Long Range System Planning Outline

Purpose:

To outline Platte River's basic methodology, criteria, and processes used in long range system planning.

Implementing Parties and Assigned Responsibilities:

This methodology is applicable to, and the specific responsibility of, the System Planning Manager.

Associated Items:

Transparency principle in FERC Order No. 890

Long Range System Planning:

Platte River has an annual process for updating its Ten-Year Transmission Plan as follows. Platte River and the Owner/Cities coordinate their respective planning activities through the Joint Technical Advisory Committee, which consist of operations, engineering, and planning staff from each entity. The Owner/Cities tell Platte River what new transmission delivery points are needed for them in the ten-year horizon, either a new substation or a new transformer at an existing substation. Each Owner/City prepares its own ten-year load forecasts coincident with the Platte River peak on a delivery point basis. Platte River prepares its own ten-year load forecast on a Platte River (aggregated Owner/Cities) basis. Both "base" and "high" load forecasts are prepared. Platte River uses its "high" load forecast for transmission planning purposes to ensure transmission adequacy in the event actual loads exceed forecasted loads or new transmission construction is delayed.

The sum of the coincident Owner/Cities load forecasts is scaled to match the Platte River "high" load forecast and the corresponding delivery point load projections are represented in the powerflow model. A detailed representation is preferred with loads modeled at the low-voltage bus of the distribution substation transformer in order to capture transformer losses, particularly var losses, which change the power factor of the load as seen by the transmission bus. Since Platte River is a summer-peaking utility, a summer base case is used for the ten-year planning studies.

Network Customer load forecasts are provided and representations in the base case are updated as necessary.

Platte River's resource planning group provides the resource plans for the ten-year horizon.

With the modified ten-year summer planning case, Platte River simulates contingencies according to NERC Reliability Standards TPL-001 through 004 and identifies any performance criteria violations. Possible mitigation alternatives are developed and studied to verify their performance. Platte River meets with the Owner/Cities to present the results with possible alternatives and to receive their feedback on the proposed plan. After Owner/City review and input, Platte River refines the plan, selecting preferred alternatives and developing a timeline for the projects. Preferred alternatives to mitigate transmission performance criteria are selected

based on factors such as right-of-way (new vs. rebuild on existing), diversity of supply lines, feasibility to build, time to completion, system risk during construction, beyond ten-year usefulness, and cost. In order to determine a time-line for projects, years between the operating scenario and the ten-year scenario are studied to determine by what year the problem needs correction. The Ten-Year Transmission Plan is then finalized with maps and a list of projects including in-service dates. In cases where it is not practical to complete projects by the year needed, the timeline will be adjusted to accommodate staffing limitations or anticipated siting or routing delays. These projects are then put into the budget process.

Performance criteria violations that are extended before a project can be placed in-service will be addressed with mitigation procedures developed in the operating season assessments that are performed annually by Platte River.

TOOLS USED TO PERFORM ANALYSES: Platte River uses the Power System Simulator for Engineering (PSS/E) software from Siemens for powerflow studies, the ASPEN OneLiner software from Advanced Systems for Power Engineering for short-circuit studies, and the RateKit software from The Valley Group for steady-state and emergency ratings of overhead lines. Platte River typically contracts with others for any transient stability studies using the PSS/E software. SCADA system snapshots are periodically used to validate the powerflow model and disturbance event reports from SEL relays and DFRs are used to validate the short-circuit model.

CRITERIA USED FOR STUDIES:

Category A – System Normal

"N-0" System Performance Under Normal (No Contingency) Conditions (Category A)
NERC Standard TPL-001-0

Voltage:	0.95 to 1.05 per unit
Line Loading:	100 percent of continuous rating
Transformer Loading:	100% of highest 65 °C rating

Category B – Loss of generator, line, or transformer (Forced Outage)

"N-1" System Performance Following Loss of a Single Element (Category B)
NERC Standard TPL-002-0

Voltage:	0.92 to 1.07 per unit (PRPA) 0.90 to 1.10 per unit (all others)
Line Loading:	100 percent of continuous rating or 15 minute emergency rating where appropriate, 15-minute emergency rating curve for the Weld-Ft. St.Vrain 230 kV
Transformer Loading:	100% of highest 65 °C rating

Category C – Loss of Bus or a Breaker Failure (Forced Outage)

"N-2 or More" System Performance Following Loss of Two or More Elements (Category C)
NERC Standard TPL-003-0

Voltage and Thermal:	Allowable emergency limits as determined by available emergency mitigation plan. Curtailment of firm transfers, generation redispatch, and load shedding may be necessary.

Category D – Extreme Events (Forced Outages)

"N-2 or More" System Performance Following Extreme Events (Category D)

NERC Standard TPL-004-0

Voltage and Thermal:	Allowable emergency limits as determined by available emergency mitigation plan. Curtailment of firm transfers, generation redispatch, and load shedding may be necessary.