



Interconnection Feasibility & System Impact Study Report Request # GI-2012-5 and GI-2014-1

Interim Report

300 MW Wind Generating Facility
Missile Site 230 kV Station, Colorado

May 30, 2014

Executive Summary

Public Service Company of Colorado (PSCo) received interconnection requests GI-2012-5 (200 MW) and GI-2014-1 (100 MW) for an aggregate of 300 MW wind generating facility. The point of interconnection (POI) requested for GI-2012-5/GI-2014-1 is the Missile Site 230 kV bus and the generating facility will interconnect to the POI using a new 230 kV, 59.4 miles radial transmission line. The in-service date (ISD) requested for GI-2012-5/GI-2014-1 generating facility is January 31, 2016, and the requested service type is Network Resource Interconnection Service (NRIS) and Energy Resource Interconnection Service (ERIS).

The Feasibility & System Impact Study was performed using a 2016 heavy summer (2016HS) power flow base case. The study includes steady state power flow for the Benchmark case (Before GI-2012-5) and the Study case (After GI-2012-5). The 2016HS base case was updated to set the TOT-3 major path flow (north-south) at 896 MW and to dispatch the existing and planned wind generation interconnected at Pawnee and Missile Site stations at their maximum expected coincident output (based on 2012-13 winter operating data). The resulting Benchmark case was then used to create the Study case by adding GI-2012-5 at the Missile Site 230kV bus and dispatching the generator at 300 MW rated output. The wind generation dispatch used at Pawnee and Missile Site stations in the two cases is as follows:

- ✓ Peetz Logan (Pawnee 230kV) = 80% of rated capacity = 460 MW
- ✓ Limon I and Limon II (Missile Site 345kV) = 96% of rated capacity = 384 MW
- ✓ Cedar Point (Missile Site 230kV) = 96% of rated capacity = 240 MW
- ✓ Planned Limon III (Missile Site 345kV) = 96% of rated capacity = 192 MW
- ✓ Proposed GI-2012-5 (Missile Site 230kV) = 100% of rated capacity = 300 MW

The primary purpose of the Feasibility & System Impact Study is to determine the network upgrades required, if any, in PSCo's interconnected transmission system for delivery of additional 300 MW of generation injected into the Missile Site 230 kV bus to the PSCo network loads; that is, the Network Upgrades for Delivery required for GI-2012-5/GI-2014-1 to achieve 300 MW NRIS. This interim study report provides a preview of the study results and conclusions.

Based on the results of 2016HS steady-state power flow analyses, it is determined that injecting 300 MW at Missile Site 230 kV bus results in heavy N-1 thermal overloads on



the Smoky Hill 345/230 kV auto-transformers and the Clark – Jordan 230 kV (underground) line. Without any transmission upgrades to mitigate these two significant thermal constraints – that is, by only utilizing the existing transmission capability in PSCo’s transmission system – GI-2012-5/GI-2014-1 may be interconnected as an NRIS/ERIS at partial output of (approx.) 30 MW.

Network Upgrades are needed to increase the 345/230 kV transformation capacity at Smoky Hill and to increase the capacity (i.e. facility rating) of Clark – Jordan 230 kV (underground) line. However, transmission reinforcements consisting of the addition of a third 345/230 kV, 560 MVA auto-transformer at Smoky Hill and the replacement of the Clark-Jordan 230 kV underground cable are not stand-alone planned projects in PSCo’s five-year planning horizon. Instead, PSCo has proposed the Pawnee – Daniels Park 345 kV project to the Public Service Commission (PSC) of Colorado, which includes the addition of a third auto-transformer at Smoky Hill within its scope. Further, studies performed for the Pawnee – Daniels Park 345 kV project indicate that it also alleviates the thermal overload on the Clark – Jordan 230 kV (underground) line. The proposed Pawnee – Daniels Park 345 kV project is expected to provide the transmission capacity needed to facilitate integration of additional generation resources at Pawnee and Missile Site locations in the PSCo system. More information on this SB-100 project can be found at: <http://www.sb100transmission.com/projects/pawnee-daniels-park/index.asp>

Therefore, the earliest that GI-2012-5/GI-2014-1 may be interconnected to achieve 300 MW NRIS – and thereby also qualify as a PSCo DNR (Designated Network Resource) – would be concurrent with the in-service date of the Pawnee – Daniels Park 345 kV project, which is currently proposed to be in 2019. Prior to the 2019 in-service date of the proposed transmission project, GI-2012-5/GI-2014-1 may be interconnected as NRIS at partial output of (approx.) 30 MW, and as ERIS* at full output of 300 MW by using the existing firm or non-firm transmission capacity on an “as available” basis.

* Energy Resource Interconnection Service allows Interconnection Customer to connect the Large Generating Facility to the Transmission System and be eligible to deliver the Large Generating Facility's output using the existing firm or non-firm capacity of the Transmission System on an "as available" basis. Energy Resource Interconnection Service does not in and of itself convey any right to deliver electricity to any specific customer or Point of Delivery.