



October 4, 2011

Black Hills Colorado Transmission Q2-Q3 TCPC / SB-100 Stakeholder Meeting

Improving life with energy



Meeting Overview

- Welcome and Introductions
- 2011 TCPC / SB-100 Study Scope
- Preliminary Study Results
- Stakeholder Input & Questions

TCPC Meeting Policies

- FERC Standards of Conduct
- Anti-Trust Policy
- Confidentiality

BHCE Ten Year Plan

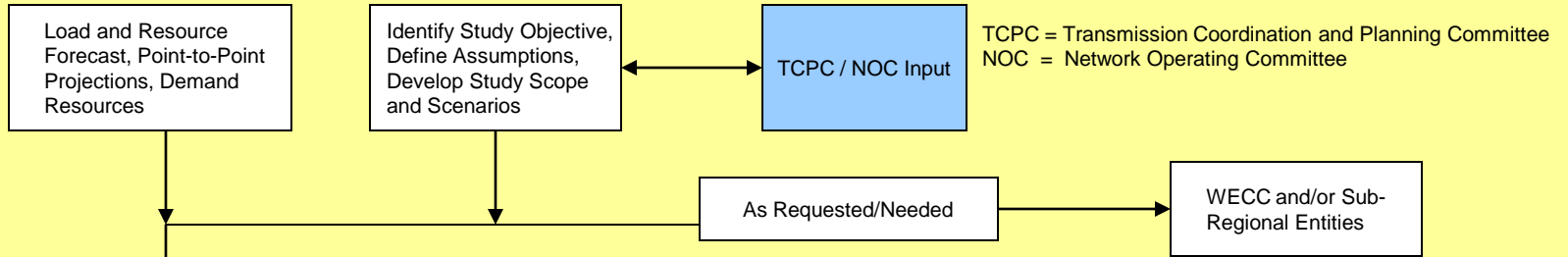
- Baculite Mesa 115 kV substation (complete)
- Nyberg 115 kV substation (complete)
- West Station 115 kV substation expansion (complete)
- Baculite Mesa-Airport Memorial 115 kV rebuild (complete)
- West Station-Baculite Mesa 115 kV double circuit (2011)
- Baculite Mesa-Nyberg 115 kV line (2011)
- Portland-West Station #2 115 kV line (2012)
- Baculite Mesa-Overton 115 kV line rebuild (2012)
- Reader-Rattlesnake Butte 115 kV line (2012)
- Second Boone 230:115 kV transformer (2013)
- Pueblo-Hyde Park-West Station 115 kV rebuild (2013)
- Overton 115 kV substation (2013)
- Reader 115:69 kV transformer #1&2 replacement (2013)
- Greenhorn-Reader 115 kV line rebuild (2013)
- La Junta Tri-State 115 kV Interconnection (2014)

Local Transmission Plan (LTP) Study Cycle

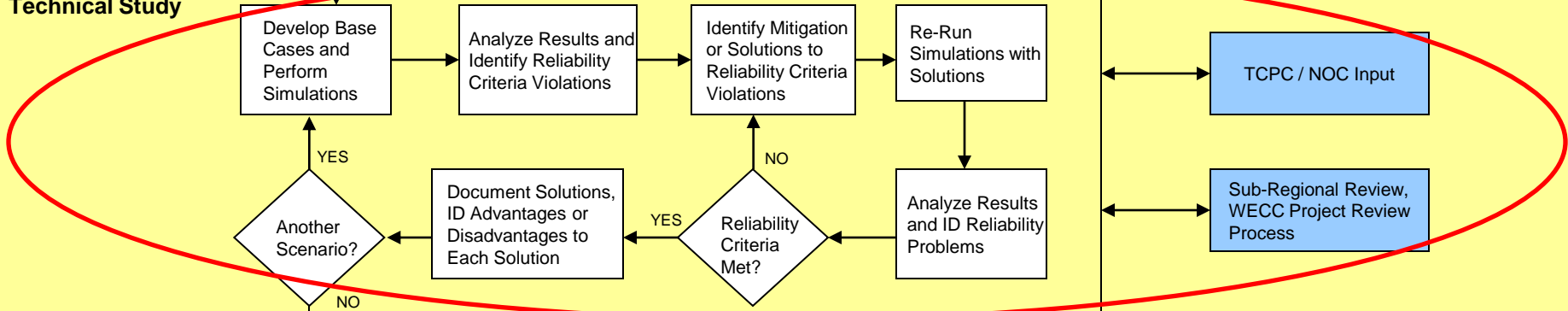
Quarter	Planning Steps	Data Collection	TCPC Meetings
Q4	Study Scope, Data Collection & Scenario Development	Open	X
Q1	Technical Study	Optional	X
Q2		Closed	X
Q3	Decision & Reporting		

LTP Study Process

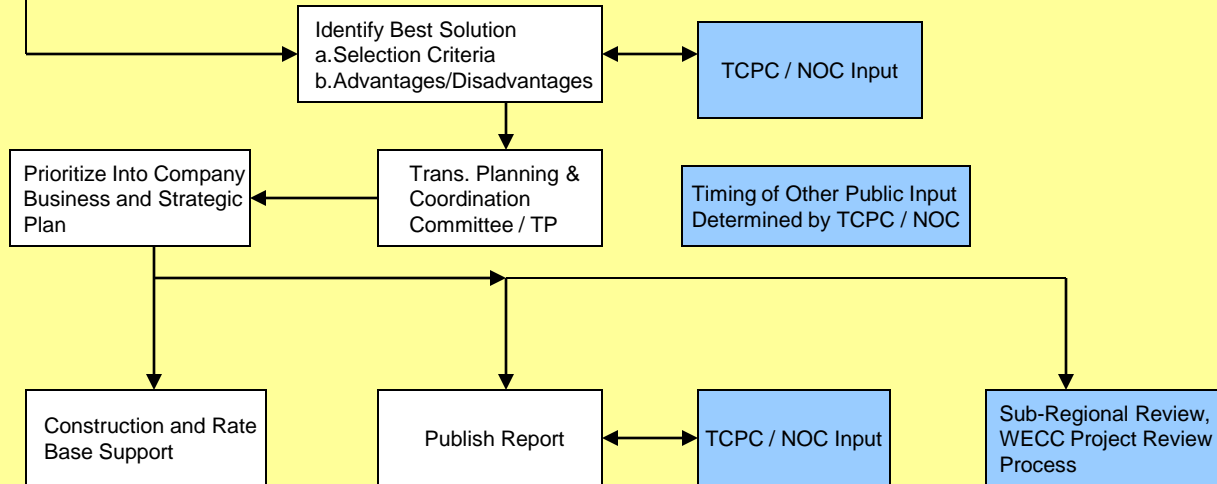
Data Collection, Study Scope and Scenario Development



Technical Study



Decision And Reporting

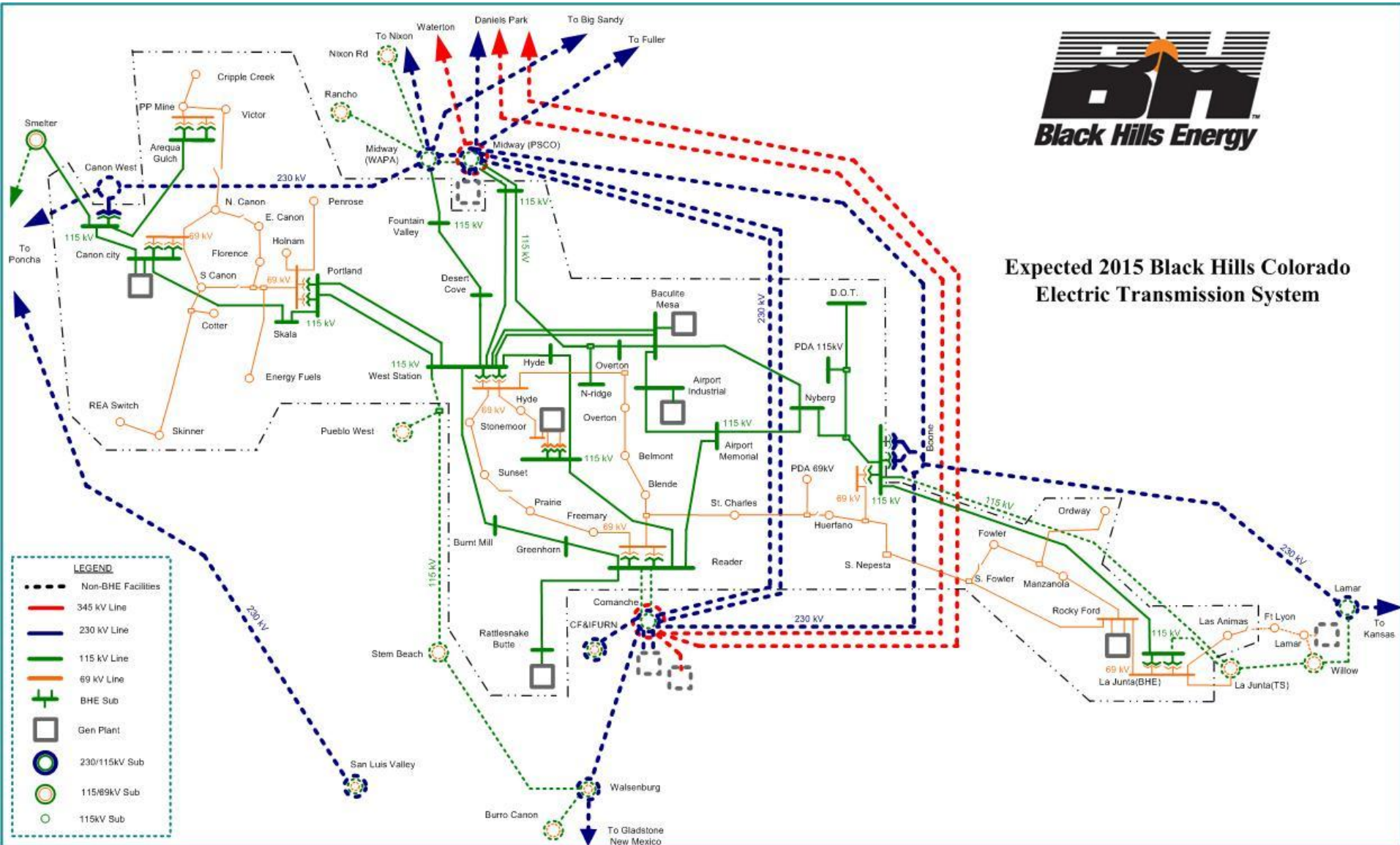


LTP Study Scope

- 2015 and 2021 timeframes
- Analyze peak and off-peak scenarios
 - Power Flow
 - Transient Stability
- Use NERC/WECC planning criteria
- Evaluate N-0, N-1, N-2 and N-1-1 scenarios (Category A-C)
- Worst-case extreme outages evaluated (Category D)
- Validate committed projects/recommend additional solutions
- Include SB-100 analysis



Expected 2015 Black Hills Colorado Electric Transmission System



Near Term Baseline Cases

- 2015 Heavy Summer (peak)
 - Starting Case: TSG&T 2015HS LGI Case
 - BHCE Loads + Losses = 483 MW
- 2015 Light Autumn (off-peak)
 - Starting Case: TSG&T 2015LA LGI Case
 - BHCE Load + Losses = 323 MW

Far Term Baseline Case

- 2021 Heavy Summer (peak)
 - Starting Case: WECC 21hs1a1p.sav
 - Updated for Regional DEEP study
 - BHCE Load + Losses = 515 MW
- 2021 Light Winter (off-peak)
 - No longer evaluating this scenario

SB-100 Overview

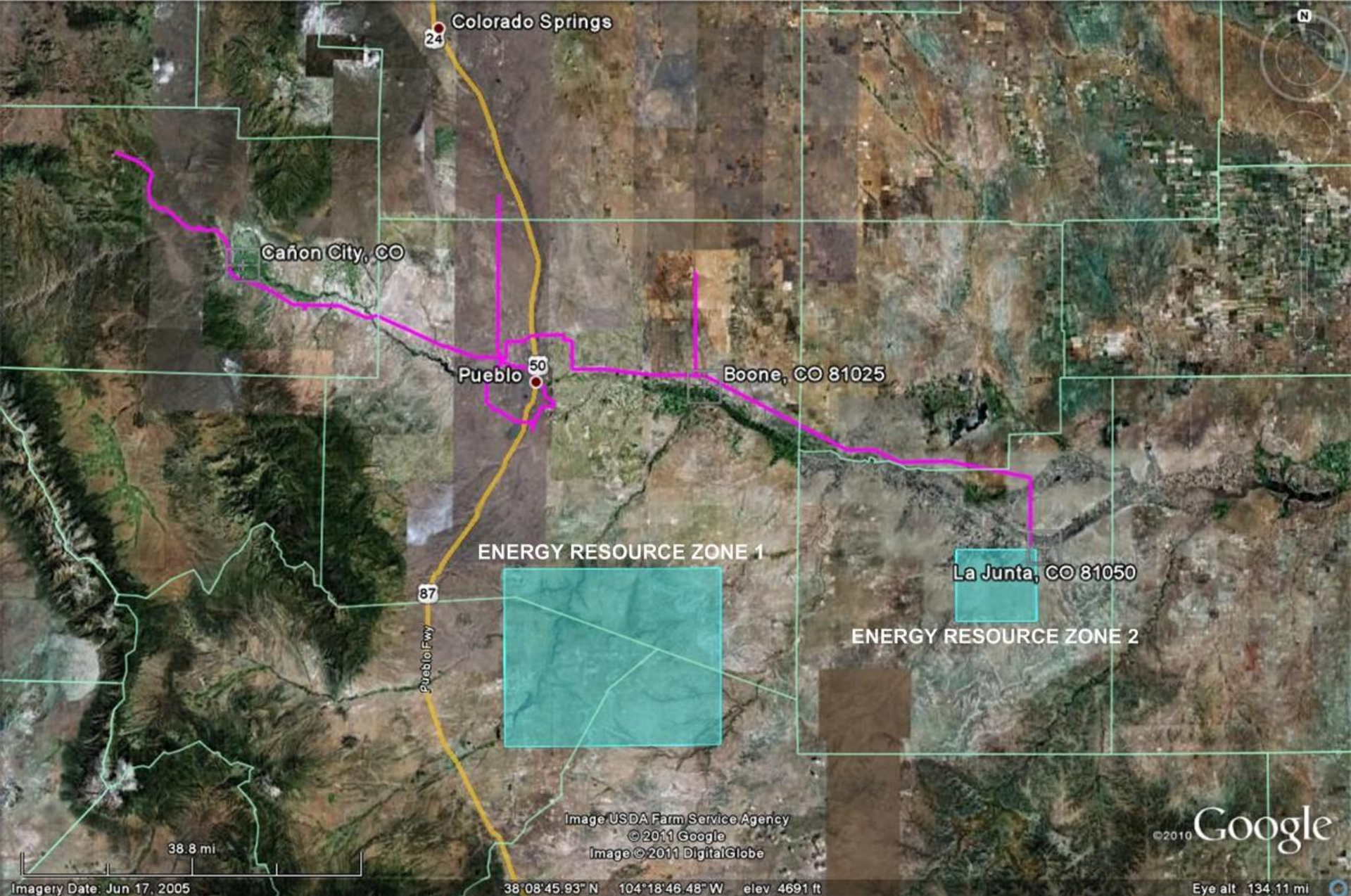
- On or before October 31 of each odd-numbered year, submit to the Commission:
 - Designated Energy Resource Zones
 - Plans for construction or expansion of transmission facilities
 - Applications for Certificates of Public Convenience and Necessity

Senate Bill 07-100 Scenarios

- Model transmission facilities to accommodate resource injection from Energy Resource Zones (ERZ)
- Identify maximum resource injection into BHCE system from each ERZ
- Perform SB-100 sensitivity for each of the TCPC study cases

SB-100: ERZ Identification

- Selected based on publicly announced generation projects and the BHCE Generator Interconnection Queue
- Two active requests used for the 2011 SB-100 ERZ selection



2015HS SB-100 Initial Results

(ERZ #1-South of Pueblo)

- Conductor thermal limit reached on Burnt Mill-W. Station 115 kV line (100 MVA) for ERZ Injection of **140 MW****
 - Baculite Mesa-W. Station + Reader-Pueblo 115 kV (N-1-1)
- Reader-Pueblo 115 kV overload for multiple N-1 & N-1-1 outages
 - Overloads mitigated by removing CT limitation
- Reader-Blende 69 kV overload for single N-1-1 outage
 - Overload mitigated by removing CT limitation

**Not including planned 29 MW wind project (modeled online) at Rattlesnake Butte substation

2015HS SB-100 Initial Results

(ERZ #2-La Junta)

- Conductor thermal limit reached on Rocky Ford-LaJunta (BH) 69kV line (41 MVA) for ERZ Injection of **50 MW**
 - Boone-LaJunta (BH)+ LaJunta (TS)-LaJunta (BH) 115 kV (N-1-1)
- LaJunta (BH) 115:69 kV transformer continuous thermal limit reached for ERZ Injection of **50 MW**
 - LaJunta (TS)-LaJunta (BH) 115 kV + LaJunta (BH)115:69 XFMR (N-1-1)
 - Assumed 42 MVA rating on both La Junta (BH) 115:69 transformer replacements for this analysis

2015LA SB-100 Initial Results

(ERZ #1-South of Pueblo)

- Conductor thermal limit reached on Burnt Mill-W. Station 115 kV line (100 MVA) for ERZ Injection of **140 MW****
 - Reader-Airport Memorial+ Reader-Pueblo 115 kV (N-1-1)
 - Overload occurs for greater number of outages as injection approaches 160 MW.
- Reader-Pueblo 115 kV overload for single N-1-1 outage with ERZ Injection of **160 MW****
 - Overloads mitigated by removing CT limitation

**Not including planned 29 MW wind project (modeled online) at Rattlesnake Butte substation

2015LA SB-100 Initial Results

(ERZ #2-La Junta)

- Conductor thermal limit reached on Rocky Ford-LaJunta (BH) 69kV line (41 MVA) for ERZ Injection of **45 MW**
 - Boone-LaJunta (BH) + LaJunta (TS)-LaJunta (BH) 115 kV (N-1-1)
- Boone 115:69 kV XFMR continuous thermal limit reached (33 MVA) for ERZ Injection of **45 MW**
 - Boone-LaJunta (BH)+ LaJunta (TS)-LaJunta (BH) 115 kV (N-1-1)

2021 HS SB-100 Initial Results

(ERZ #1-South of Pueblo)

- Conductor thermal limit reached on Reader-Rattlesnake Butte 115 kV line (222 MVA) for ERZ Injection of **190 MW****
 - System Intact overload on radial transmission line

**Not including planned 29 MW wind project (modeled online) at Rattlesnake Butte substation

2021 HS SB-100 Initial Results

(ERZ #2-La Junta)

- LaJunta (BH) 115:69 kV transformer continuous thermal limit reached for ERZ Injection of **40 MW**
 - LaJunta (TS)-LaJunta (BH) 115 kV + LaJunta (BH) 115:69 XFMR (N-1-1)
 - Assumed 42 MVA rating on both La Junta (BH) 115:69 transformer replacements for this analysis
- Conductor thermal limit reached on Rocky Ford-LaJunta (BH) 69kV line (41 MVA) for ERZ Injection of **50 MW**
 - Boone-LaJunta (BH) + LaJunta (TS)-LaJunta (BH) 115 kV (N-1-1)

SB-100 Conclusions: ERZ #1

- Assume all terminal equipment limitations removed
- ERZ #1 can accommodate 140 MW of new generation before overloading Burnt Mill-W. Station 115 kV line, assuming SLV-Calumet-Comanche and Lamar-Front Range facilities are not in service.
- ERZ #1 can accommodate 190 MW of new generation before overloading Reader-Rattlesnake Butte 115 kV line, assuming SLV-Calumet-Comanche and Lamar-Front Range facilities are in service.
- Planned Reader-Rattlesnake Butte 115 kV line needed to deliver potential renewable energy resources to BHCE load.

SB-100 Conclusions: ERZ #2

- Assume all terminal equipment limitations removed
- ERZ #1 can accommodate 40 MW of new generation before reaching La Junta (BH) 115:69 xfmr continuous thermal rating (assumed replacement rating)
- ERZ #1 can accommodate 45 MW of new generation before reaching the Rocky Ford-LaJunta (BH) 69kV conductor limit and the Boone 115:69 kV transformer continuous thermal rating

2015HS TCPC Initial Results (Canon City Area 115 kV)

- Arequa Gulch low voltages for A. Gulch-W. Canon 115 kV outage
- Poncha-Smelter 115 kV line overloads for Portland-Skala or Skala-Canon City prior outage + W. Canon 230:115 xfmr forced outage (low voltages also)
- W. Canon 230:115 kV transformer and Canon City-W. Canon 115 line overloads following loss of both Portland-W. Station 115 kV lines
- W. Station-Portland #1 115 kV line overloads for N-1-1 loss of W. Station-Portland #2 and W. Canon-Canon City 115kV lines

2015HS TCPC Initial Results (Canon City Area 69 kV)

- N-1 overloads on Portland 25 MVA 115:69 kV transformer
- N-1-1 overload on Portland 42 MVA 115:69 kV transformer
- N-1-1 overload on Canon City 115:69 kV transformer
- Canon City area 69 kV low voltages for N-1 and N-1-1 outages
- N-1-1 overloads on Portland-Highland and Canon City-S. Canon W. 69 kV lines

2015HS TCPC Initial Results (Pueblo Area)

- N-1 overloads on both W. Station 115:69 kV transformers
- N-1 overloads on Reader-Freemary 69 kV line
- St. Charles 69 kV low voltages for N-1-1 outage
- N-1-1 overloads on Reader-Blende-West Station 69 kV lines

2015HS TCPC Initial Results (Rocky Ford Area)

- La Junta (TS) 115:69 kV transformer overload for single N-1-1 outage of La Junta (TS)-La Junta (BH) and Boone-La Junta (BH) 115 kV lines.
- Mitigated by dispatching Rocky Ford diesel generation, moving load around on 69 kV system, etc.

2015LA TCPC Initial Results

- No new violations identified in the light autumn case that were not in the heavy summer case

Initial TCPC Mitigation Options

- Capacitors at Canon City and Arequa Gulch 115 kV buses
- Replace Portland 25 MVA transformer
- Replace all limiting terminal equipment
- Evaluate possible 115 kV transmission into Canon City area
- Evaluate additional transformation needs in Pueblo area (115:69 kV) and Canon City area (230:115, 230:69, 115:69)

Next Steps

- Seek input regarding results and solutions
- Finish Study Analysis:
 - Complete dynamic assessment
 - Complete evaluation of mitigation options
- Compile results and provide draft TCPC report for stakeholder review and approval
- Hold follow-up meeting as necessary to complete 2011 study cycle.

Stakeholder Comments

Comments / Suggestions

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