

Colorado Long Range Transmission Planning Group

2015 Study

August 17, 2006

Purpose

- Develop 10-Year Coordinated “Backbone” Transmission Plans for the Front Range of Colorado
- Accommodate Planned and Potential Generation Projects
- Identify Regional Issues
- Estimate 10-year Transmission Costs
- Reliability Studies
 - Powerflow and Stability
 - No Production Cost

Principles

- **Adhere to NERC/WECC Reliability Standards and Criteria**
- **Develop transmission that could accommodate a variety of generation placement (or options),**
- **Consider the needs and interests for Colorado load-serving entities by conducting joint planning, Maximize use of existing transmission corridors where prudent,**
- **Manage issues associated with parallel low voltage networks,**
- **Establish new transmission corridors,**
- **Establish high-voltage transmission corridors,**
- **Construct for higher voltage operation where appropriate,**
- **Plan corridors to allow for future circuits where appropriate,**
- **Acquire additional rights-of-way when possible for future transmission,**
- **Build new transmission adjacent to existing substations to allow for future sectionalizing.**

Participants

- ▶ Open Invitation – All Stakeholders Invited to Participate
- ▶ Study Work Limited to Transmission Owners for Efficiency:
 - Aquila Networks
 - Colorado Springs Utilities
 - Platte River Power Authority
 - Public Service Company of Colorado / Xcel Energy
 - Tri-State Generation and Transmission
 - Western Area Power Administration

Transmission Definitions

▶ Primary Backbone

- High-voltage facilities 230 kV and above, and in the area of study (Northern or Southern), required to provide a transmission path from new generation resources to the major load centers.

▶ Secondary Bulk

- Higher voltage facilities (115 kV to 230 kV range), which are needed to deliver power from the primary backbone system to the load-serving systems.
- The Secondary Bulk for the Southern alternatives includes some transmission that is considered Primary Backbone for the Northern alternatives. Also, the Secondary Bulk for the Northern alternatives includes transmission that is considered Primary Backbone for the Southern alternatives.

▶ Regional

- Required based primarily on regional load growth, and not necessarily influenced by the implementation of additional resources.

Studies

- ▶ Three Resource Scenarios
 - ▶ 1. Standard Southern
 - ▶ 2. Expanded Southern
 - ▶ 3. Northern

Resources

► Southern

- **Planned**
 - Holcomb Project (1200 MW)
 - Comanche Project (750 MW)
- **Potential**
 - Squirrel Project - Potential (500 MW)
 - Expanded – Lamar Area Generation (600 MW)

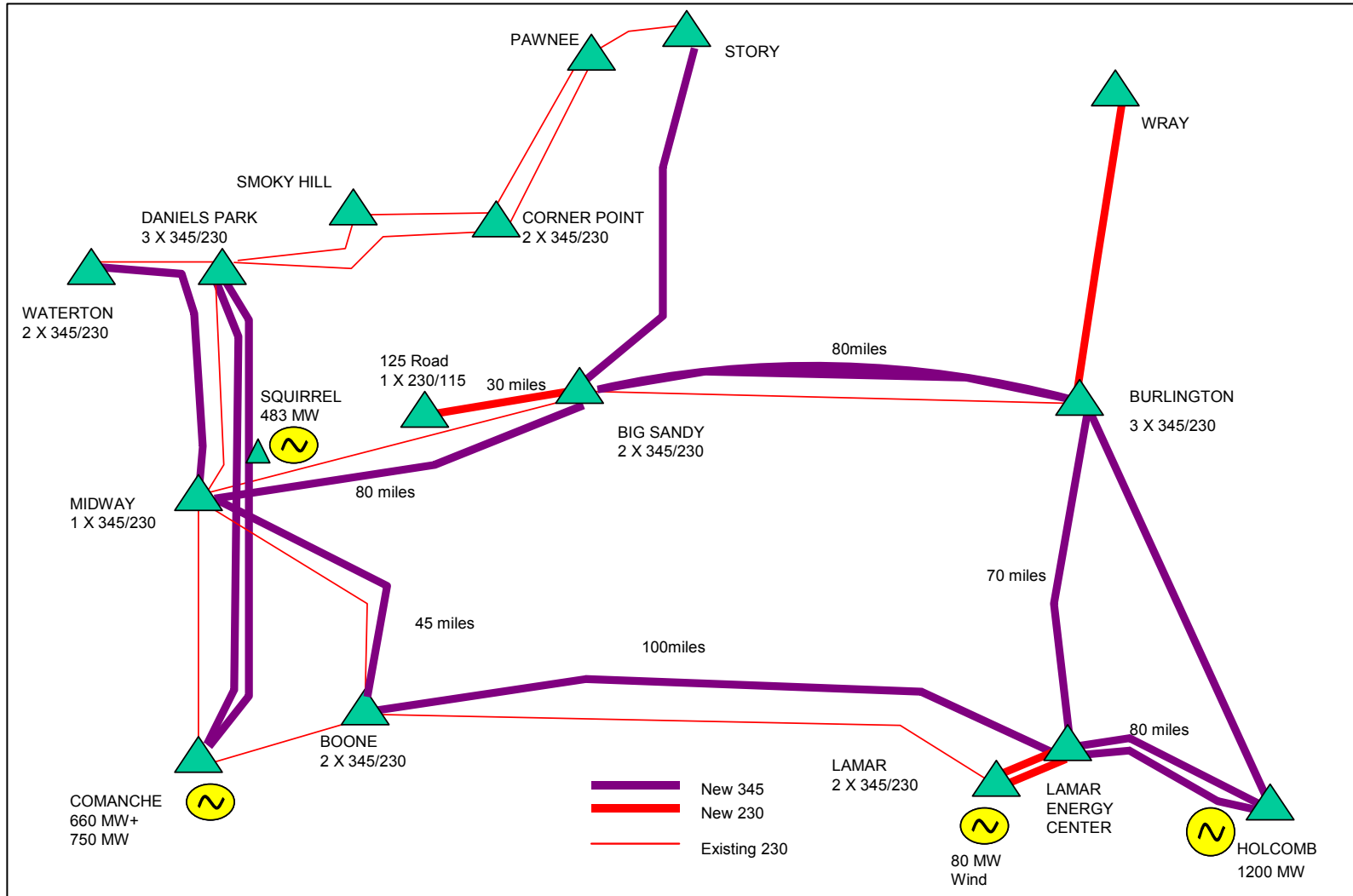
► Northern

- **Planned**
 - Spindle (270 MW)
- **Potential**
 - Spruce (264 MW)
 - Pawnee Injection (900 MW)
 - RMEC Injection (300 MW)
 - Corner Point Injection (500 MW)

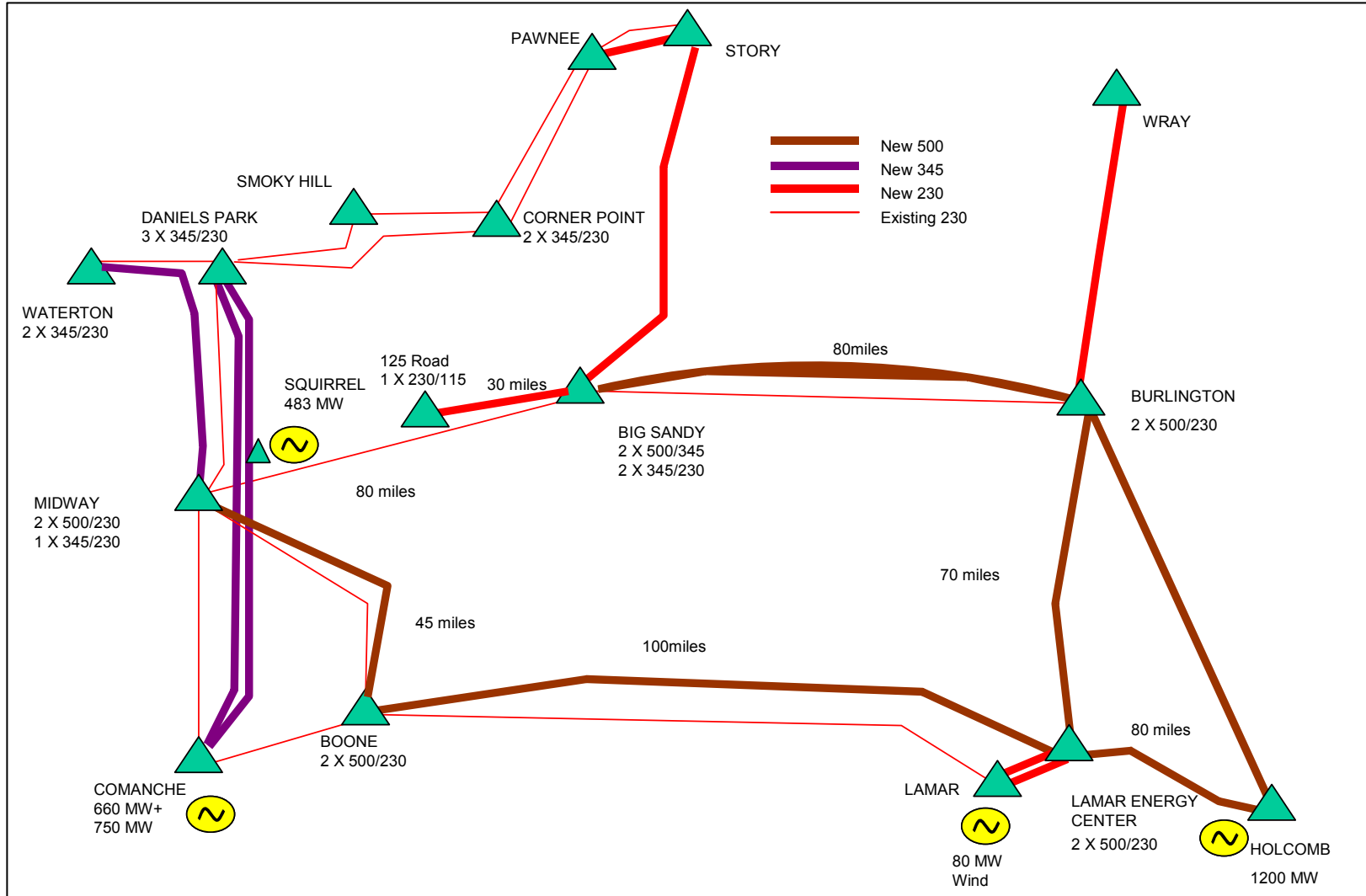
Resource Scenarios

Studied Resources			Scenario Dispatch (MW)		
Project	Interconnection	Utility	Standard Southern	Expanded Southern	Northern
Holcomb		TS	1200	1200	700
Comanche Unit 3	Comanche	PSCo	750	750	600
Squirrel	Comanche – Daniels Park 345	PSCo	483	483	0
Lamar Wind	Lamar	PSCo	80	80	0
Cedar Creek	RMEC – Green Valley 230 kV	PSCo	30	30	300
Spruce	Blue Spruce Energy Center	PSCo	264	264	264
Spindle	St.Vrain – Valmont 230 kV	PSCo	269	269	269
Spring Canyon	Pawnee	PSCo	40	40	400
Corner Point	Pawnee – Smoky Hill 230 kV	PSCo	0	0	500
Pawnee Expansion	Pawnee	PSCo	533	533	533
Rawhide E	Rawhide	PRPA	80	80	80
Lamar Energy Center	Lamar	Independent	0	600	0
Total			3729	4329	3646

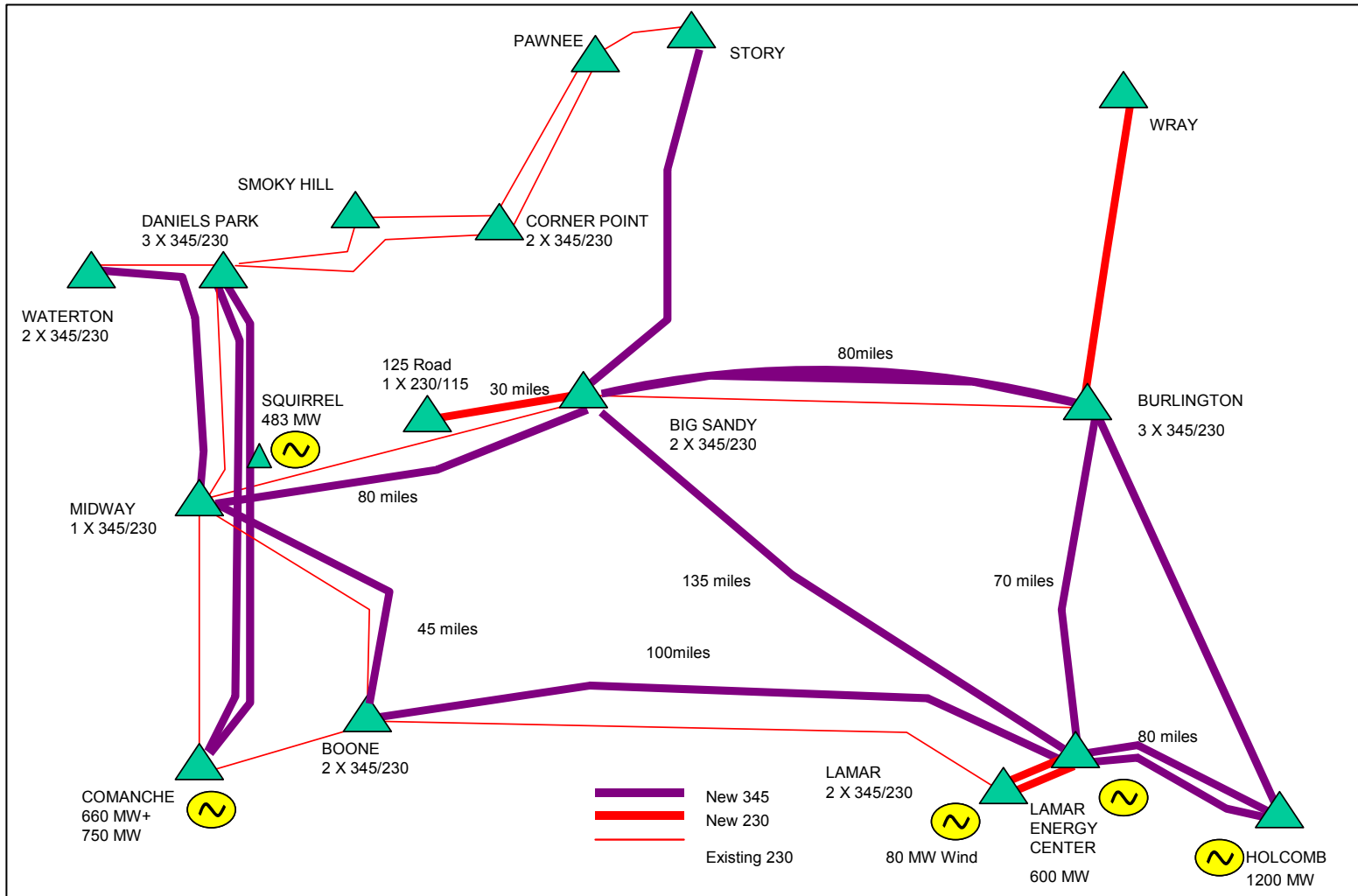
Standard Southern 345 kV Alternative



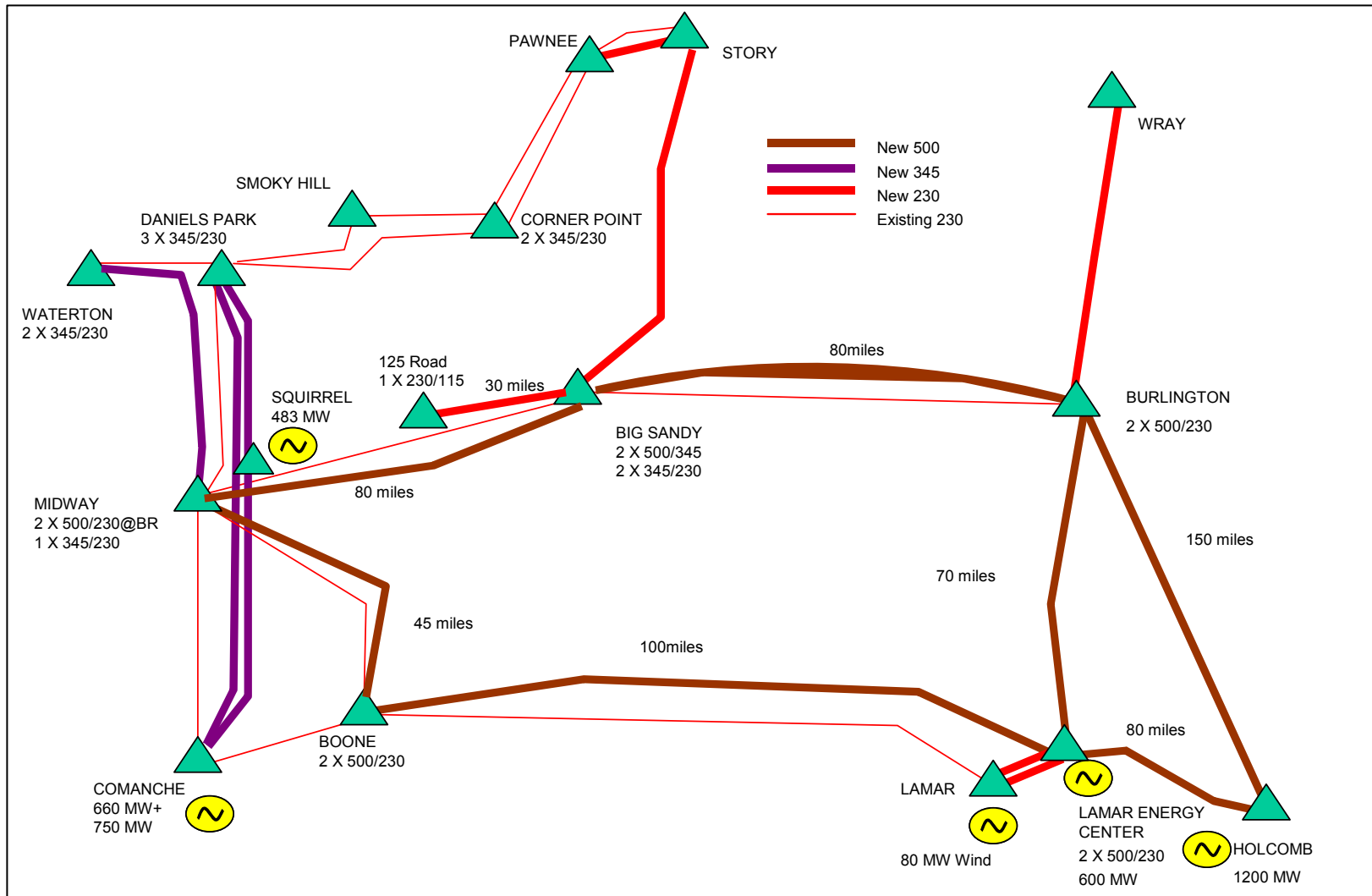
Standard Southern 500 kV Alternative



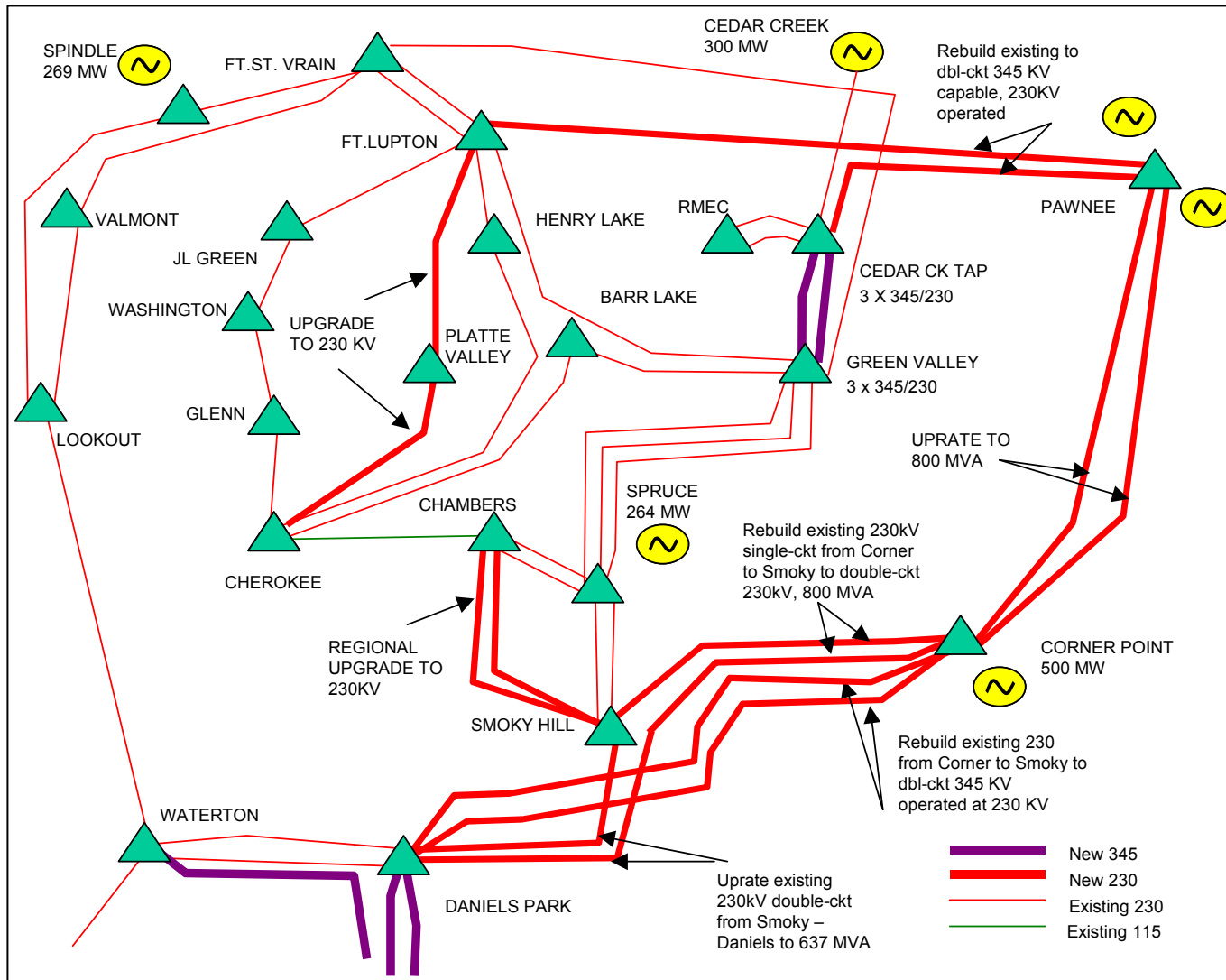
Expanded Southern 345 kV Alternative



Expanded Southern 500 kV Alternative



Northern Alternative 2



Costs

► Scenario Transmission Costs (in \$Millions)

	Standard Southern 345 kV	Standard Southern 500 kV	Expanded Southern 345 kV	Expanded Southern 500 kV	Northern Alt 1	Northern Alt 2
Primary Backbone	\$966	\$1093	\$1058	\$1186	\$177	\$183
Total	\$1,699	\$1,833	\$1,783	\$1,915	\$1,722	\$1,704

Conclusions

1. Two potential transmission alternatives were developed for the Standard Southern scenario. Either of these scenarios appear to accommodate the southern generation resources.
2. Two potential transmission alternatives were developed for the Expanded Southern scenarios. These alternatives did not fully alleviate potential system overloads. However, since the expanded generation is not anticipated until beyond the 2015 time frame, full system solutions were not developed. Post 2015 cases are needed to more accurately quantify required system upgrades for the Expanded Southern scenarios.
3. Two potential transmission alternatives were developed for the Northern scenario. Both of these alternatives appeared to accommodate the northern generation scenarios studied.

Future

When Resources are firmed up:

- ▶ Integration of the Northern and Southern resource scenarios
- ▶ Specific backbone transmission facilities required
- ▶ Develop the appropriate network upgrades in the Denver-metro region
- ▶ Additional analyses of the Expanded Southern scenarios.

Q&A

- http://www.rmao.com/wtpp/CO_Transmission_Planning_Group.html