2008 BPA Plan

Transmission Services

Draft

July 6, 2008

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1 Objectives

Transmission Services Growth Capital portfolio is comprised of the capital investments required to expand and reinforce the transmission system to meet the forecast requirements of BPA and other customers over the 10-year planning period to meet adequacy and reliability long term outcomes.

The system expansion and reinforcement reflected by this Growth Capital portfolio is driven by service requests, including: (1) Contractual obligations for load service; (2) PTP contracts between BPA and other customers including BPA Power Services; (3) loads and resource interconnections; (4) mandatory Compliance with NERC/WECC Planning Standards; and (5) other agreements.

2 Key Drivers

2.1. Interconnection of New Generation

IPP's may request interconnection to BPA's system for the purpose of making sales to other purchasers. IPP connections typically include a combination of direct assignment facilities which are fully paid for by the IPP and Network Upgrades which are funded in accordance with the Wholesale Transmission Service (WTS) and Open Access Transmission (OATT) tariffs. BPA has no control over the timing or location of IPP's interconnections.

2.2 Load Growth

The primary load centers within the BPA system are located west of the Cascade Mountains in western Washington and western Oregon. The Puget Sound load area is one of the largest load areas within the BPA system. This area contains several major industries and cities including: Seattle, Tacoma, Bellingham, and Bellevue. BPA supplies four major utilities in the Puget Sound area:

- Puget Sound Energy (PSE)
- Tacoma City Light (TCL)
- Seattle City Light (SCL)
- Snohomish PUD

The other major load area is within the Willamette Valley. Portland, Salem, and Eugene are the main load centers within the Willamette Valley. BPA supplies the following major utilities within the Willamette Valley:

- Portland General Electric (PGE)
- PacifiCorp (PACW)
- Springfield Utility Board
- Eugene Water and Electric Board (EWEB)

2.3 Existing Resources

The following are major generation resources in the BPA system:

- Hydroelectric generation on the Columbia River
- Hydroelectric generation on the Snake River
- Columbia Generation Station (Nuclear)
- Coal generation in Montana and Centralia, Washington
- Thermal generation west of the Cascades
- Wind generation primarily east of the Cascades

The BPA load varies over the course of a day as customers increase and decrease their consumption of electricity. The Northwest has historically been a winter peaking system because heating of homes and buildings is a primary load. Conversely, California tends to be a summer peaking load due to the large air conditioning load on the system.

During the winter, when Northwest loads are peaking, the Northwest sometimes imports power from California via the Pacific AC and DC interties.

During the summer, when California loads are peaking, the Northwest often exports large amounts of power to California via the Pacific AC and DC interties.

BPA's peak loads, plus any firm transmission service obligations, are used to determine the bulk system reinforcement requirements. Around the Northwest, load growth occurs at different rates depending on the specific geographic area.

2.4 Customer Requested Projects

From time to time, a BPA customer may request changes to the transmission system for their own benefit. These types of requests may include increased service levels beyond that which is normally provided, or relocation of transmission system equipment (e.g., lines and towers). The customer requesting the project would pay or cost-share in the project, but BPA continues to own the assets.

2.5 Operations & Maintenance Flexibility

Operating Bulletin #19 (OB-19) designates critical transmission system equipment which requires a 45-day process for scheduling maintenance outages. Prior to "planned" outages being granted on OB-19 lines and equipment, system conditions have to be analyzed and appropriate adjustments made to cut-plane and Intertie capacities. When "unplanned" outages occur, immediate, and severe curtailment of Intertie capacities may be placed in effect until studies can be completed. A long-term outage planning process, based on analysis, has been developed to meet the needs of both system reliability and the market place. Although the new requirements and processes are successful, they have the added effect of limiting available outage windows for construction and maintenance activities on our system. Therefore, some limiting transmission system configurations, constrain our ability to operate and maintain the transmission system, in order to meet our strategic business objective of system availability.

O & M flexibility projects are considered for funding, in order to remedy these operation and maintenance limitations, and improve availability of lines and equipment, with special emphasis on OB-19 lines and equipment. Most O & M Flexibility upgrades will address the following issues:

- Forced outages to collateral lines and equipment beyond that of the desired equipment or lines during maintenance
- Excessive equipment or line clearing during fault conditions due to lack of protective devices
- Reduced maintenance windows due to critically of lines or equipment
- Typical O & M Flexibility projects could include any of the following:
- Bus tie breakers
- Bus sectionalizing breakers or disconnect switches
- Transformer high side breakers
- Terminal breakers
- Additional redundant protective relaying

3 Expansion Portfolio

The Expansion portfolio is composed of the following asset groups:

- Main Grid
- Area & Customer Service
- Upgrades & Additions

3.1 Main Grid

BPA's Main Grid consists of the 500 kV transmission and substation facilities as well as some 345 kV and a few 230 kV facilities. BPA has over 5,500 circuit miles of line in this category. Several of the northwest's major interties and paths that BPA uses for scheduling, are included in this category.

Some of the key drivers for expansion of the Main Grid, include:

- Load Service/Load Growth served by network transmission
- Compliance with mandatory Reliability Standards
- Congestion Relief
- Interconnection of new Generating Resources
- Point to Point (PTP) transmission service requests
- Improved Operational and Maintenance Flexibility

Main Grid Projects

The Main Grid can be divided into sub-categories based on the magnitude of load in the area and further by geographic locations within the system. These categories will be described in the sections which follow.

3.1.1 Major Load Areas

Major Load Areas are those which span a broad geographic area and incorporate several load centers with a combined total load in the range of thousands of megawatts (MW).

Puget Sound Area / West of Cascades - North

The Puget Sound area includes the load area west of the Cascades Mountain range roughly from Chehalis, Washington to the Canadian border. The transmission system in this area serves the major Seattle/Tacoma Metropolitan Area in Washington, as well as many outlying communities such as Aberdeen, Bellingham and Everett.

The total peak area load in Puget Sound is approximately 12,000 MW. Customers served within this area include: Puget Sound Energy, Seattle City Light, Snohomish PUD, Tacoma Public Utilities, Tacoma Mutuals, Whatcom County PUD, Grays Harbor PUD, the US Navy, Trans-Alta (Generation Integration at Centralia/Big Hanaford), and several other smaller customers.

There is a total of over 5200 MW of generating resources in the Puget Sound area. This is a combined total of resources owned Puget Sound Energy, Trans-Alta, Seattle City Light, Tacoma Public Utilities, and Snohomish PUD). The remainder of the load, not covered by these resources, is served by power imported on the major transmission sources to the area.

There is a total of approximately 6,600 MVAR of reactive support in the Puget Sound load area.

There are no projects identified for this area in the fiscal year 2009 to 2010 timeframe.

Projects forecast in this area include:

Seattle Area 500/230 kV Transformer Bank

Description:

Install a new 500/230 kV Transformer Bank in the Puget Sound Area.

The project will also involve development of a 500 kV yard at the site chosen for the transformer installation.

Key Drivers:

Puget Sound Area load growth

Issues Being Addressed:

Load growth in the Puget Sound area

Discussion of Alternatives:

The full plan of service for the project has not been developed yet. Alternatives will be considered as part of that development.

North Cross Cascades Reinforcement - Phase I

Description:

Add series compensation to the Schultz-Raver 500 kV lines No.3 and 4

Key Drivers:

- Main Grid Voltage Support
- Service to the Puget Sound Load Area
- System Reliability
- Congestion Relief

Issues Being Addressed:

Load growth in the Puget Sound area

Additional capacity to move resources from locations east of the Cascades to load centers west of the Cascades.

Discussion of Alternatives:

The full plan of service for the project has not been developed yet. Alternatives will be considered as part of that development.

WILSWA Area / West of Cascades - South

The WILSWA (Willamette Valley and Southwest Washington) area includes the load area west of the Cascade Mountain range from approximately Longview, Washington to the Oregon/California border. The transmission system in this area serves the major Portland/Vancouver metropolitan area as well as several other communities down the Willamette Valley such as Salem, Eugene, Roseburg, Grants Pass, and Medford.

The total peak area load for WILSWA is approximately 9,500 MW. Customers served within this area include: Portland General Electric, PacifiCorp, Clark Public Utilities, Cowlitz PUD, Clatskanie PUD, Columbia PUD, Skamania PUD, Tillamook PUD, Central Lincoln PUD, Wahkiakum PUD, Emerald PUD, Western Oregon Electric Co-Op, Blachley-Lane Electric Co-Op, Lane Electric Co-Op, Douglas Electric Co-Op, Salem Electric Co-Op, Consumers Power Electric Co-Op, Coos-Curry Electric Co-Op, and the cities of Eugene, Springfield, Monmouth, McMinnville, Forest Grove, Canby, Cascade Locks, Bandon, Drain and Ashland.

There is a total of approximately 6,100 MVAR of reactive support in the WILSWA load area.

There is a total of over 5000 MW of generating resources serving the greater WILSWA load area. This is a combination of thermal and hydroelectric resources owned/operated by the Corps of Engineers, Clark Public Utilities, Portland General Electric, PacifiCorp, Cowlitz PUD, and Eugene Water and Electric Board. The remainder of the load, not covered by these resources, is served by power imported on the major transmission sources to the area.

Projects forecast in this area include:

Allston 500 kV Shunt Capacitor Addition

Description:

Install a new 500 kV Shunt Capacitor Bank at Allston Substation.

Key Drivers:

WILSWA Area load growth

Issues Being Addressed:

Load growth in the Portland and Willamette Valley vicinity.

Discussion of Alternatives:

Locating the capacitors at other sites was considered, but did not prove as effective for voltage support as Allston.

3.1.2 Large Load Areas

Large load areas are served mostly by 230 kV facilities as part of an interconnected network. The total magnitude of load in these areas is typically 300 MW or greater.

Olympic Peninsula

The Olympic Peninsula load area is located north of Olympia and Aberdeen, Washington and west of Puget Sound. Transmission Facilities in the Olympic Peninsula serve the larger communities of Shelton, Bremerton, and Port Angeles, Washington as well as many smaller communities in between (e.g. Port Townsend, Sequim, Port Ludlow, etc.).

The total area load in the Olympic Peninsula is approximately 1200 MW (winter peak). Customers served within this area include: Clallam PUD, Mason PUD Nos. 1 and 3, the City of Port Angeles, Port Townsend Mill, Puget Sound Energy, and the U.S. Navy.

There is a total of approximately 800 MVAR of reactive support in the Olympic Peninsula load area.

There is very little local generation (less than 30 MW) within the Olympic Peninsula load area. Therefore, most of the power to serve area loads must be imported on the major transmission sources to the area.

This area has been a site of rapid load growth in recent years. The primary concern in this area is maintaining reliable service to these growing loads.

Projects forecast for this area include:

Olympic Peninsula Reinforcement

Description:

Remove the Olympia-Shelton No.1 115 kV line up to the Dayton Mason County Tap to provide right-of-way for building a new line. Split the Olympia-Satsop No.2 230 kV line at a point approximately 6 miles west of Olympia. Construct a new 14 mile double circuit 230 kV line from Shelton to connect with the split Olympia-Satsop No. 3, 230-kV line. This will create the Olympia-Shelton No. 5, 230-kV and the Satsop-Shelton No. 1, 230 kV.

Key Drivers:

- Load Growth
- Voltage Stability Performance

Issues Being Addressed:

Load growth in the Olympic Peninsula area

Discussion of Alternatives:

- Do Nothing – This is unacceptable because of load loss and potential voltage instability as well as NERC Criteria violations will result
- Non-Wires Solutions – Conservation is being implemented and a pilot program for demand-side management was tested. However, none of these measures solve the problems for the critical double contingencies which drive the project
- New 500 kV single circuit line to Shelton – This option does not solve the voltage instability problems in the area
- New 230 kV double circuit line to Shelton – This is the preferred alternative.

Central Oregon

The Central Oregon load area includes the area east of the Cascades Mountain range roughly from Maupin to La Pine, Oregon. The transmission system in this area serves the cities of Redmond and Bend, as well as many outlying communities such as Madras, Prineville, Sisters, and Lapine. The total area load in Central Oregon is over 600 MW (winter peak). Customers served within this area include: PacifiCorp, Central Electric Co-Op, Harney Electric Co-Op, and Mid State Electric Co-Op.

There is approximately 100 MVAR of reactive support in the Central Oregon load area.

There is very little local generation within the Central Oregon area so loads are primarily served from resources outside the area via imports on the transmission system.

Both summer and winter are critical seasons for this area. Winter loads are high due to heating demands. However, there is a potential for facility overloads in summer when higher ambient temperatures restrict the ratings of facilities. This area has been the site of rapid load growth in recent years. With growing loads, some of the transmission facilities in the area are reaching the limits of their capacity. The primary concern in this area is maintaining reliable service to these growing loads.

Projects forecast for this area include:

Redmond 230/115 kV Transformer Bank Addition

Description:

Expand Redmond Substation and install a new 230/115 kV transformer bank.

Key Drivers:

- Rapid load growth in the Central Oregon area
- System Reliability

Issues Being Addressed:

Additional source of transformation to serve growing loads in the Central Oregon load area.

Discussion of Alternatives:

Alternatives included:

- Alternate sites (substations) for the transformer addition
- Adding shunt capacitors for voltage support to defer the need date for the transformer.

Adding the transformer at Redmond was selected as the preferred plan of service because it maintains reliability to growing loads.

Central Oregon 500/230 kV Transformer Bank Addition

Description:

Install a new 500/230 kV Transformer Bank in the Central Oregon Area (potentially locations being considered are at either Ponderosa or Pilot Butte Substation).

Key Drivers:

- Load service to growing Central Oregon area loads
- System Reliability

Issues Being Addressed:

Load growth in Central Oregon

Discussion of Alternatives:

The full plan of service for the project has not been developed yet. Alternatives considered include locating the new transformer at Ponderosa or Pilot Butte Substations. Other alternatives will be considered as the plan of service is developed.

Tri-Cities

The Tri-Cities area is located in South Central Washington and encompasses the cities of Pasco, Richland, and Kennewick, Washington – all of which are located along the Columbia River. The transmission system in this area serves these cities, as well as the rural irrigation loads of Big Bend Electric, Benton PUD and Benton REA and many other smaller rural towns near the Tri-Cities area. The total area load in Tri-Cities is approaching 900 MW. Customers served within this area include: Franklin County PUD, City of Richland, Benton County PUD, Benton REA, Big Bend Electric Co-Op, Columbia REA, South Columbia Basin Irrigation District, U.S. Bureau of Reclamation, PacifiCorp, and Avista.

There is a total of approximately 240 MVAR of reactive support in the Tri-Cities load area.

Generating Resources, which support loads in the Tri-Cities area, include: hydroelectric plants at Ice Harbor, Chandler, and Canal generation (at Scotney, Glade & Ringold) and local wind farms (Nine Canyon & Nine Mile). The combined total of these projects is approximately 900 MW.

Increasing constraints on the operation of hydroelectric projects in the area, limit the ability to re-dispatch resources to off-load constrained transmission paths. One of the primary sources to the area, the Sacajawea transformer bank, has been out of service for over a year, and due to long manufacturer lead times, a replacement won't be available until 2009. This further limits the operational flexibility in the area. Maintaining reliable load service is the main issue for the Tri-Cities area.

Projects forecast for this area include:

Tri-Cities Area Reinforcement

Description:

Add a 115 kV bus sectionalizing breaker at White Bluffs Substation and upgrade a short section of 115 kV line.

Key Drivers:

Load service to growing loads in the Tri-Cities area

Issues Being Addressed

Load growth in the Tri-Cities area.

Discussion of Alternatives

Upgrading multiple lines in the area to higher capacity was another alternative that was considered. However, this option was not as cost effective as the recommended plan of service.

Future projects:

Future projects in the Tri-Cities area are currently under study.

Mid-Columbia Area

The Mid-Columbia area includes the load area in central Washington east of the Cascades Mountain range roughly from south of the Upper Columbia River basin, down to Yakima, Washington. The transmission system in this area serves the central Washington towns of Wenatchee, Ellensburg, and Yakima, as well as many outlying communities such as Chelan, Ephrata, and Moses Lake. The total peak area load in the Mid-Columbia area is approximately 800 MW. Customers served within this area include: PacifiCorp, Grant, Chelan, and Douglas County PUD's, and several other smaller customers such as Okanogan PUD.

The primary generation resources which serve the Mid-Columbia area are the five hydroelectric projects at Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids. These plants have a combined output capacity of over 4500 MW.

The Mid-Columbia area has been the site of significant wind generation development in recent years. Maintaining reliable load service and accommodating renewable resource development are the primary issues for the Mid-Columbia area.

Projects forecast for this area include:

Mid-Columbia Area Reinforcement

Description:

Sectionalize the Vantage 230 kV bus with two series breakers. Add a second breaker between the Vantage and Wanapum 230 kV buses. Upgrade the Vantage-Midway 230 kV line to higher capacity.

Key Drivers:

Load service to growing loads in the Mid-Columbia area

Issues Being Addressed:

Load growth in the Mid-Columbia area.

Discussion of Alternatives:

Plan of service and cost estimates are currently under development.

Future Projects:

Future projects for the Mid-Columbia area are currently under study.

3.1.3 Commercial Infrastructure Projects

In the Northwest, there is considerable development of new generating resources by Independent Power Producers (IPP's). These developers need access to transmission in order to move their resources to the load centers. This has led to a need for increased capacity in many portions of the transmission system in order to accommodate these transmission service requests as required by the FERC Open Access Transmission Tariff. This category of Commercial Infrastructure Projects includes transmission reinforcements needed to accommodate long-term firm point-to-point transmission service requests.

Network Open Season

In Spring 2008, BPA is initiating a Network Open Season process (NOS) which will affect the implementation of most projects in the following category. The intent of this process is to ensure priority transmission is built by offering precedent agreements to those parties who want to secure long-term firm capacity on BPA's network transmission system. These parties may include generation developers as well as existing customers. Those who accept the precedent agreements are committed to take transmission service at a specified time and under specified terms. Those not yet ready to sign a precedent agreement will have other opportunities as NOS is expected to be offered at least annually.

Once precedent agreements are signed, BPA proposes to "cluster" those requests to determine how much available transfer capability can be offered and which new transmission facilities, if any, will be required to accommodate the requests. By studying confirmed requests in a "cluster," BPA will be able to more efficiently determine collective system impacts and new facility requirements.

The NOS approach is expected to improve transmission queue management by winnowing out the speculative transmission requests for potential future projects and those who are not yet ready to commit to new resources. BPA's current first-come, first-served queue for network transmission requests has grown to a size that makes it difficult if not impossible to manage. Currently, requests in the queue total about 8,500 megawatts of new capacity. At times, the requests have exceeded 12,000 MW. Speculative requests can make it impossible to evaluate the region's priority transmission needs.

The following areas are impacted by Commercial Infrastructure Projects and the Network Open Season process.

West of McNary

The West of McNary transmission path is located in eastern Oregon near Umatilla, Oregon. The West of Slatt path is located in eastern Oregon, south of the town of Arlington, Oregon. These two paths are in series with each other and represent a major east-west path through BPA's transmission system. This area has been the site of a large amount of generation development over the past decade. Initially, a large amount of combustion turbine generation and more recently renewable resource (wind generation) development has occurred. This has resulted in transmission facilities reaching the limit of their capacity.

With the recent surge in development of renewable resources east of the Cascades, there are presently several long-term firm service requests to the Bonneville Power Administration (BPA) which impact the West of McNary transmission path. In order to accommodate these requests, as required by BPA's Open Access Transmission Tariff (OATT), transmission reinforcements are needed.

West of McNary Generation Integration Project

Description:

Build a new, single circuit, 500 kV line (approximately 75 miles long) from McNary Substation to John Day Substation. This is a Commercial Infrastructure Project. The project schedule depends on the outcome of BPA's Network Open Season (NOS) process. If a decision is made to launch the project, the energization date is expected to be approximately 3-4 years after initiating the project.

Key Drivers:

- Point to Point (PTP) Transmission Service Requests
- Interconnection of new renewable resources (wind generation) east of John Day
- Congestion Relief

- System Reliability

Issues Being Addressed:

This project addresses the issue of meeting the FERC Open Access requirements by building the necessary transmission facilities to accommodate new generation resources seeking access to BPA's transmission network.

Discussion of Alternatives:

Other alternatives considered, included:

- McNary-Big Eddy 500 kV line
- McNary-John Day 500 kV and John Day-Big Eddy No.3 500 kV lines
- McNary to a new substation (Station Z) which taps the Wautoma-Ostrander 500 kV line

Wautoma-Ostrander Tap (Station Z) to Big Eddy 500 kV

Description:

Build a new, single circuit 500 kV line (approximately 28 miles long) from Big Eddy Substation to a new substation (Station Z) built near tower 73/1 on the Wautoma-Ostrander 500 kV line. This is a Commercial Infrastructure Project. The project schedule depends on the outcome of BPA's Network Open Season (NOS) process. If a decision is made to launch the project, the energization date is expected to be approximately 4-5 years after initiating the project.

Key Drivers:

- Point to Point (PTP) Transmission Service Requests
- Interconnection of new renewable resources (wind generation) east of John Day
- Congestion Relief
- Load Service
- System Reliability

Issues Being Addressed:

This project addresses the issue of meeting the FERC Open Access requirements by building the necessary transmission facilities to accommodate new generation resources seeking access to BPA's transmission network. The project also addresses the issue of increased reliability to loads in the southwest Washington and Willamette Valley vicinity.

Discussion of Alternatives:

Other alternatives considered, included:

- John Day-Big Eddy No.3 500 kV and Big Eddy-Station Z 500 kV lines
- John Day-Station Z 500 kV and Big Eddy-Station Z 500 kV lines
- McNary-Station Z 500 kV line

I-5 Corridor

The I-5 Corridor transmission system extends from the Canadian to the California border and west of the Cascades Mountain Range. However, the present area of concern is the portion of the path which extends roughly from Chehalis, Washington, to Oregon City, Oregon.

With the recent development of new resources along the I-5 Corridor, congestion along this path has increased to the point where transmission facilities no longer have adequate capacity to accommodate the growing demands. There are presently several long-term firm service requests to the Bonneville Power Administration (BPA) which impact the I-5 Corridor transmission system. In order to accommodate these requests, as required by BPA's Open Access Transmission Tariff (OATT), additional transmission reinforcements are needed for the I-5 Corridor.

I-5 Corridor Reinforcement Project

Description:

Construct a new 500 kV line (approximately 70 miles) between southwest Washington (in the vicinity of Castle Rock, WA) and northwest Oregon (alternatives of Troutdale or Pearl are being considered). This is a Commercial Infrastructure Project. The project schedule depends on the outcome of BPA's Network Open Season (NOS) process. If a decision is made to launch the project, the energization date is expected to be approximately 6 years after initiating the project.

Key Drivers:

- Point to Point (PTP) Transmission Service Requests
- Interconnection of new resources along the I-5 Corridor
- Congestion Relief
- Improved service to a major load center
- System Reliability

Issues Being Addressed:

This project addresses the issue of meeting the FERC Open Access requirements by building the necessary transmission facilities to accommodate new generation resources seeking access to BPA's transmission network. The project also addresses the issue of increased reliability to loads in the southwest Washington and Willamette Valley vicinity.

Discussion of Alternatives:

Other alternatives considered, included:

- Sub-grid reinforcements to the lower-voltage system
- New 500 kV line from a new substation in the vicinity of Castle Rock, WA to Troutdale Substation
- New 500 kV line from a new substation in the vicinity of Castle Rock, WA to Pearl Substation

California-Oregon Intertie (COI)

The California – Oregon Intertie (COI) is a multiple owner path that includes a network of 500 kV AC transmission facilities that connects the Pacific Northwest (PNW) with Northern California. Owners include the Bonneville Power Administration (BPA), PacifiCorp (PAC), and Portland General Electric (PGE) at the northern end, and Pacific Gas & Electric (PG&E), Western Area Power Administration (WAPA), and Transmission Agency of Northern California (TANC) at the southern end.

In order to accommodate the long-term firm transmission service requests, as required by BPA's Open Access Transmission Tariff (OATT), additional transmission reinforcements are needed for the COI. The plan of service consists of the following:

COI 4800 MW Reinforcement Project

Description:

The COI Reinforcement project consists of the following upgrades and additions:

- Install new series capacitors at Bakeoven Substation along the John Day – Grizzly #1 and #2 500 kV lines, along with required control, protection, and communication equipment.

- Install two new 200 MVAR shunt capacitor groups at Captain Jack 500 kV Substation.
- Install one new 300 MVAR shunt capacitor group at Slatt 500 kV Substation.
- Upgrade the John Day-Grizzly 500 kV lines Nos. 1 and 2

The project schedule is contingent on agreements with the other COI owners. Once the necessary agreements are in place, it would be approximately 3 years until the project is energized.

Key Drivers:

- Point to Point (PTP) Transmission Service Requests
- Congestion Relief
- System Reliability

Issues Being Addressed:

This project addresses the issue of meeting the FERC Open Access requirements by building the necessary transmission facilities to accommodate new generation resources seeking access to BPA's transmission network.

Discussion of Alternatives:

Other sites for the location of series and shunt compensation were considered as alternatives for this project.

3.1.4 On-Going Projects

NERC Criteria Compliance

Description:

This is a general category for grid expansion projects that are required in order to comply with mandatory NERC Reliability Standards. This category may include projects such as line upgrades, line or transformer additions, bus sectionalizing breaker additions, etc.

Key Drivers:

Mandatory compliance with NERC Reliability Standards

Issues Being Addressed:

NERC Compliance

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

Main Grid Reactive Additions

Description:

General category for reactive additions required to support voltage schedules system wide.

Key Drivers:

- Reliability Standards for system voltages
- Load Growth

Issues Being Addressed:

Voltage Support

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

Line Relocations on Tribal Lands

Description:

BPA has a number of facilities which cross tribal lands. As BPA's rights to cross these lands expire, they must either be re-negotiated or the lines must be physically re-located. This general category covers the funds needed to rebuild the lines off of the tribal lands if new rights cannot be negotiated.

Key Drivers:

Expiring agreements with the tribes for right-of-way access

Issues Being Addressed:

Tribal agreements and right-of-way access for transmission facilities.

Discussion of Alternatives:

This category covers all feasible alternatives for securing access to right-of-ways.

Main Grid Facility Additions

Description:

This is a general category for grid expansion projects required to support customer needs or other contractual obligations or criteria. This category may include projects such as line taps, substation bay additions, redundant transfer trip addition, or remedial action schemes.

Key Drivers:

- Contractual Obligations
- Customer service requirements
- Criteria Compliance

Issues Being Addressed:

Same as Key Drivers above.

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

Other Associated Interconnection Facilities

Description:

This is a general category for grid expansion projects required to interconnect new resources, or customer lines and loads, into the transmission system, as required by BPA's Open Access Transmission Tariff (OATT). This category may include projects such as line upgrades, new lines, new substations, etc.

Key Drivers:

- Generation Interconnection
- Lines and Loads Interconnection
- Contractual Obligations

Issues Being Addressed

Same as Key Drivers above.

Discussion of Alternatives

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

Network Open Season Additions

Description:

This is a general category for grid expansion projects required to support BPA's Network Open Season process and accommodate long term firm transmission service contracts. This category may include projects such as line upgrades, new transmission lines, new substations, series compensation, etc.

Key Drivers:

- Point to Point (PTP) Transmission Service Requests
- Contractual Obligations

Issues Being Addressed:

Same as Key Drivers above.

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

3.2 Area and Customer Service

The Area and Customer Service asset group consists of facilities, typically 230 kV and below, which function primarily to serve area and customer loads. BPA has over 9000 circuit miles of line in this category. This network serves load areas across Oregon, Washington, Idaho, and Montana. Typical area and customer loads are served either radially or by a loop network. Typical projects in this category include line taps, new substation development, transformation, and reactive additions. These projects are usually driven by load growth and contractual obligations to serve the load.

Some of the key drivers for expansion of Area and Customer service facilities include:

- ♦ Load Service/Load Growth
- ♦ Compliance with mandatory Reliability Standards
- ♦ Contractual Obligations
- ♦ Improved Operational and Maintenance Flexibility

3.2.1 Load Areas

Area and Customer Service Projects typically share a common key driver of load service. These projects can be divided into sub-categories based on their geographic location within the system.

South Oregon Coast

Rogue SVC (Static VAR Compensator)

Description:

Install a 115 kV Static VAR Compensator (SVC) at Rogue Substation with a dynamic range of -45 MVAR to +50 MVAR.

Key Drivers:

Maintain reliable load service to the South Oregon Coast load area

Issues Being Addressed:

Load growth along the South Oregon Coast

Discussion of Alternatives:

Other alternatives to the project included adding shunt capacitors in the area or building new transmission into the area. Shunt capacitors did not offer adequate fine-tuning of voltage control and building new transmission was not economically feasible at this time.

Lebanon Area

Lebanon Shunt Capacitor Addition

Description:

Add a 19.6 MVAR, 115 kV shunt capacitor bank at Lebanon Substation

Key Drivers:

Voltage support to maintain reliable load service to customers

Issues Being Addressed:

Maintain reliable service to loads in the Lebanon area

Discussion of Alternatives:

Another alternative considered was adding a new 230/115 kV transformer in the Lebanon area. However, it was determined that this more costly project could be deferred with the shunt capacitor addition.

City of Centralia

Description:

Rebuild both of the Chehalis-Centralia 69 kV lines No.1 and 2 with higher capacity conductor using H-frame structures, and 115 kV spacing and insulation. The lines will be operated initially at 69 kV.

Key Drivers:

- Load service obligations
- Commercial and Industrial load growth in this area

Issues Being Addressed

Maintain reliable service to growing loads in the Centralia vicinity.

Discussion of Alternatives

Other alternatives considered for this project included building a new double circuit 115 kV line. However, the upgrade was selected as the preferred alternative because it was the most cost effective solution to provide adequate capacity for load service.

Southern Idaho and Lower Valley Area

Lower Valley Reinforcement (Hooper Springs)

Description:

This project was originally a joint project between BPA, PacifiCorp, and Lower Valley Energy. Each utility's component of the project is described below.

(BPA portion): Construct Hooper Springs Substation. Install a 138/115 kV transformer at Hooper Springs.

(PacifiCorp portion): Construct three mile knoll Substation. Install a 345/138 kV transformer. Loop in the Goshen-Bridger 345 kV transmission line.

(Lower Valley Energy portion): Build a new 20 mile, double circuit line, from Hooper Springs to Lanes Creek/Valley. The new double circuit line will be built as 161 kV, but operated initially at 115 kV.

The project cost and schedule is contingent on agreements being signed between the affected parties.

Key Drivers:

- Voltage Stability
- Reliable load service to the Lower Valley and Fall River Load Areas

Issues Being Addressed:

Maintaining reliable load service to the Lower Valley and Fall River area loads.

Discussion of Alternatives:

- Build a new 115 kV Substation (Lanes Creek) with a 115/161 kV transformer bank. Add a 161-kV terminal at Goshen. Build a new 161 kV line (approx. 65 miles) from Lanes Creek to Goshen.
- Add two 161 kV terminals at Goshen Substation. Add a new 161 kV yard at Swan Valley Substation. Add a 115/161 kV transformer at Palisades. Rebuild Palisades-Goshen as a 161 kV double circuit line. One circuit would become the Goshen-Swan Valley No.2 161 kV line and the other would become the Goshen-Palisades 161 kV line.
- Same as the previous option except the Goshen-Swan Valley line would be operated as 161 kV, but the Goshen-Palisades line would be initially operated at 115 kV.

Drummond Shunt Capacitor Addition

Description:

Add two groups of 115 kV shunt capacitors (15 MVAR each) at Drummond Substation

Key Drivers:

Voltage support for reliable load service to customers

Issues Being Addressed:

Maintaining reliable load service to customers in the Southern Idaho load service area

Discussion of Alternatives:

Alternate locations for the shunt capacitor addition were considered but Drummond was chosen to provide optimal voltage support to the area.

3.2.2 On-Going Projects

Area Service Reactive Additions

Description:

This is a general category for reactive additions to support voltage schedules system wide for the Area and Customer Service asset category.

Key Drivers:

- Reliability Standards for system voltages
- Load Growth

Issues Being Addressed:

Voltage Support

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

Customer Service Facility Additions

Description:

This is a general category to capture facility additions or upgrades required to meet customer service needs defined by contractual obligations. Projects in this category may include substation bay additions, line upgrades, line taps, etc.

Key Drivers:

Customer service contractual obligations

Issues Being Addressed:

Same as Key Drivers above.

Discussion of Alternatives:

A discussion of alternatives will be included on a case by case basis once the individual projects are identified.

3.3 Upgrades and Additions

This category consists of additions to high voltage equipment or control/communications equipment or replacement of existing facilities with new facilities that have additional capacity or capabilities. Some examples of projects in this category include: adding high voltage switchgear at a new tap point, upgrading a transmission line with higher capacity conductor, or replacing obsolete control systems.

Some of the issues associated with this category are:

- Land availability for additions (either lines, substations, or communications)
- New technology for potential upgrades – proven or experimental
- Capacity needs versus cost for upgrades
- Some of the key drivers for upgrades and additions are:
- Compliance with mandatory NERC Reliability Standards
- Aging infrastructure – poor condition of existing facilities
- Lack of manufacturer support
- Lack of spare parts
- Obsolete technology (no longer compatible with other equipment on the system)
- Cost of maintaining existing equipment versus service life from upgrading equipment.

Albany-Eugene 115 kV Line Rebuild

Description:

Rebuild a section of the Albany-Eugene 115 kV line with new structures and higher capacity conductor

Key Drivers:

- Aging and poor condition of existing structures
- Load growth
- Compliance with NERC Reliability Criteria

Issues Being Addressed:

Same as Key Drivers above.

Discussion of Alternatives:

The plan of service for the project is currently under development.

Tucannon-Walla Walla 115 kV Line Rebuild

Description:

Rebuild the Tucannon-Walla Walla 115 kV line section with new structures and higher capacity conductor.

Key Drivers:

Aging and poor condition of existing transmission structures

Issues Being Addressed:

Same as Key Drivers above.

Discussion of Alternatives:

The plan of service for the project is currently under development.

PDCI (Pacific DC Intertie) Upgrade

Description:

The primary focus of the Celilo upgrades is on Converter 1 and 2. Most of the existing facilities are 25+ years old and in many cases the equipment is completely obsolete in terms of vendor support and spare parts. Upgrades of the Control/Protection systems, DC filters, AC filters, Cooling Systems, Valves and Buswork will address age/condition related issues as well as support potential capacity expansion. The upgrades will improve NERC compliance with system protection and control requirements for reliability.

Converter 3 and 4 work is predominantly to maintain existing capability and is covered in the Sustain Portfolio in this report under the Stations Replacement section.

Key Drivers:

- Control System – Expandability
- Aging equipment
- Reliable Operation of the PDCI
- Revenue

Transformer Spares

Description:

Purchase 5 new transformers that will be designated as system spares. In 2006-2007 we saw the failure of 6 large power transformers and 2 reactors. The spares will primarily replace the spare transformer capacity that was put into service after the failures. A revised spare transformer policy is being implemented that will relocate both existing and new spare transformers to strategically locate spares in line with system critical infrastructure. These spares will be installed at Ponderosa, Monroe, Sickler, Hot Springs, and Alvey substations.

Key Drivers:

- Reliability
- Aging equipment
- Environment

Issues Being Addressed:

Replace transformer spares due to system failures and relocate new and existing spares to meet reliability priorities.