WELCOME

PUC Rule 3627 Stakeholder Meeting
August 16, 2019

Meeting Logistics – Webinar Participants

- Due to feedback problems that prevent webinar participants from hearing the presentation clearly, we have muted all call in lines

- If you are attending via webinar and would like to submit a question or comment, please do so using the typewritten comment box available to you

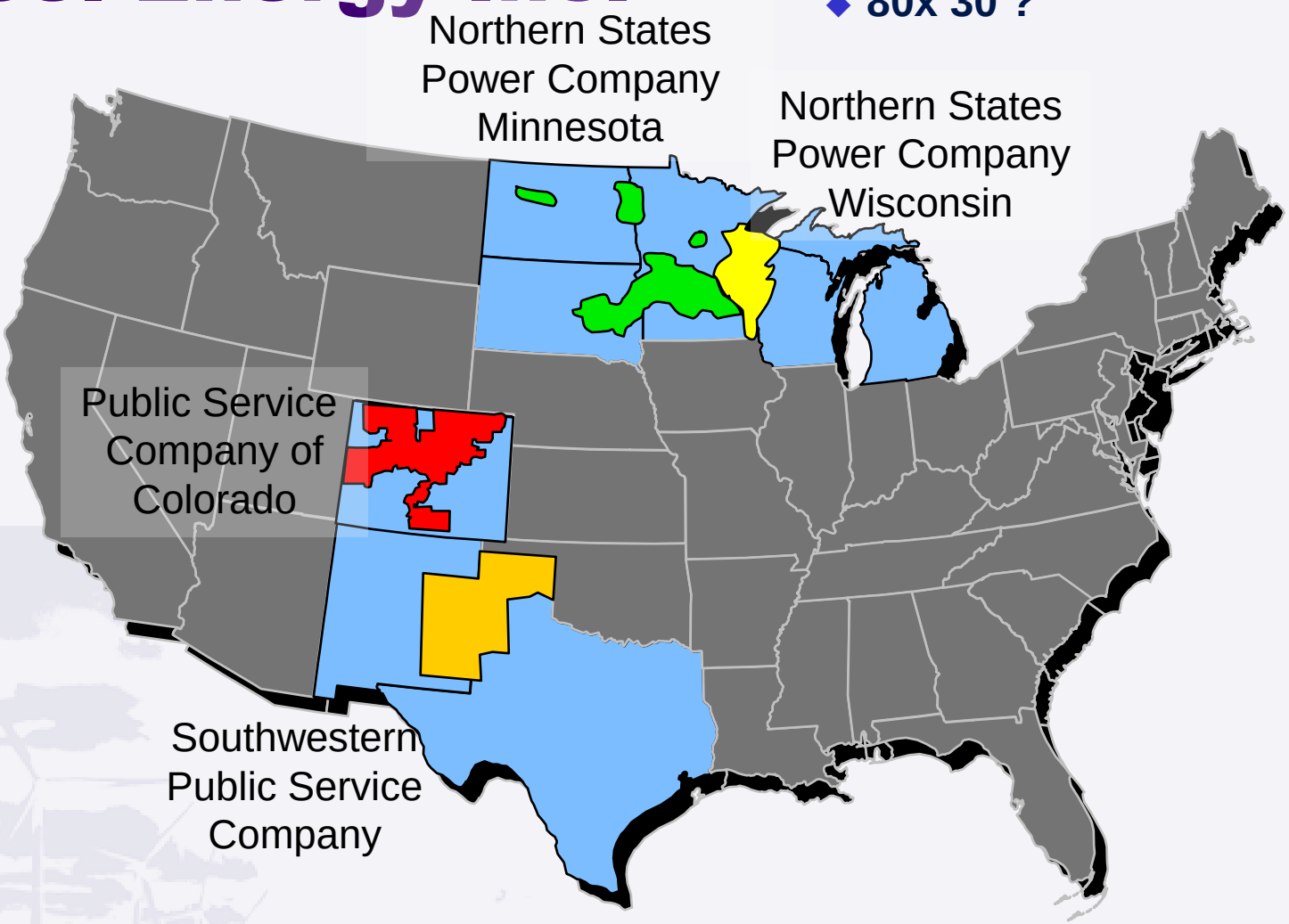
- Staff is monitoring these written comments and we will address them during the meeting

Today's Presentation

- Introduction and Overview
- Transmission Planning Basics
- Rule 3627
- Review Transmission Plans
- Solicit Feedback

Xcel Energy Inc.

- 80x 30 ?



Gas Customers	**2.0 M**
Electric Customers	**3.6 M**

Xcel Energy®

Xcel Energy Transmission

- Over 20,000 transmission line miles
- More than 1,200 substations
- Serving customers in 8 states
- 3 NERC Regions; 2 RTOs; Non-RTO west

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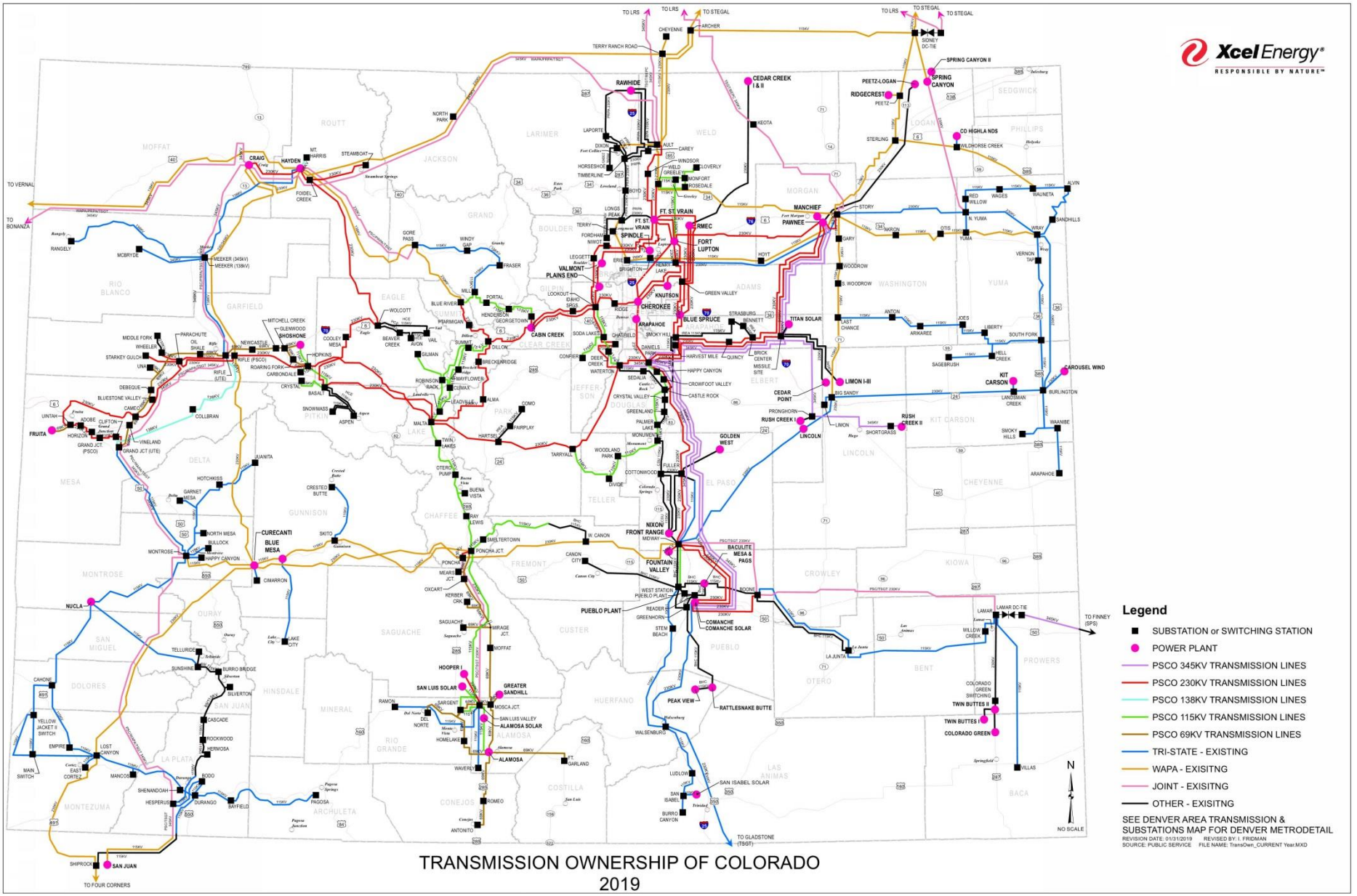
Transmission Ownership Colorado – 2019



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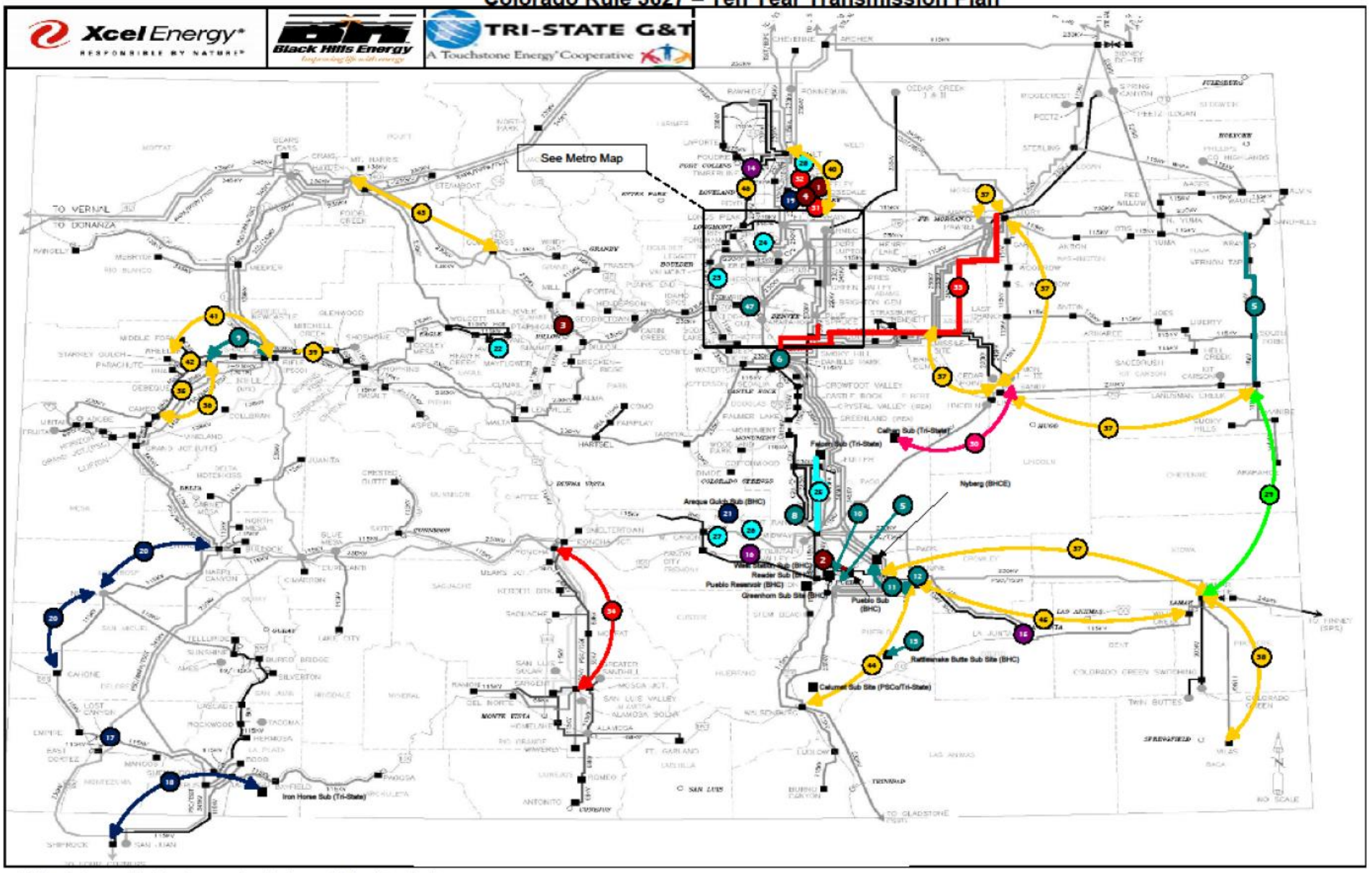
Rule 3627

- Rule 3627
  - Public Utilities Commission of Colorado (PUC) Rule
  - Adopted in 2011
    - Applies to Black Hills, Tri-State, Public Service
- Filing:
  - 10-Year Transmission Plan & 20-Year Scenarios
  - File in February of Even Years
  - Next Filing: February 2020
  - Stakeholder Participation
- PUC Determines “Adequacy”
  - 2012, 2014, 2016, and 2018 Reports Deemed Adequate

Rule 3627

- 10-Year Report Content:
  - Transmission Plans
    - Projects > 100 kV
    - "Planned" & "Conceptual"
  - Other Details
    - Methodology, Criteria, Assumptions
    - Related Reports and Studies
    - Summary of Stakeholder Participation
- Proceeding Consolidated with SB07-100
  - Public Policy Legislation that Promotes Proactive Transmission Planning
  - Discussed Later

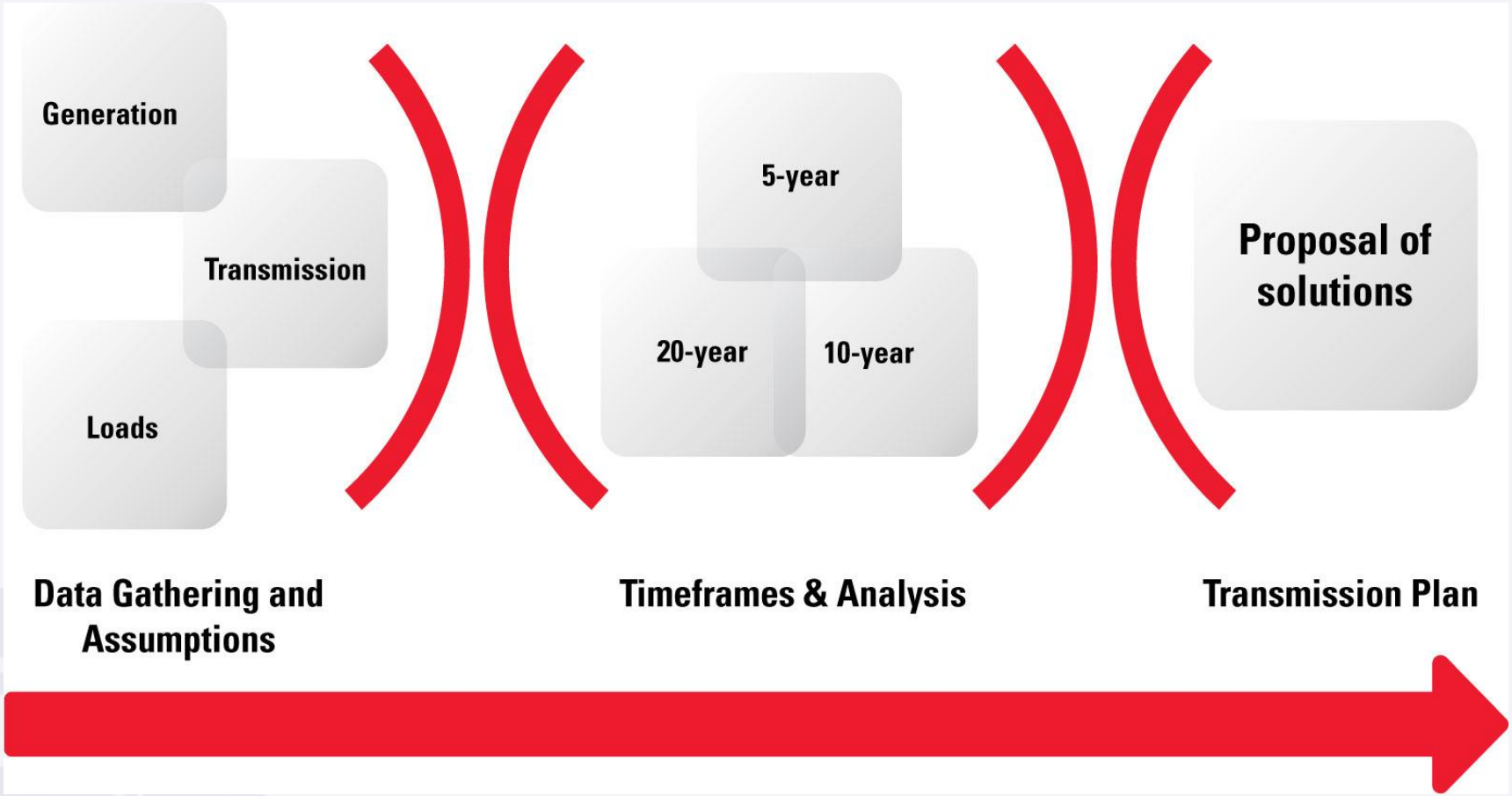
Colorado Rule 3627 – Ten Year Transmission Plan



*All projects are subject to change and routes have yet to be determined.

Transmission Planning Process

Transmission Planning Process



Transmission planning is the art of identifying future transmission infrastructure for delivery from forecasted resources to forecasted load centers without violating mandatory compliance standards.

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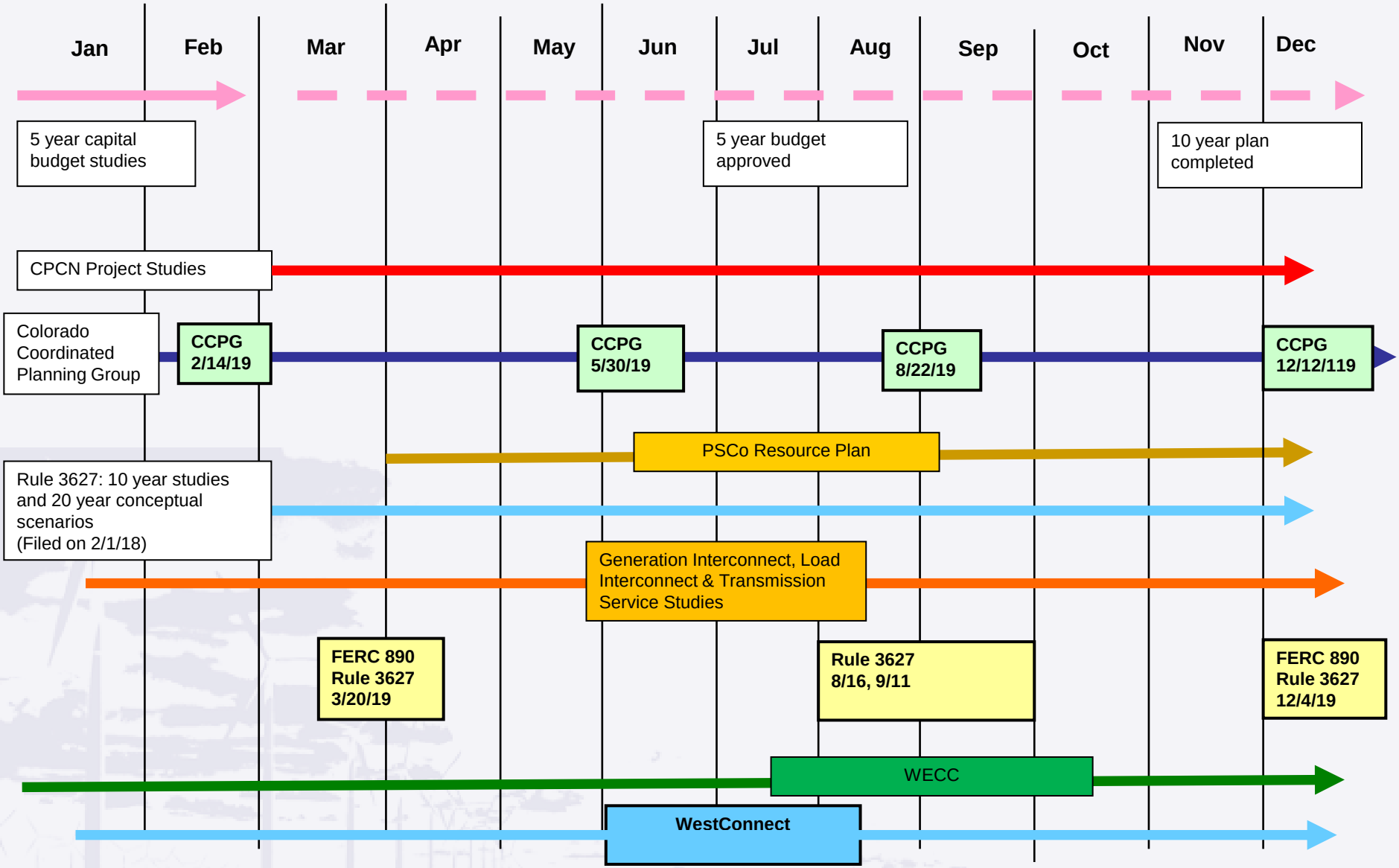
Planning Process Calendar 2019



2019 Transmission Planning Studies and Assessments

Zinn Photography/Courtesy of SunEdison

Transmission Planning Drivers

- Load Service / Reliability
  - Near-Term (1-5 years)
  - Longer-Term (5-10 years)
- Resource Accommodation
  - PSCo Resource Plans (2016 ERP & CEP)
  - Generator Interconnection Requests
- Public Policy
  - Senate Bill 07-100 (SB-100)
  - 2017 Colorado Energy Plan (CEP)
  - Carbon Free Requirements and Goals
  - Senate Bill 19-236
- Other
  - Tariff Studies
  - Transmission Service

Planning Study Process

- Prepare Study Models
  - Commercial Software
  - Inputs: Load Forecasts, Resources, Transmission
  - Coordinates with Other Transmission Owners
- Perform Studies
  - Steady State, Transient Stability, Short Circuit
- Metrics & Compliance
  - NERC Standards (TPL, MOD, FAC)
  - PSCo Criteria
  - Variable Energy Resource (VER) Guidelines
- Recommendations for System Upgrades

PSCo Electric Resource Plan
Colorado Energy Plan

Zinn Photography/Courtesy of SunEdison

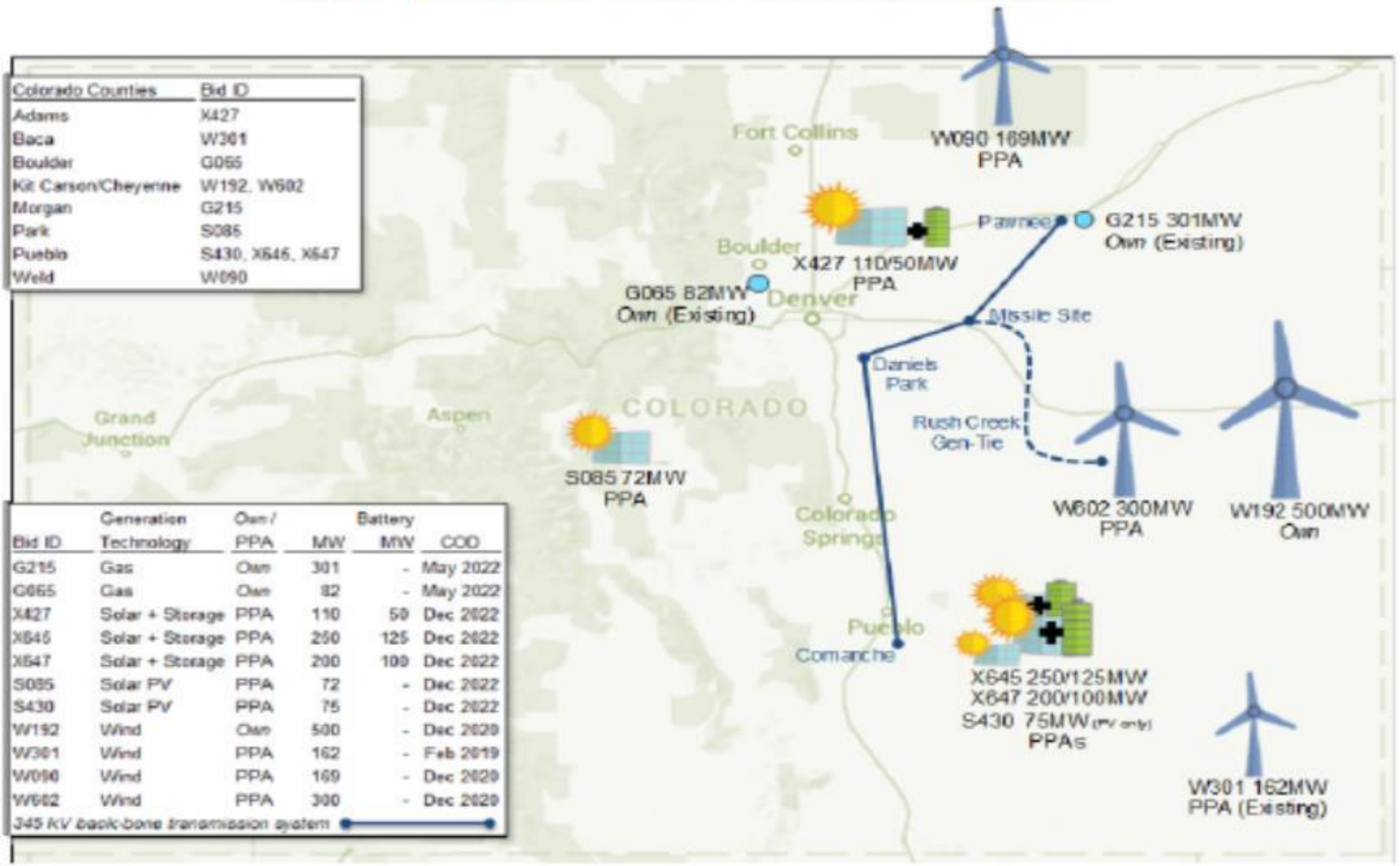
PSCo Initiatives

- **Colorado Electric Plan**
  - Filed August 2017
  - Retire 660 MW Coal Gen by 2025
  - 1100 MW New Wind Generation
  - 700 MW New Large-Scale Solar
  - 275 MW Battery Storage
- **Clean Energy Future**
  - 100% Carbon Free by 2050
    - Aligns with Colorado Governor Polis' Goals
  - 80% Carbon Reduction by 2030

- Colorado Energy Plan Task Force (CEPTF)
  - Under Colorado Coordinated Planning Group (CCPG)

Colorado Energy Plan Portfolio (CEPP) Map

Figure 5 - Preferred CEPP Generation Locations



CEPP projects are conceptual until execution of a Provisional LGIA or pro forma LGIA

Preferred CEPP

Table 9 - Preferred CEPP Projects

Bid ID	Project Name	Technology	MW	Ownership	In-Service
X645	[redacted]	Solar w/ Storage	250/125	IPP	2023
X647		Solar w/ Storage	200/100	IPP	2023
X427		Solar w/ Storage	110/50	IPP	2023
S430		Solar	75	IPP	2023
S085		Solar	72	IPP	2023
W192		Wind	500	Own	2021
W602		Wind	300	IPP	2021
W090		Wind	169	IPP	2021
W301		Wind (repower)	162	IPP	2019
G215		Gas (existing)	301	Own	2022
G065		Gas (existing)	82	Own	2022

Note: In-Service refers to the first summer the unit is available.

All CEPP projects are conceptual until they successfully complete the LGIP

Rush Creek Gen-Tie Interconnections

- Additional 800 MW at the Shortgrass Switching Station
- Shortgrass Switching Station near Rush Creek II site
- 2 projects:
  - Cheyenne Ridge 500 MW Wind
  - Bronco Plains 300 MW Wind
- Shortgrass CPCN - approved
- Cheyenne Ridge CPCN - approved
- Bronco Plains PPA
- Planned ISDs of 2022

Rush Creek Gen-Tie Projects

Rush Creek I: 380 MW
Rush Creek II: 220 MW
Bronco Plains: 300 MW
Cheyenne Ridge West: 250 MW
Cheyenne Ridge East: 250 MW

Total = 1400 MW

Shortgrass Switching Station Project Location

Xcel Energy® RESPONSIBLE BY NATURE®

S Substation/Switch Yard
Planned Transmission Line
Rush Creek Gen-Tie
Other Wind Farm Boundaries
Cheyenne Ridge Project Boundary

N

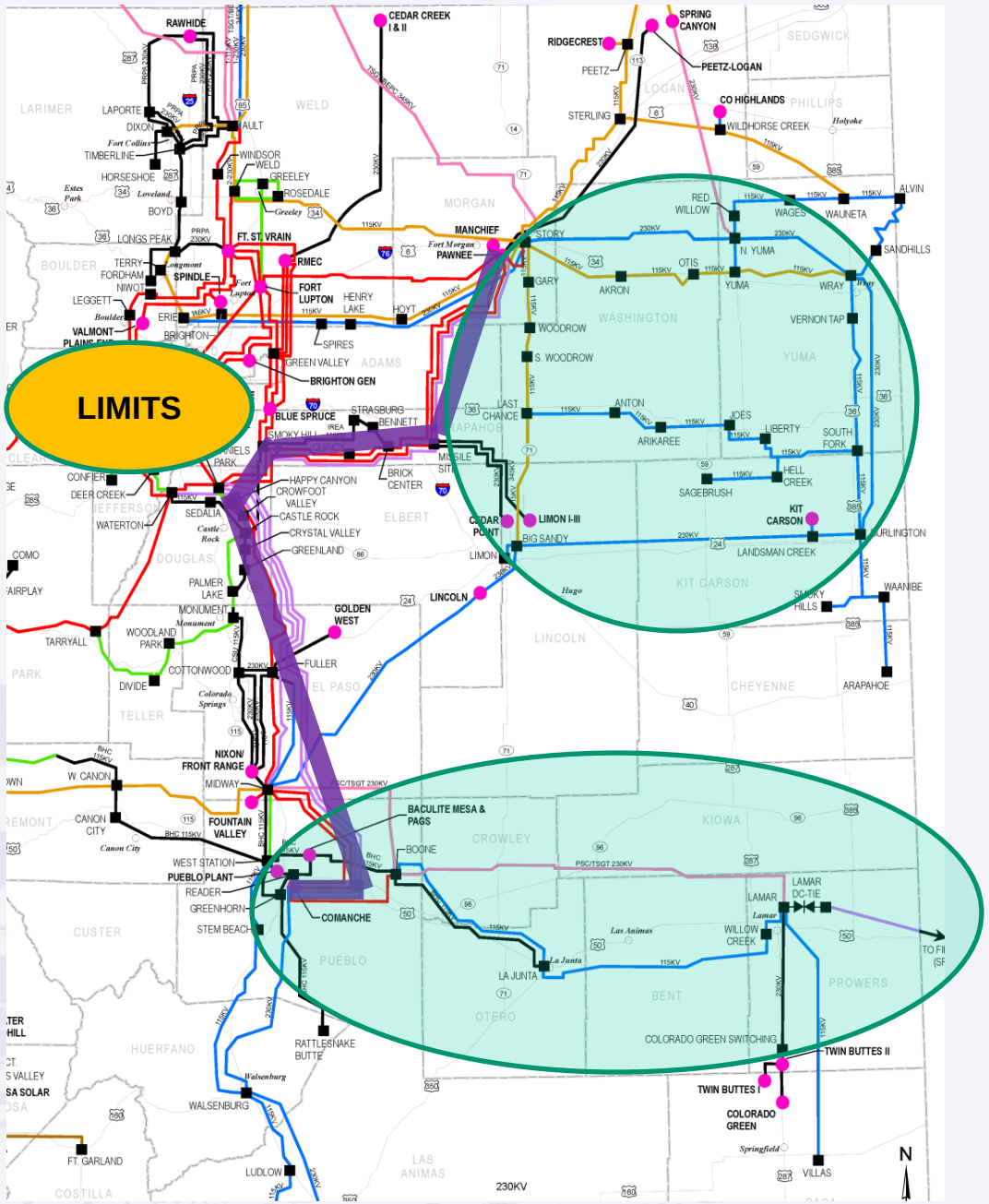
Miles
0 10 20 30

Date: 11/27/2018

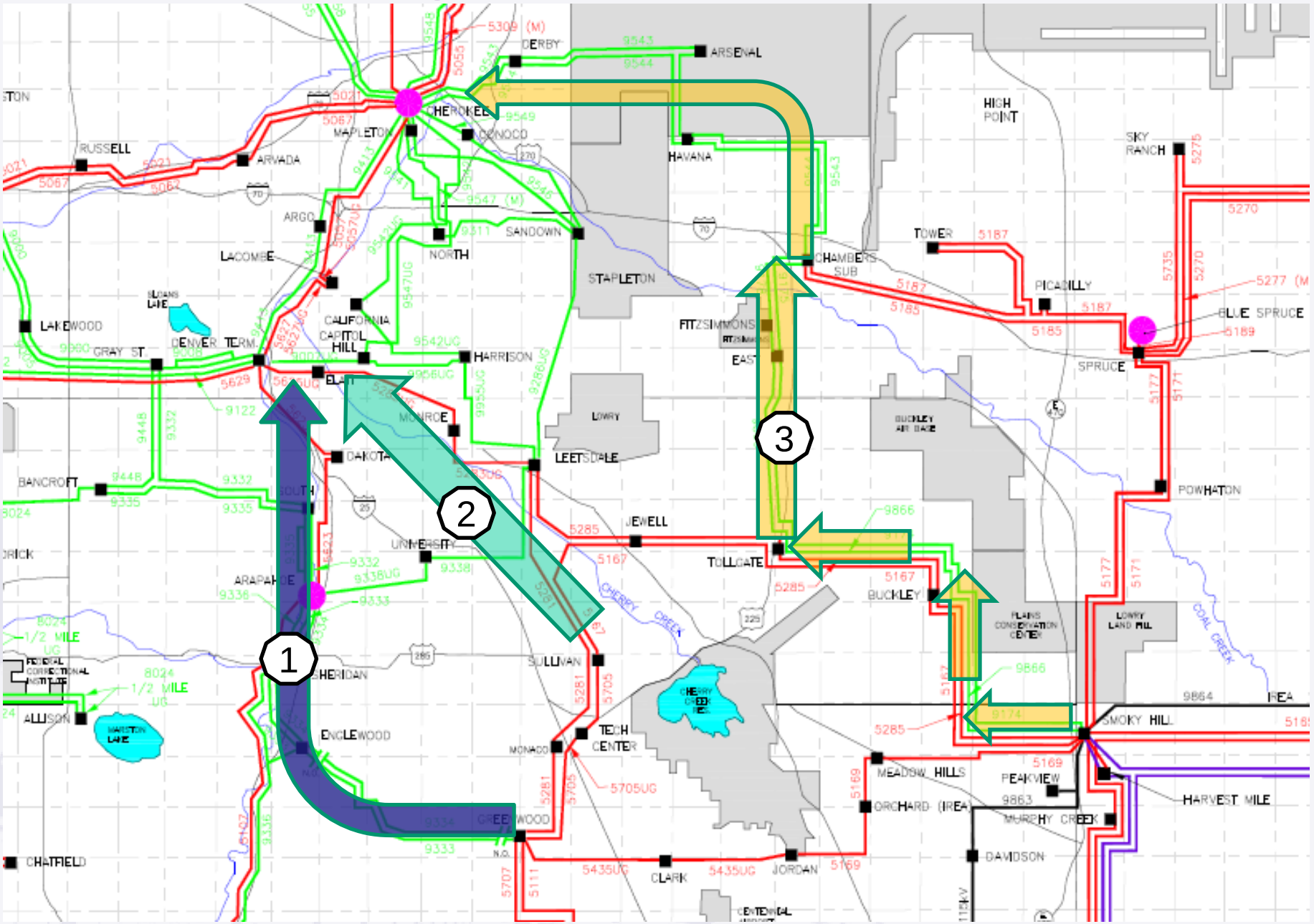
CEPP Network Upgrade Studies

- **Objective:**
  - Accommodate CEPP
  - Develop Plan for Denver-metro System
- **Results:**
  - 345 kV Backbone Allows Flexibility for CEPP Generation
  - Limits: Denver Metro Transmission
- **Alternatives:**
  - New Greenwood–Arapaho –Denver Terminal 230 kV Line
  - Upgrade Existing 230 kV lines
  - Smoky Hill – Chambers – Cherokee 230 kV conversion

Limits


LIMITS
RAWHIDE
CEDAR CREEK I & II
SPRING CANYON
RIDGECREST
PEETZ
PEETZ-LOGAN
CO HIGHLANDS
WILDHORSE CREEK
STERLING
LARIMER
WELD
LOGAN
PHILLIPS
SEDGWICK
LAPORTE
DIXON
TIMBERLINE
HORSESHOE
WINDSOR
WELD
GREELEY
ROSEDALE
BOYD
LONGS PEAK
FT. ST. VRAIN
RMEC
MANCHIEF
PAWNEE
MORGAN
BOULDER
TERRY
FORDHAM
NIWOT
SPINDLE
LEGGETT
ERIE
VALMONT
BRIGHTON
FORT LUPTON
HENRY LAKE
HOYT
SPIRES
GREEN VALLEY
ADAMS
BRIGHTON GEN
BLUE SPRUCE
STRASBURG
BENNETT
SMOKY HILL
QUINCY
MISSILE SITE
BRICK CENTER
CONIFER
DEER CREEK
SEDALIA
WATERTON
HAPPY CANYON
CROWFOOT VALLEY
CASTLE ROCK
CRYSTAL VALLEY
GREENLAND
JEFFERSON
DOUGLAS
ELBERT
PALMER LAKE
MONUMENT
WOODLAND PARK
TARRYALL
COMO
PARK
TELLER
EL PASO
DIVIDE
COTTONWOOD
FULLER
GOLDEN WEST
LINCOLN
LIMON
CEDAR POINT
LIMON I-III
BIG SANDY
ARAPAHOE
CHEYENNE
KIT CARSON
LINCOLN
WASHINGTON
YUMA
RED WILLOW
WAGES
WAUNETA
ALVIN
SANDHILLS
N. YUMA
OTIS
YUMA
WRAY
GARY
AKRON
WOODROW
S. WOODROW
VERNON TAP
LAST CHANCE
ANTON
ARIKAREE
JOES
LIBERTY
SOUTH FORK
HELL CREEK
SAGEBRUSH
KIT CARSON
LANDSMAN CREEK
BURLINGTON
SMOKY HILLS
WAANIBE
NIXON/ FRONT RANGE
MIDWAY
W. CANON
CANON CITY
FOUNTAIN VALLEY
WEST STATION
PUEBLO PLANT
READER
GREENHORN
STEM BEACH
COMANCHE
BACULITE MESA & PAGS
BOONE
CROWLEY
KIOWA
LAMAR
LAMAR DC-TIE
WILLOW CREEK
LA JUNTA
OTERO
BENT
PROWERS
PUEBLO
CUSTER
HUERFANO
RATTLESNAKE BUTTE
WALSENBURG
COLORADO GREEN SWITCHING
TWIN BUTTES II
TWIN BUTTES I
COLORADO GREEN
VILLAS
FT. GARLAND
LUDLOW
LAS ANIMAS
COSTILLA
230KV
N

Network Upgrade Map



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Other Alternatives Evaluated / Considered

1) Pawnee-Green Valley 230 kV (New)
2) Greenwood-Arapahoe-Denver Terminal & Waterton-Arapahoe conversion (Expansion of Proposal)
3) Missile Site - Spruce 345 kV Double Circuit (New)
4) Chambers - Cherokee 230 kV (Conversion from 115)
5) Chambers – Sandown 230 kV (New) & Sandown – Leetsdale 230 kV (Conversion from 115)

- None of the above alternatives resolved performance issues, except #2, which expands the proposed project

10-Year
Transmission Plans

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Substations

- Completed
  - Bluestone Valley Phase 1 (2019)
  - Harvest Mile (2019)
  - Wolcott (2x20 MVAR Reactors)(in service)
- 2020
  - Shortgrass 345 kV Switching Station
  - NREL Interconnection
- 2021
  - Cloverly 115kV Expansion
- 2022
  - Graham Creek 115kV
  - Husky 230/115kV
  - Other CEPP Interconnections
- TBD
  - Reliability:
    - Bluestone Valley Phase 2
- Distribution
  - Moon Gulch (In Service)
  - Avery (2021 – was 2019)
  - Thornton (in service)
  - Barker (Bank 1: 2021, Bank 2: 2022, Bank 3 TBD)
  - High Point (2022)
  - Titan (2022)
  - Dove Valley (2023)
  - Stock Show (2026)
- Conceptual, ISD TBD
  - Box Elder Replacement
  - New Castle
  - Wilson
  - Solterra
  - Superior
  - Sandy Creek

Transmission

Completed

- Rush Creek – Missile Site 345 kV (2018)

Planned

- 2019
  - Pawnee – Daniels Park 345 kV
- 2020
  - Shortgrass – Cheyenne Ridge 345 kV
- 2021
  - Monument–Flying Horse 115kV Series Reactor
- 2022
  - Ault–Cloverly 230kV
  - Gilman – Avon 115kV
  - Climax – Robinson Rack – Gilman 115kV
  - Greenwood-Arapahoe-Denver Terminal 230 kV
- 2023+
  - South of Greeley Plan

Conceptual, ISD TBD

- Gen-Tie Networking*
- Glenwood–Rifle Upgrade
- Robinson Rack – Gilman 115kV
- Parachute–Cameo 230kV
- Lamar–Front Range *
- San Luis Valley–Poncha 230kV #2**
- Poncha–W.Canon–Midway 230kV #2

* Potential Reduced Carbon Projects

** TSGT lists SLV as 2022

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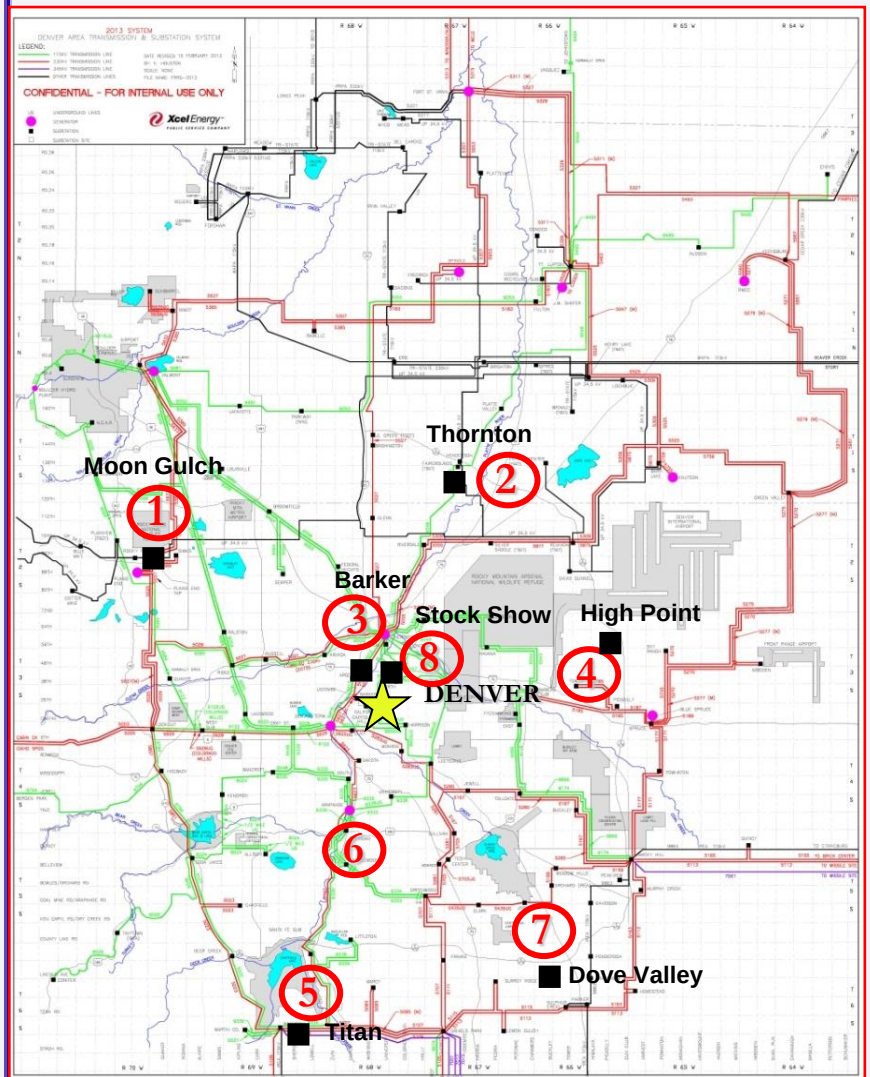
Projects by Area

Denver Metro Area

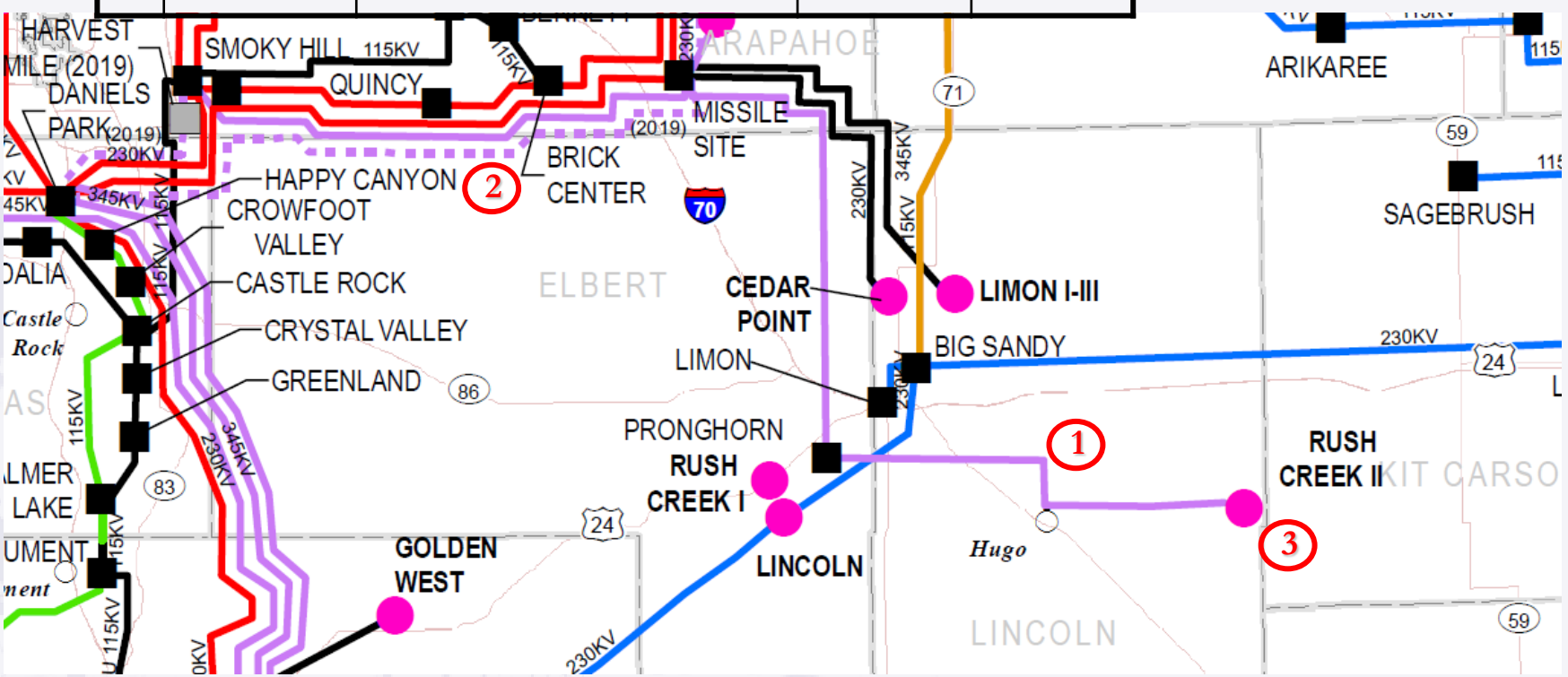


#	Project	Comments	ISD*	Drivers
1	Moon Gulch Substation	New substation in Denver Area to serve distribution load growth in west Arvada.	In Service 2018	Distribution
2	Thornton Substation	New substation in Thornton to serve distribution loads. Replaces the Brantner Substation project.	In Service 2019	Distribution
3	Barker Substation	New substation in Denver Area to serve distribution load growth in Historic Ballpark Area	2021	Distribution
4	High Point Substation	New substation in Denver Area to serve distribution load growth in Green Valley Ranch Area	2022	Distribution
5	Titan Substation	New substation in Denver Area to serve distribution load growth in Sterling Ranch Area	2022	Distribution
6	Greenwood-Arapahoe-Denver Terminal	New 230 kV line primarily utilizing existing right-of-ways from Greenwood to Arapahoe to Denver Terminal.	2022	Generation
7	Dove Valley Substation	New substation in Denver Area to serve distribution load growth in South Metro Area	2023	Reliability
8	Stock Show Substation	New substation in Denver Area to serve distribution load growth for the National Western Stock Show renovation	2025	Distribution

*All project in-service dates subject to change

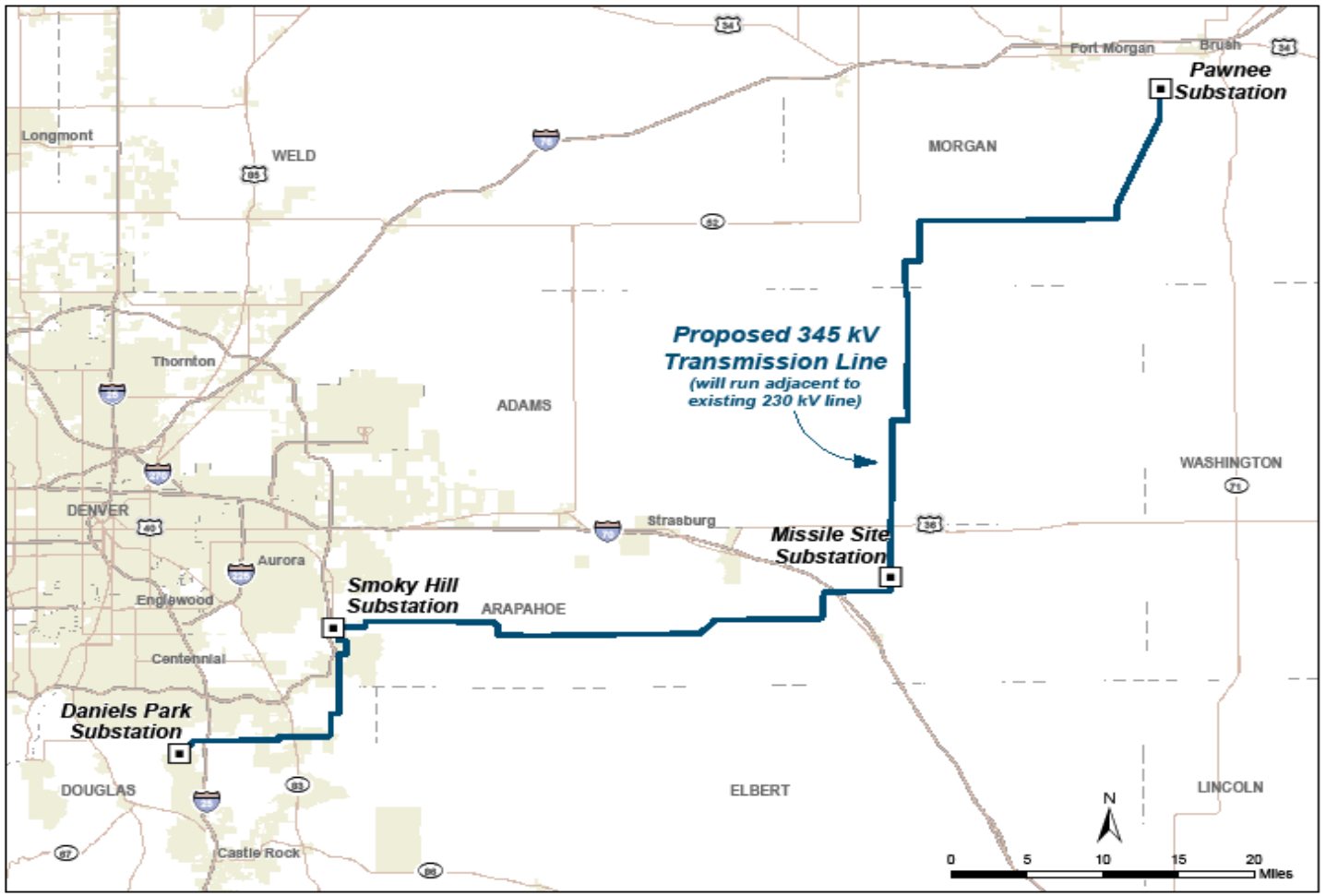
East Plains Area

#	Project	Comments	ISD*	Drivers
1	Missile Site – Rush Creek 345 kV Transmission Line	New generation tie-line for the Rush Creek Wind Project. Includes Pronghorn Switching Station near Rush Creek I Collector Site	In-Service 2018	Generation
2	Pawnee – Daniels Park 345 kV Transmission Line	Add an additional 345 kV line between the Pawnee and Daniels Park substations. Add Harvest Mile Substation near Smoky Hill	2019	Reliability
3	Shortgrass Switching Station	New 345 kV switching station near Rush Creek II collector site to interconnection two new wind projects	2020	Generation

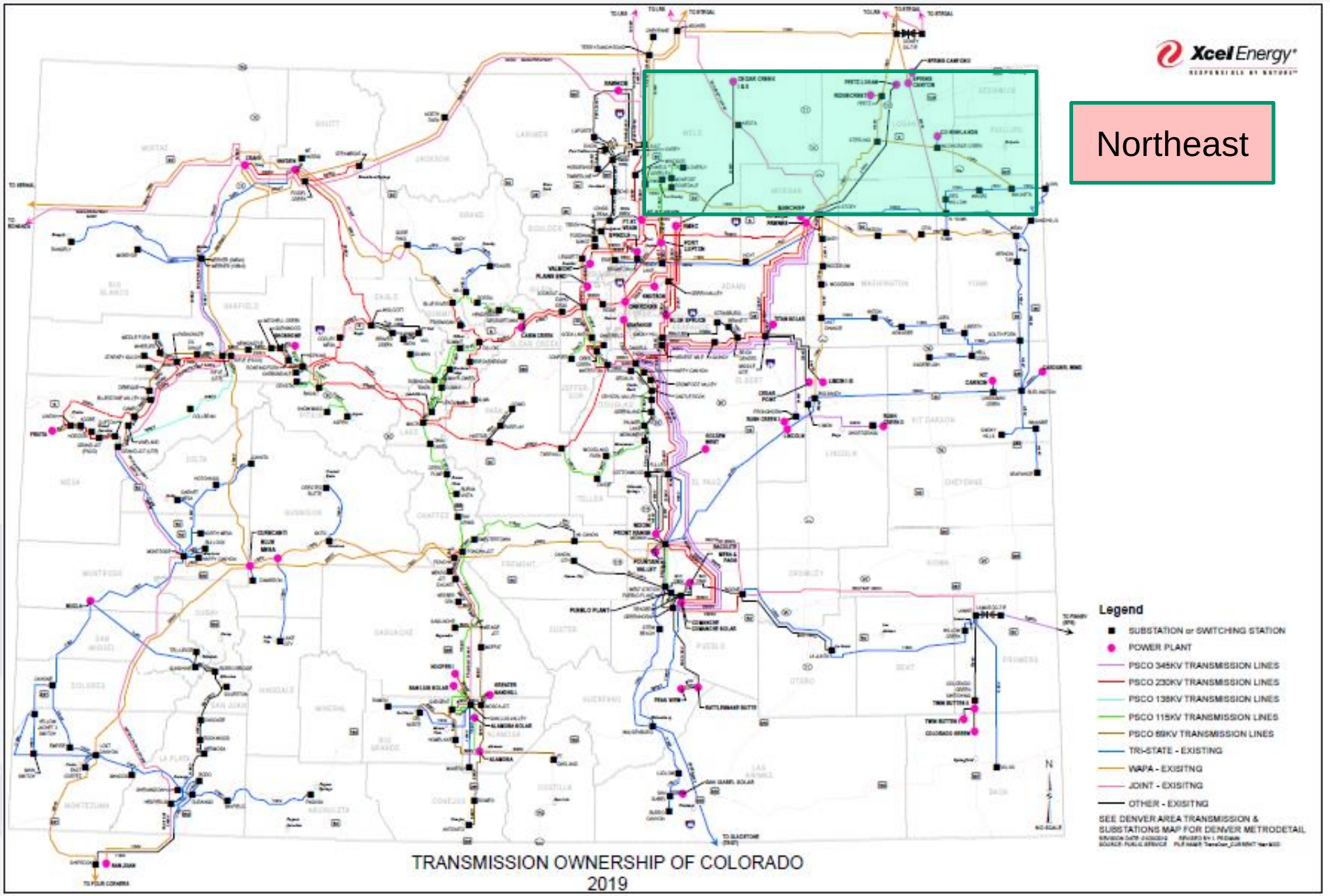


*All project in-service dates subject to change

Pawnee - Daniels Park Project Map



- Location: Morgan, Adams, Arapahoe, Elbert and Douglas counties
- Infrastructure: 115-mile transmission line from Pawnee Substation to Daniels Park Substation and from Smoky Hill Substation to Daniels Park Substation



TRANSMISSION OWNERSHIP OF COLORADO
2019

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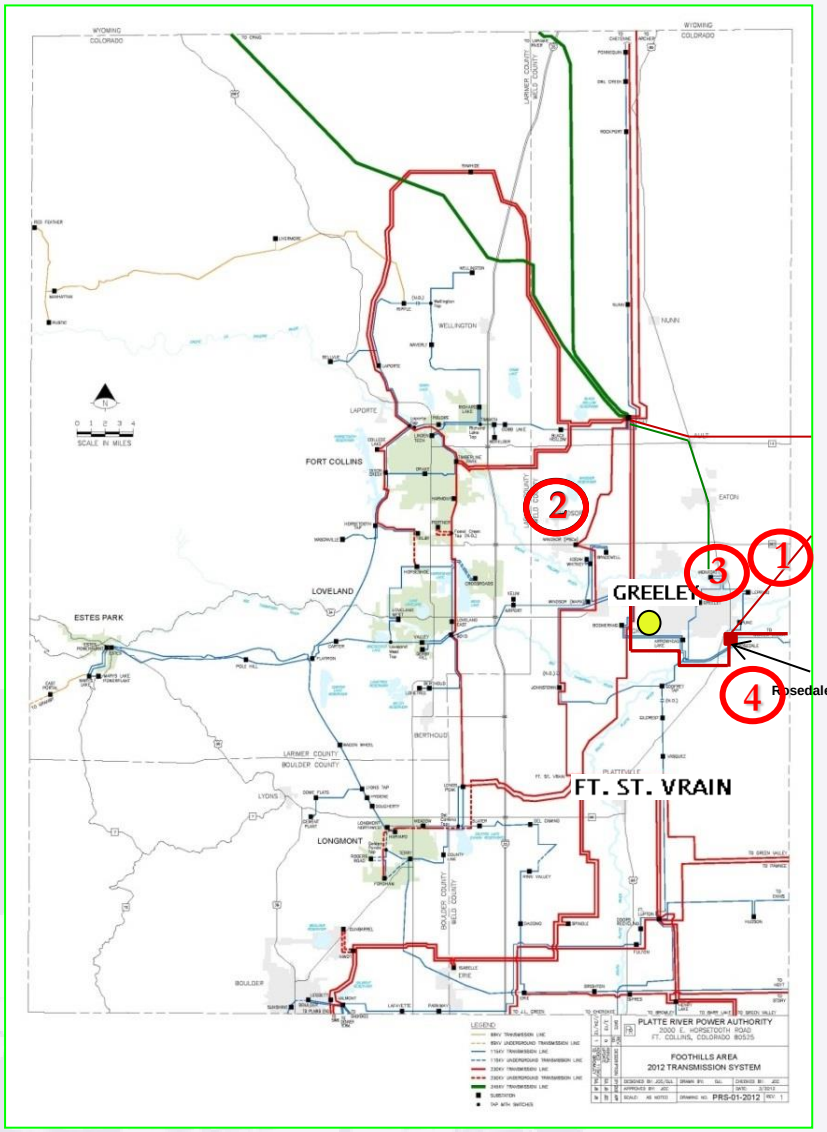
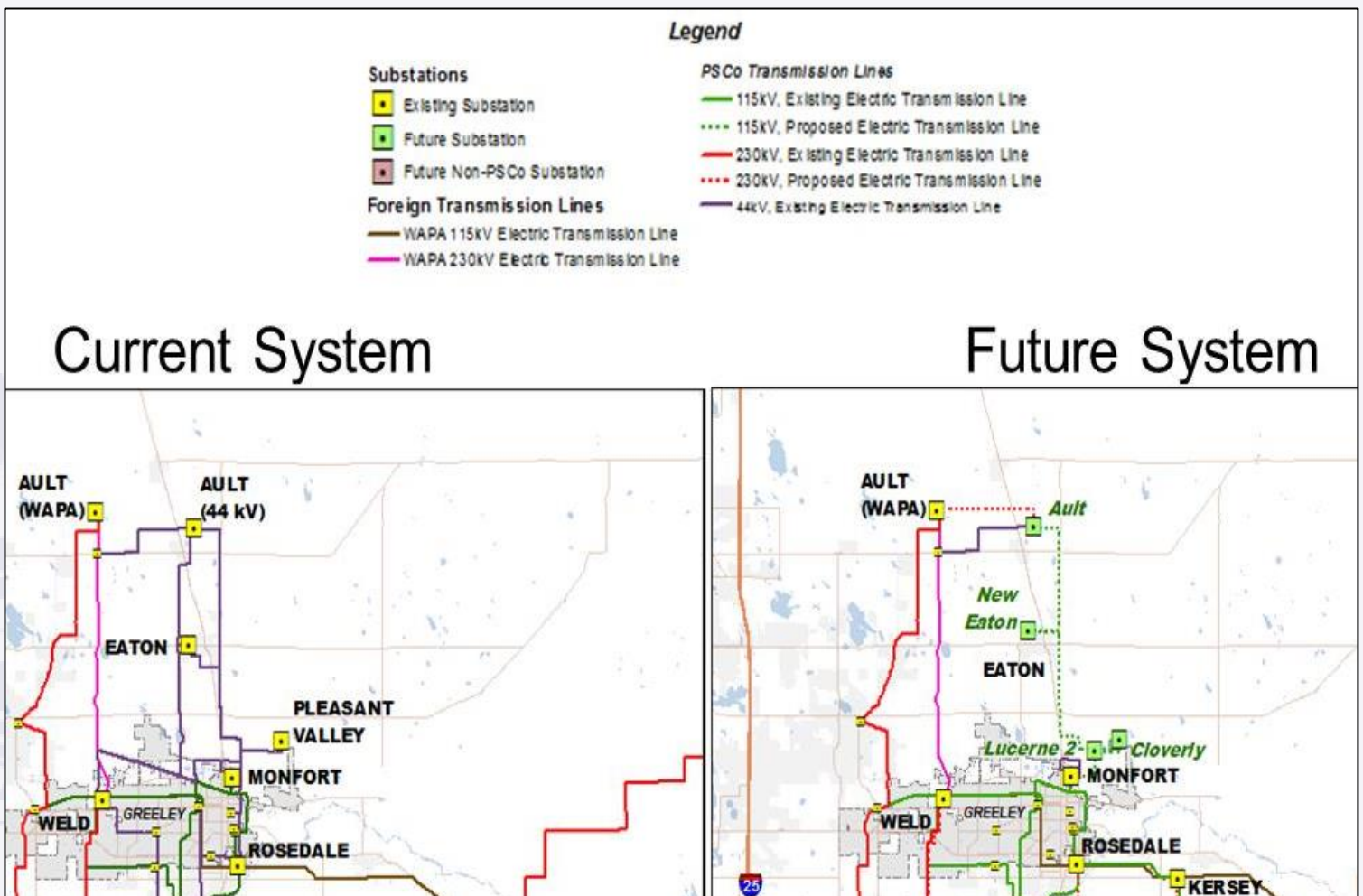
Foothills/Greeley Area - Northeast Colorado



#	Project	Comments	ISD*	Drivers
1	Avery Substation	New distribution substation to serve loads in the area	2021	Distribution
2	Ault – Cloverly 230/115kV Subs: Husky, Graham Ck.	New line from Ault Substation to Cloverly Substation. Create new substations near PSCo Ault and Eaton to move 44kV loads to higher voltage.	2022	Reliability Load Growth Resource
3	Weld – Rosedale 230kV	New line from Weld Substation to Rosedale Substation. Build a new 230kV substation (Beebe Draw) to replace the existing 44kV La Salle Substation.	TBD	Reliability Load Growth

*All project in-service dates subject to change

- **NGAP: Ault – Cloverly Project**
  - **Ault-Husky 230kV (Ault 44kV Replacement at Husky)**
  - **Husky-Graham Creek 115kV, built double circuit 230kV capable (Eaton 44kV Replacement at Graham Creek)**
  - **Graham Creek-Cloverly 115kV, built double circuit 230kV capable (Pleasant Valley 44kV Replacement at Cloverly)**
- **CPCN**
- **ISD: 2022**
- **Cost: $65M**



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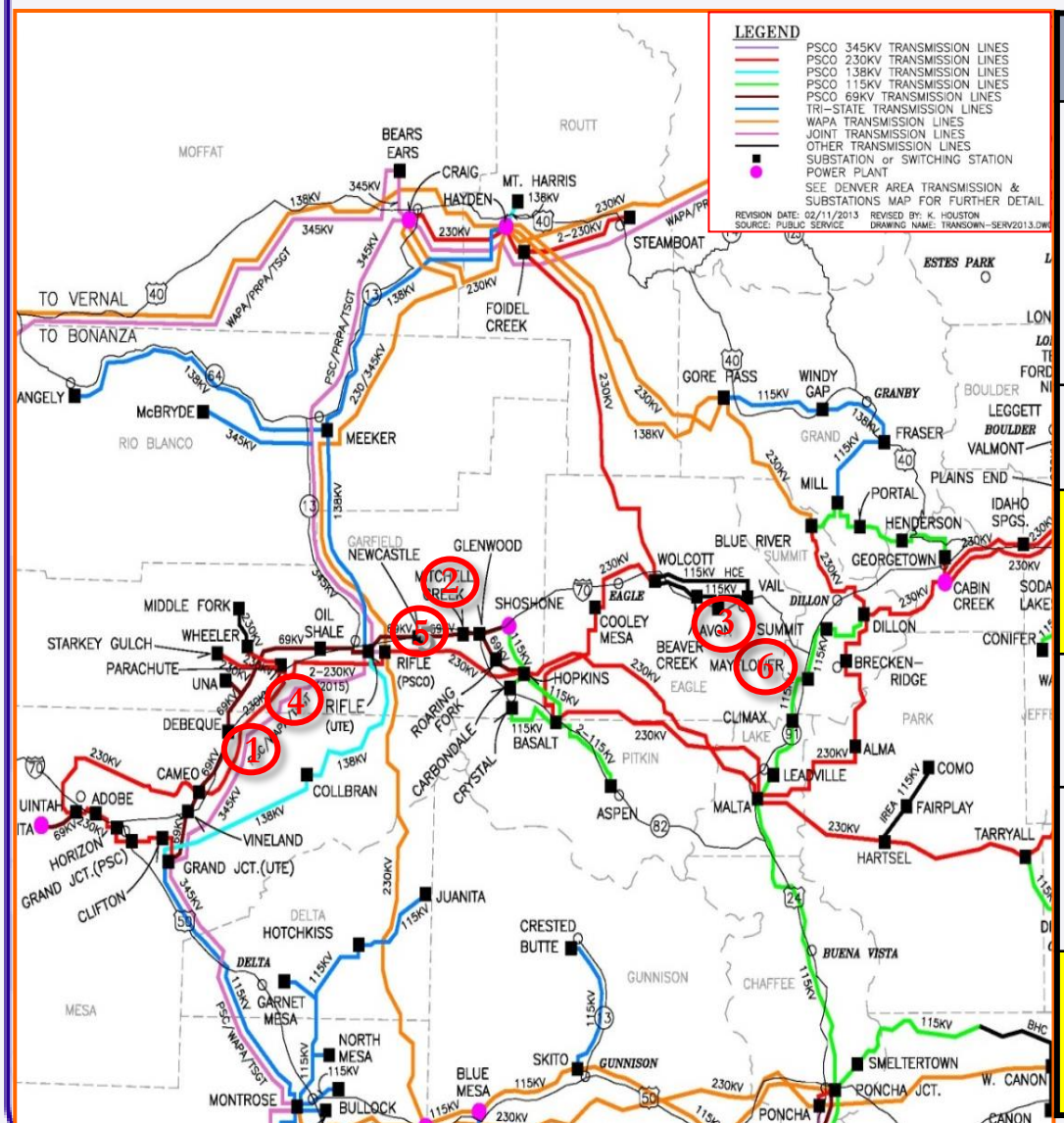
South of Greeley Area Plan

- **Objectives**
  - Replace the southern part of the 44kV sub-transmission system
  - Improve Reliability
  - Increase Load Serving Capability
  - Increase Resource Accommodation
  - Align with Other Transmission Plans
    - NCAP: North, SWEP
- **Plan**
  - **New 230 kV and 115 kV Transmission from Weld – Rosedale – Box Elder - Ennis**
- **Next**
  - **Drafting Study Report**
  - **File CPCN**

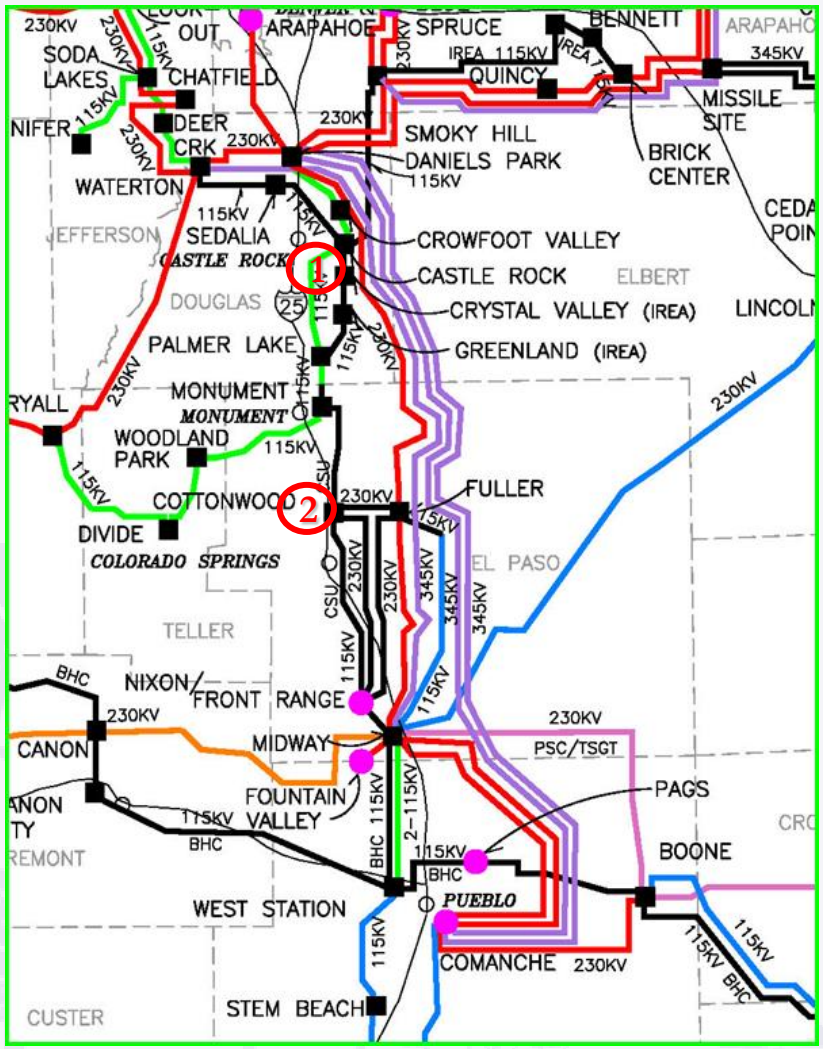
Western Slope / Mountain Area



#	Project	Comments	ISD*	Drivers
1	Bluestone Valley Substation	Phase 1: Construct the Bluestone Valley 69kV Switching Station. Phase 2: Construct the 230kV Bluestone Valley Substation that taps the Parachute-Cameo 230kV line.	Phase 1: 2019 Phase 2: TBD	Reliability
2	Glenwood-Rifle 69kV to 115kV	Upgrade the Glenwood-Rifle 69 kV line to 115 kV.	TBD	Reliability
3	Gilman–Avon 115kV Line	Add a new 10-mile 115kV line in Eagle County for reliability and alternate source to Holy Cross customers	2022	Reliability
4	Parachute – Cameo 230kV Line	New 230 kV line from the Parachute substation to Cameo substation	TBD	Reliability
5	New Castle Substation	Construct a new 115 kV substation to serve Distribution loads in New Castle	TBD	Distribution
6	Climax – Robinson Rack – Gilman	Repair and uprate 115kV transmission from Climax to Gilman substations for reliability in the Eagle/Vail Valley	2022	Reliability

*All project in-service dates subject to change

South Denver/CO Springs Area



#	Project	Comments	ISD*	Drivers
1	IREA Happy Canyon	Construct a new 115 kV substation for IREA	2016	Wholesale Customer
2	Monument – Flying Horse 115kV Series reactor	Series reactor on the Monument – Flying horse 115kV line	2021	Reliability

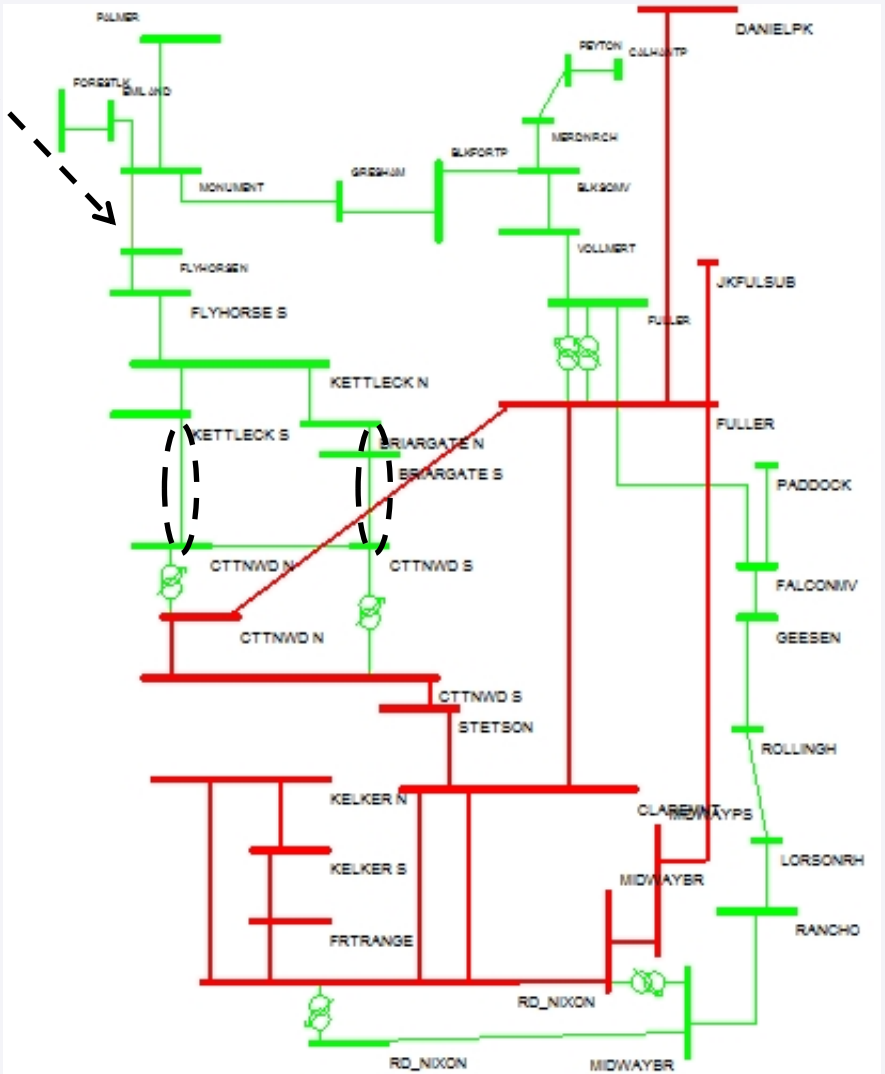
*All project in-service dates subject to change

Monument – Flying Horse 115kV Series Reactor

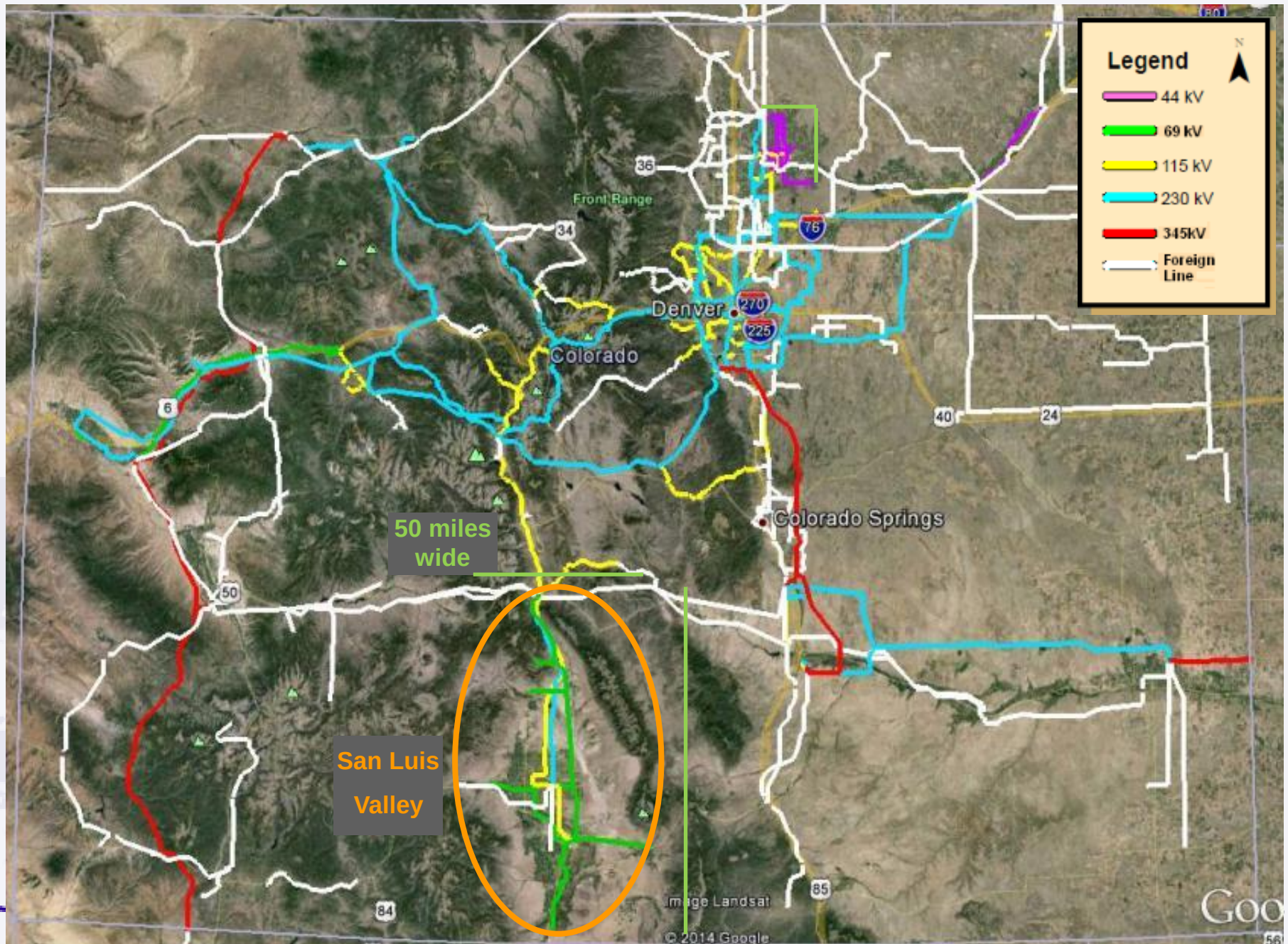
Objective
Develop a transmission project to alleviate the potential for unacceptable loading on the Colorado Springs Utilities system.

Project
Add a Series Reactor to either the Monument or Flying Horse Substation.

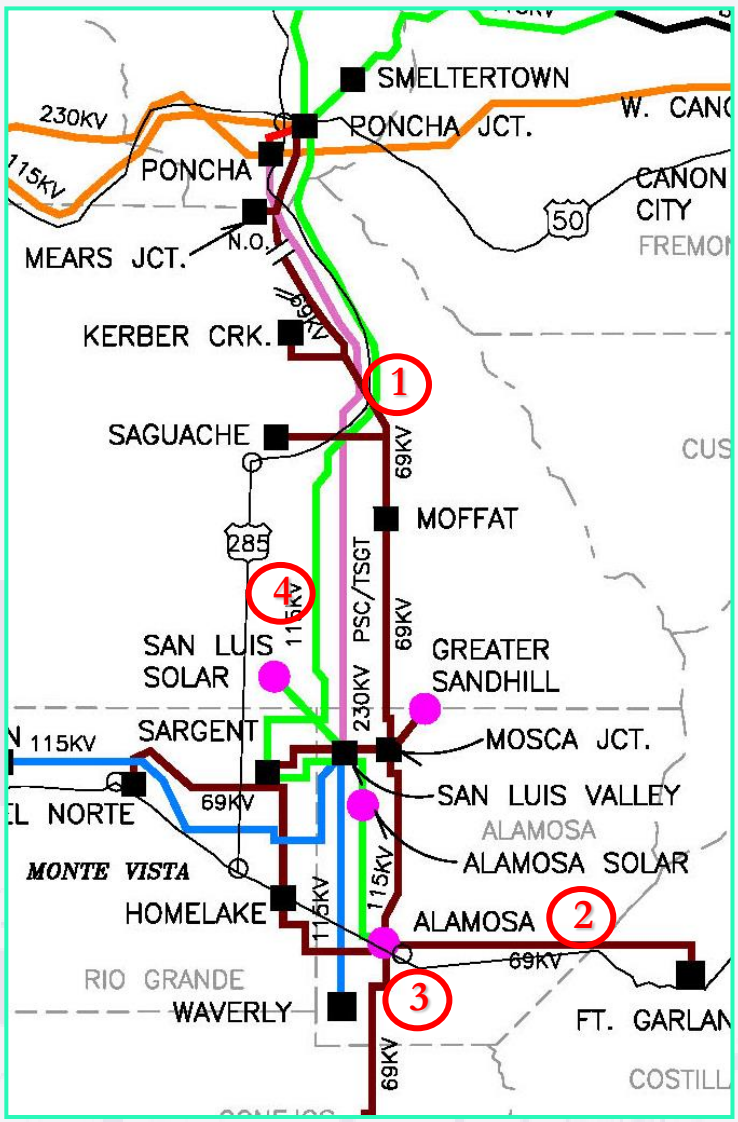
Working with CSU and TSGT to determine feasibility and scope of mitigation.



San Luis Valley Area



San Luis Valley Area



#	Project	Comments	ISD*	Drivers
1	Upgrade 69kV line: L6905	Phase 1-3: Rebuilt L6905 from Mosca to Villa Grove. Phase 4: Villa Grove - Poncha	2017-18 2021	Reliability
2	Upgrade 69kV line: L6964	Rebuilding L6964 from Alamosa Plant to Ft. Garland	2018	Reliability
3	Alamosa Bank #2 Replacement	Installing a new 28 MVA 115/13.8kV distribution transformer to replace an 8 MVA.	2018	Distribution
4	Refurbishment L9811	Replacing deteriorate structures, poles, and cross-arms on L9811 from SLV to Poncha.	2021	Reliability

Conceptual Project - SLV-Poncha 230kV line #2. Proposed joint project with Tri-State.

*All project in-service dates subject to change

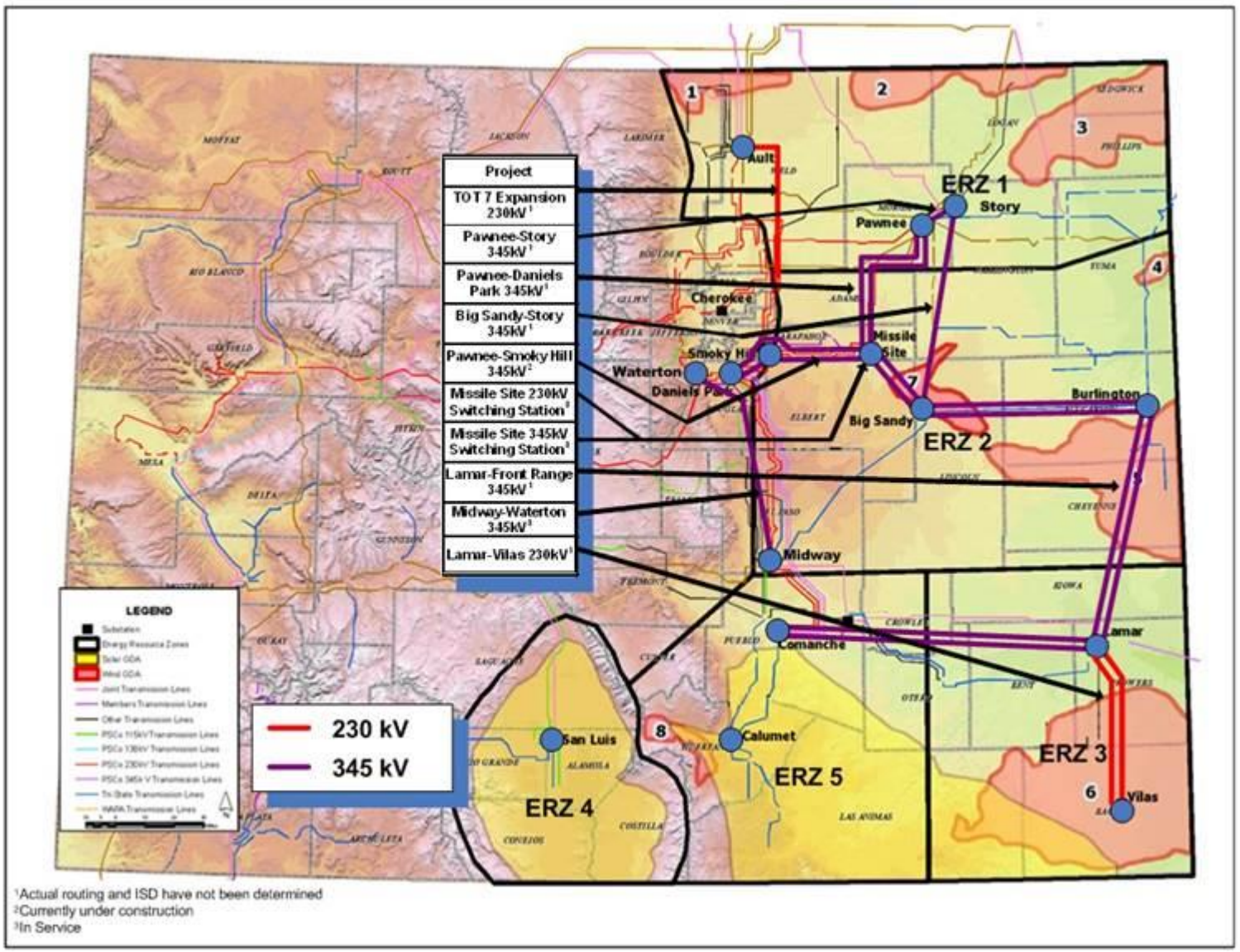
Public Policy Planning
Senate Bill 07–100

Zinn Photography/Courtesy of SunEdison

PSCo Public Policy
Senate Bill 07-100

- Designate “Energy Resource Zones (ERZ)”
- Develop plans for the construction or expansion of transmission facilities necessary to deliver electric power consistent with the timing of the development of beneficial energy resources located in or near such zones
- Consider how transmission can be provided to encourage local ownership of renewable energy facilities
- Submit proposed plans, designations, and applications for certificates of public convenience and necessity to the commission

Public Service Company of Colorado SB-100 Projects



Senate Bill 100 Project List

Item	Project	Zone	In Service Date*	Project Status
Planned				
1.	Missile Site 230kV Switching Station	2	Nov 2010	In Service No CPCN Required
2.	Midway - Waterton 345kV Transmission Project	3,4,5	Jun 2011	In Service CPCN: July 2009
3.	Missile Site 345kV Switching Station	2	October 2012	In service CPCN: June 2010
4.	Pawnee-Smoky Hill 345kV Transmission Project	1	June 2013	IN Service CPCN: Feb 2009
5.	Pawnee-Daniels Park 345kV Transmission Project	1	2019	Under Construction CPCN: April 2015
6.	Northern Colorado Area Plan (North)	1	2022	Local Permitting Ongoing CPCN: March 2018
Conceptual				
7.	Lamar-Front Range 345kV Transmission Project	2, 3	TBD	Studies Complete. No plans for full build-out at this time
8.	Lamar-Vilas 230kV Transmission Project	3	TBD	See Lamar – Front Range
9.	Northern Colorado Area Plan (South)	1	TBD	Studies Ongoing CCPG – NECO Subcommittee
10.	San Luis Valley	4	TBD	Studies Complete Tri-State Lists “Phase 1” 2022 ISD

*All project in-service dates subject to change

Public Policy Planning
Senate Bill 19-236

Senate Bill 19-236

- Extended CPUC for 7 years
- Performance based regulation study
- Requires submission of distribution plans
- CPUC to survey utility wholesale and retail rates
- Investigatory docket on costs and benefits of RTOs, EIMs, joint tariffs and power pools
- Requires generation and transmission utilities to submit resource plans to CPUC for approval
- SB19-236 addresses 80x30 and zero carbon by 2050

DESTINATION 2050

- https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Corporate%20Responsibility%20Report/CRR-2018-Corporate-Responsibility-Report.pdf

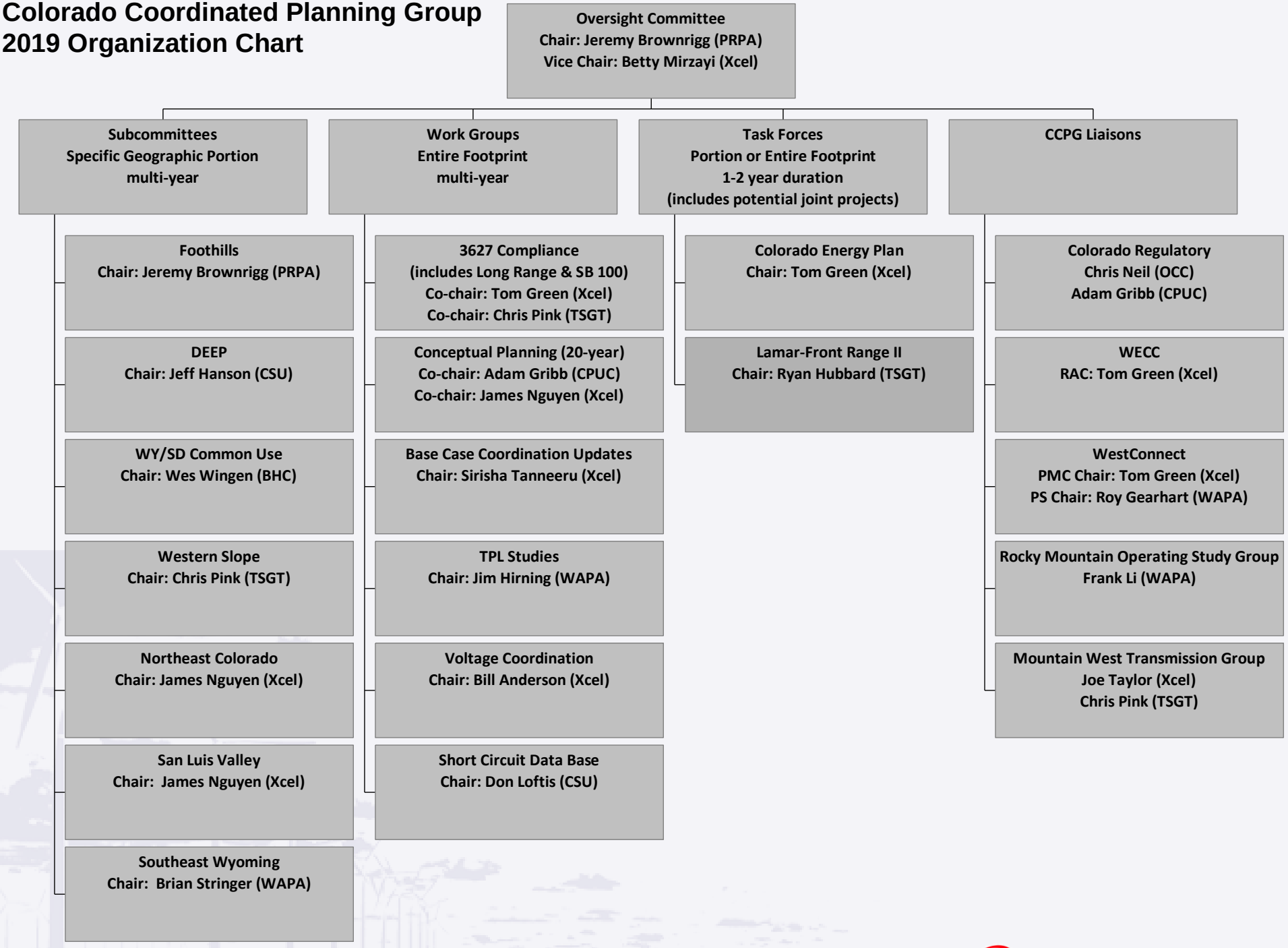
- Xcel Energy will continue working with all states it operates within and stakeholders. Our interim goal is to reduce carbon emissions 80% by 2030 is based on absolute, company-wide emissions from the electricity that serves our retail and wholesale customers, measured from a 2005 baseline. Likewise, our aspiration to serve customers with carbon-free electricity by 2050 is company-wide.

DESTINATION 2050: Common Plan Elements

- Adding thousands of megawatts of wind and solar power to our system
- Incorporating both natural gas and storage resources to help balance high levels of renewable energy
- Deploying strategic electrification of certain end uses to help create flexible demand
- Continuing to implement industry-leading energy efficiency programs
- Seeking to operate our nuclear plants through at least the remainder of their licenses
- Retiring additional coal units or changing their operations to minimize emissions affordably and reliably
- Investing in supportive infrastructure to modernize the power grid

Regional & Subregional Updates (CCPG, WestConnect, WECC)

Colorado Coordinated Planning Group
2019 Organization Chart



CCPG EVENTS

- **CCPG Meetings**
  - **August 22, 2019**
  - **December 12, 2019**

CCPG Contacts:

Jeremy Brownrigg – Chair

brownriggj@prpa.org

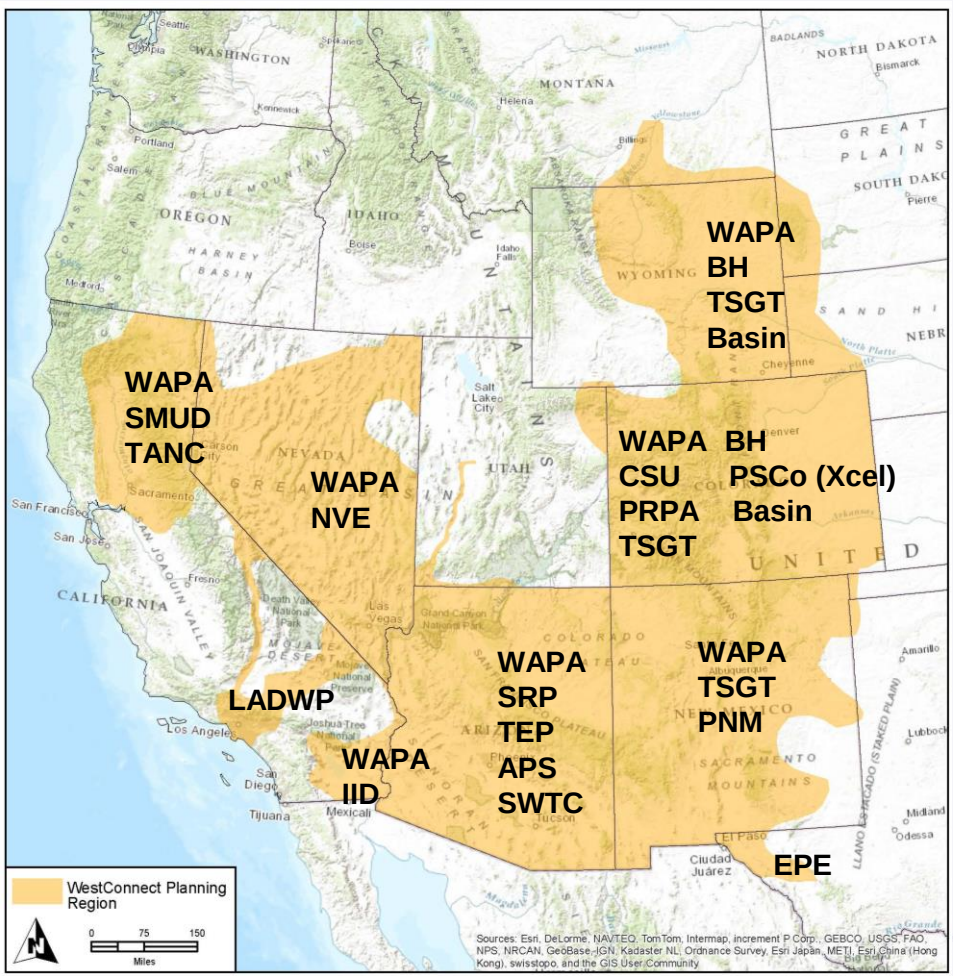
(970) 266-7979

Betty Mirzayi – Vice Chair

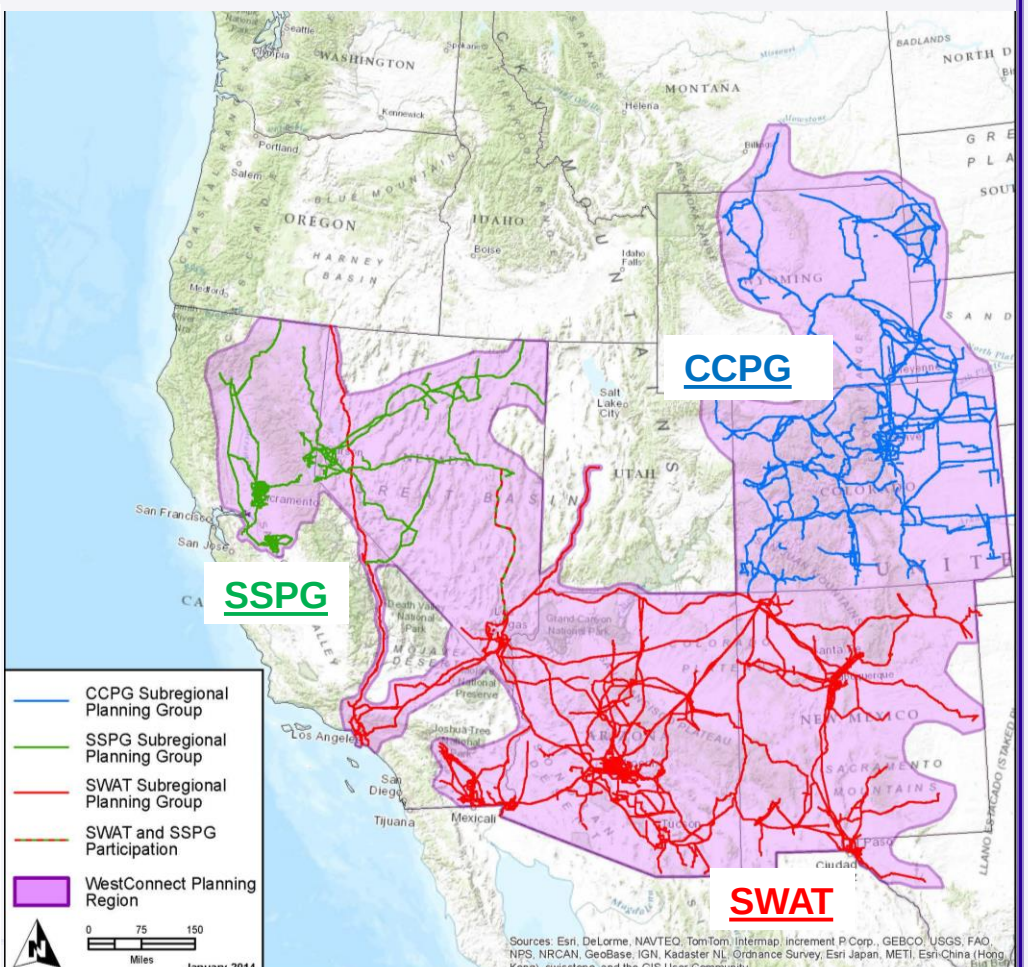
betty.mirzayi@xcelenergy.com

(303) 571-7169

WestConnect Planning Region



WestConnect Subregional Planning Groups



Xcel Energy®

Stakeholder Opportunity for Comment

Feedback Requested

- Study Thoughts
- Alternative Suggestions
- Public Policy Concerns
- Environmental / Societal
- Renewable Energy Policies
- Significant Load Impacts
- Deadline October 1 for consideration in 2020 report
- Stakeholder input always welcome

Comment Form

CCPG Comment Form

(For Stakeholder Comments, Requests for Clarification, Reliability Studies, Alternative Evaluation, and other General Feedback)

Provide the information in the yellow boxes. If the information is unavailable or unknown, please indicate.

Requester Information:	
Date:	
Requester:	
Address:	
State & Zip:	
Requester Contact:	
Title:	
Phone Number:	
Email:	

General Information:	
Study or Project Name:	
New Study or Alternative:	
Narrative Description:	
Study Horizon Date:	
Geographic Footprint Impacted:	
Load and Resource Modeling:	
Transmission Modeling	
Suggested Participants: (TP's, LSE's, Work Groups)	
Policy Issues to be Addressed: (SB100, RES, FERC, NERC, etc)	
Other Factors to be Considered:	
Type (Powerflow or Stability):	

Return To:	
CCPG Chair:	Wes Wingen
In care of:	Black Hills Corporation
Address:	PO Box 1400
City, State, Zip:	Rapid City, South Dakota, 57709
Phone:	605-721-2268
Email:	Wes.Wingen@blackhillscorp.com

All study requests received from stakeholders will be reviewed and evaluated to determine the appropriate process for addressing.
This planning process does not replace the System Impact Study process. Specific requests for transmission service or generation interconnection will continue to be studied pursuant to existing OATT processes.

http://www.oasis.oati.com/PSCO/PSCOdocs/FERC_890_customer_request__.pdf

PSCo PUC Rule 3627 Information

- On the Xcel Energy website at:
  - http://www.transmission.xcelenergy.com/Planning/Planning-for-Public-Service-Company-of-Colorado/Colorado-Public-Utilities-Commission-Rule-3627
- WestConnect website for all regional projects:
  - http://regplanning.westconnect.com/ccpg.htm

Contact Information

Transmission Planning

Betty Mirzayi
Betty.Mirzayi@xcelenergy.com
303.571.7169

Tom Green
thomas.green@xcelenergy.com
303.571.7223

Regional Transmission Initiatives

Connie Paoletti
Connie.paoletti@xcelenergy.com
303.571.2741