court, which left stay in effect and is holding litigation until EPA completes reconsideration
- EPA plans to address this now that it has completed its BART rule as described below

Major Regulations Affecting SPS (Cont.)

- January 2017 - EPA proposed Texas BART rule that included dry scrubbing for Harrington 1 and 2
- Xcel submits comments in May 2017
- September 2017 EPA adopted a rule for a Texas only trading program based on CSAPR SO2 budgets. Limits apply to all SPS coal units as a BART Alternative
- EPA also adopts rule removing Texas from CSAPR
- Environmental advocates have appealed both rules

Major Regulations Affecting SPS (Cont.)

- Litigation continues
- SPS has intervened in support of EPA's rules
- Next regional haze plan for all states is due in 2021

Major Regulations Affecting SPS (Cont.)

National Ambient Air Quality Standards

- NAAQS for SO₂, Ozone, PM, NO₂
- Areas near SPS plants have been designated attainment for ozone, PM and NO₂
- SO₂ designations complete:
 - Area near Tolk Station meets standard
 - Area near Harrington Station being monitored and area will be designated in 2020
- If designated nonattainment, Texas plan would be due in 2022
- Potential for increased controls at Harrington
- Attainment would be required by 2025

Major Regulations Affecting SPS (Cont.)

Coal Combustion Residuals (CCR)

Rules

- Regulation of coal ash as nonhazardous
- Increased landfill construction & monitoring requirements once our ash becomes non-saleable
- Potential to affect ash sales – 100% beneficial use

Major Regulations Affecting SPS (Cont.)

Clean Power Plan – GHG 111(d)

- 2015 final rules for GHG regulation from existing sources
- Stayed by Supreme Court in 2016
- EPA has proposed to repeal the CPP
- Comments due in April 2018
- Unknown whether EPA would adopt a replacement rule, or what form that might take

Major Regulations Affecting SPS (Cont.)

Threatened and Endangered Species

- Sand Dune Lizard
- Lesser Prairie Chicken

Avian Protection

- APP

Major Rules Not Affecting SPS (at this time)

- CCR – Coal Combustion Residual rule or Ash Rule
- 316(b) – Water Intake Structure Rule
- WOTUS – Waters of the United States

Recent Issues Affecting SPS

- Gaines Co Plant Permitting
- Wind, Wind, Wind
- City of Amarillo and N/H Wastewater Permit



Questions and Discussion



IRP Information

- Web Page:

https://www.xcelenergy.com/company/rates_and_regulations/resource_plans/sps_2019-2038_integrated_resource_plan

Note: After navigating to the webpage, in the upper left-hand corner of the page, make sure that “New Mexico” is selected. Click on Public Advisory Meeting then click on the link for the second meeting.

- Ashley Gibbons and Ben Elsey – Xcel Energy/SPS Contact
 - Address: 1800 Larimer Street, Ste, 1600 Denver CO 80202
 - Phone: Ashley (303) 571-2813 and Ben (303) 571-6705
 - Email: ashley.gibbons@xcelenergy.com
ben.r.elsey@xcelenergy.com



Topics For Future Meetings

- Aging Generation Fleet
- Coal Supply
- Demand-side Management and Energy Efficiency
- Storage



Next Meeting

- **Date:**
 - **Tuesday, March 27, 2018**
- **Time:**
 - **10:00am to 12:00pm (Mountain Time)**
- **Location:**
 - **Webinar meeting**





Southwestern Public Service Company
Sales and Load Forecasting
New Mexico Resource Plan Public Advisory
Meeting
March 27, 2018



Agenda



- Energy and peak demand forecasting process
- Economic and demographic assumptions
- Weather assumptions
- Forecast adjustments
- Energy and peak demand forecast results
- SE New Mexico oil development
- Forecast scenarios

Forecasting Process



- 30-year forecasts of monthly customers, sales and peak demand are developed using primarily regression analysis.
- Retail sales are forecast by major class and by state.
- Retail peak demand is forecast at the aggregated company level.
- Wholesale sales and peak demand are forecast by individual customer.

Regression Analysis



- Use statistical relationships between monthly sales or demand and explanatory variables such as economics, weather, customers, and price of electricity. Once a statistical relationship is established from historical data, the relationship is applied to the forecast of the explanatory variables to derive a sales or demand forecast. This process is referred to as regression analysis.
 - For example: Residential sales = f (number of customers, weather, household income)
- Strengths: industry standard, robust, test results, defines relationships, adaptable/flexible
- Weaknesses: historical relationships can change, limited by available data, extremes can create challenges

Other Methodologies



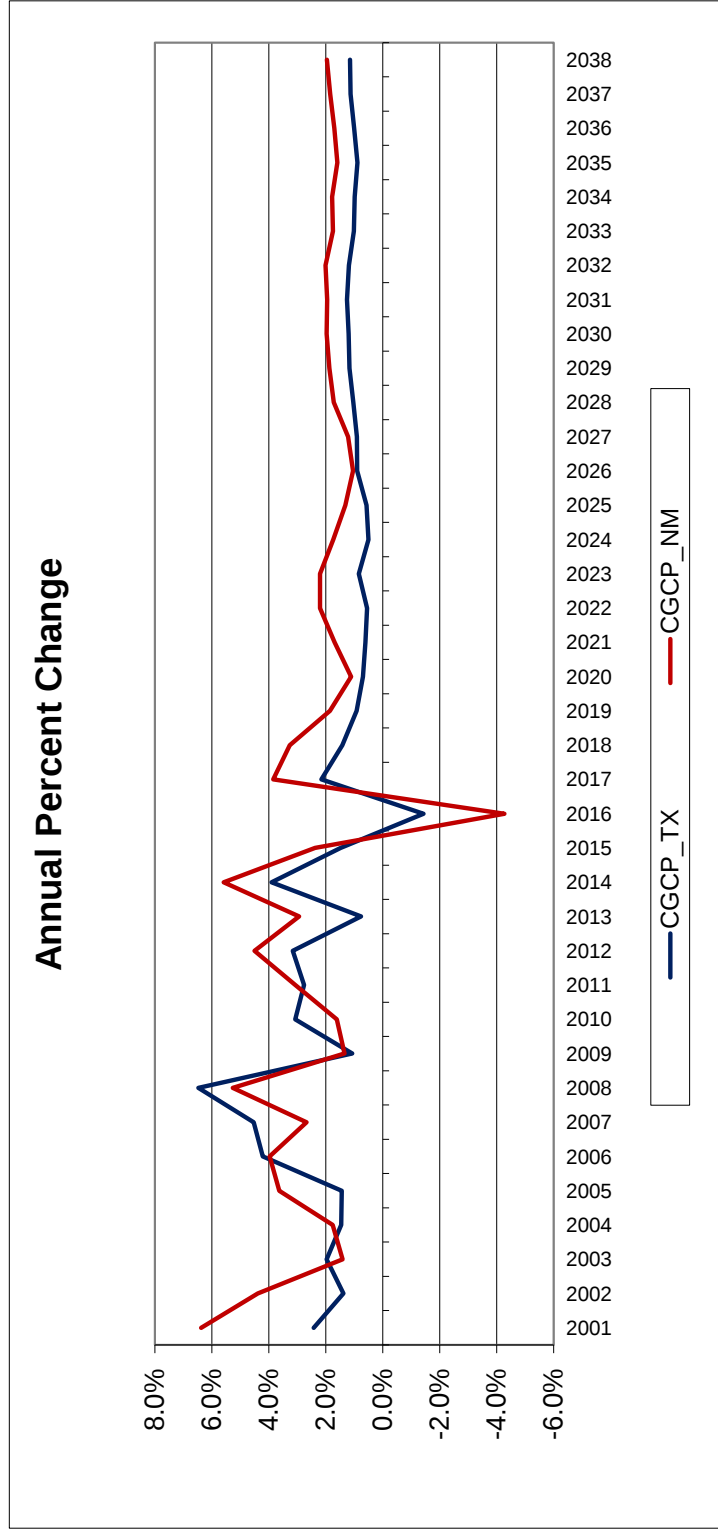
- Load factor analysis
- Historical trends
- Contractual requirements
- Exogenous adjustments for new load on the system

Economic and Demographic Assumptions



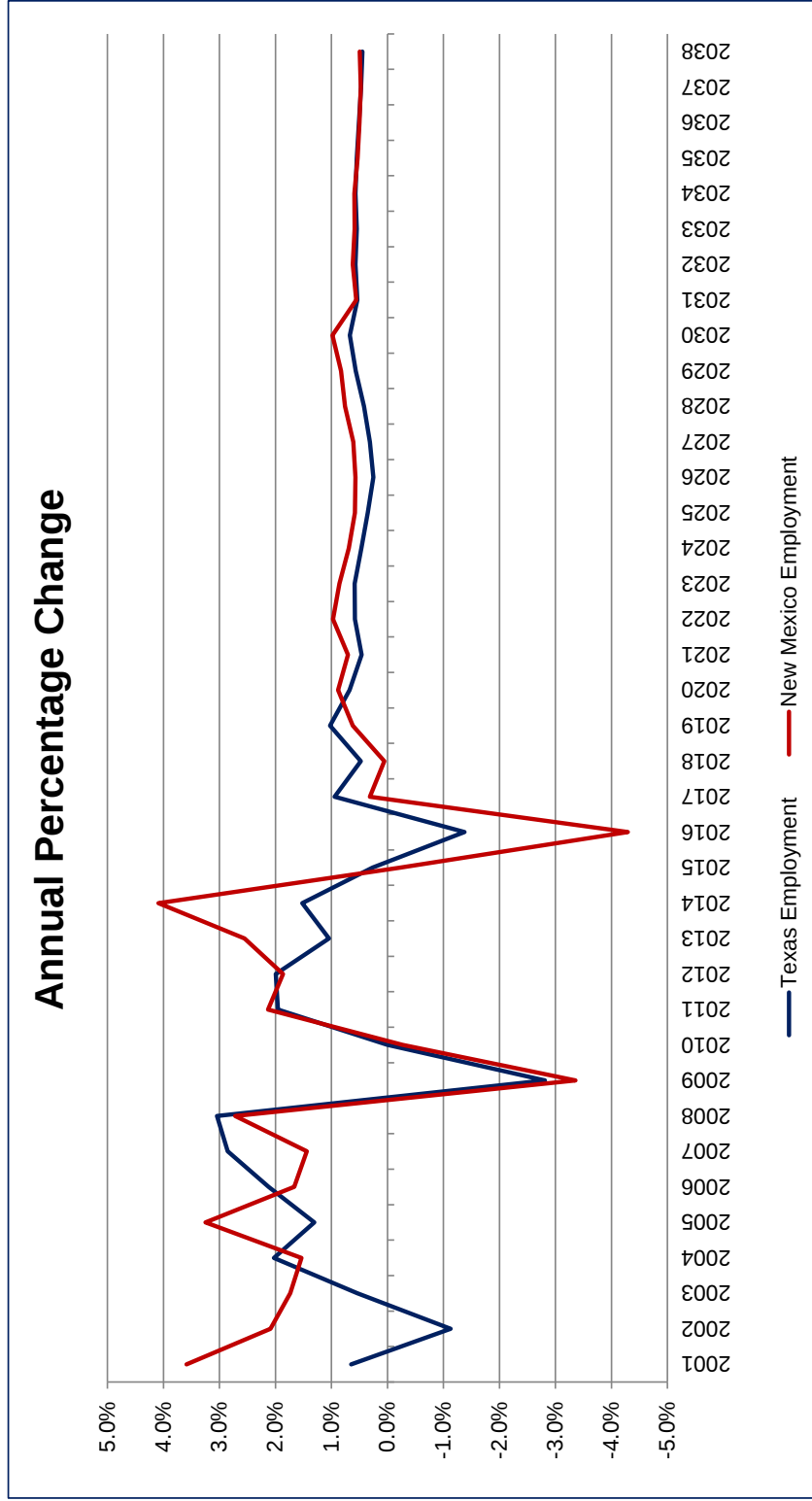
- Economic and demographic data obtained from IHS Global Insight, Inc. (both historical and forecast) for U.S., state and counties. County level data is aggregated to service territory.
- Economic and demographic variables used in modeling include service area employment, households, personal income, population, Gross County Product; Gross State Product (GSP); and U.S. Gross Domestic Product, oil and gas extraction index and oil prices.

Texas and New Mexico Service Area Gross County Product Growth



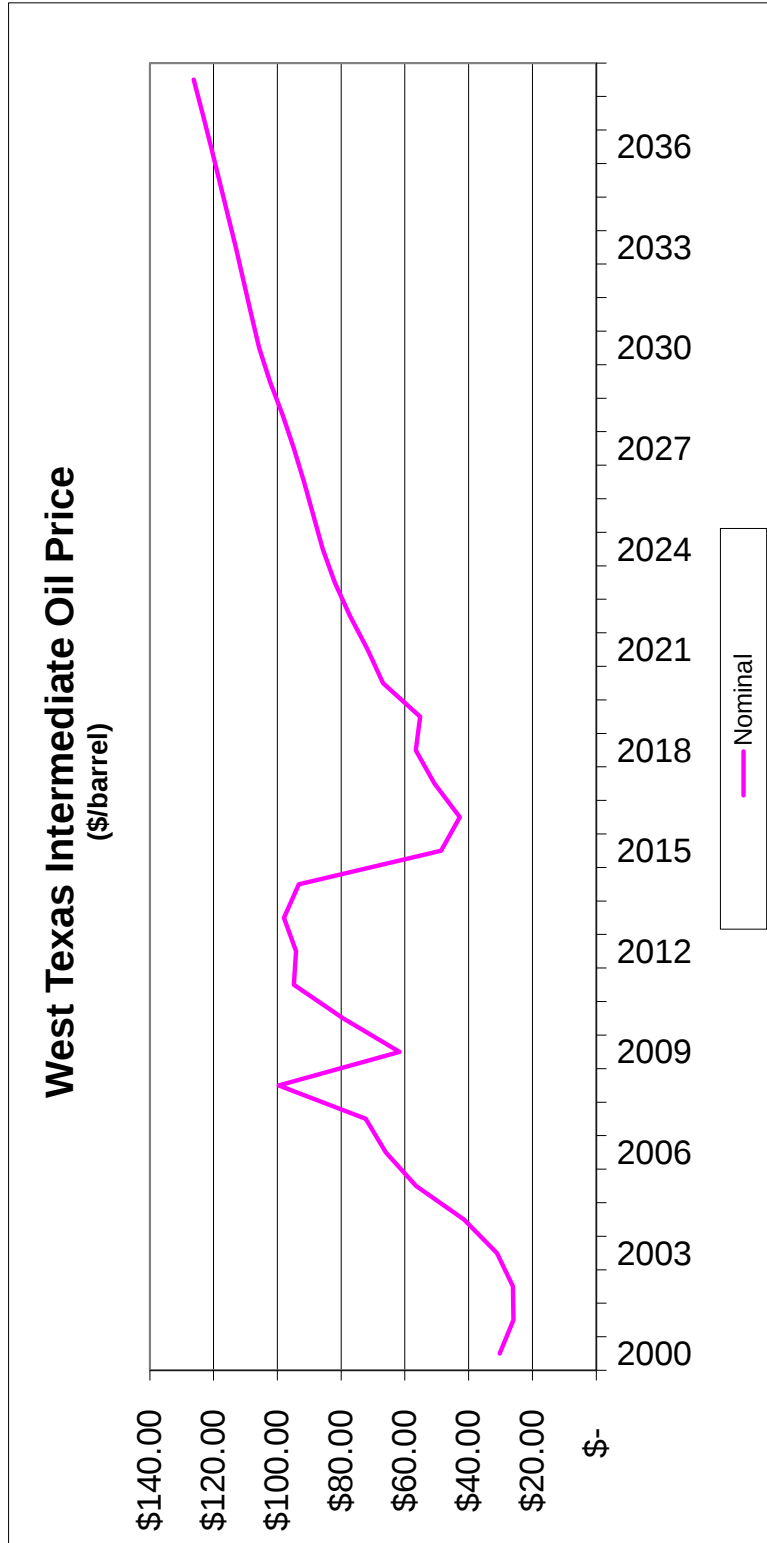
Source: IHS
Historical Data Ends: 2016

Texas and New Mexico Job Growth



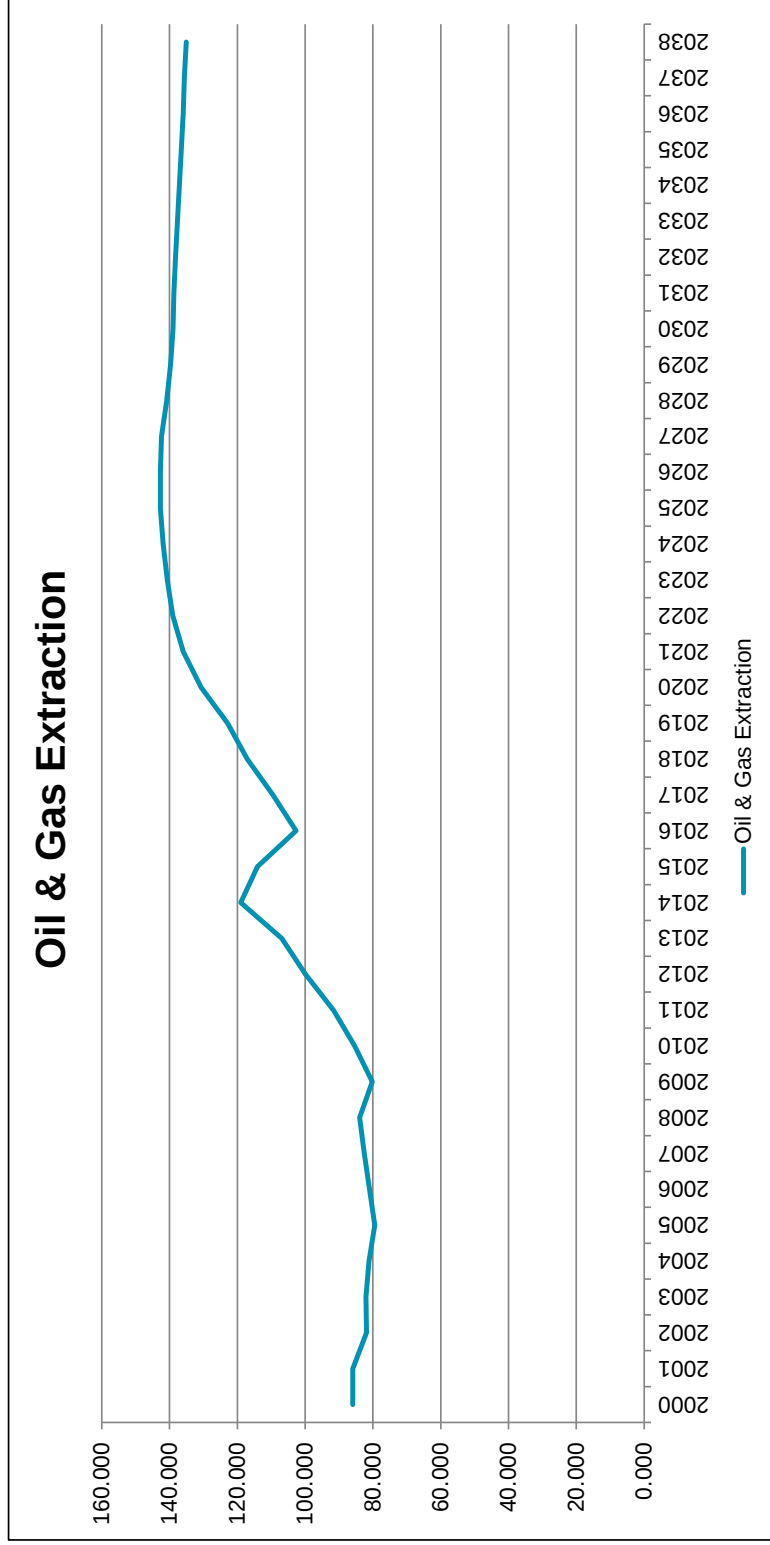
Source: IHS, Bureau of Labor Statistics
Historical Data Ends: 2016

Oil Price



Source: IHS
Historical Data Ends: December 2017

Oil and Gas Extraction Index



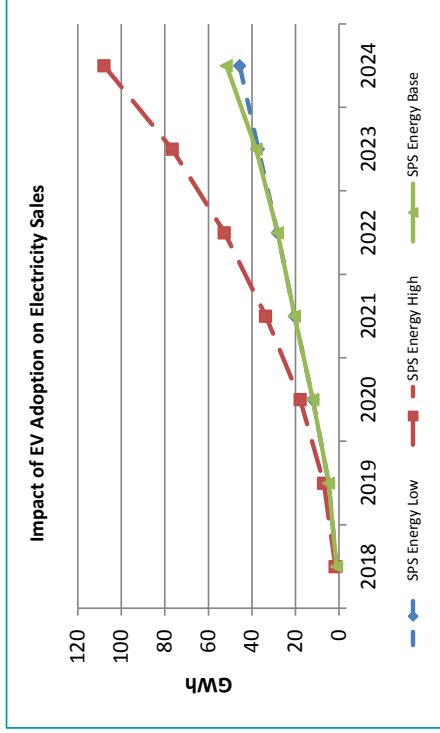
Source: IHS
Historical Data Ends: December 2017

Weather Assumptions



- Weather data collected from NOAA for Amarillo, Lubbock, and Roswell
- Forecast assumes normal weather defined as 30-year rolling average
- Includes temperature, Heating Degree Day (HDD), Cooling Degree Day (CDD), and precipitation
- Historical sales and peak demand are weather normalized for variance analysis

Residential Forecast Exogenous Adjustment for Electric Vehicles*



Electric Vehicle Adoption Comparison

U.S. Adoption Rates	2016	2020	2025	2030
Xcel Energy	0.2%	0.7%	2.8%	9.6%
Bloomberg	0.2%	1.0%	3.0%	9.0%
GreenTech Media			3.8%	
Energy Information Agency			2.6%	
Navigant	0.2%	1.0%	2.8%	
Bank of America/Merrill Lynch (global adoption)	0.2%	1.0%	10.0%	33.0%

SPS Base Scenario				
Year	# Cars	% of cars	EV Forecast (GWh)	
2018	1,793	0.30%	1	1
2019	2,898	0.40%	5	5
2020	5,016	0.70%	12	12
2021	6,641	1.00%	20	20
2022	8,485	1.20%	28	28
2023	11,004	1.60%	38	38
2024	14,586	2.10%	52	52
2025	14,586	2.10%	52	52
2026	14,586	2.10%	52	52
2027	14,586	2.10%	52	52
2028	14,586	2.10%	52	52
2029	14,586	2.10%	52	52
2030	14,586	2.10%	52	52
2031	14,586	2.10%	52	52
2032	14,586	2.10%	52	52
2033	14,586	2.10%	52	52
2034	14,586	2.10%	52	52
2035	14,586	2.10%	52	52

*Electric Vehicle assumptions provided by EV Strategy team (Risk Analytics, Strategy & Planning, and Customer Solutions)

Distributed Generation



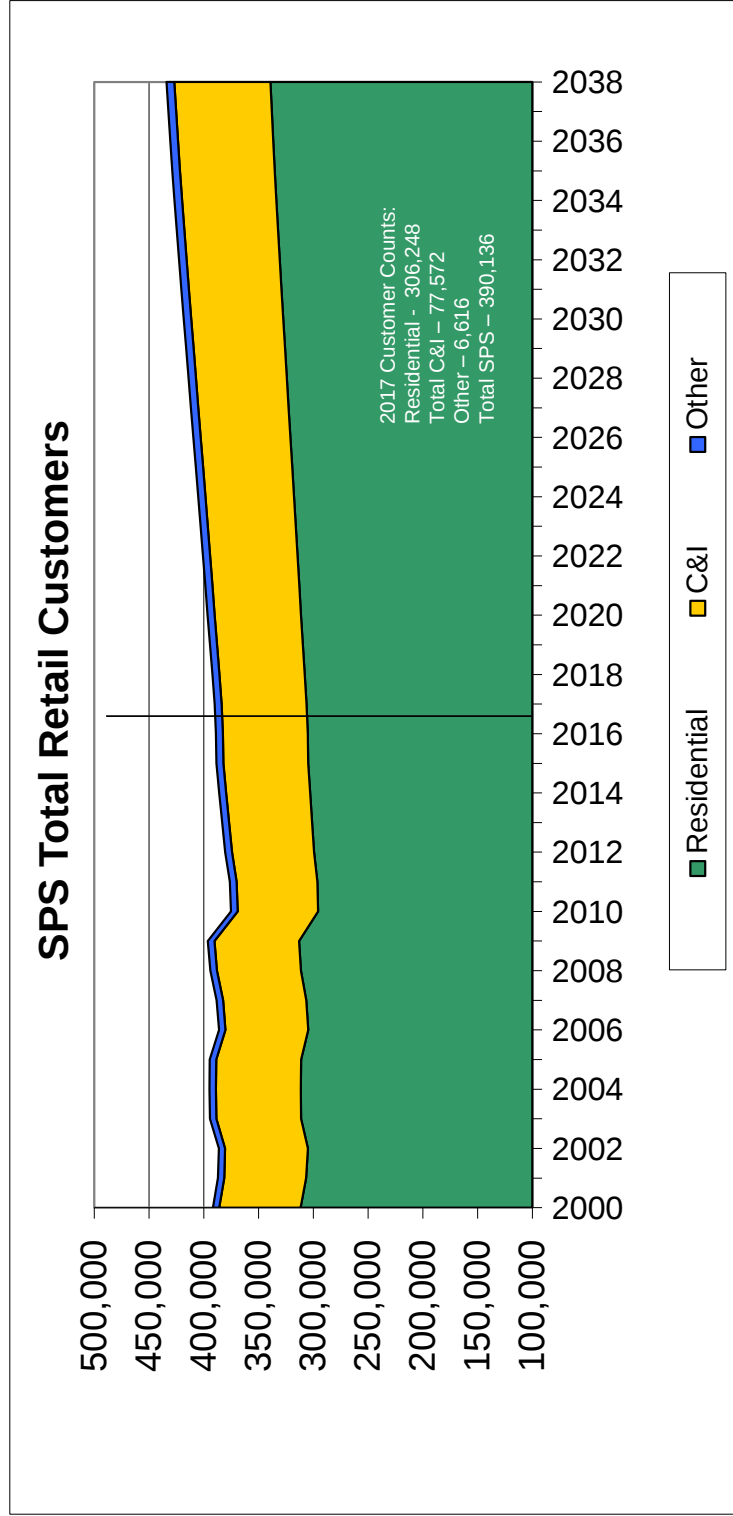
- The historical energy sales data used in SPS's forecast modeling process is net of behind-the-meter generation and demand response energy sales.
- The historical peak demand data used in the forecasting process has been adjusted to add back behind-the-meter generation and demand response to represent the total demand on the system.

Demand-Side Management



- Sales and peak demand forecasts are adjusted to account for expected incremental DSM savings
- DSM savings are based on legislated mandates
- Residential programs: CFLs, air source heat pumps, and cooling
- C&I programs: business lighting, cooling, motor replacement, and custom projects

Customer Forecast



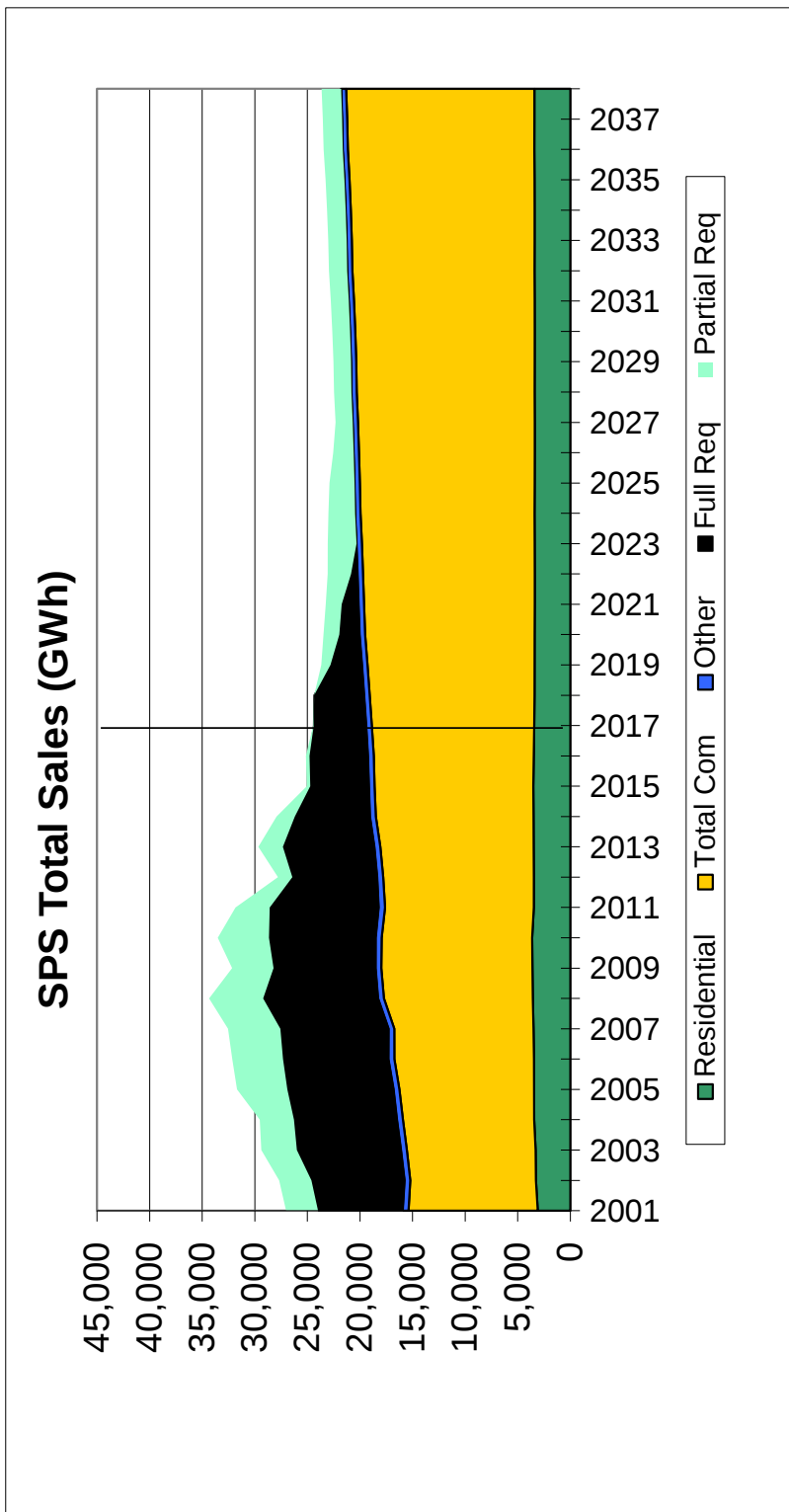
Retail Avg. Annual % Ch. 2011-2017 = 0.6% 2018-2038 = 0.5%

SPS Forecast Key Drivers



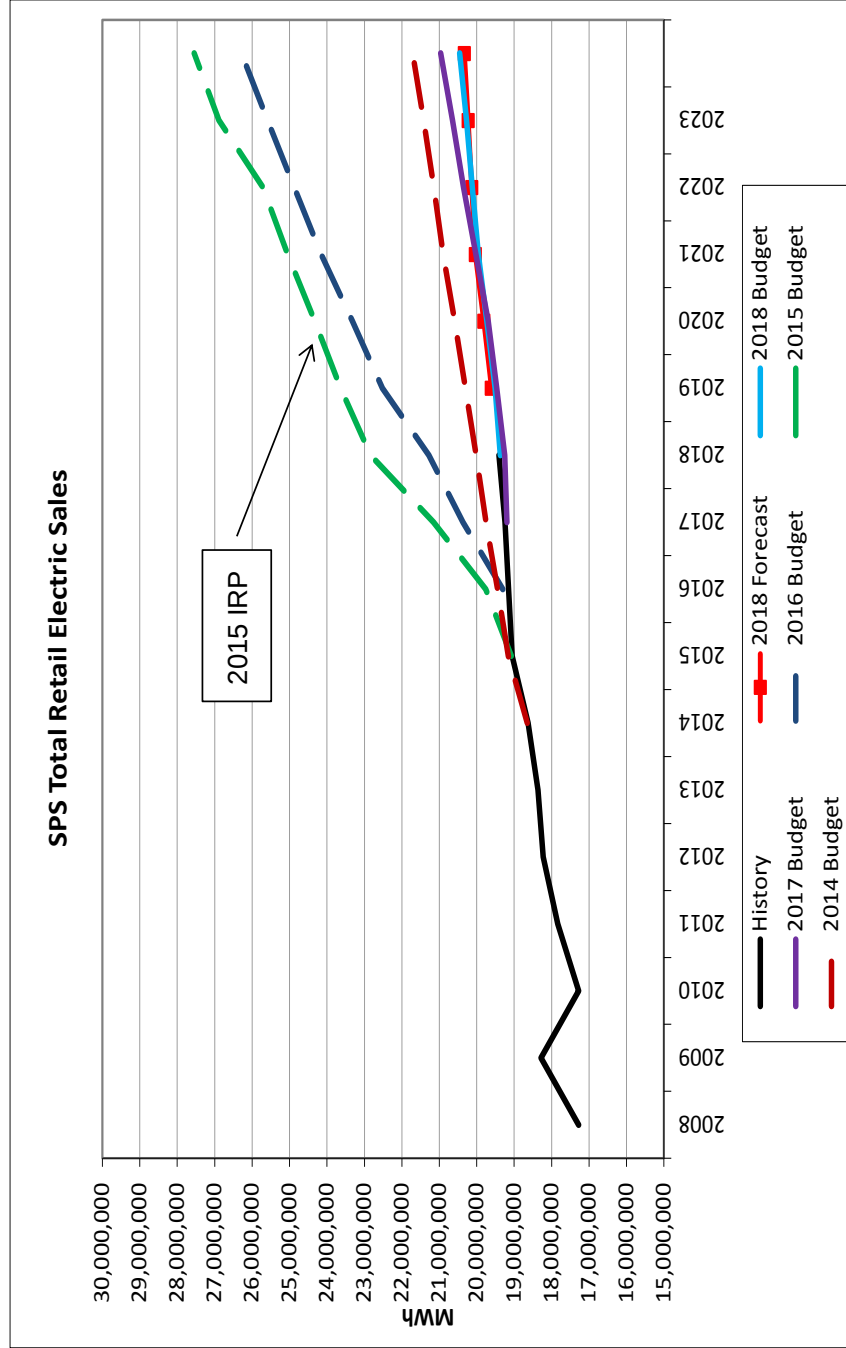
- Residential
 - Declining use per customer due to lighting standards
 - Forecast adjusted for impacts of EV's
- Small C/I
 - Declining use per customer in Texas
 - Increasing use per customer in New Mexico
- Large C/I
 - Sales growth flattens after 2020 based on Oil & Gas Extraction Index

Sales Forecast

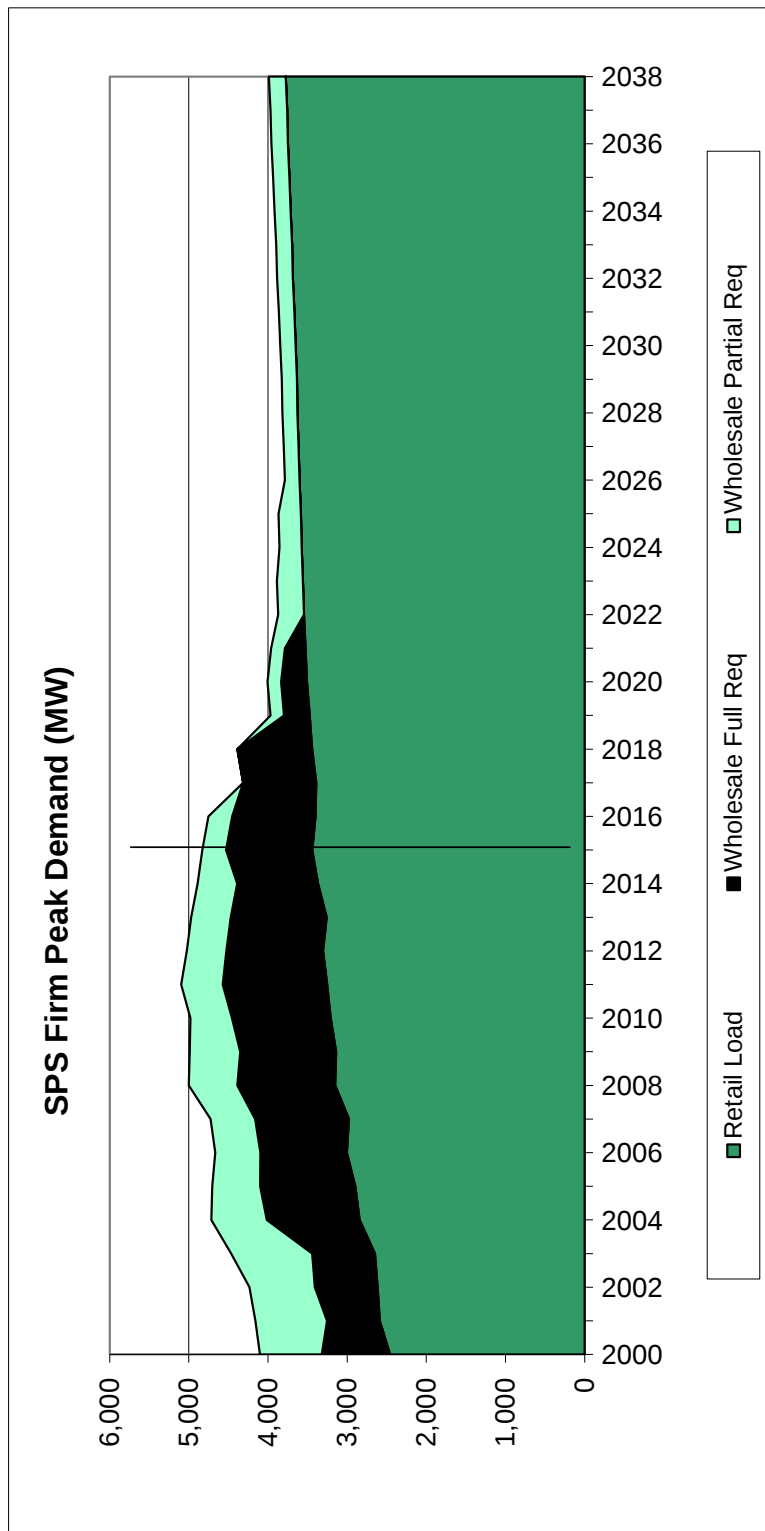


Retail Avg. Annual % Ch. 2011-2017 = 1.1% 2018-2038 = 0.5%
 SPS Avg. Annual % Ch. 2011-2017 = -4.3% 2018-2038 = -0.1%

Sales Forecast Comparison



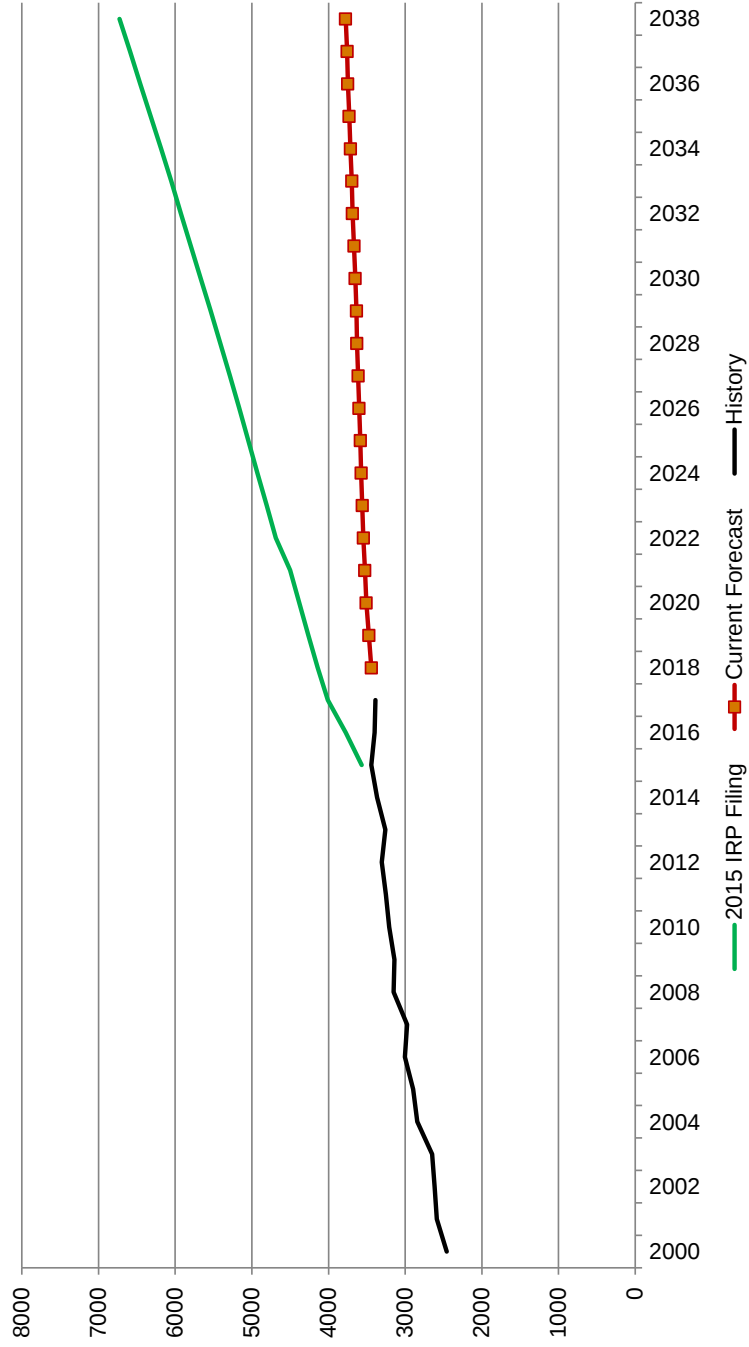
Peak Demand Forecast



Peak Forecast Comparison



SPS Firm Peak Demand (MW)



Potential Load For SPS (in MW)

Year	Cust 1	Cust 2	Cust 3	Cust 5	Cust 4	Cust 6	Cust 7	Cust 8	Cust 9	Cust 11	Cust 10	Total
2018	5	9	6	8	0	0	0	0	0	0	0	28
2019	5	55	6	30	9	53	25	14	28	0	0	224
2020	5	55	12	52	9	140	46	20	28	25	0	391
2021	5	55	12	52	9	230	46	26	28	25	0	487
2022	5	55	12	52	9	273	46	32	28	25	0	536
2023	5	55	12	52	9	311	46	38	28	25	17	597
2024	5	55	12	52	9	311	46	38	28	25	17	597
2025	5	55	12	52	9	311	46	38	28	25	17	597
2026	5	55	12	52	9	311	46	38	28	25	17	597
2027	5	55	12	52	9	311	46	38	28	25	17	597
2028	5	55	12	52	9	311	46	38	28	25	17	597
2029	5	55	12	52	9	311	46	38	28	25	17	597
2030	5	55	12	52	9	311	46	38	28	25	17	597
2031	5	55	12	52	9	311	46	38	28	25	17	597
2032	5	55	12	52	9	311	46	38	28	25	17	597
2033	5	55	12	52	9	311	46	38	28	25	17	597
2034	5	55	12	52	9	311	46	38	28	25	17	597
2035	5	55	12	52	9	311	46	38	28	25	17	597
2036	5	55	12	52	9	311	46	38	28	25	17	597
2037	5	55	12	52	9	311	46	38	28	25	17	597
2038	5	55	12	52	9	311	46	38	28	25	17	597

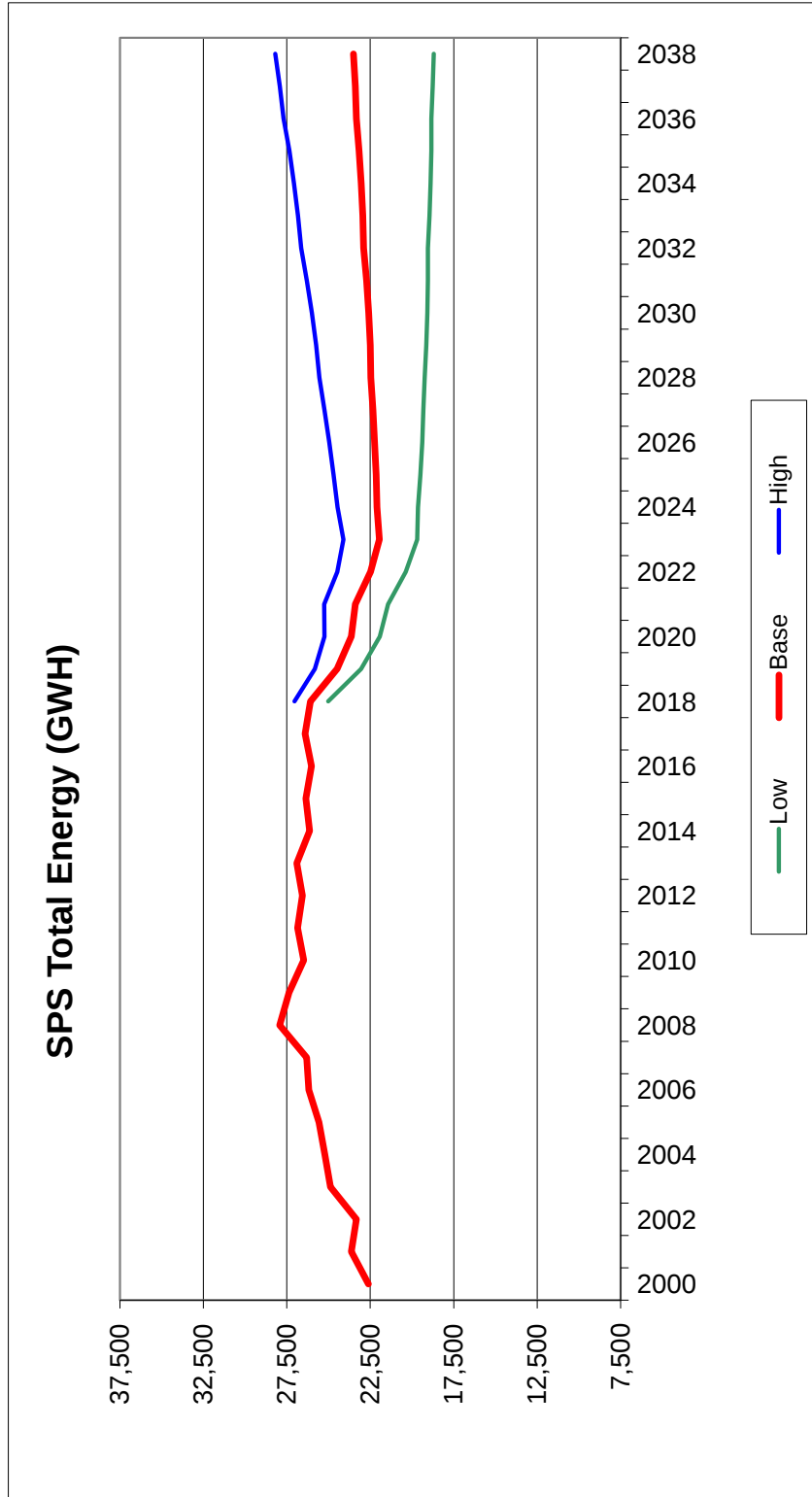
- SPS Key Account Managers provide potential new load that has been identified through conversations with the customer.
- Timing and actual load risks.

Forecast Scenarios

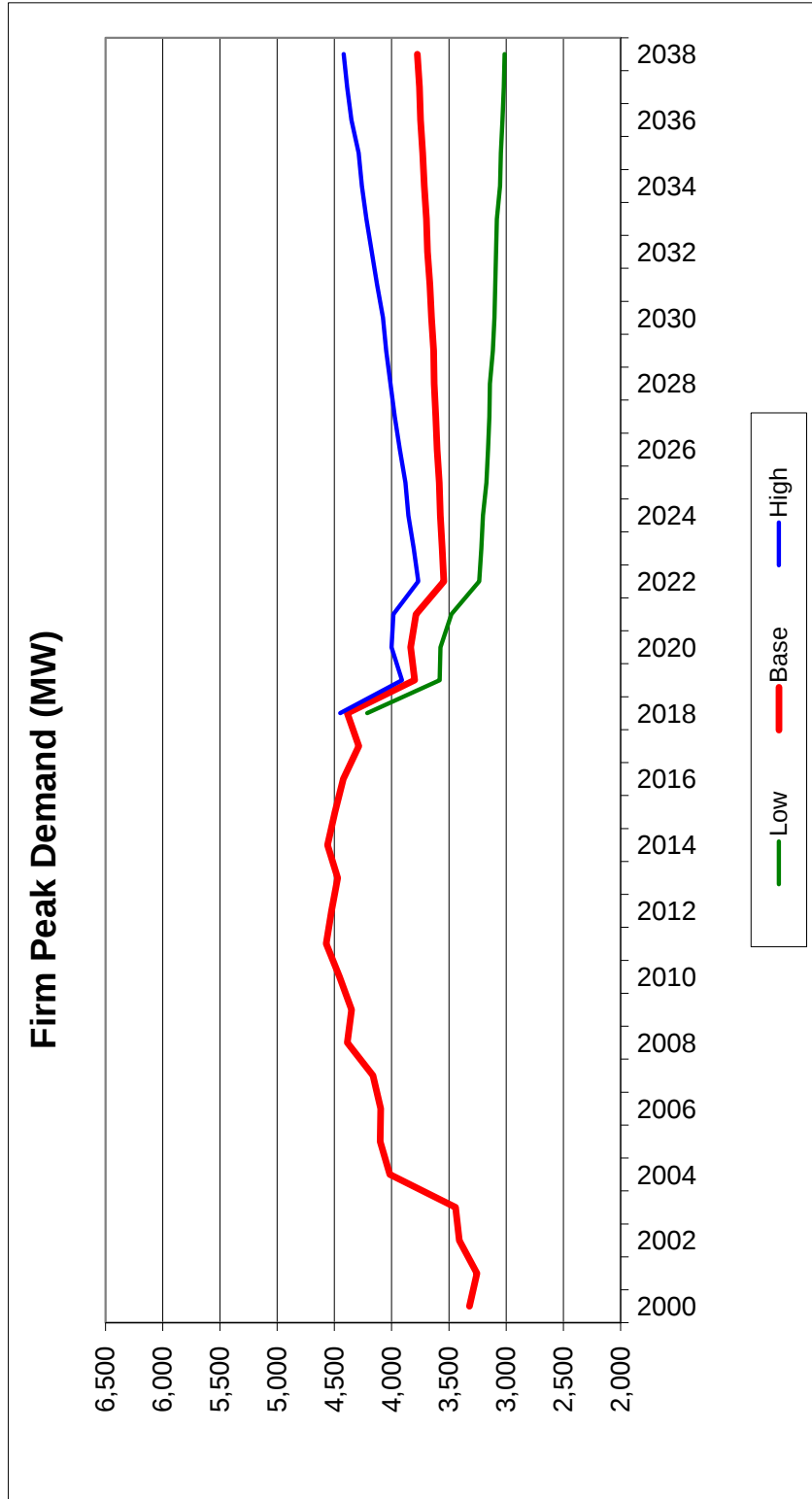


- Probability distributions are developed by conducting Monte Carlo simulations on the main drivers (e.g., weather and economics) of energy and peak demand forecasts
- Low-growth scenario is equivalent to the 15th percentile probability distribution
- High-growth scenario is equivalent to the 85th percentile probability distribution

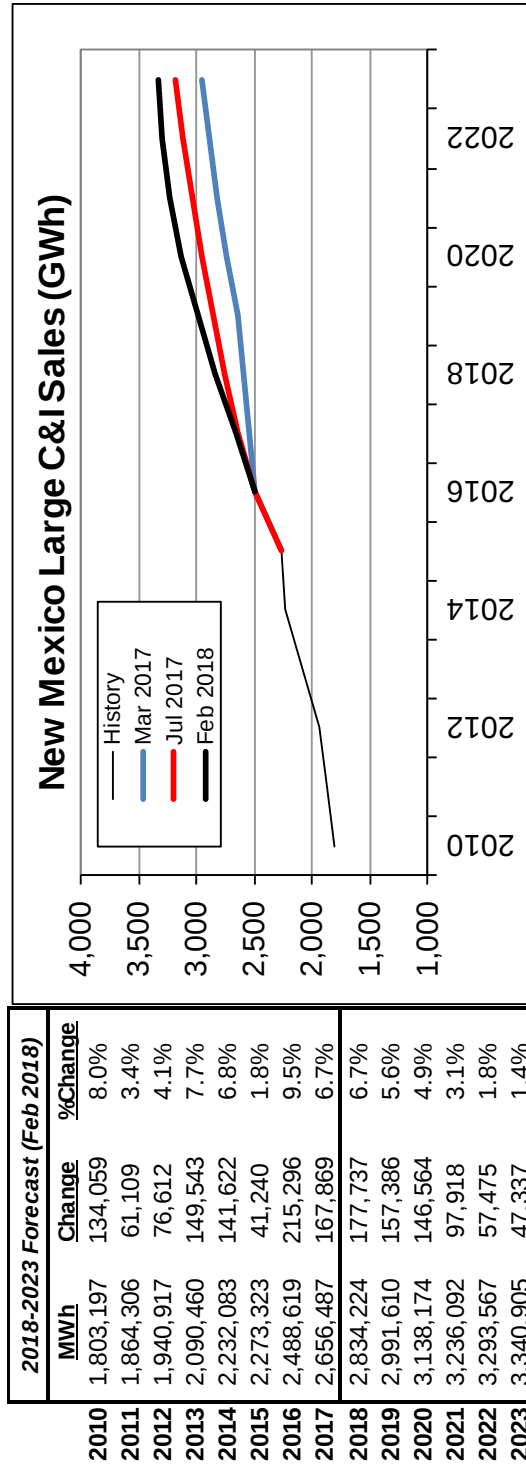
Energy Forecast Scenarios



Peak Demand Forecast Scenarios



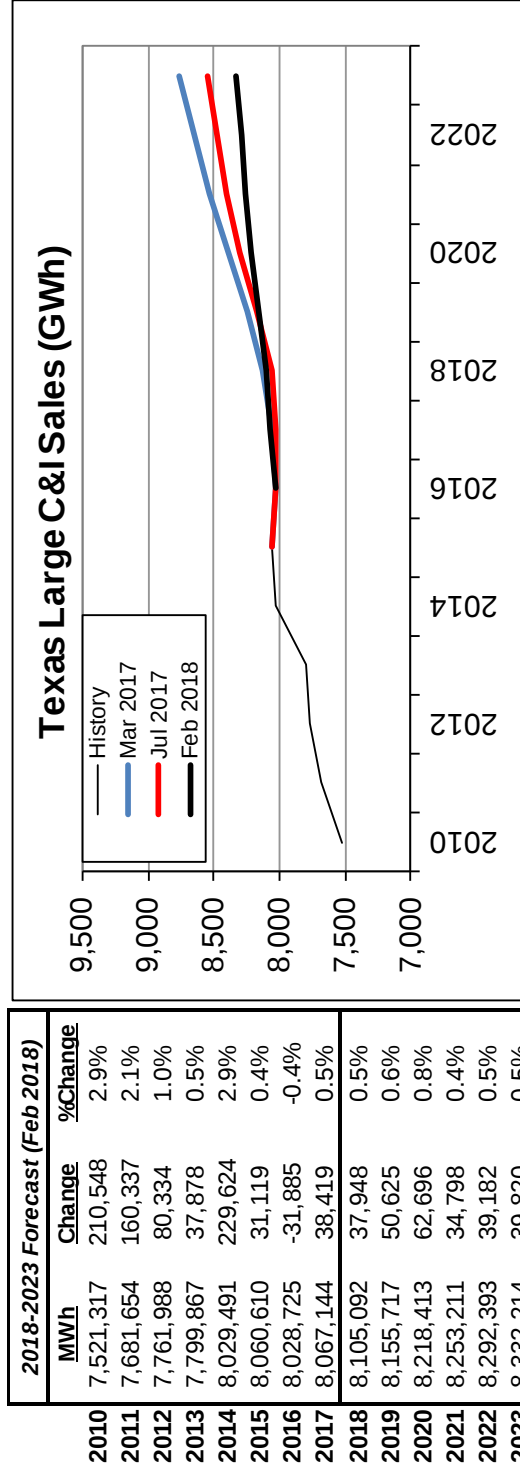
Appendix



New Mexico Large C/I Sales Growth

Year	Historical Growth	Historical Growth w/o New Loads
2013	7.7%	2.6%
2014	6.8%	2.7%
2015	1.8%	2.0%
2016	9.5%	3.4%
2017	6.7%	2.1%

Feb 2018 Forecast adjusted for customer which came online in January 2018







Questions and Discussion



IRP Information

- Web Page:

https://www.xcelenergy.com/company/rates_and_regulations/resource_plans/sps_2019-2038_integrated_resource_plan

Note: After navigating to the webpage, in the upper left-hand corner of the page, make sure that “New Mexico” is selected. Click on Public Advisory Meeting then click on the link for the third meeting.

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 - Email: ashley.gibbons@xcelenergy.com
ben.r.elsey@xcelenergy.com



Topics For Future Meetings

- Coal Supply
- Storage



Next Meeting

- **Date:**
 - **Thursday, May 31, 2018**
- **Time:**
 - **10:00am to 12:00pm (Mountain Time)**
- **Location:**
 - **Webinar meeting**

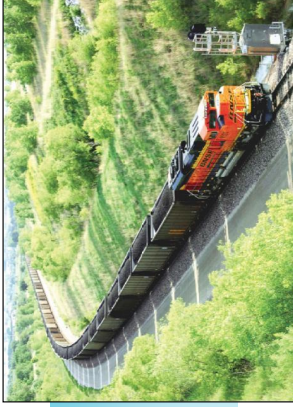




2018 SPS Integrated Resource Plan ("IRP")

Public Advisory Meeting #5

SPS Resource Planning



Coal Supply Presentation

Dana Echter
Manager, Fuel Supply Operations
May 31, 2018

Harrington Station

- **Location:** near Amarillo, Texas
- **Three coal-fired units:** 1,066 net MW
- **Coal sources**
 - **Low-sulfur Southern Powder River Basin (“PRB”) coal mines - North Antelope Rochelle, Antelope and Black Thunder**
- **Rail Transportation:** Burlington Northern Santa Fe (BNSF)
- **Trestle unloading system**
- **2017 consumption:** ~2.8 million tons

Tolk Station

- **Location:** near Muleshoe, Texas
- **Two coal-fired units:** 1,130 net MW
- **Coal sources**
 - **Low-sulfur Southern Powder River Basin (“PRB”) coal mines - North Antelope Rochelle, Antelope and Black Thunder**
- **Rail Transportation:** Burlington Northern Santa Fe (BNSF)
- **Rotary unloading system**
- **2017 consumption:** ~3.0 million tons

SPS Contract Information

- **TUCO, Inc.**
 - **TUCO is a third-party supplier responsible for managing contracts with coal suppliers, rail transportation and coal handling.**
 - **SPS purchases coal from TUCO at the plant bunkers**
 - **Xcel Energy's Fuel Supply Operations manages the TUCO contract**
 - **The TUCO contracts expire on Dec 31, 2022**

TUCO Coal Contract Information

- Coal suppliers are Peabody Energy (North Antelope Rochelle), Cloud Peak Energy (Antelope) and Arch Coal (Black Thunder)
- Coal contracts are fixed price, term and quantity
- Coal supply agreements are short term and expire before the TUCO agreements

TUCO Transportation Contract Information

- **Transportation**
 - **Tolk and Harrington served by BNSF Railway**
 - **The Harrington rail agreement expires in Dec 2022**
 - **The Tolk rail agreement expires in Dec 2022**
 - **Include Mileage Based Fuel Surcharges**
- **Railcars**
 - **Railcars are provided by long-term lease held by TUCO and expire concurrently with the TUCO Coal Supply Agreements**

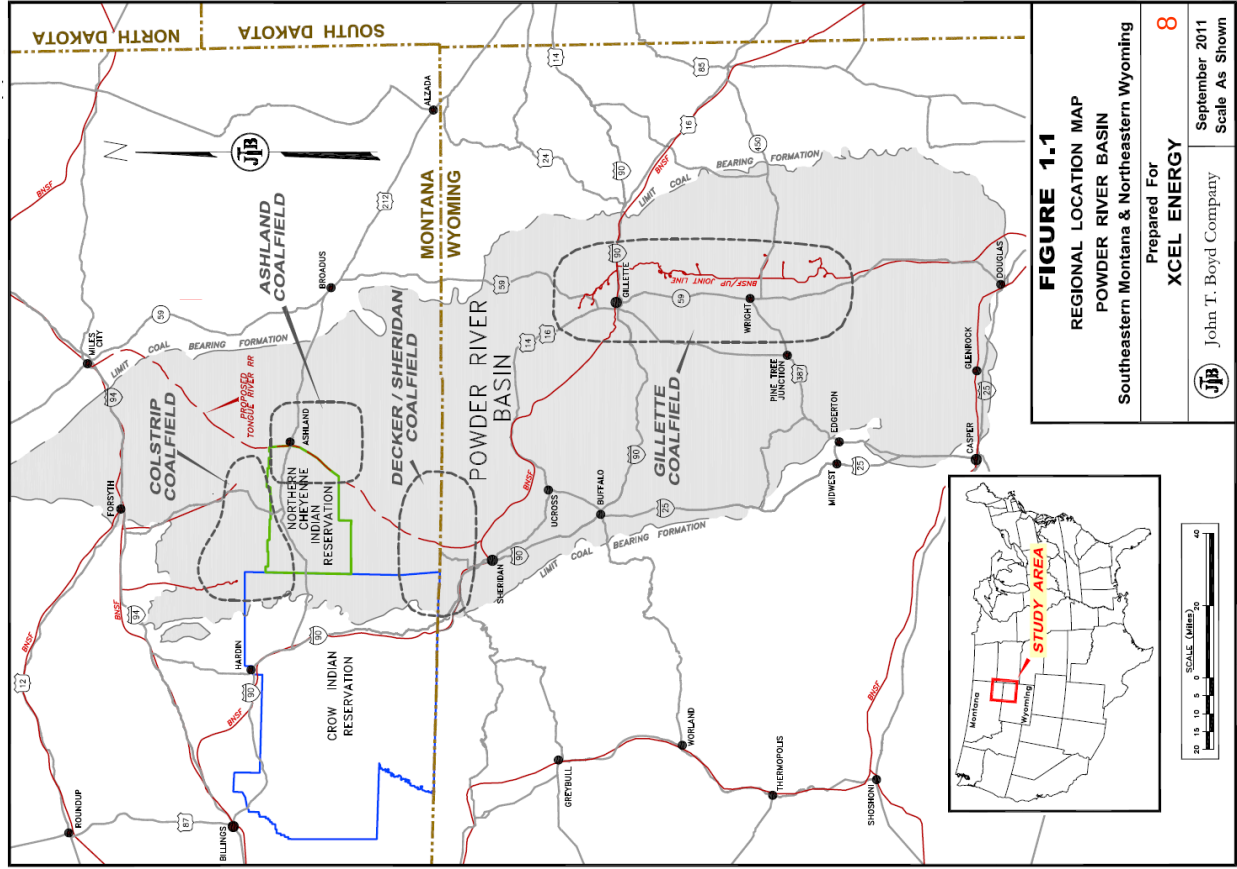
Powder River Basin

■ Roughly 300mi x 100 mi

■ USGS

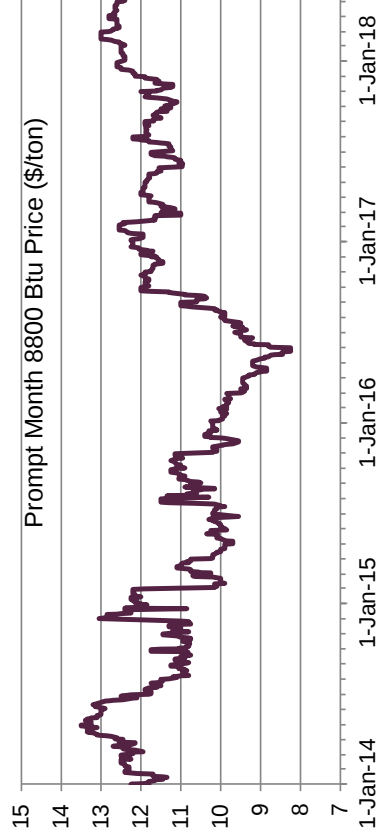
■ 140b tons of resources in areas of most interest

■ 77b tons in Gillette Coalfield alone



Purchase Strategy

- Current market is approximately \$12.40/ton for 8,800 Btu/lb PRB coal (fob mine)



- Keep relatively large open position to be able to react to changes in system operations
- Target is by December, purchase ~75% of upcoming year requirements, ~40% for 2nd year and ~20% for 3rd year.

Questions and/or Discussion?





Energy Storage Overview

SPS New Mexico IRP Public Advisory Meeting

May 31, 2018





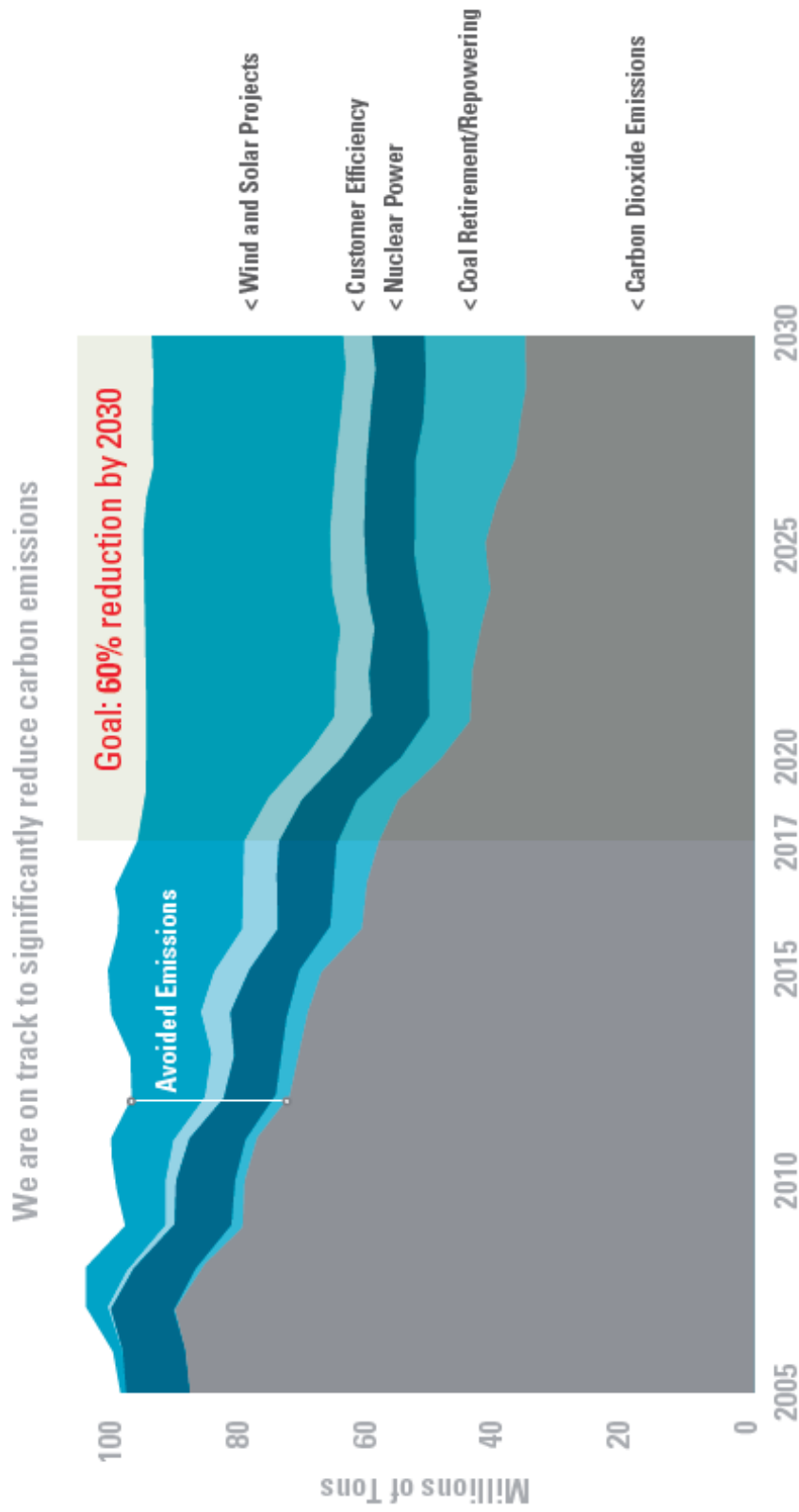
Lead the
Clean Energy
Transition

Enhance
Customer
Experience

Keep Bills
Low

LEADING THE ENERGY FUTURE

Carbon Emissions Reductions



Energy Storage

What is Energy Storage?



Definition	
• Technology capable of storing previously generated electric energy and releasing it at a later time. • Can occur as potential, kinetic, chemical, or thermal energy. • Release of energy can be in forms that include electricity, gas, thermal energy and other energy carriers. • Can be deployed in all parts of the grid – helps to enable a smarter, stronger, cleaner, and more reliable energy grid for all customers.	
Asset Categories	Uses
• Electric generation asset • Transmission asset • Distribution asset • DSM asset	• Capacity • Flexibility • Reliability/resiliency • Microgrids and community projects

Technologies
Solid state batteries: Electrochemical storage, including advanced chemistry batteries and capacitors – sodium sulfur, lead acid, lithium ion Flow batteries: Energy is stored in electrolyte solution for longer life cycle and quick response Flywheels: Mechanical devices that harness rotational energy to deliver instantaneous electricity Compressed air energy storage: Compressed air is used to create a potent energy reserve Thermal: Heat and cold are captured to create energy on demand Pumped hydro power: Large scale reservoirs of energy are created with water

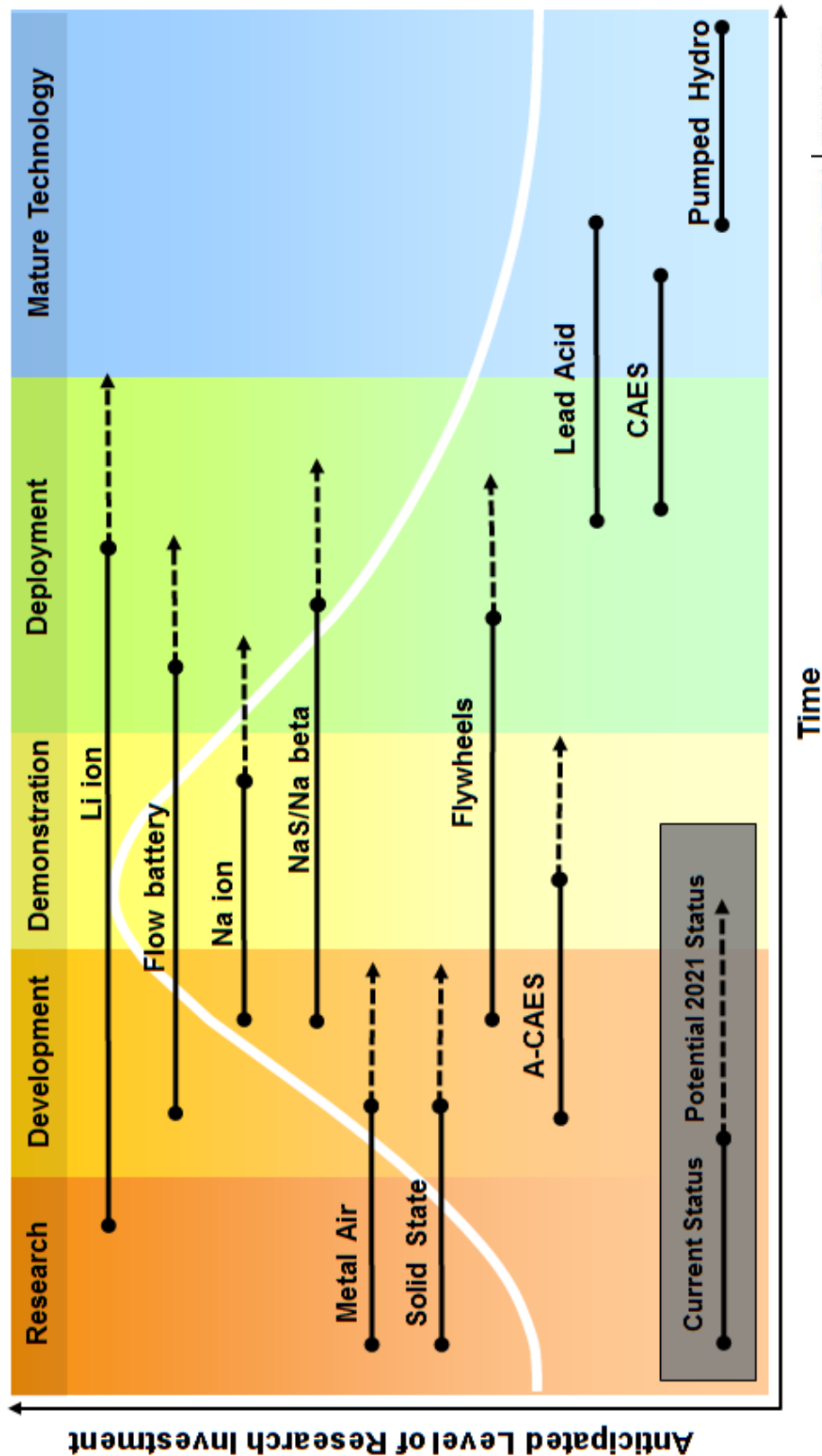


Storage Technologies



Technology	Benefits	Challenges	Applications
Lithium-Ion Battery	• Energy density • Power density	• Cycle life constraints • Safety concerns	Peak shaving, T&D investment deferral, renewable integration, ancillary services
Lead Acid Battery	• Familiar • Inexpensive	• Relatively low energy & power density • Poor cycle life • Often requires maintenance • Environmental impacts	Best suited for relatively limited-cycle applications requiring shallow depth of discharge such as backup power and limited peak shaving.
Sodium Sulfur Battery	• High energy density	• High temps required • Limited power capabilities	Peak shaving, T&D investment deferral, renewable integration
Flow Batteries	• Decouple power (reactor size) from energy (tank size) • Improved cycle life	• Low energy density • Added components with pumping	Peak shaving, T&D investment deferral, renewable integration, ancillary services
Flywheels	• Fast Response • High Power	• Low Energy • High self discharge rates	Power quality, frequency regulation, wind generation stabilization
Compressed Air Energy Storage (CAES)	• Reliable bulk storage	• Geologically limited	Capacity/energy services, ancillary services, renewable integration
Pumped hydro	• Reliable Bulk Storage	• Geographical limits • Capital intensive	Capacity/energy services, ancillary services, renewable integration

Storage Technology Development Status



Battery as a Bathtub



- The size of the tub (or reservoir in the case of a pumped hydro facility), and therefore how much water or energy it can store, determines the **kWh (battery energy capacity)**
- The Power Conversion System works like the faucet/drain in the tub. It determines how quickly the tub will drain and then refill, and therefore determines the **kW (power)** metric
- The cost of the tub as a resource can be described in terms of **\$/kW-month (system capacity cost)**
- Duration is one of the most important drivers of the value of a particular storage system (**hours**)



Fixed Cost of the Bathtub, leveled over the life = System Capacity Cost (\$/kW-month)

$$\text{Stored Energy (kWh)} = \text{Power (kW)} * \text{Discharge time (hrs)}$$

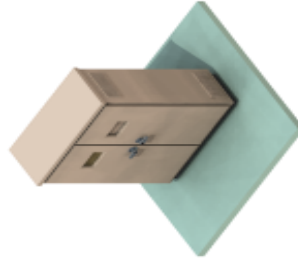
Storage Costs Example



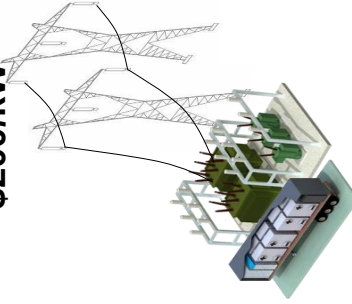
Battery
\$300/kWh*4hr
= \$1200/kW



Power Conversion System
(PCS)
\$250/kW



Integration / Balance of
Plant
\$200/kW



**\$1650/kW
for 4 hr
Duration**

Battery
\$300/kWh*2hr
= \$600/kW

Power Conversion System
(PCS)
\$250/kW

Integration / Balance of
Plant
\$200/kW

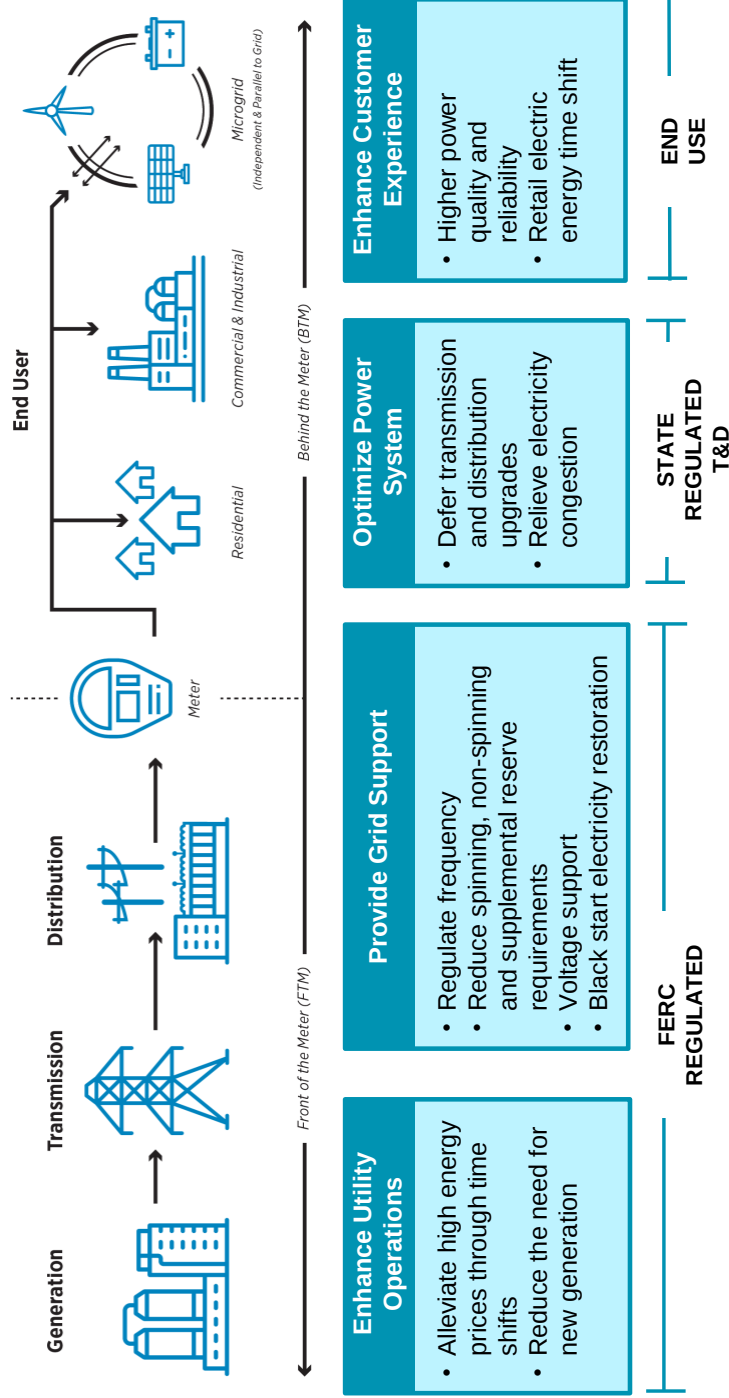
**\$1050/kW
for 2 hr
Duration**

For Illustration Only – not actual costs

Why Energy Storage?



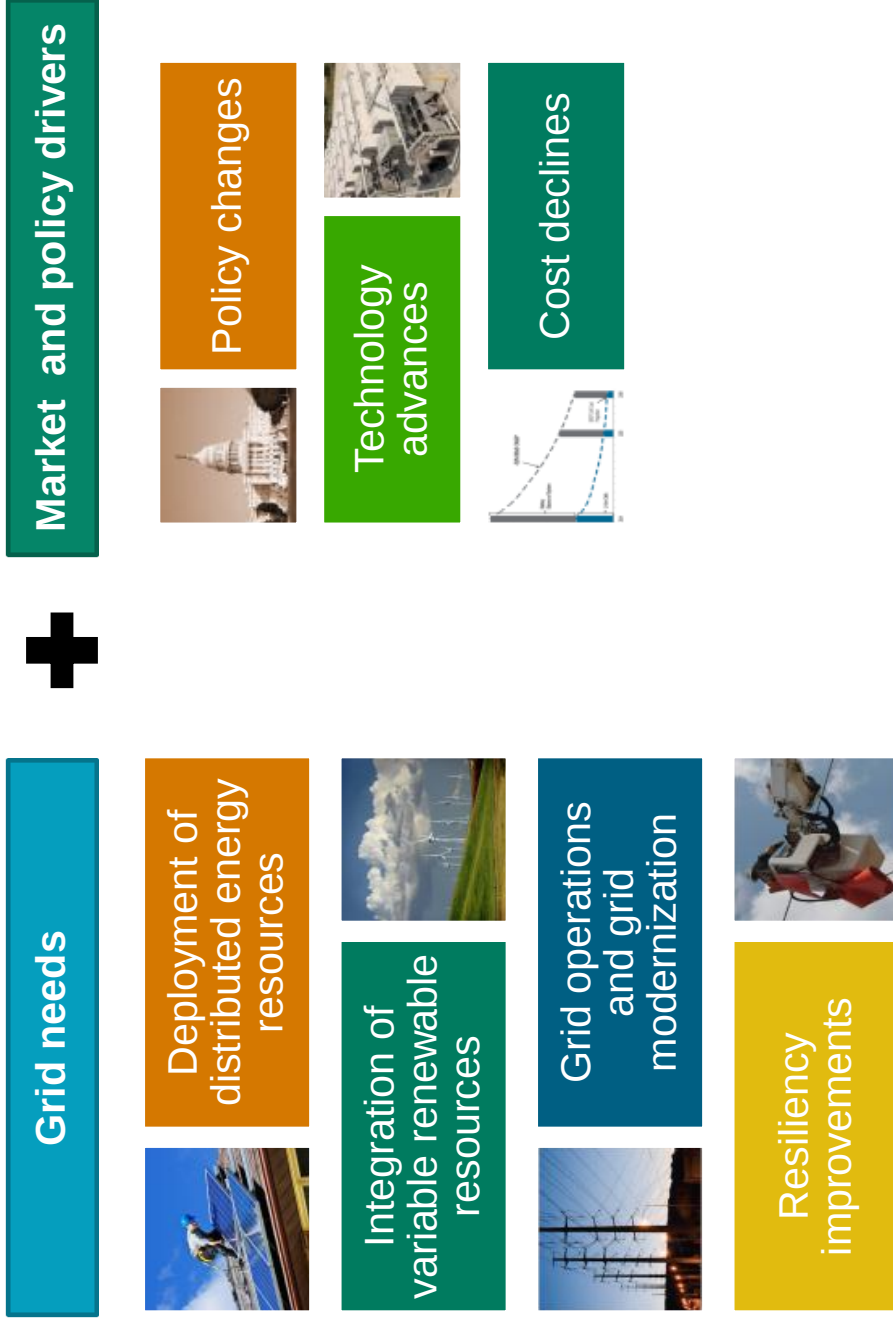
Energy storage can be deployed in all parts of the grid, and has applications in all parts of the value chain.



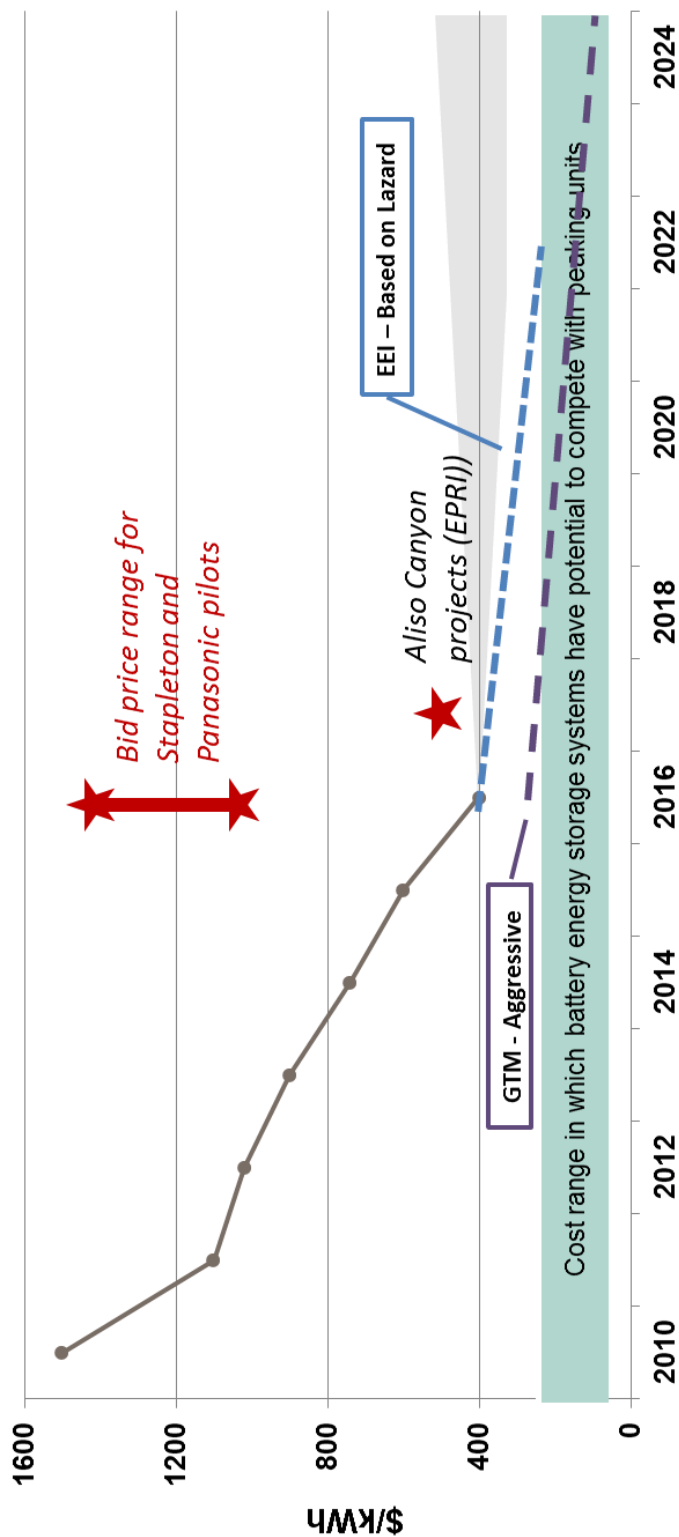
Source: Adapted from DOE/EPRI Handbook, EEI (graphic)



Why Now?



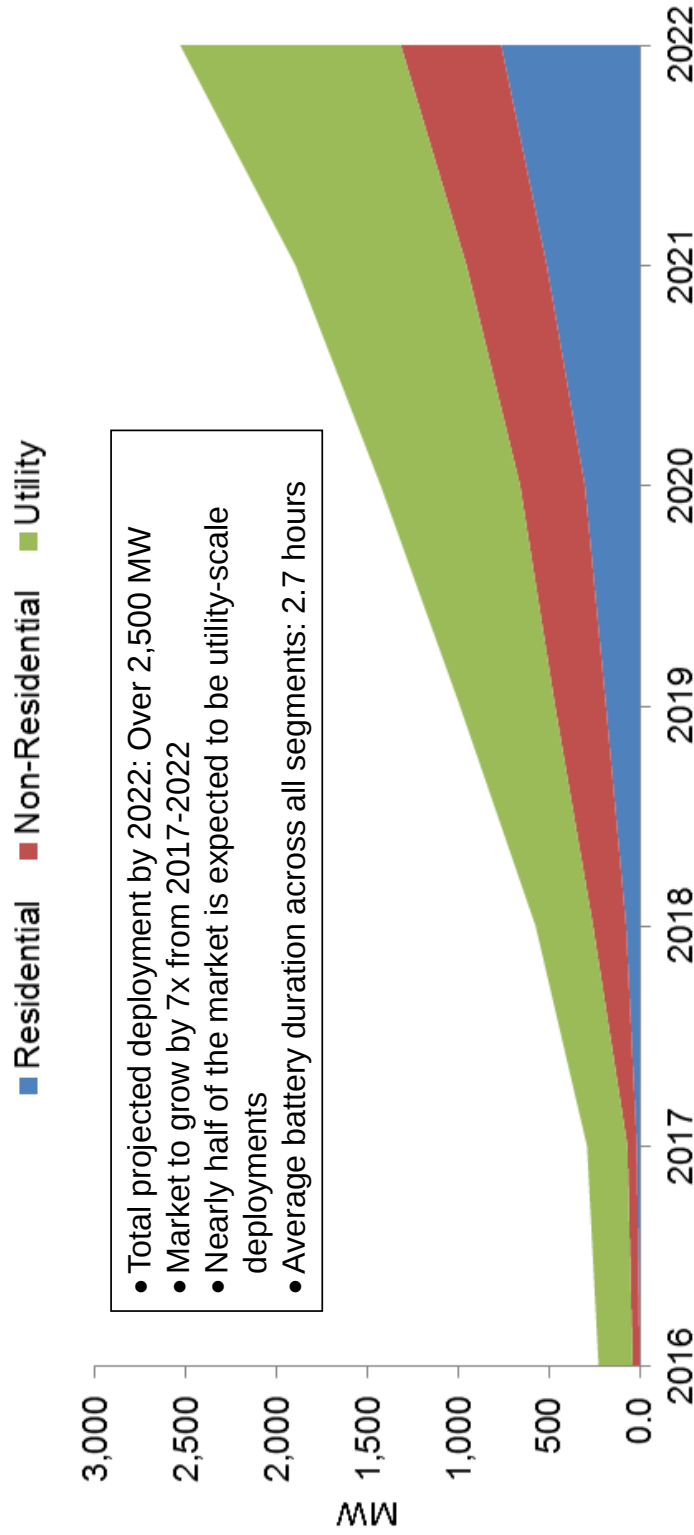
Lithium-Ion Battery Costs



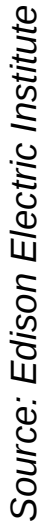
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- Cost declines of 70% from 2010-2016
- 5-10% annual cost declines projected for the next 5-10 years

Projected Market Growth



- Residential Storage: 2-5% of U.S. additions
- Non-Residential Storage: 1-2% of U.S. additions
- Utility Storage: 2-3% of U.S. additions



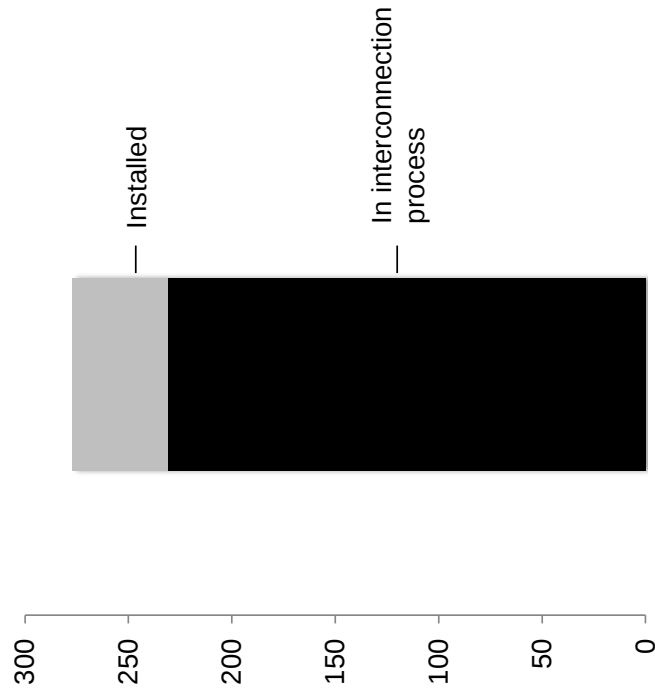
Residential batteries in Xcel Energy service territory today



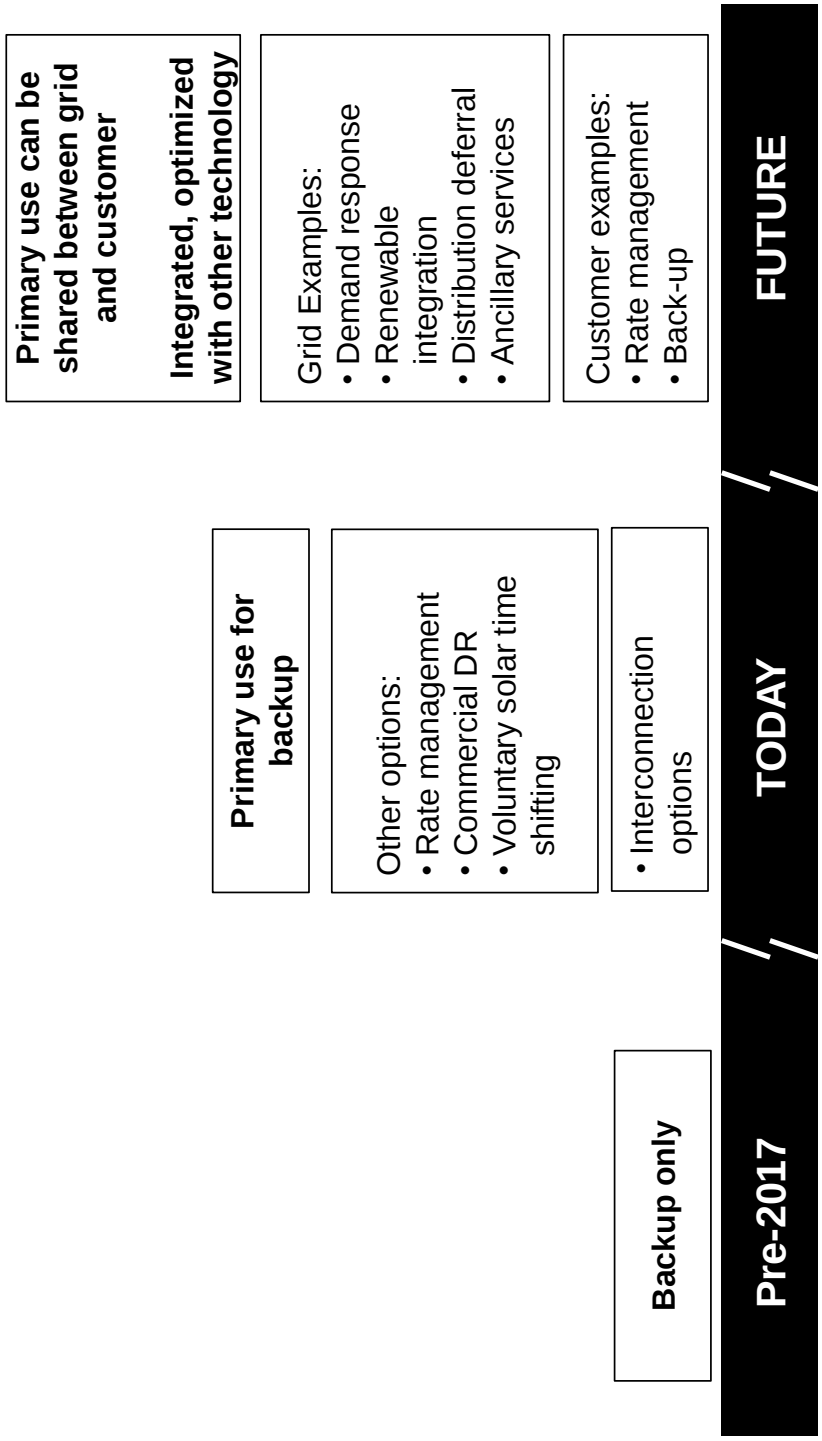
Stapleton Pilot with Sunverge



Residential Battery Interconnections in CO and MN, (2017-present)

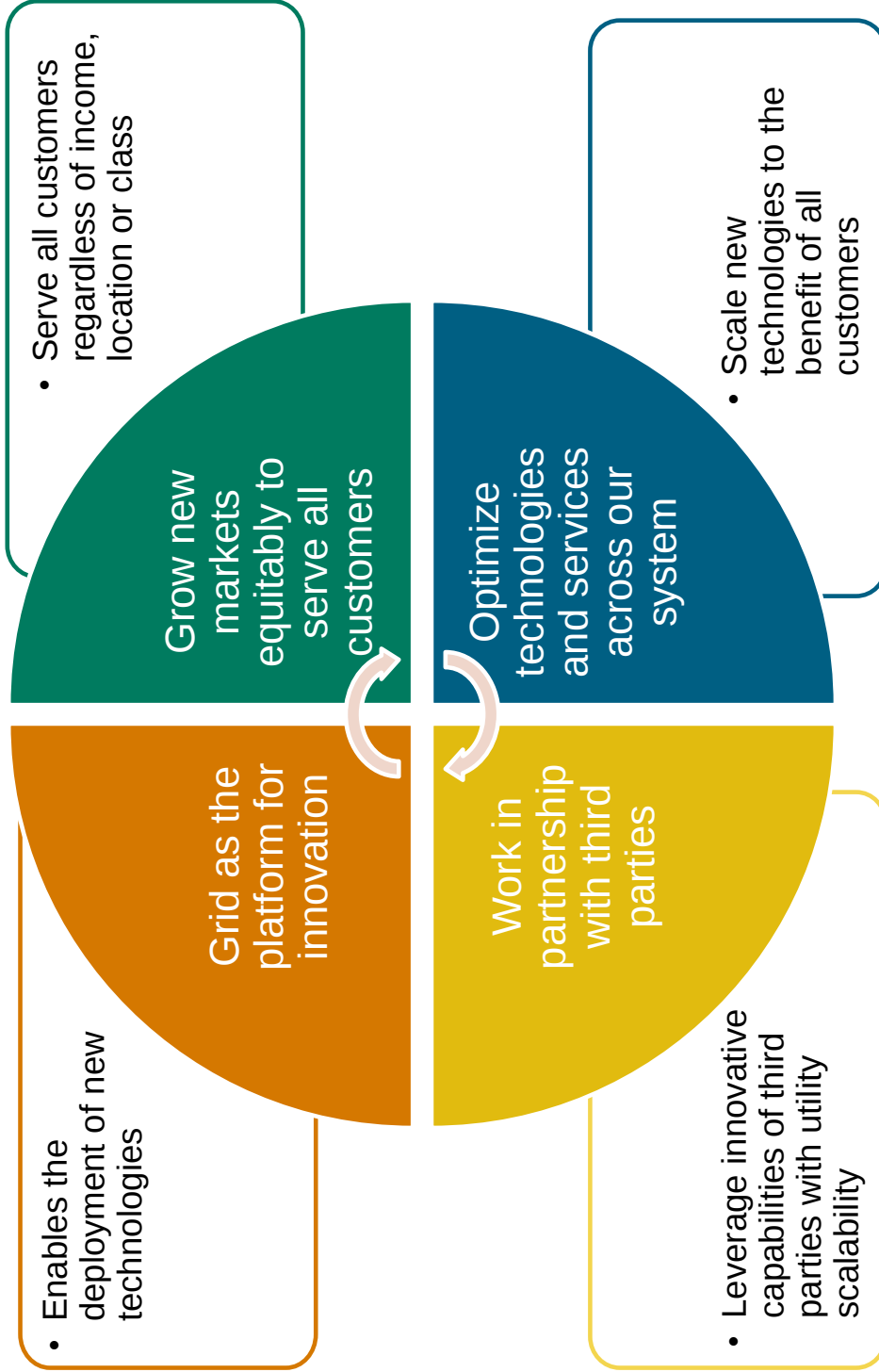


Where we are going



Utility Innovation & Emerging Technologies

Utilities can be Engines of Innovation

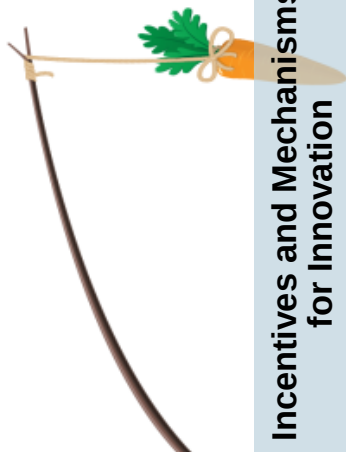


Strategies for Utility Innovation

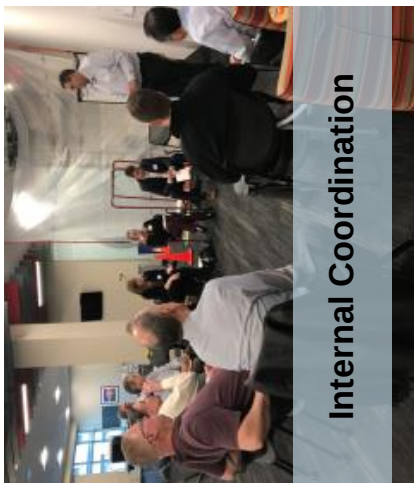


- Lead the Clean Energy Transition
- Keep Bills Low
- Enhance the Customer Experience

Tied to Strategic Vision



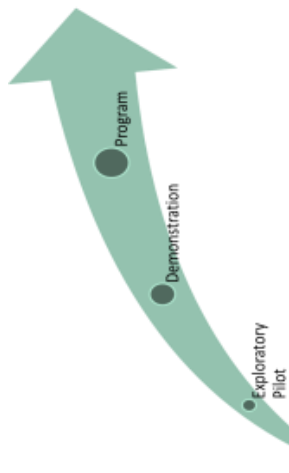
Incentives and Mechanisms for Innovation



Internal Coordination



Stakeholder Engagement



Designed to Scale



Partnerships

Pilot & Demonstration Projects



Panasonic – Peña Station Pilot



- Utility-sited 1 MW, 2 MWh Lithium-Ion Younicos Battery Storage System
- 1.6 MW carport solar PV system
- 260 kW customer-sited rooftop PV system
- Switching and control systems owned by Xcel Energy
- **Main operations:** Microgrid/Resiliency, Voltage Regulation, System Peak Demand Reduction, Solar Ramp Rate Control, Energy Arbitrage, Frequency Response
- **Microgrid capabilities:** During a grid outage, battery powers Panasonic facility
 - Panasonic's building management system prioritizes energy usage based on battery state of charge and expected length of outage
 - Panasonic's 240 kW rooftop PV also able to operate
 - 10% of battery capacity reserved for Panasonic



Community Energy Storage - Stapleton



- Located in Stapleton neighborhood in Denver, CO
- 6 utility-sited batteries
- 6 customer batteries
- 2015: ~18.5% PV Penetration
- Main Operations:
 - Solar Time Shifting
 - Voltage Regulation
 - System Peak Demand Reduction
 - Energy Arbitrage
- Testing of BTM batteries to understand future impact of batteries

Questions?



Thank you

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IRP Information

- **Web Page:**

https://www.xcelenergy.com/company/rates_and_regulations/resource_plans/sps_2019-2038_integrated_resource_plan

Note: After navigating to the webpage, in the upperleft-hand corner of the page, make sure that “New Mexico” is selected. Click on Public Advisory Meeting then click on the link for the fifth meeting

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