

March 18, 2011
Tri-State Generation and Transmission Association, Inc.
Response to Request for Economic Studies

Reference December 28, 2010 Request from Inez G. Dominguez, P.E., CPUC Staff

On Dec 28, 2010 Tri-State received a request for two economic studies from Inez Dominguez of the Colorado Public Utilities Commission staff. The request also was submitted to Public Service Company of Colorado (PSCO) and Black Hills Energy. Tri-State, PSCO, and Black Hills conferred on the request but each transmission provider is submitting responses independently.

Economic Study #1:

Are there generating units in Colorado run out of economic dispatch order because of local transmission reliability issues? Will this situation arise in any year of the ten year planning horizon?

Answer:

Tri-State has adequate transmission assets to operate generation within the State of Colorado in economic dispatch order with all transmission elements in service (i.e. N-0 conditions). During times of transmission maintenance or unplanned transmission outages, there may be the need for limited generation redispatch. Tri-State has not evaluated the impacts of potential local transmission limitations on the economic dispatch of units not owned by Tri-State within the State of Colorado. With regard to transmission reliability issues, the transmission system in Colorado is designed, constructed, operated and maintained to standards that result in a high degree of availability.

Over the next ten years, load growth near existing generation resources has the potential to reduce the transfer requirements across constrained boundaries. For example, load growth on the Western Slope of Colorado will tend to reduce transfers from the Craig Station, the Nucla Station, and the Rifle Generation Station across TOT5, to Eastern Colorado. Over the next ten years, as transmission limitations are factored into new generation and transmission siting, economic dispatch order should be maintained.

Economic Study #2

Given the transmission constraints within Colorado and limited available transmission capacity connecting Colorado to neighboring states, is Colorado foregoing the opportunity to access (either firm or non-firm) more economical generation in neighboring states? If the answer is yes, what is the economic penalty for not having access to more economical generation, and what is the nature and cost of transmission upgrades necessary to improve the transmission capacity?

Answer:

Conceptually, it is possible that Colorado may be foregoing opportunities to access more economical generation in neighboring states. However, whether such opportunities actually exist is determined by

changing market conditions and costs of transmission upgrades necessary to facilitate such opportunities. Based on current market and cost information, Tri-State does not believe that it is foregoing opportunities to access more economical generation in neighboring states due to transmission constraints.

Any time there is a price differential between locations, it is suggestive of transmission constraints. Such pricing differences exist between trading hubs such as Palo Verde, Four Corners, Mid-Columbia (Mid-C) and the California-Oregon Border (COB). If additional transmission capacity were constructed to connect Colorado to these various trading hubs, then presumably additional transactions would occur, the regional generation fleet would presumably be dispatched more efficiently, and regional utilities would recognize benefits as a result. Key issues include the following:

1. Do the benefits of more efficient dispatch outweigh the costs of transmission system expansion?
2. Would generation expansions be more effective at reducing locational pricing differences?

This cost/benefit calculation is common in the gas pipeline industry, and the expansion of interstate pipelines is largely driven by economic considerations rather than reliability considerations. That said, the gas pipeline business differs from the electric transmission business in many ways, including transfer rights that are clearly defined, no east/west interconnection boundaries and importantly, much deeper and more liquid markets which allow for financial hedging.

In addition to building transmission from Colorado to these trading hubs, transmission would have to be constructed within Colorado to effectively deliver the energy to load centers.

In the states that surround Colorado, circumstances vary considerably. Construction of transmission for the purpose of accessing market in Nebraska, Kansas and Oklahoma would require the construction of AC-DC-AC converter stations, which would add to project cost and losses. Utah, Wyoming, and New Mexico have wholesale markets that are driven by resource stacks that are similar to those in Colorado. The resulting wholesale electricity market pricing is similar to Colorado, and the price differentials are unlikely to drive construction of transmission projects. Additionally, the relatively long distances between trading hubs and the relatively low population (and load) densities in the region tend to be economic hurdles.

There is limited information available regarding the prevailing wholesale electricity market price in Colorado, however Tri-State's experience indicates that Colorado pricing is generally similar to Mid-C and/or Four Corners pricing.

Figure 1 shows historic daily on-peak pricing at Four Corners, Palo Verde and Mid-C over from January 1, 2009 through mid-February, 2011. It is clear from the graph that the price at these three market hubs is highly correlated.

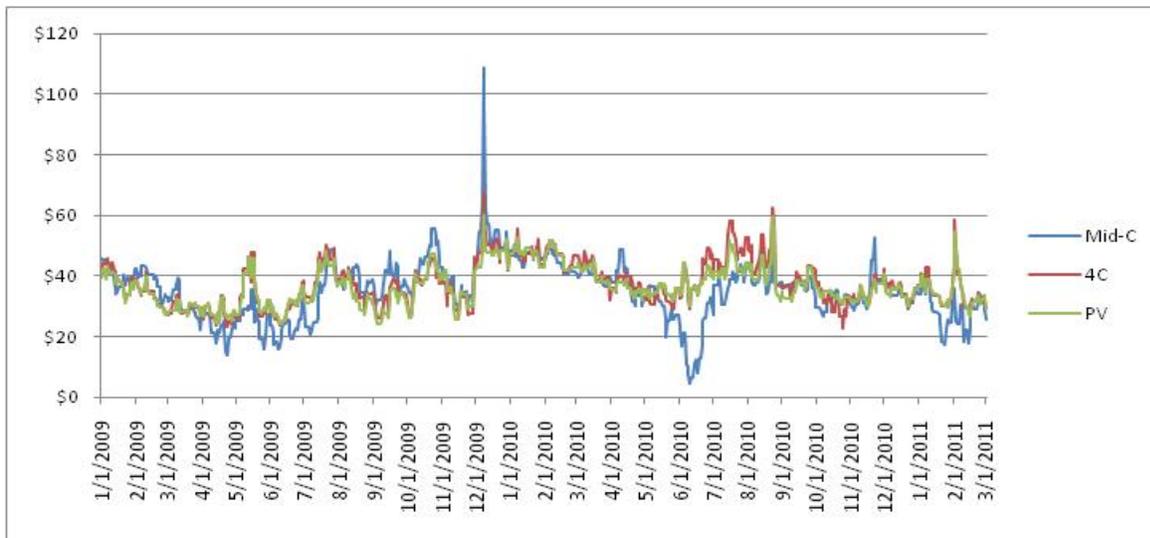


Figure 1: Historical Trading Hub On Peak Pricing

The average on-peak price at each of the hubs over this time period is as follows:

MID-C	4C	PV
\$ 35.34	\$ 37.53	\$ 36.63

The maximum price differential between market hubs is \$2.20 per MWH (Mid-C vs. 4C) and the smallest price differential is \$0.90 per MWH (PV vs. Four Corners).

Again, Tri-State’s experience is that Colorado pricing varies between Four Corners and Mid-Continent pricing. If for the sake of simple analysis we were to assume a \$3.00 per MWH price differential between the Front Range of Colorado and Four Corners, and if we assume this differential would not be impacted by construction of a new line with 500 MW of new capacity from the Front Range to Four Corners, the benefit from access this market could be calculated as follows:

$$\text{Annual Benefit} = 8,760 \text{ hours per Year} * 500 \text{ MW} * \$3/\text{MWH}$$

$$\text{Annual Benefit} = \$13.14 \text{ Million}$$

If new transmission expense is conservatively estimated at \$1 million/ Mile, and the distance is approximately 400 Miles, then the projected investment would be \$400 Million. A \$13 million annual revenue stream will not support such an investment. A more detailed cost estimate would likely show that transmission cost would likely be much more than \$ 1 million per mile to cross the Rocky Mountains; additionally the distance would likely be much greater than 400 miles to avoid sensitive areas.

It should be noted that the price of wholesale electricity has decreased substantially over the last three years, and if market prices were to rebound a different result could occur. However, pricing forecasts generally indicate a slow rebound occurring over a many-year time period.

This analysis indicates that the payback on such an investment would not justify the capital expense, and so Tri-State would likely not move forward with such a project, absent other benefits.