

WILLAMETTE VALLEY
JUNCTION CITY - COTTAGE GROVE AREA
TRANSMISSION SYSTEM STUDY
2012-2016

Executive Summary

The focus of the study is the 230 kV, 115 kV and 69 kV transmission system including transmission and distribution substations in the Willamette Valley, Junction City and Cottage Grove area. The purpose of the study is to identify system constraints and local reinforcements needed to meet area load growth for the period from summer 2012 to winter 2016-17.

The coincidental PacifiCorp load in the study area is projected to peak at 579 MW in summer 2016 and 644 MW in winter 2016-17. Based on historical load data, the annual load growth rate is 1.3% in summer and 1.2% in winter. The area load factor is 52.6%.

The more significant system deficiencies identified in the study include the following:

Fry Reactive Support

System reinforcements are needed during the study period to maintain NERC TPL-002 planning criteria for loss of the Bethel – Parrish Gap 230 kV line. This contingency begins to overload the Albany – Hazelwood 115 kV line in summer 2015. In addition, loss of the Parrish Gap – Fry 230 kV line or a single 230-115 kV transformer at Fry is shown to reach or exceed the continuous rating of the 115 kV line. The long-term solution is to rebuild the Albany – Hazelwood line and construct a 115 kV ring bus at Hazelwood. This project is also driven by several system deficiencies associated with the Hazelwood Substation configuration, equipment condition and anticipated load development in Millersburg. The heavy loading between Albany and Hazelwood is partly caused by large reactive demand on the transmission system in the area. The recommended interim project is to construct a 115 kV four-stage 100 MVAR capacitor bank at Fry Substation. The proposed reactive support will meet compliance with TPL-002 beyond the study period, will address four existing system deficiencies and will defer the tie line rebuild and construction at Hazelwood. This project is planned for 2014.

Fry 115 kV Bus Configuration and Relaying

Due to the existing substation topology at Fry, a fault on the 115 kV main bus will open the Fry terminal of the Lebanon loop. This contingency can result in low voltage at Lebanon Substation during typical generation level at Green Peter and Foster plants and cause overload of BPA's 115 kV system between Albany and Lebanon and voltage collapse during minimal generation. This contingency may not meet TPL-003 planning criteria depending on the generation level. The recommended addition of a 115 kV breaker for the Lebanon line on the bypass bus at Fry will allow the Lebanon loop to stay intact during a 115 kV bus fault, supplied from an alternate bus. It is proposed to install the bypass bus breaker on the Lebanon line along with two additional breakers for the Corvallis and Conser lines in 2014 to improve reliability.

A transformer fault at Fry with a stuck breaker on the 115 kV main bus transformer position will clear the 230 kV ring bus, both transformers and the 115 kV main bus, causing voltage and loading issues on the Lebanon system. A similar contingency with a stuck breaker on the bypass bus will clear the 230 kV ring bus, both transformers and the bypass bus, while all lines and load remain connected to the main bus. This contingency does not meet TPL-003 criteria as it overloads the 115 kV system between Albany and Oremet at typical generation and results in voltage collapse during minimal generation at Green Peter and Foster. The recommended project to replace the transformer differential relays will mitigate this deficiency and ensure compliance with NERC planning criteria. This project is proposed for 2014.

Corvallis 115 kV Loop N-1 Contingency Capacity

For an outage of the Hazelwood – Circle Tap line, the loading on the Fry – Circle Blvd line can reach 109% at the 2012 summer peak load level after all possible switching, increasing to 113% by 2016. Operating with the Hazelwood – Circle Tap line section out of service will result in 9 MW of load shedding in 2012 and up to 13 MW in 2016. The recommended solution is to reconductor the limiting 1.1-mile section of 397.5 ACSR with 1272 ACSR. This project will allow utilization of the 556.5 ACSR rating, increasing the line's summer capacity by 32 MVA. It is also recommended to reconductor the getaway from Circle Blvd. Substation to Circle Tap with 795 ACSR or larger conductor as this section is projected to overload for contingency just outside of the study period.

Lebanon/Sweet Home 115 kV System Contingency Support

For loss of the Fry – Lebanon line, the Lebanon loop will be supported by the alternate Albany (BPA) source. During typical generation level this outage causes low voltage at Lebanon, Crowfoot and Sweet Home in summer and winter. When generation is not available, the line outage will result in overload of BPA's 115 kV system between Albany and Lebanon and low voltage at Green Peter, Foster, Sweet Home, Crowfoot and Lebanon in summer and cause voltage collapse in winter. It will be necessary to shed up to 26 MW in summer and 40 MW winter in the first year of the study. The load shedding requirement increases to 29 MW in summer and 46 MW in winter by 2016. The study proposes to construct a 115 kV five breaker ring bus at Lebanon (BPA) and build a 0.25-mile 115 kV double-circuit that would loop the Crowfoot – Sweet Home line into Lebanon (BPA). This solution will provide support for the Lebanon loop in the event of the Fry – Lebanon line outage, mitigating all deficiencies during typical generation and significantly reducing load shedding exposure during minimal generation level. Adding a 230-115 kV transformer at Lebanon (BPA) would eliminate all exposure.

Polk Line Conversion

The study identified the need to reinforce the Albany – Hazelwood 115 kV supply and construct a 115 kV ring bus at Hazelwood in the initial phase and ultimately convert the Polk Line to 115 kV when evaluating the effects of anticipated load development in Millersburg and considering existing system constraints in the area. The proposed project will also convert sections of the Vine – Jefferson Tap line to 115 kV to provide an additional source to Murder Creek and Millersburg substations from the Polk Line. Completion of this project will provide a new 115 kV path between Salem and Hazelwood. The proposed project will also mitigate existing system deficiencies

associated with Vine Substation capacity, Hazelwood and MonPac equipment condition, Hazelwood operability and contingency issues, 69 kV system contingency coverage, and Dallas and Independence load service. This project will also be necessary in the long-term to maintain TPL-002 compliance for 230 kV system contingencies between Bethel and Fry.

Santiam 69 kV System Contingency Support

Loss of the 69 kV line between Santiam Switching Station and Lyons or loss of the switching station will require supplying Lyons and Scio substations from Parrish Gap via Jefferson. This contingency configuration overloads the Jefferson Jct – Scio 69 kV line and causes low voltage at Lyons in summer 2012 after all possible switching. During winter 2012-13 this outage overloads the 69 kV system between Jefferson Jct and Evergreen Bio Tap and causes low voltage at Scio and Lyons. By 2016 this contingency results in voltage collapse. The proposed project to construct a 0.74-mile tie between Santiam Switching Station and the Lyons – Scio line will allow Lyons and Scio to be supplied from Santiam via the tie line during contingencies. This project will greatly improve system flexibility for maintenance and contingency coverage.

Lyons Substation Capacity Increase

The 12.5 MVA transformer T-2098 at Lyons is expected to exceed its winter rating after the planned block load addition in the first year of the study. The summer loading is projected to reach 105% of nameplate rating in 2014. There is also a loading issue on the Mill City Feeder supplied from Lyons. The recommended solution is a capacity increase at Lyons and line extension to Mill City. The proposed project will swap the 9.375 MVA T-1182 at Lyons with the 12.5 MVA T-1187 at Junction City and construct a 69 kV line between Lyons and Mill City, initially operated at 20.8 kV. The line extension is planned for 2014 with substation construction proposed for 2015.

Oremet and Brownsville Substation Capacity

Summer loading on T-3746 at Oremet is projected to reach 105% of nameplate rating during the study period after anticipated block load additions. The Brownsville Substation regulator is expected to overload in summer 2015. The Rogersdale Feeder that runs south from Oremet towards Calapooya is reaching capacity. The proposed distribution substation inside Calapooya Substation yard will provide load relief to both substations and the feeder. This project is planned for 2015 pending load requirements.