



Transmission Asset Management Strategy Executive Summary Appendices

December 2011

Transmission Asset Management Strategy

Appendix A: Strategic direction

Transmission Services’ Asset Management vision and strategic objectives are derived from BPA’s mission, vision and agency-level strategic business objectives.¹ Seven of the strategic objectives are important drivers of this asset management strategy.

Asset Management- *Maximize the long-term value of FCRPS power and transmission assets through integrated asset management practices (supports agency strategic objective 14)*

Transmission Services will manage its assets and capital investment decisions with a comprehensive understanding of the long-term costs, benefits, risks, and strategic opportunities the region faces. In critical areas, transmission assets are aging and need increased maintenance or replacement. New capacity is needed to ensure the agency can provide adequate, efficient and reliable services. Transmission will employ a rigorous, risk-informed and transparent asset management program that applies leading practices in planning, maintaining, expanding, operating and disposing of assets.

FCRPS Operations & Expansion - *Operate and expand FCRPS power and transmission facilities to meet availability and reliability standards in the most regionally cost-effective manner (S2, S8)*

FCRPS operations are increasingly complex and challenging. The Northwest transmission grid and federal power system are now operated in ways not originally envisioned due to dramatic changes in markets, generation resources and transmission patterns. These changes are placing increasing stress and congestion on the grid and creating new requirements for flexibility and capacity in the power system. Expanding and upgrading the aging transmission infrastructure are key to sustaining reliability.

Transmission Services is committed to ensuring transmission availability and reliability through new transmission construction and upgrades that will facilitate an increase in the supply of non-federal capacity services to integrate wind and other generation resources. Likewise, with the need to integrate large amounts of variable generation into the transmission system, Transmission Services will continue to examine and adjust its system and coordination capabilities to ensure the grid continues to operate reliably.

Renewable Energy - *Actively enable renewable resource integration and development through cost-effective, innovative solutions (S6)*

Cost-effective renewable resources are second in priority only to energy efficiency for meeting future energy needs. They offer numerous advantages over other generation sources, including reduced exposure to carbon emissions and to fuel price uncertainty. Many challenges need to be addressed in order to capture the full benefit of renewables for the region and BPA’s customers. These include integrating resources with variable output into the existing system in a way that preserves reliability, protects fish recovery efforts and is cost effective.

**Transmission Asset Management Vision
for managing transmission assets**

We will manage our assets to achieve high reliability, availability and adequacy standards and maximize economic value for the region. We will use efficient and transparent practices that are effective in managing risks and delivering results.

BPA’s Vision

BPA’s will be an engine of the Northwest’s economic prosperity and environmental sustainability. BPA’s actions advance a Northwest power system that is a national leader in providing:

- high reliability;
- low rates consistent with sound business principles;
- responsible environmental stewardship; and
- accountability to the region.

We deliver on these public responsibilities through a commercially successful business.

¹ BPA’s mission statement and strategic objectives are available at: http://www.bpa.gov/corporate/About_BPA/

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Policy & Regional Actions - Promote policies that result in regional actions that ensure adequate, efficient, environmentally responsible, and reliable regional transmission service (S1, S5, S7, S8)

Transmission Services develops policies and facilitates collaborative actions to produce the best outcomes for regional consumers and their requirements for adequate, efficient and reliable electricity. This reflects Transmission Service's mandate to advance innovative regional solutions that balance diverse stakeholder interests. Transmission Services will continue its leadership, facilitation and participation in industry policy and implementation venues, including public policy and decision-making processes; state, regional and West-wide planning and resource adequacy initiatives; national reliability entities; and similar channels to ensure the best outcomes for the region.

Transmission Access & Rates- BPA provides open, nondiscriminatory transmission services (S4)

Transmission Services is committed to providing open access transmission services to all customers as described in the BPA tariff filed with the Federal Energy Regulatory Commission (FERC) while observing the FERC Standards of Conduct. Transmission Services will provide service at cost-based rates that are as low as possible consistent with sound business principles, while making investments to maintain reliability, manage congestion, and provide firm transmission and related services to deliver power from new resources, particularly renewable resources.

Systems and Processes- BPA meets the demands of business operations efficiently and effectively through standardized continuously-improved systems and processes (11)

Transmission Services will broaden its use of disciplined, repeatable, standardized business processes and systems to deliver value in the most efficient and effective manner. We will continually improve systems and processes to meet evolving business needs and deliver high value to our customers and internal clients.

Technology Innovation- BPA solves business challenges and enables breakthroughs using a program of disciplined research and technology innovation that is recognized to deliver high value to the region (15)

Transmission Services will advance research, development and adoption of technologies that improve the reliability, cost-effectiveness, efficiency and environmental sustainability of the FCRPS. Transmission Services will use an approach that is directed toward advancing its strategic objectives. It will foster a wide range of credible business-driven initiatives, continuously refocus resources on the most promising efforts, and ensure that regional stakeholders will benefit from the lessons learned and breakthroughs achieved. Transmission Services will collaborate in this program with other utilities and regional, national and international partners.

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Appendix B: Transmission Services Asset Management Goals and Strategic Objectives

Goals for improving asset management practices

Goals	Strategic initiatives
<p>G1 Transmission asset management practices conform with leading practices.</p>	<p>I-1. Transmission Services employs a structured management system to evaluate, identify and prioritize areas of improvement for the Asset Management program. The gaps are validated with an independent assessment to be conducted in Q3 of FY12 against Asset Management best practices. Ongoing performance is monitored through the Asset Management operational Dashboard. (G1) (Lead: TPB; Support: T, TAMEC, AMS Sponsor Team)</p> <p>Note: Strategic initiatives for G2 are shown in the Expand and Sustain sections below</p>
<p>G2 Expansion, replacements, and maintenance are:</p> <ul style="list-style-type: none"> • Coordinated and integrated • Prioritized to give prompt attention to the most critical assets at greatest risk • Directed at meeting reliability, adequacy, availability and other standards • Directed at minimizing life-cycle costs • Responsive to regional customer needs 	<p>I-2. Streamline and integrate business processes and information systems and train the workforce on process changes through selected projects under the Integrated Program and Project Improvement (IPPI) program (within approved scope, schedule and spending targets) (G1, G3) (Business Sponsor: IPPI Team)</p> <ul style="list-style-type: none"> • TAS/WPSS - Deliver the Transmission Asset System (TAS Outside-the-Fence) and the Work Planning and Scheduling System (WPSS) Information Technology projects (Lead: T, NJ) • Project Management Implementation Plan - Improve project management processes and practices and implement the Project Management Playbook (Business Sponsor: TEP)
<p>G3 Asset management plans deliver on the transmission asset management strategy through an optimized funding and resourcing plan. Projects are completed within scope, on schedule and within budget</p>	<ul style="list-style-type: none"> • Asset Plan Repository/Portfolio Management - Improve processes and tools to, at a minimum, facilitate cross-program prioritization/coordination, effective sequencing/aggregation of work, IPR/OMB financial forecasting (Business Sponsor: TPW) • Asset Plan and Strategy Development - Develop a more structured, systematic, and integrated approach to formulating Asset Strategies/Plans. (Lead: TPO; Support TPW) • IPPI Change Management - Implement a robust, integrated change management strategy and plan to promote acceptance and adoption of business process changes and new systems • Resource Strategies Development - the Strategic Capability Planning Team will develop resourcing strategy recommendations, the TAMEC will review and approve the recommendations for implementation.

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Goals for expanding transmission

Goals

- G4 **Load service obligations and customer service requests are met with solutions that are:**
 - Directed at meeting reliability and other standards at least life-cycle cost
 - Implemented consistent with tariff timelines and requirements and with customer requirements

- G5 **Implement a regional expansion planning process that is long term, integrated with resource planning and directed at minimizing total system costs**

- G6 **A robust grid that effectively and efficiently integrates renewable and other energy resources**
 - Promotes Department of Energy and regional energy policy objectives
 - Enables NW customers to meet their renewable portfolio standards
 - Fosters a geographically diverse wind fleet
 - Provides access to cost-effective balancing reserves
 - Complies with reliability and other standards and with tariff requirements

Strategic initiatives

- I-3. **Improve forecasting ability, conduct screening studies for alternatives (including non-wires alternatives), and develop long-term plans for BPA’s load service areas where system reinforcement is necessary (G4) (Lead: TPP)**
 - Develop metrics for customer requested screening studies to help determine resource requirements and customer service levels.

- I-4. **Evaluate options for providing service to transfer customers that improve reliability and reduce life-cycle costs (G4) (TPP, TPC, SR)**

- I-5. **Implement a regional expansion plan that (1) is long term and integrated with resource planning, (2) meets reliability standards and (3) is directed at minimizing total system costs (by date) (G5) (Lead: TPL; Support: TPP, SR)**
 - Support and apply established WECC expansion planning process and policies

- I-6. **NOS and GI Process Reform: Implement sustainable processes to 1) integrate renewable and other generation, 2) process long-term transmission service requests, and 3) efficiently plan transmission system expansion in a cost effective manner by: (G6) (Leads: TPP, TS; Support: TPL, TPC)**
 - Establishing criteria to promote participation from customers committed to using the service they request;
 - Removing road-blocks that may inhibit the interconnection of generation within an appropriate timeline;
 - Reducing financial risk to BPA and rate payers;
 - Developing transmission capacity where and when needed by regional stakeholders;
 - Facilitating transmission planning that enables regional input on assumptions and sensitivities;
 - Planning to meet obligations to Network Integration Transmission Service customers;
 - Maintaining transmission system reliability when developing new generation interconnection and transmission infrastructure.
 - Study and evaluate opportunities to join other utility transmission projects that meet BPA and regional needs.

Transmission Asset Management Strategy

Goals for expanding transmission
Continued

Goals

- G7 The need for increasing interregional transfer capability is assessed regularly in a joint planning process among transmission providers potentially affected by an increase in interregional transfer capability**
- Enables interregional transfer needs to be identified and assessed regularly by those potentially affected by an increase in interregional transfer capability, including BPA
 - Assures that the commercial needs of buyers and sellers of electric power between regions are met in a timely manner, including the benefits of:
 1. Importing or exporting energy or capacity into or out of the Pacific NW
 2. Strengthening dynamic scheduling capabilities between regions
 3. Maintaining reliability
 - Complies with energy policy objectives, regulatory standards and tariff requirements
- G8 Fuller, more optimal use is made of existing transmission capacity through:**
- Reliable and cost-effective management of transmission congestion
 - Technological innovations that enable:
 - grid operators to “see” the grid more accurately
 - intermittent generation to be forecast more accurately
 - grid operations to be controlled more precisely
 - Methodological refinements that increase the availability of capacity while protecting from overselling
 - Scheduling and product design innovations that increase access and enable fuller use of existing capacity
 - Demand response, redispatch, power exchange and other non-wires solutions to manage transmission congestion, when more economic than wires solutions

Strategic initiatives

- 1-7. (IOS) Develop & implement a process to facilitate expansion of interregional transfer capability by:** (G7) (Lead: TSP; Support TP, TO)
- Establishing a coordinated interregional planning process to assess proposals or respond to customer requests to increase interregional transfer capability that includes participation by transmission providers potentially affected by such proposals, whether located within or outside the region
 - Assuring that any such process is consistent with Order 1000, including rules for allocating costs among project sponsors
 - Assuring that any such proposal is likely to be supported by transmission providers potentially affected by such proposal both within and outside the region
 - Developing a process to allocate equity, capacity or other ownership interests among project sponsors
 - Assuring that enough customers are willing to commit to take service from affected transmission providers potentially affected by such proposal to justify incurring the cost, time, and effort needed to plan, design, and construct new capability
 - Establishing customer financing obligations to pay for engineering or other technical studies, for NEPA or other environmental studies, and for constructing any new facilities
 - Assuring that construction is approved in advance and meets BPA’s and other regulatory requirements and safety standards.
 - Determining fair and equitable rate treatment that are consistent with BPA statutes and policies for the costs of any new Intertie facilities assigned to BPA
- 1-8. Select and implement operational tools and visualization techniques to give system operators critical decision-making information on wind fleet operating status, reserves availability, potential ramps and contingencies** (G7) (Lead: TO; Support: TPM)
- 1-9. Improve Remedial Action Scheme (RAS) functionality and infrastructure by:** (G8) (Leads: TO, TE, TP, SR)
- Replacing and upgrading antiquated RAS infrastructure
 - Improving granularity of generation dropping
 - Transitioning from manual to automatic arming of major schemes
- 1-10. Implement policies to optimize use of existing transmission assets** (G8) (TO, SR)
- BPA ATC method made consistent with ATC reliability standards (once approved by FERC)
 - Margins (TRM) set in accordance with NERC ATC reliability standards and reliable operating practices
 - Federal and nonfederal generation redispatch programs put in place to mitigate operational constraints
 - Innovative transmission products developed (or expanded in the case of conditional firm service) that can increase utilization of transmission
 - Innovative power exchanges considered to avoid transmission build

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Goals for expanding transmission

Continued

Goals	Strategic initiatives
<ul style="list-style-type: none"> • Balancing authority consolidation (or virtual consolidation), should the region decide to consolidate 	<p>I-11. Enhance grid ops and commercial systems to enable: (G8) (TO, NJ)</p> <ul style="list-style-type: none"> • Dynamic and sub-hourly scheduling, should BPA decide to implement these changes in scheduling practices • Balancing authority consolidation (or virtual consolidation), should the region decide to consolidate • Customers to self-supply all or a portion of their wind integration balancing needs

Note

Light gray text: a goal and strategic initiatives that influence the management of assets, but is deemed to be outside the scope of this asset management strategy.

Goals for sustaining transmission

Goals	Strategic initiatives
<p>G9 Information on asset attributes (condition, performance, and costs) is complete, accurate, and readily accessible</p>	<p>I-12. Establish processes, procedures, controls, roles & responsibilities to ensure nameplate, condition assessment, outage history, maintenance costs and other asset information is accurate, complete, and readily accessible via the Transmission Asset Register (implementation to be addressed through the IPPI projects) (G9) (Lead: TPO)</p>
<p>G10 Assets are proactively maintained and replaced</p> <ul style="list-style-type: none"> • Maintenance, replacements and sparing planning is integrated • Priority is given to critical assets at greatest risk of failure or noncompliance • Reliability, availability, and other standards are met at least life-cycle cost 	<p>I-13. Maintain or replace existing communications, control and operations infrastructure on a timely basis to ensure reliable, efficient, secure, and safe operation of the power system (G10, G11) (Lead: TPO)</p> <ul style="list-style-type: none"> • Develop and implement policies, guidelines, and standards that ensure communications, control and operations infrastructure will comply with regulatory standards and requirements
<p>G11 Maintenance is reliability-centered (condition-based)</p>	<p>I-14. Prioritize and manage maintenance and replacement backlogs to sustainable levels (target dates set in life-cycle strategies for each sustain program) (G10, G11) (Lead: TPO)</p> <p>I-15. Develop and implement a process that ensures replacement and maintenance actions result in no more than X% of critical assets at high risk of failure or noncompliance (target percents and target dates set in life-cycle strategies for each sustain program) (G10, G11) (Lead: TPO)</p> <p>I-16. Develop and implement sparing strategies to assure a supply of critical spare parts is geographically situated to enable timely restoration of service (G10) (Lead: TPO)</p>
	<p>I-17. Establish condition-based maintenance standards and implement reliability-centered maintenance as each asset class is added to TAS (G11) (Lead: TPO)</p> <p>I-18. Develop a near term process and plan for integrating asset strategies across programs where interdependent equipment drives coordinated investment decisions. Plan to include defined scope, timeline, funding, and committed resources. (Lead: TPO, Support: TPW)</p>

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Long-term Outcomes: Transmission's future state for asset management

It is anticipated that through the successful completion of initiatives and achievement of long term goals, Transmission's asset management program will result in asset strategies and actions that ensure critical assets operate reliably, meet availability targets, and provide adequate capacity into the future, and that life cycle costs will be prudent and economic. Asset strategies will be developed with a vision across all programs and the implementation of an integrated Transmission capital program will be driven by:

- the agency's strategic priorities and business environment
- asset performance objectives
- assessments of asset health, performance and cost
- analysis of risks to achievement of performance objectives
- risk-informed evaluation of alternative investments

When selecting investments, highest priority is assigned to:

- Replacements and maintenance that minimize regional economic risks from equipment failure
- Upgrades and additions to effectively and efficiently:
 - Meet load service and wheeling requests
 - Integrate renewable and other energy resources
 - Ensure ongoing reliable power system operations
- Enhancements that enable fuller, more optimal use of the transmission system.

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Appendix C: Documentation of System Performance Measures and End-stage Targets

Measure:	<i>System Average Interruption Duration Index (SAIDI)</i> – Average number of automatic outage minutes by BPA line category
Background:	Maintaining system reliability is a critical BPA responsibility. This reliability measure is monitored to help minimize the duration of unplanned (automatic) line outages on the BPA system. SAIDI provides an indication of BPA’s success at minimizing the duration of unplanned transmission line outages. SAIDI data is used in developing Transmission’s asset management strategies and plans, and in its capital and expense planning levels.
Methodology:	<p>Reliability assessment is based on IEEE-standard measures of outage duration (SAIDI). Control chart techniques, closely mirroring transmission reliability methodology adopted by the California Independent System Operator (ISO), are used to establish allowable performance levels for each line importance category (1-4). Control charts are statistically-based graphs which illustrate the natural range of variability in performance, based on the most recent 10 years of historical data (FY 2002 - FY 2011). In general, the Control Limit is calculated as the 3-standard deviation band, and the Warning Limit as the 2-standard deviation band, based on historical line performance. Actual SAIDI results from the past year are then compared to the control chart limits to gauge the adequacy of system reliability and to determine control chart violations.</p> <p>Control chart violations are defined as follows:</p> <ul style="list-style-type: none"> • Latest fiscal year above the Upper Control Limit (short-term degradation) • 2 of last 3 fiscal years above the Upper Warning Limit (mid-term degradation) • Continuous worsening trend in the last six fiscal years (long-term degradation)
End-stage Targets:	<p>No control chart violations for line importance categories 1 and 2.</p> <p>No more than 1 control chart violations per year for line importance categories 3 and 4.</p>
Inclusions/ Exclusions:	<ul style="list-style-type: none"> • Reliability monitoring is based on unplanned (automatic) outages to transmission lines (not points-of-delivery) • Duration of any single outage is capped at 4,320 minutes (three days) • Momentary outages are excluded • Outages to lines with all or part non-federal ownership are excluded • Outages in the year in which a line may have been energized or retired are excluded (i.e., line must have “full year” availability) • Outages with a cause attributed to a foreign utility are excluded • Overlapping outages to the same line, due to multiple section outages, are compressed to eliminate double-counting of outage duration
Responsibility for Monitoring & Reporting:	System Operations, Technical Operations (TOT)

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Measure:	<i>System Average Interruption Frequency Index (SAIFI) – Average number of automatic outages by BPA line category</i>
Background:	Maintaining system reliability is a critical BPA responsibility. This reliability measure is monitored to help minimize the frequency of unplanned (automatic) line outages on the BPA system. SAIFI provides an indication of BPA’s success at minimizing the number of unplanned transmission line outages. SAIFI data is used in developing Transmission’s asset management strategies and plans, and in its capital and expense planning levels.
Methodology:	<p>Reliability assessment is based on IEEE-standard measures of outage frequency (SAIFI). Control chart techniques, closely mirroring transmission reliability methodology adopted by the California Independent System Operator (ISO), are used to establish allowable performance levels for each line importance category (1-4). Control charts are statistically-based graphs which illustrate the natural range of variability in performance, based on the most recent 10 years of historical data (FY 2002 - FY 2011). In general, the Control Limit is calculated as the 3-standard deviation band, and the Warning Limit as the 2-standard deviation band, based on historical line performance. Actual SAIFI results from the past year are then compared to the control chart limits to gauge the adequacy of system reliability and to determine control chart violations.</p> <p>Control chart violations are defined as follows:</p> <ul style="list-style-type: none"> • Latest fiscal year above the Upper Control Limit (short-term degradation) • 2 of last 3 fiscal years above the Upper Warning Limit (mid-term degradation) • Continuous worsening trend in the last six fiscal years (long-term degradation)
End-stage Targets:	<p>No control chart violations for line importance categories 1 and 2.</p> <p>No more than 1 control chart violations per year for line importance categories 3 and 4.</p>
Inclusions/ Exclusions:	<ul style="list-style-type: none"> • Reliability monitoring is based on unplanned (automatic) outages to transmission lines (not points-of-delivery) • Duration of any single outage is capped at 4,320 minutes (three days) • Momentary outages are excluded • Outages to lines with all or part non-federal ownership are excluded • Outages in the year in which a line may have been energized or retired are excluded (i.e., line must have “full year” availability) • Outages with a cause attributed to a foreign utility are excluded • Overlapping outages to the same line, due to multiple section outages, are compressed to eliminate double-counting of outage duration
Responsibility for Monitoring & Reporting:	System Operations, Technical Operations (TOT)

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<p>Measure:</p>	<p><i>Frequency of Line Outages caused by Vegetation Growth</i> – Report the number of outages caused by vegetation growing into the conductor or within flashover distance to the conductor on transmission lines of 200 kV or higher and lower voltage lines designated by the Regional Reliability Organization (RRO) as critical lines to maintaining transmission system reliability.</p> <p>WECC vegetation outage reporting classifies these as Category 1 – Grow-ins: outages caused by vegetation growing into lines from vegetation inside/or outside of the right-of-way.</p>
<p>Background:</p>	<p>Maintaining system availability is a critical BPA responsibility. A vegetation growth caused outage measure is monitored to help minimize the amount of time that transmission lines are out of service due to a tree related incident. Cause of outage observed in the field is documented and captured in the outage management system. Outage cause data is used in determining Transmission’s expense planning for vegetation management.</p>
<p>Methodology:</p>	<ul style="list-style-type: none"> • The Outage Analysis and Reporting System (OARS) database is the repository of information related to WECC Vegetation Growth Outages. • Outages that have a ‘TREE’ cause appearing in the Dispatcher Cause or Field Cause or Fault Location or Comment fields are investigated by TF. • Vegetation related Transmission line outages are classified as follows: <ul style="list-style-type: none"> • Category 1 – grow-ins, from inside/or outside of the right-of-way • Category 2 – fall-ins, from inside the right-of-way • Category 3 – fall-ins, from outside the right-of-way • Mandatory reporting to WECC of vegetation outages.
<p>End-stage Targets:</p>	<p>No outages to transmission lines of 200 kV or greater and for RRO designated lines caused by vegetation growth.</p>
<p>Inclusions/ Exclusions:</p>	<ul style="list-style-type: none"> • Applies primarily to lines 200 kV or greater with the exception of lower voltage lines that are designated RRO. • WECC reporting includes tree falling from inside and outside of the right-of-way. For purposes of this measure, only category 1 vegetation outages apply. Category 2 and 3 are excluded. • Excludes vegetation related outages that result from natural disasters or major storm events • Excludes vegetation related outages that are due to human or animal activity such as logging, vehicle contact, etc.
<p>Responsibility for Monitoring & Reporting:</p>	<p>Transmission Field Services, Internal Operations, Vegetation/Access Road Management (TFBV)</p>

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Measure:	<i>System Operating Limit (SOL) for BPA Paths, Interties, & Flowgates</i> – number of minutes that actual path flows are near, at or above System Operating Limit. Monitored for 21 separate directional paths, interties and flowgates.
Background:	On-going monthly analysis comparing System Operating Limit (SOL) with Actual Path Flows for 24 separate directional paths, interties, & flowgates, based on 1-minute SCADA data. Selected elements are Transmission Business Key Performance Indicators and NERC/WECC Compliance reporting elements. Note terminology update from "OTC" (Operational Transfer Capacity) to "SOL" (System Operating Limit), per national standards.
Methodology:	For 24 separate directional paths, compare the actual path flow to the System Operating Limit (SOL) for that path, at 1-minute increments. Calculate the number of minutes where actual flows were within 20% of SOL, 10% of SOL, and Over SOL. Report this by month, by path, in minutes and percentage of total time. For excursion periods Over SOL, compare the consecutive minutes vs. the reliability limits (30 minutes) to determine if a NERC/WECC violation occurred.
End-stage Targets:	No end stage target will be set for this metric during this planning cycle.
Inclusions/ Exclusions:	This metric indicates: <ul style="list-style-type: none"> • Utilization levels/patterns for existing line assets. • Congestion areas for which capacity expansion may merit consideration.
Responsibility for Monitoring & Reporting:	System Operations, Technical Operations (TOT)

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Measure:	<i>Percent Availability for Service of BPA’s most important transmission lines</i> = (Total Time minus Planned Outage Time)/Total Time.
Background:	Maintaining system availability is a critical BPA responsibility. Availability measures are monitored to help minimize the amount of time the most important lines on the system are out of service for maintenance, construction, and related “planned” activities, thus maximizing the commercial availability of the grid. Availability data are used in Transmission’s capital and expense planning, maintenance, and operations processes.
Methodology:	<p>Control chart techniques are used to establish allowable performance levels for system availability. Control charts are statistically-based graphs which illustrate the natural range of variability in performance, based on the most recent 5 years of historical data (FY2007-FY2011). In general, the Control Limit is calculated as the 3-standard deviation band, and the Warning Limit as the 2-standard deviation band, based on historical line availability, for lines of importance ranks 1&2. Actual Availability for the current year is then compared to the lower limit of availability to determine if it falls below the violation limits.</p> <p>Control chart violations are defined as follows:</p> <ul style="list-style-type: none"> • Latest fiscal year below the Lower Control Limit (short-term degradation) • 2 of last 3 fiscal years below the Lower Warning Limit (mid-term degradation) • Continuous worsening trend in the last six fiscal years (long-term degradation)
End-stage Targets:	<p>Line importance categories 1 & 2 (combined) are available for service at least 98% of the time.</p> <p>Line importance categories 3 & 4 (combined) are available for service at least XX% of the time. (Target to be determined.)</p>
Inclusions/ Exclusions:	<p>The following outage inclusion/exclusion rules apply:</p> <ul style="list-style-type: none"> • Momentary outages are excluded • Planned outages only, excludes automatic outages • Outages to lines with all or part non-federal ownership are excluded • Outages in the year in which a line may have been energized or retired are excluded (i.e., line must have “full year” availability) • Outages to the four Big Eddy-Celilo feeder lines are excluded • Outages with causes Voltage Control, Foreign Request, and Normally Out are excluded • Tap outages excluded • Overlapping outages to the same line, due to multiple section outages, are compressed to eliminate double-counting of outage duration
Responsibility for Monitoring & Reporting:	Transmission Technical Operations (TOT)

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Appendix D: Report on results of system performance measures

SAIFI:



SaifiFY11Rank1.JPG (41 KB)



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(43 KB)



(37 KB)

SAIDI:



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(41 KB)



(47 KB)



(38 KB)

Availability:



AvailabilityFY11Rank
1&2.JPG (50 ...)

Line Rank Criteria:



LineRankCriteria.JPG
(55 KB)

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Appendix E: Prioritization Criteria

Component Rankings by Sustain Program

More Important		Less Important		
AC Subs	<ul style="list-style-type: none"> Power Transformers Power Circuit Breaker Circuit Switchers DC Control Batteries and chargers 	<ul style="list-style-type: none"> Shunt Capacitors Current Limiting Reactors Instrument Transformers Surge arrestors Fuses 	<ul style="list-style-type: none"> Disconnect Switches Seismic Hardening Substation grounding 	<ul style="list-style-type: none"> Substation Bus and structures Station auxillary exc. DC control batteries
DC Subs	<ul style="list-style-type: none"> All components 			
Steel Lines	<ul style="list-style-type: none"> Towers Connectors Conductors Insulator assemblies Footings Rights of way 	<ul style="list-style-type: none"> Dampers 		<ul style="list-style-type: none"> Counterpoise
Wood Lines	<ul style="list-style-type: none"> Poles Conductors Insulator assemblies Guy assemblies Rights of way Fiber optic cable 	<ul style="list-style-type: none"> Line disconnect switches 		<ul style="list-style-type: none"> Ground wire Counterpoise
PSC/Telecom	<ul style="list-style-type: none"> RAS Transfer Trip SCADA Fiber cable Comm batteries/chargers SONET/MW Radios 	<ul style="list-style-type: none"> VHF/mobile/portable radios UHF DATS Multiplex Power Line Carrier Telemetry Operational Networks/NMS Engine Generators Supervisory Control Systems UPS 	<ul style="list-style-type: none"> Telephone systems Telephone protection FIN network 	<ul style="list-style-type: none"> Misc support systems
SPC	<ul style="list-style-type: none"> Transformer relays Bus relays Line relays Breaker relays 	<ul style="list-style-type: none"> RAS Reactive relays Revenue metering SER 	<ul style="list-style-type: none"> DFR Control equip 	<ul style="list-style-type: none"> Load shedding relays Indicating Meter Transducers Relay Communications
Control Center	<ul style="list-style-type: none"> Systems that control and manage the grid (SCADA Master, AGC, RAS Masters) Systems & cyber infrastructure that enables and protects our CC systems and network CC Critical Power Infrastructure 	<ul style="list-style-type: none"> Systems that support real-time operations decision-making, events response & communication, and which impact field safety (PSST, Sequential Events Monitor Master/Fault Locator system, Lightning Monitoring, AVTEC) Systems that enable management of CC and communications networks and systems infrastructure Facilities assets that support building and fire safety 	<ul style="list-style-type: none"> Systems that support non-real-time operations decisions, processes, and analysis (Dispatch Activity Record and Tracking (DART), Plant Interface (PI), Dispatch Training Facility (DTF)) 	<ul style="list-style-type: none"> Systems & facilities that support Commercial Business systems

This ranking occurs after the ranking based on designation of Transmission system criticality– it is independent of the overall importance of the line, sub, or facility.

Since CC assets components cannot be replaced independently, these rankings delineate types of systems by criticality of function.

The component ranking will be re-evaluated annually to capture changes in system needs and priorities.