Investment summaries

Prioritized Expansion Portfolio
Capital Investment Review
February 21, 2014

Investment summaries

The investment summaries that follow are for reference purposes

The summaries cover all investments nominated that are at various stages of play in the prioritization process (40 total plus I-5 Corridor Project)

Prioritized Expansion Portfolio

Page #	Investment Name	Asset Category	Investment Classification	Net Economic Benefit Ratio	Capital spending (base amounts; without AFUDC) 2014	2015	2016	2017	Later Years	Total	Next Steps
	Compliance Investments (Costs only assessed)										
1	Transmission Aggregated CC Compliance projects LT $3M.	Transmission	Compliance		0	794	0	0	0	794	Proceed with projects, update cost estimates
3	Transmission Aggregated Compliance Sub Upgrades LT $3M	Transmission	Compliance		0	0	0	589	589	1,178	Give green light at later date
5	FY15 - FY17 PMUs	Transmission	Compliance		0	337	3,032	1,819	1,550	6,738	Proceed to Business Case
7	DeMoss-Fossil Shunt Reactive Project	Transmission	Compliance		0	281	1,125	4,219	0	5,625	Proceed to Business Case
	Subtotal				0	1,412	4,157	6,627	2,138	14,334	
	Discretionary Investments (Costs & Benefits assessed)										
9	ITSM - CRM Project	IT	Discretionary	76.5	0	0	628	0	0	628	Proceed to Inception Stage
11	Walla Walla Reinforcement (Tucannon River-Hatwai 115kV)	Transmission	Discretionary	18.1	0	424	424	424	7,212	8,485	Proceed to Business Case
13	Spare Transformers at Wind Sites - Slatt Substation	Transmission	Discretionary	16.8	0	0	1,136	5,114	0	6,250	Proceed to Business Case
15	Spare Transformers at Wind Sites - Central Ferry Substation	Transmission	Discretionary	15.7	0	0	0	1,136	5,114	6,250	Proceed to Business Case
17	Spare Transformers at Wind Sites - Rock Creek Substation	Transmission	Discretionary	13.0	0	1,250	5,625	0	0	6,875	Proceed to Business Case
19	Spare Transformers at Wind Sites - John Day Substation	Transmission	Discretionary	12.8	1,250	5,625	0	0	0	6,875	Proceed to Business Case
21	ITSM - CMDB/AIM/ETS	IT	Discretionary	8.6	0	511	0	0	0	511	Proceed to Inception Stage
23	ITSM-CMS Project	IT	Discretionary	8.8	0	0	276	0	0	276	Proceed to Inception Stage
25	Monroe 500kV Line Retermination	Transmission	Discretionary	5.7	0	0	1,271	3,813	3,390	8,474	Proceed to Business Case
27	O&M Flex Project - Carlton Substation Sectionalization Project	Transmission	Discretionary	2.0	1,055	2,461	0	0	0	3,516	Proceed to Business Case
29	Montana-to-Washington Transmission System Upgrade Project	Transmission	Discretionary	1.6	0	18,250	82,125	82,125	0	182,500	Deferred
31	Power Constraint Management System (PCMS)	IT	Discretionary	0.5	0	1,854	955	0	0	2,809	Examine alternatives
33	Redmond MHQ Addition and Building Upgrade	Facilities	Discretionary	0.3	0	0	1,238	3,713	7,425	12,375	Examine alternatives
35	Snohomish MHQ Upgrade	Facilities	Discretionary	0.2	0	1,300	3,900	7,800	0	13,000	Examine alternatives
37	Southern Idaho Communication Upgrade	Transmission	Discretionary	(0.1)	0	0	1,400	4,900	700	7,000	Redefine scope of project
39	Lewiston MHQ Facility	Facilities	Discretionary	(0.5)	0	0	0	1,119	10,069	11,188	Examine alternatives
41	L0322 Klondike-Blalock Reinforcement Mobile Transformer	Transmission	Discretionary	(0.5)	0	0	0	1,663	0	1,663	Re-assess benefits
43	Sacajawea to Ice Harbor-Franklin 115kV #1 Line	Transmission	Discretionary	(1.0)	0	0	173	2,770	519	3,463	Cancelled
45	Structured Data Management (SDM)	IT	Discretionary	(1.1)	0	1,080	1,620	0	0	2,700	Proceed to Inception Stage
47	Business Systems Disaster Recovery	IT	Discretionary	(1.6)	0	5,502	8,254	0	0	13,756	Tabled
	Business Systems Disaster Recovery (Alternative 2)	IT	Discretionary	(4.2)	0	1,259	1,888	0	0	3,147	
	Subtotal				2,305	38,258	109,025	114,576	34,429	298,592	
	Discretionary/Policy Commitment Investments (Costs only assessed at this point)										
49	Garrison East Transmission Project	Transmission	Discretionary		0	2,500	7,500	30,000	10,000	50,000	Deferred
51	Business Enterprise Services Strategy (BESS) initiatives	IT	Discretionary		0	0	2,490	520	2,790	5,800	Examine alternatives
53	Business Intelligence Competency Center	IT	Discretionary		0	0	0	2,100	0	2,100	Examine alternatives
55	Billing Information System Upgrade	IT	Discretionary		0	0	5,000	5,000	0	10,000	Examine alternatives
57	Boardman to Hemingway	Transmission	Discretionary		0	0	0	0	375,000	375,000	Assess benefits, examine alternatives
59	Capability Upgrades for Planning and Operations in Power Services (CUPO)	IT	Discretionary		0	1,540	4,616	4,616	9,232	20,004	Examine alternatives
61	EIM Potential Technology Enhancements	IT	Discretionary		0	0	850	850	6,800	8,500	Assess benefits, revise cost estimates
63	Transmission Asset Portfolio Management System	IT	Discretionary		0	2,500	2,500	0	0	5,000	Define scope, assess costs and benefits
65	G0314 Interconnection of Thompson Falls Hydroelectric Project at Ashley Creek Substation	Transmission	Policy Commitment		0	0	1,781	7,719	2,375	11,875	Tabled
67	G0105/G0432 enXco's Desert Claim Wind Project	Transmission	Policy Commitment		0	0	0	563	10,688	11,250	Tabled
69	Transmission Aggregated PFIA Projects LT $3M	Transmission	Policy Commitment		0	2,287	2,287	2,287	2,287	9,146	Proceed with projects, update cost estimates
71	G0361 Invenergy's Heppner Wind Stanfield	Transmission	Policy Commitment		0	0	0	3,750	21,250	25,000	Tabled
73	Transmission Aggregated A & CS projects LT $3M	Transmission	Policy Commitment		0	625	625	0	0	1,250	Proceed with projects, update cost estimates
75	Monroe 500kV Reactor	Transmission	Policy Commitment		0	1,502	1,502	6,009	1,002	10,015	Assess benefits
77	ETC Scenario Analysis	IT	Discretionary		0	0	500	500	0	1,000	Examine alternatives
	Subtotal				0	10,954	29,651	63,913	441,423	545,940	
	Projects "Green Lighted" and in Prioritized Portfolio				2,305	15,675	18,049	18,812	19,552	74,392	
	Projects deferred, excluded until further assessment				0	34,949	124,784	166,304	458,438	784,474	
	Total Prioritized Portfolio				2,305	50,623	142,833	185,116	477,990	858,866	
79	I-5 Corridor Project	Transmission	Policy Commitment		11,000	62,500	209.25	209,250	82,510	574,509	

Next Steps for nominated and assessed investments (1)

Project	Asset Category	Actions	Remarks
DeMoss-Fossil Shunt Reactive	Transmission	"Green Light" - proceed to meet near-term compliance requirements	Prepare business case that sets project execution targets and risk mitigation plan. Project starts in FY 2015 and is estimated to cost $5.8 million
PMU FY 2015-2017 (Phasor Measurement Units)	Transmission	"Green Light" – proceed to meet near-term compliance requirements	Prepare business case that sets project execution targets and risk mitigation plan. Project starts in FY 2015 and is estimated to cost $5.4 million
Misc. Small Control Center Compliance Projects < $3million	Transmission	"Green Light" – proceed to meet near-term compliance requirements	Prepare business case that sets project execution targets and risk mitigation plan. Project starts in FY 2015 and is estimated to cost $0.8 million
Misc. Small Substation Compliance project	Transmission	Defer decision	Project is not expected to start before FY 2017
CMDB/AIM/ETS-Configuration Mgmt **CRM - Customer Relation Mgmt system** **CMS - Change Management System**	IT	"Green Light" this suite of data base and applications	These projects show great promise in benefits because they deliver significant internal IT efficiencies when completed. The projects should proceed to the "Inception Phase", then "Alternatives Phase".
Spare Transformers at Wind Generation substation sites: John Day, Central Ferry, Slatt and Rock Creek	Transmission	"Green Light" – proceed to prepare business cases for these projects	These investments have significant economic value.
Walla Walla Reinforcement	Transmission	"Green Light" – proceed to prepare business case	Validate avoided wheeling costs associated with this line build.
Monroe 500 kV Line Retermination	Transmission	"Green Light" – proceed to prepare business case	Agency approval in FY 2014 with design/construction start in FY 2015
O&M Flex –Carlton substation	Transmission	"Green Light" – proceed to prepare business case	Agency approval in FY 2014 with design/construction start in FY 2015
SDM – (Structured Data Management)	IT	"Green Light" – proceed to Inception Phase	This project has significant compliance components, starts in FY 2015 and is expected to cost $3.6 million
Montana to Washington 500 kV line Reinforcement & Garrison East	Transmission	Removed at this time, examining alternatives	

Next Steps for nominated and assessed investments (2)

Project	Asset Category	Actions	Remarks
Monroe 500 kV Reactor	Transmission	Assess project benefits	Project costs have been assessed but not all the benefits
Klondike-Blalock Reinforcement Southern Idaho Communications	Transmission	Re-scope, re-assess costs and benefits	
Power Constraint Management System (PCMS)	IT	Re-scope, re-assess costs and benefits	
Maintenance HQ projects at: Redmond, Snohomish & Lewiston	Facilities	Re-scope, assess costs and benefits	Projects as originally scoped are not economic. Examine alternatives that reduce costs/increase benefits. Bring re-scoped projects back for further consideration in a future cycle.
LGIA projects: Heppner wind, Thompson Falls & Desert Claim Wind	Transmission	Continue to monitor need for these investments	LGIA investments that is customer-driven with very low probability to start before FY 2018.
Aggregated projects <$3 million - **PFIA** - **A&CS**	Transmission	"Green Light" - Proceed with investments as needed	These projects are classified as policy commitment
Sacajawea to Ice harbor-Franklin 115 kV #1 Line	Transmission	Table or cancel	Lacks adequate benefit to justify proceeding
Various IT investments nominated but not assessed BESS, BICC, CUPO, ETC, BISU, EIM and TAPM	IT	Continue to scope, identify alternatives and assess costs and benefits	Consider re-submitting revised projects in future investment evaluation cycle
Boardman to Hemingway	Transmission	Proceed to assess economics and evaluate alternatives	
I-5	Transmission	Continue with NEPA	

Transmission Aggregated CC Compliance projects LT $3M
Classification: Compliance
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Several initiatives currently in planning at BPA are: Logical Access Control (LACS)/Remote Access System (RAS)/WIN7; Digital Certificates Customer Portal; Physical Access Control System (PACS)/Pro. This proposed project will implement Active Directory Certificate Services (ADCS) as the BPA's internal Public Key Infrastructure, and it will provide the platform needed to meet HSPD-12 requirements.

Why is this investment needed?

There are wide variations in the quality and security of identification used to gain access to secure facilities where there is potential for terrorist attack. In order to eliminate these variations, U.S. policy is to enhance security, increase Government efficiency, reduce identity fraud, and protect personal privacy by establishing a mandatory, Government-wide standard for secure and reliable forms of identification issued by the Federal Government to its federal and contract employees. HSPD-12 mandates a federal standard for secure and reliable forms of identification. HSPD-12 and application development requirements drive the need for a PKI infrastructure to implement other requirements of HSPD-12. A Public Key Infrastructure does not currently exist at BPA. Security capabilities are out-dated and insufficient to support systems and projects that require X.509 certificate-based authentification. This is a compliance project and is necessary to meet the requirements of HSPD-12 authentification.

What assumptions are behind the investment need?

BPA must comply with HSPD-12.

What actions would we take if this investment were not made?

We would not be in compliance with HSPD-12 if we do not complete this work and may be subject to NERC/WECC sanctions as a result.

What investment alternatives were considered and why are they not recommended?

There are no viable alternatives to making this investment.

Who would benefit from this investment?

BPA and its stakeholders will benefit from having a standardized governmental approach to security that reduces fraud through secure and reliable forms of identification.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Jul-15	Sep-15	Dec-15	$590	$635	$740	$0	$794	$0	$0	$0	$794	0%	3	5	10

What drives the investment costs to be low or high?

This is a rather small project and there should not be any significant variations from the estimated cost.

OP_CABRptText7_IX

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$200	$200
Present value:	$0	$89	$89

What is the proposed investment?

TSO140082 – Troutdale Substation 230kV Series Bus Sectionalizing Breaker Addition

Why is this investment needed?

This is a compliance project and is necessary to meet NERC Reliability Requirements TPL-003 concerning the loss of 2 or more system elements). If we do not proceed with this project and we have a failure, we would be liable for sanctions from WECC for knowingly disregarding a standard.

What assumptions are behind the investment need?

This project is required to mitigate thermal overloads due to the failure of the bus sectionalizing breaker (A-130) between Troutdale East and West bus. The loss of both bus sections could potentially result in cascading outages in the Portland area. BPA needs to begin this project in FY 16 in order to complete the project by the scheduled energization date in order to comply with NERC Reliability Standard TPL-003 "System Performance following the loss of Two or More Bulk Electric System Elements".

What actions would we take if this investment were not made?

It would be necessary to limit flows through this bus to avoid the potential of a cascading outage in the Portland area.

What investment alternatives were considered and why are they not recommended?

The only feasible alternative is to do nothing, which does not mitigate the problem and potentially subjects BPA to sanctions from WECC.

Who would benefit from this investment?

BPA and its customers would benefit because in the event of a breaker failure in which the breaker did not open, both buses would be lost, thereby resulting in potential outages throughout the Portland area. This would typically damage both BPA and customer equipment, resulting in outages and reputational damage. Additionally, we would likely be subjected to WECC sanctions for non-compliance

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-16	Jun-18	Sep-18	Dec-18	$850	$942	$1,250	$0	$0	$0	$589	$589	$1,178	0%	30	40	70

What drives the investment costs to be low or high?

Field conditions and outage availablity could be better or worse than planned. Costs for labor and materials could be higher than planned.

OP_CABRptText7_IX

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$5	$5
Present value:	$0	$11	$11

FY15 - FY17 PMUs
Classification: Compliance
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

This project installs 27 Phasor Measurement Units (PMU) at 13 sites in 3 phases over 4 years. Each phase is composed of 1 year of design and 1 year of construction. The equipment being installed includes control and data PMUs, routers and channel units. Some of the PMUs would be new installations for areas not yet monitored and others would replace old PMUs.

The Synchrophasor Project approved by the CAB has deployed most of the PMUs planned by the Western Interconnection Synchrophasor Project (WISP), but critical substations had to be bypassed due to scheduling and other issues. This project is a follow-up to the Synchrophasor Project to complete the installation of PMUs at those sites.

Why is this investment needed?

The PMU project provides wide area monitoring across the WECC system to provide better situational awareness and improve transmission operation and increase transmission utilization. Other benefits include the avoidance of large scale outages.

Transmission providers such as BPA are required to verify actual performance of generators connected to the system and validate simulation models to ensure adequate voltage performance is being provided. BPA is using PMUs to comply with forthcoming NERC standards. PMUs provide high resolution samples to record low frequency oscillations and damping issues across the system and to validate generator operator models. In addition, the models must be validated through event analysis and base-line performance. PMU's give more accurate and timely data to accomplish this.

What assumptions are behind the investment need?

The costs are based on our past experience with installing PMUs. Most of the issues with installing the PMUs have been resolved. If there are still show stoppers at a substation, we will chose to do another substation in it place.

What actions would we take if this investment were not made?

PMUs would stop being deployed upon completion of the Synchrophasor project was approved a couple of years ago by the CAB. Data would be reviewed to see if the existing PMUs provide an adequate information to comply with NERC standard PRC-002. If as expected they would not provide adequate information, a corrective action plan work need to be created and a new investment proposal submitted.

What investment alternatives were considered and why are they not recommended?

Stop deploying PMUs after FY14 and review the data to see if the existing PMUs provide an adequate system picture to comply with PRC-002.

Who would benefit from this investment?

Transmission customers , through avoided outages and outage costs, increased BPAT revenue through fuller, more optimal system use, and avoided regulatory sanctions from noncompliance.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Jul-18	Sep-18	Sep-18	$5,090	$5,390	$6,390	$0	$337	$3,032	$1,819	$1,550	$6,738	0%	15	20	25

What drives the investment costs to be low or high?

If no extra cabling and no battery replacements are required, then costs will come in low. If extra cabling and battery replacements are required beyond expectations, then cost will be high. If there are multiple control houses involved , costs will also likely be higher than expected.

OP_CABRptText7_IX

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$179	$211	$32
Present value:	$236	$279	$42

DeMoss-Fossil Shunt Reactive Project
Classification: Compliance
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Installation of a 4 - MVAR Shunt Reactor at Fossil Substation 69 kV bus and a 4-MVAR Shunt Capacitor at DeMoss Substation.

Why is this investment needed?

This project is needed for two reasons:
1) To support local area load growth. During peak winter load conditions with local area wind not generating, an outage can cause low voltages as well as local area load loss; and
2) To support PATU wind and Condon wind generation. During low to average load level conditions, a single line outage of Big Eddy-DeMoss 115 line can cause high area voltages (above 1.10 PU) with or without wind generating.

What assumptions are behind the investment need?

That adequare space is available at both substations for the installations.

What actions would we take if this investment were not made?

For high voltage conditions, we would limit wind generation that is interconnected in that area (Condon wind). For low voltage conditions, during peak winter load and little or no wind generation, we would have to shed load to be within voltage criteria. The contingency that would cause either of these conditions is the loss of Big Eddy DeMoss #1 (115kV line).

What investment alternatives were considered and why are they not recommended?

A 115kV Fossil STATCOM sized +/- 4 MVARs. This investment was determined to be much more expensive and it would entail adding a unique set of equipment that would require unique maintenance skills and costs.

Who would benefit from this investment?

The major beneficiaries would be BPA system operations, Wasco Electric Coop, Northern Wasco PUD and Columbia Basin Electric Coop.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Sep-16	Sep-17	Sep-18	$3,500	$4,500	$10,340	$0	$281	$1,125	$4,219	$0	$5,625	0%	30	40	65

What drives the investment costs to be low or high?

The low cost estimate assumes (1) good soil (easy to dig), (2) no land or control house expansion is needed, and (4) work is performed by in-house labor. The high cost estimate assumes (1) a control house expansion is necessary, (2) the project is performed by contractor, (3) The road at DeMoss will have to be moved to enable a substation expansion, (4) substantial environmental work is required.

OP_CABRptText7_IX

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$105	$141	$36
Present value:	$244	$326	$83

ITSM - CRM Project
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

The IT Service Management (ITSM) is a suite of software replacements that, taken together, would improve efficiency, accuracy, increased quality and timeliness of client service, as well as a reduction in outage downtime. The foundation for the ITSM involves creating a Configuration Management Database (CMDB) to serve as a single repository of information-shared applications used by customer relationship management (trouble ticketing), IT application/system change management, IT asset inventory management and equipment tracking functions. The Customer Relationship Management (CRM) system is used to manage trouble reports submitted by users. The proposed investment would replace the current system to implement a workflow to better manage trouble tickets; provide a knowledge-base that can be used by support technicians and users; and allow for trend analysis to better understand the root cause of problems so as to plan for updates/replacements or education. This particular alternative calls for using an already-purchased, in-house tool that is not being used today.

Why is this investment needed?

The IT Service Management (ITSM) suite of investments is needed to integrate data elements across applications that are siloed, updated and maintained manually. The result of this siloed, manual approach is inaccurate data, inefficient and unnecessarily labor-intensive processes. With today's CRM, reporting is heavily labor-intensive because needed data is insufficiently granular and accessible and problem-solving is inefficient (i.e., difficult and time-consuming to, for example, recognize defect patterns, diagnose root causes, and correlate incidents to a single root cause). A well designed and implemented CRM would reduce labor hours and costs for trouble-ticketing, assessing problems, assigning resources to address problems, preparing reports, and otherwise supporting IT application and hardware users. A new CRM would also reduce workflow disruptions and productivity losses among users.

What assumptions are behind the investment need?

- Timely implementation and effective integration with other ITSM program projects.
- Reduction in downtime due to improved understanding of outage relationships.
- Reduction in downtime due to more efficient root cause analyses.

What actions would we take if this investment were not made?

We would continue with the heavily labor-intensive system in place today with occasional O&M work. Outages would continue to increase because the number of changes in today's production environment has been increasing. Today's system does not provide for trend analysis, therefore missing opportunities to identify problematic root causes and addressing the problems through replacement, repair or education.

What investment alternatives were considered and why are they not recommended?

Five alternatives were considered, with three not ssed largely for cost reasons:

- Status Quo (rejected)
- Buy an off-the-shelf (COTS) solution (not assessed)
- Use an in-house, already purchased commercial tool (1 of 2 alternatives preferred for discussion)
- In-house, build from scratch (not assessed)
- Enhance the Status Quo (1 of 2 alternatives preferred for discussion)

Who would benefit from this investment?

Users of IT applications and hardware. IT support technicians would benefit through a better workflow and knowledge-base for assisting their customers, as would those who analyze problem root causes and produce reports.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Aug-16	Sep-16	Sep-17	$208	$628	$1,114	$0	$0	$639	$0	$0	$639	2%	8	15	20

What drives the investment costs to be low or high?

Cost uncertainties include scope and cost of integrating the CRM with other systems, number of labor hours , labor cost rates), programming and security costs, and training costs for users and IT personnel.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$115,021	$76,217	-$38,804
Present value:	$127,680	$84,605	-$43,075

Walla Walla Reinforcement (Tucannon River-Hatwai 115kV)
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Construct 8 miles of transmission line from the North Lewiston terminus of BPA's Tucannon River – Hatwai 115kV line to BPA's Hatwai substation, and add a new 230/115kV transformer at Hatwai substation.

Why is this investment needed?

This investment is needed because the amount of Long-Term Firm (LTF) transmission service BPA awarded to customers with Points of Receipt (POR or generators) in the Walla Walla area exceeds the rating of BPA facilities that connect the generation to BPA's bulk transmission system. As a result of this, Agreement #12TX-15710 has been put into effect for payment of $266,000 per month to Avista through September 30,2042, for parallel use of the substation facilities at North Lewiston and 8 miles of 230kV transmission line between North Lewiston and Hatwai substations.

What assumptions are behind the investment need?

Section 7.4 of the above agreement describes an intent to coordinate planning and development of the transmission system for the purpose of facilitating cost-effective transmission solutions, including construction alternatives. This project is intended, pursuant to section 7.4 of said agreement, as a cost effective construction alternative to a parallel capacity support arrangement with Avista. Risks mitigated by this investment are the possibility of PacifiCorp filing a similar request for payment for parallel capacity support in the Walla Walla area, and continuing risk of curtailments of Walla Walla area wind if Avista's system becomes congested.

What actions would we take if this investment were not made?

BPA would continue to pay wheeling fees of approximately $3.2 Million per year to Avista for use of their transmission facilities and would risk a similar requirement from PacifiCorp.

What investment alternatives were considered and why are they not recommended?

Status Quo – Contract between BPA and Avista requiring monthly payments for use of Avista transmission facilities. Or construct a 35 mile 115kV transmission line between BPA's Walla Walla and Sacajawea 115kV substations – this would provide the same benefits as the proposed investment, as well as increased reliability to the Walla Walla area, but at a greater cost.

Who would benefit from this investment?

BPA and its network customers would benefit from this investment by not having to pay $3.2 Million per year to Avista and by eliminating the risk that PacifiCorp would request similar compensation.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Dec-18	Dec-20	Dec-21	$5,706	$6,788	$7,671	$0	$424	$424	$424	$7,212	$8,485	0%	50	60	70

What drives the investment costs to be low or high?

Low cost assessment assumes the project will be constructed with in-house resources, that an environmental EIS will be prepared, and that line construction costs will be $500K per mile. Base cost assessment assumes this project will be constructed by contractor, and that the right-of-way will be adjacent to the Avista-owned line, with no new access roads needed, no difficult land owners, and no need to purchase 462 acres at $1000/acre (as assumed in high case). Communications work includes adding a few additional SCADA points, with no significant fiber costs beyond what is needed within the Hatwai Substation. Base line construction costs are assessed at $600K per mile. High cost assessment assumes the project will be constructed by contractor, an Environmental EIS will be prepared, with arrowheads found or species impacted that require mitigation. ROW would be away from existing line, with land acquisitions required, land owners being unwilling to sell, and construction of new access roads needed. Line construction costs at$700K/mile.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$72	$198	$125
Present value:	$539	$1,092	$553

Spare Transformers at Wind Sites - Slatt Substation
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The proposed investment is to install a fourth 500 kV single phase transformer at Slatt substation (one of four to be installed) The investment improves reliability for wind generation customers served by this bank and brings the substation up to conformance with Transmission policy of installing a spare transformer at these wind substation sites. In 2005, wind generation availabiliy was not considered an issue for grid operations. Loss of wind generation due to transformer failure could be offset with other generation within the BPA BAA. Accordingly, a radial connection with the transformer as a single point of failure was deemed unacceptable. Generation customers integrated at these four substations were made aware of a potential 30 day outage due to transformer failure.

Why is this investment needed?

Transmission Services management has determined that the addition of a spare transformer at all 500/230kV BPA facilities for integrating wind projects is now BPA policy. A policy for future wind generation projects has been approved and will go into effect in the fall of 2013. There remains an outstanding issue of how to address needed spare transformer additions to 4 existing substations that only have 3 single phase transformers in place (Slatt, John Day, Rock Creek and Central Ferry).

What assumptions are behind the investment need?

Installation of these transformers would enable BPA to rotate each one of the 4 transformers out of service on a 10-year cycle, thereby extending their service lives, reducing long-term replacement costs, and lowering O&M costs.

What actions would we take if this investment were not made?

The cost of lost generation may well be unacceptable to the wind project owners.

What investment alternatives were considered and why are they not recommended?

The only technical alternative is to do nothing which adds considerable risk to the producer as well as to BPA.

Who would benefit from this investment?

Wind Generation owners

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Apr-17	Aug-17	Nov-17	$4,000	$5,000	$6,400	$0	$0	$1,136	$5,114	$0	$6,250	0%	30	45	70

What drives the investment costs to be low or high?

Low investment cost: on time delivery, use BPA labor; High investment cost: late delivery, use CMO labor

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$192	$248	$56
Present value:	$539	$696	$157

Spare Transformers at Wind Sites - Central Ferry Substation
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The proposed investment is to install a fourth 500 kV single phase transformer at Central Ferry substation (one of four to be installed) The investment improves reliability for wind generation customers served by this bank and brings the substation up to conformance with Transmission policy of installing a spare transformer at these wind substation sites. In 2005, wind generation availabiliy was not considered an issue for grid operations. Loss of wind generation due to transformer failure could be offset with other generation within the BPA BAA. Accordingly, a radial connection with the transformer as a single point of failure was deemed unacceptable. Generation customers integrated at these four substations were made aware of a potential 30 day outage due to transformer failure.

Why is this investment needed?

Transmission Services management has determined that the addition of a spare transformer at all 500/230kV BPA facilities for integrating wind projects is now BPA policy. A policy for future wind generation projects has been approved and will go into effect in the fall of 2013. There remains an outstanding issue of how to address needed spare transformer additions to 4 existing substations that only have 3 single phase transformers in place (Slatt, John Day, Rock Creek and Central Ferry).

What assumptions are behind the investment need?

Installation of these transformers would enable BPA to rotate each one of the 4 transformers out of service on a 10-year cycle, thereby extending their service lives, reducing long-term replacement costs, and lowering O&M costs.

What actions would we take if this investment were not made?

The cost of lost generation may well be unacceptable to the wind project owners.

What investment alternatives were considered and why are they not recommended?

The only technical alternative is to do nothing which adds considerable risk to the producer as well as to BPA.

Who would benefit from this investment?

Wind Generation owners

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-16	Apr-18	Aug-18	Nov-18	$4,000	$5,000	$6,400	$0	$0	$0	$1,136	$5,114	$6,250	0%	30	45	70

What drives the investment costs to be low or high?

Low investment cost: on time delivery, use BPA labor; High investment cost: late delivery, use CMO labor

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$187	$241	$54
Present value:	$523	$675	$152

Spare Transformers at Wind Sites - Rock Creek Substation
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The proposed investment is to install a fourth 500 kV single phase transformer at Rock Creek substation (one of four to be installed) The investment improves reliability for wind generation customers served by this bank and brings the substation up to conformance with Transmission policy of installing a spare transformer at these wind substation sites. In 2005, wind generation availabiliy was not considered an issue for grid operations. Loss of wind generation due to transformer failure could be offset with other generation within the BPA BAA. Accordingly, a radial connection with the transformer as a single point of failure was deemed unacceptable. Generation customers integrated at these four substations were made aware of a potential 30 day outage due to transformer failure.

Why is this investment needed?

Transmission Services management has determined that the addition of a spare transformer at all 500/230kV BPA facilities for integrating wind projects is now BPA policy. A policy for future wind generation projects has been approved and will go into effect in the fall of 2013. There remains an outstanding issue of how to address needed spare transformer additions to 4 existing substations that only have 3 single phase transformers in place (Slatt, John Day, Rock Creek and Central Ferry).

What assumptions are behind the investment need?

Installation of these transformers would enable BPA to rotate each one of the 4 transformers out of service on a 10-year cycle, thereby extending their service lives, reducing long-term replacement costs, and lowering O&M costs.

What actions would we take if this investment were not made?

The cost of lost generation may well be unacceptable to the wind project owners.

What investment alternatives were considered and why are they not recommended?

The only technical alternative is to do nothing which adds considerable risk to the producer as well as to BPA.

Who would benefit from this investment?

Wind Generation owners

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Apr-16	Aug-16	Nov-16	$4,600	$5,500	$7,190	$0	$1,250	$5,625	$0	$0	$6,875	0%	30	45	70

What drives the investment costs to be low or high?

Low investment cost: on time delivery, use BPA labor; High investment cost: late delivery, use CMO labor

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$197	$255	$58
Present value:	$555	$716	$162

Spare Transformers at Wind Sites - John Day Substation
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The proposed investment is to install a fourth 500 kV single phase transformer at John Day substation (one of four to be installed) The investment improves reliability for wind generation customers served by this bank and brings the substation up to conformance with Transmission policy of installing a spare transformer at these wind substation sites. In 2005, wind generation availabiliy was not considered an issue for grid operations. Loss of wind generation due to transformer failure could be offset with other generation within the BPA BAA. Accordingly, a radial connection with the transformer as a single point of failure was deemed unacceptable. Generation customers integrated at these four substations were made aware of a potential 30 day outage due to transformer failure.

Why is this investment needed?

Transmission Services management has determined that the addition of a spare transformer at all 500/230kV BPA facilities for integrating wind projects is now BPA policy. A policy for future wind generation projects has been approved and will go into effect in the fall of 2013. There remains an outstanding issue of how to address needed spare transformer additions to 4 existing substations that only have 3 single phase transformers in place (Slatt, John Day, Rock Creek and Central Ferry).

What assumptions are behind the investment need?

Installation of these transformers would enable BPA to rotate each one of the 4 transformers out of service on a 10-year cycle, thereby extending their service lives, reducing long-term replacement costs, and lowering O&M costs.

What actions would we take if this investment were not made?

The cost of lost generation may well be unacceptable to the wind project owners.

What investment alternatives were considered and why are they not recommended?

The only technical alternative is to do nothing which adds considerable risk to the producer as well as to BPA.

Who would benefit from this investment?

Wind Generation owners

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-13	Apr-15	Aug-15	Nov-15	$4,600	$5,500	$7,190	$1,250	$5,625	$0	$0	$0	$6,875	0%	30	45	70

What drives the investment costs to be low or high?

Low investment cost: on time delivery, use BPA labor; High investment cost: late delivery, use CMO labor

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$203	$262	$59
Present value:	$571	$738	$167

ITSM - CMDB/AIM/ETS
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

The IT Service Management (ITSM) is a suite of software replacements that, taken together, would improve efficiency, accuracy, increased quality and timeliness of client service, as well as a reduction in outage downtime. The foundation for the ITSM involves creating a Configuration Management Database (CMDB) to serve as a single repository of information shared by multiple applications used by customer relationship management (trouble ticketing), IT application/system change management, IT asset inventory management equipment tracking functions. This specific investment focuses on IT asset inventory management and equipment tracking functions portion of the ITSM suite. This particular alternative looks at overhauling the systems currently used for managing IT system equipment and application inventory. It also creates a Configuration Management Database (CMDB) that would be used to tie together all systems in the ITSM suite. It should be noted this does not affect the Sunflower application.

Why is this investment needed?

The ITSM suite of projects is needed to integrate data elements across applications that are siloed, updated and maintained manually. The result of this siloed, manual approach is inaccurate data and inefficient and unnecessarily labor-intensive processes. The ITSM introduces workflow which can provide visibility for activity occurring in the change management system, the customer relationship management system (i.e., what may be going one with potential problems called in by users) as well as visibility into particular system's asset configuration. To not only increase the accuracy regarding the systems being tracked and managed, this investment would also tie together the asset management systems, customer relationship management system and the configuration management system. In turn, this multi-implementation would allow users to understand equipment/system relationships, thus reducing downtime as well as proactively understanding potential impacts to changes in the production environment. It would also assist with quicker root cause analysis.

What assumptions are behind the investment need?

- Timely implementations and effective Integration with other ITSM projects.
- The CMDB (Configuration Management Database) will be in place before the other ITSM-based projects can begin because each of the other projects will need to integrate with the CMDB.
- The gathering of the requirements is to be done through a FY14 expense project.

What actions would we take if this investment were not made?

We would continue using asset management systems where data is not accurate and component relationships can't be created (currently limited to five types of components where more than 40 are required.) Continue O&M work to fix problems and errors in data. The customer relationship management, change management and asset management systems would not be able to share problem or outage-based information through a common database, thus adding to frequency and duration of outages.

What investment alternatives were considered and why are they not recommended?

Two alternatives are preferred at this time. Three additional alternatives were considered but were not assessed largely for performance and cost reasons:
1). Status Quo (rejected)
2). Modify to improve existing systems (1 of 2 alternatives preferred for discussion)
3). Build new or from scratch (not assessed)
4). Purchase an off-the-shelf (COTS) solution (not assessed)
5). SaaS-based (1 of 2 alternatives preferred for discussion)

Who would benefit from this investment?

IT staff responsible for managing IT-based system inventory; handling support calls; and managing changes to BPA's production IT environment. Users of hardware and software systems.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Aug-15	Sep-15	Apr-16	$251	$511	$1,023	$0	$724	$0	$0	$0	$724	29%	8	15	20

What drives the investment costs to be low or high?

Cost uncertainties include training requirements and costs and consulting costs.

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$9,373	$2,070	-$7,303
Present value:	$10,394	$2,296	-$8,099

ITSM-CMS Project
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

The IT Service Management (ITSM) is a suite of software replacements that would improve the efficiency, accuracy, overall quality and timeliness of IT service to clients. The foundation for the ITSM involves creating a Configuration Management Database (CMDB) to serve as a single repository of information used by customer relationship management (trouble ticketing), IT application/system change management, and IT asset inventory management equipment tracking applications. CMS tracks changes to IT components and systems and is to provide a calendar of changes and workflow for approvals. This specific investment focuses on replacing the current change management system with a third party, off-the-shelf system that will enable IT to plan and manage changes to the production IT environment more efficiently and effectively.

Why is this investment needed?

The IT Service Management (ITSM) is a suite of software replacements that would improve the efficiency, accuracy, overall quality and timeliness of IT service to clients. The foundation for the ITSM involves creating a Configuration Management Database (CMDB) to serve as a single repository of information used by customer relationship management (trouble ticketing), IT application/system change management, and IT asset inventory management equipment tracking applications. This specific investment focuses on replacing the current change management system with a system that will enable IT to plan and manage changes to the production IT environment more efficiently and effectively. The system is currently manual and all components are entered manually, thus unable to asses the impacts of changes to infrasteructure and other systems.

What assumptions are behind the investment need?

Other project components of the ITSM are implemented timely. Outages will be reduced due to greater visibility of changes and their impacts on the production IT environment.

What actions would we take if this investment were not made?

We would continue with the heavily labor-intensive system in place today with occasional O&M work. Outages would continue to increase as the number of changes in today's production environment has been increasing. The system is also not tied to incidents or problems.

What investment alternatives were considered and why are they not recommended?

1) Status Quo (rejected)
2) In-house application rewrite (1 of 2 alternatives preferred for discussion)
3) Enhance the existing application (backend) (Not assessed – too complicated and labor intensive)
4) Purchase a third party, off-the-shelf (COTS) solution (1 of 2 alternatives preferred for assessment)
5) Software as Service (not assessed – security concerns)

Who would benefit from this investment?

Staff responsible for initiating and managing changes in production IT environment. Application users who are impacted by system outages

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Aug-16	Sep-16	Sep-17	$86	$276	$905	$0	$0	$465	$0	$0	$465	41%	8	15	20

What drives the investment costs to be low or high?

Software acquisition costs for a commercial off-the-shelf solution and integration and other implementation costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$15,196	$8,250	-$6,945
Present value:	$16,647	$9,134	-$7,513

Monroe 500kV Line Retermination
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

This project reterminates two 500 kV lines at Monroe substation. The Monroe-Chief Joe 500 kV line will be reterminated from Bay 4 into a new line terminal in bay 5. The Monroe –Custer #2 line will be reterminated from Bay 3 into Bay 4. Add new LLL on the Monroe-Custer #2 line in Bay 4. Add new line protection relay to relay transfer trip on the Monroe-Custer #2 in Bay 4. Re-wire the existing differential relays in Bay 3 to pick up PCB 4526.

Why is this investment needed?

The Monroe line retermination project will eliminate a severe N-2 outage (Breaker Failure PCB4526) which results in loss of two 500kV lines at Monroe (Custer-Monroe#2 and Monroe-Echolake). This is the most severe thermal and voltage stability Main Grid outage for the PSANI area. By reterminating the Custer #2 and Chief Joe lines, there will no longer be a credible common mode failure that would result in loss of two lines at Monroe 500kV station. Eliminating BKF 4526 will increase Northern Intertie Total Transfer Capability by at least 50MW, and provide more reliable load service to the Puget Sound Area. The project will also provide increased operational flexibility when taking maintenance outages for the breakers at Monroe, Custer and Echo Lake substations.

What assumptions are behind the investment need?

Assumes this project will increase the capacity of the Northern Intertie by a minimum of 50 MW and that there is demand to fill this extra capacity. Other assumptions: no land needs to be acquired, no expansion of yard will be necessary, no relocation of structures will be needed, and expansion of control house will not be needed. These added assumptions have nothing to do with the "Investment Need".

What actions would we take if this investment were not made?

Do nothing and live within existing system operating limits. This will reduce Operations and Maintenance flexibility in the Puget Sound and Northern Intertie area.

What investment alternatives were considered and why are they not recommended?

Only the do nothing alternative was considered.

Who would benefit from this investment?

Technical Operations and Substation Maintenance would benefit from the increased reliability. The capacity of the Northern Intertie would be increased, which would benefit transmission customers and add to BPA transmission revenue.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Dec-17	Dec-18	Dec-18	$5,213	$6,779	$7,288	$0	$0	$1,271	$3,813	$3,390	$8,474	0%	30	40	50

What drives the investment costs to be low or high?

Costs will be low if Monroe and customer relays can be re-used, brush clearing costs are minimal, station service does not need to be updated, retermination costs are relatively low, a new trenway is not needed, and costs for landings to access are relatively low. In-house labor is used. Costs will be high if the relays require enhancements, significant brush clearing is required, station service needs to be updated, retermination costs are relatively high, a new trenway is required, and costs for landings to access are relatively high. May need a new trenway if existing trenway is full ($100k). Contractor is used to perform most of the work.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$425	$488	$63
Present value:	$990	$1,137	$146

O&M Flex Project - Carlton Substation Sectionalization Project
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Add 115kV PCB At Carlton Breaking Into Two Lines The Old Forest Grove-McMinnville 115kV Line To New Carlton-McMinnville #2 & Forest Grove-Carlton 115kV Lines, Move B-403 Auto Sect Disc To Filbert Tap And Add SF6 Interrupters To B-403 Enabling Loop Break. Add Carlton 115kV Bus Tie PCB Addition. Add Three (3) 230kV PCB's Sherwood, Cascade Steel, & 230kV Bank High Side, This Carlton Substation Project will greatly increase the flexibility Of District operations and maintenance activities.

Why is this investment needed?

This project is needed to reduce risk and improve reliability at Carlton Steel as well as most of the McMinnville area. The proposed solution will 1) insure that we will not lose the entire line and all taps with a fault on this line section and 2) provide better opportunities to replace current manual processes with better relaying, thereby reducing outage time and providing greater operational availability. Planned maintenance will also be improved by not having to sectionalize or open end line for PCB maintenance.

What assumptions are behind the investment need?

The primary driver behind the proposed investment is the need to reduce risk and improve reliability at Carlton Steel as well as most of the McMinnville area.

What actions would we take if this investment were not made?

Without the investment Transmission would be forced to consider either continuing on an "as is" basis or implement the alternative short-term solution identified below.

What investment alternatives were considered and why are they not recommended?

An interim solution of installing a bus tie breaker is moving forward at an estimated cost of $1,1M. This will improve the reliability somewhat but Cascade will continue to experience more outages than necessary.

Who would benefit from this investment?

Making this investment will improve the reliability of all customers served from the Carlton Substation, but Cascade Steel should see a substantial financial benefit based on reductions in both planned and unplanned outages. BPA would also benefit from having fewer unplanned outages and improved operational efficiencies and effectiveness.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-13	Mar-15	Sep-15	Sep-16	$2,188	$2,813	$3,063	$1,055	$2,461	$0	$0	$0	$3,516	0%	40	50	60

What drives the investment costs to be low or high?

Low investment cost: on time delivery, use BPA labor; High investment cost: late delivery, use CMO labor

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$204	$304	$100
Present value:	$673	$999	$327

Montana-to-Washington Transmission System Upgrade Project – M2W
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

This investment would upgrade parts of BPA's existing transmission system in Montana, Idaho, and Washington as a result of recent requests for transmission service. The investments would (1) reinforce BPA's transmission system at the Garrison Substation, Hot Springs Substation, Bell Substation, Dworshak Substation, and the Hatwai Substation; reconductor four sections totaling 12 miles on the Dworshak-Taft No. 1 500-kilovolt (kV) line; develop a new series compensation substation along the Garrison-Taft No. 1 & No. 2 500-kV lines. The reinforcements would increase firm east-to-west transfer capability of the West of Garrison and West of Hatwai paths by primarily increasing the series compensation in existing 500-kV lines in the area. Specifically, it would: TS014055: upgrade existing series capacitors on Broadview-Garrsion #1, #2 lines to 3000 A rating and move shunt reactors; TS0140056:construct new 500 kV three breaker ring bus substation (Longhorn). with a 500/230 kV transfomer installed; install three 86.4 MVar shunt caps at Longhorn; and upgrade the McNary-Coyote Springs 500 kV line to 100C operations.

Why is this investment needed?

In 2010, BPA conducted a NOS process to help manage its queue of requests for long-term transmission service. During the NOS process, utilities and power generators (including wind generators and power marketers) requested the use of BPAT system to transmit their power. The studies found that there was not enough available transmission capacity to accommodate all requests for long-term service from BPA's Garrison substation in W. MT to load centers west of the Cascades and to market hubs serving the entire NW power market. Wind generation facilities built and proposed in the region have greatly increased the amount of planned generation in MT seeking load and markets in the NW.

What assumptions are behind the investment need?

The start date for this investment is likely to be deferred by 3-4 years.

What actions would we take if this investment were not made?

Customers, primarily Gaelectric, would not be able to access BPA's grid. We would therefore be denying them access.

What investment alternatives were considered and why are they not recommended?

There is no alternative. To tie this generation to the BPA Grid requires new lines and substation work.

Who would benefit from this investment?

Making this investment allows wind generation to be connected to the Northwestern Energy Grid which would then, in turn, connected to the BPA Grid

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
May-15	Jun-17	Sep-17	Sep-18	$126,000	$146,000	$175,200	$0	$18,250	$82,125	$82,125	$0	$182,500	0%	50	99	99

What drives the investment costs to be low or high?

Low investment cost: use of BPA labor instead of CMO, BPA and NW Energy split all costs ; High investment cost: 20% variance to the base.

These costs were identified during the pilot stage of developing the model and detailed analysis is not available at this time. When the investment is resubmitted in subsequent rounds the assessment will review the benefits in more detail.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$278	$186	-$93
Present value:	$2,294	$1,588	-$706

Power Constraint Management System (PCMS)
Classification: Discretionary
Sponsoring Asset Category: Power Services

What is the proposed investment?

The proposed Power Constraint Management Solution (PCMS) involves development of a robust, coop recoverable, constraints managment tool that can serve as a single point of storage, versioning, data-stewardship, and change-control - all for the specific purpose of managing modeling constraints relevant to the Power (PG) organization's onging hydro-regulation and generation modeling activities.

This effort would expand the technology footprint and supplement existing legacy technologies such as the OpsLog application and manual recording processes currently used to track the evolution and usage of constraints in the current operational modeling environment.

Currently, manual and independent maintenance of the constraints in daily operational use is estimated at around 1.83M annually. This number represents both realized and potential costs associated with the care and maintenance of up to 6 operational models at any given time. The new solution would offset a percentage of those estimated costs and would contribute to the mitigation of risk.

Why is this investment needed?

Currently, the cost of manual and independent maintenance of the constraints in daily operational use is estimated at around $1.83M annually. This number represents both realized and potential costs associated with the care and maintenance of up to 6 operational models at any given time. The new solution would offset a percentage of those estimated costs and would contribute to the mitigation of risk.

What assumptions are behind the investment need?

1) Model care and feeding will continue to become more expensive due to rising labor costs, increasing operational complexity, and ongoing statutory requirements that involve update and/or repeated re-configuration of constraints in use across the Agency.
2) Staff matriculation will persist and increase in coming fiscal years, resulting in the ongoing/repeated loss of knowledge capital. Hydro regulatory modeling is SME intensive and when staff depart or retire, several months are required for the business unit to fully recover, as they re-hire, re-train, and re-assign staff to cover modeling responsibilities.

What actions would we take if this investment were not made?

Model management would continue status-quo.

What investment alternatives were considered and why are they not recommended?

A constraint management solution for BPA would necessarily be a very custom effort. Several options were considered - each distinguished primarily by the depth of data-integration and amount of automation involved. One major option that was considered and then tabled was the possibility of making the PCMS a PBL and TBL combined effort. The incorporation of flow-gate considerations and T-side models was quickly realized to be significantly larger scope (effort, complexity, and dollars) than including only Power models. Another option considered was the development of a simple interface and storage solution, using existing mechanisms such as SharePoint to store constraint data. This was quickly realized to be inadequate in terms of improving the data-stewardship capabilities and would in fact add a layer of manual work and would do little to consolidate constraints or unify the management of those constraints.

Who would benefit from this investment?

1) Power Organization as it would reduce labor time spent managing models and would improve PG's ability to operate the FCRPS in a more agile and accurate fashion. The statistical probability of modeling errors would be reduced

2) BPA - the agency would benefit as a tool like the PCMS would signinficantly improve reaction time to audits and thereby demonstrate compliance with Biop, Endangered Species, and legal operating mandates. Enhanced retrospective costs alone would result in cost savings as the amount of labor required to investigate and retrieve information would be minimized. Ultimately, benefit would also be realized in the reduction of the amount/severity of fines, legal fees, and loss of public favor.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Oct-15	Apr-16	Oct-16	$2,375	$2,809	$3,678	$0	$1,954	$955	$0	$0	$2,909	3%	5	10	15

What drives the investment costs to be low or high?

The amount of automation and the level of integration that is undertaken. At the high-end, the proposal would involve a fully integrated solution in which the data-steward(s) could update power generation constraints in a centralized data-store and those values would be automatically disseminated across models.

At a less intensive level, a similar solution could be centralized, version-controlled, and auditable, but lack the ability to 'push' updates to the models in an automated fashion.

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$21,107	$16,881	-$4,226
Present value:	$16,869	$13,492	-$3,377

Redmond MHQ Addition and Building Upgrade
Classification: Discretionary
Sponsoring Asset Category: Facilities

What is the proposed investment?

(1) Addition and remodel to the office wing to provide necessary adjacencies for craft services and co-location with District Manager and administrative staff (2) New stand alone Fleet HEMEM Garage to accommodate expanded workload and address numerous operational and safety deficiencies. (3) Upgrade of mechanical and electrical services to accommodate winter temperatures and increased load demands from shop equipment (4) Upgrade building finishes to replace original 50+ year old finishes. (5) Upgrade conference area (former helipad building) to BPA workplace standards for for large reginonal assemblies and MHQ meeting space.

Why is this investment needed?

The Redmond MHQ Facility is a 50+ year old structure identified in 2001 for reinvestment in order to meeting growing operational needs. Additionally, its central location relative to other field sites has made it an ideal hub as a conference center and support node for other outlying maintenance facilities. Needs: The existing facility lacks adequate office space and adjacencies (District Operations Manager and staff housed in a double wide trailer outside the main building with makeshift access to the permanent structure), the craft services (PSC/SPC) have outgrown the original space and have been forced to move printers downstairs, fax and supplies to “make do”, mechanical systems are obsolete and in need of replacement, shop electrical panels are at capacity and can no longer support all equipment or provide expansion options. Overhead doors for both TLM and the Redmond HMEM garage are too small to accommodate large vehicles with boom lifts. The HMEM garage also lacks a level slab complicating vehicle routine vehicle maintenance, does not have adequate ceiling height, lighting, ventilation and does not have heat or proper ventilation (going safety concern). The former Helicopter Hangar now serves as an ad hoc, stand alone central conference room lacking restrooms and other basic support services. This is an introduction to the numerous deficiencies that can be noted however, for the sake of brevity, this proposal can best be characterized as reinvestment in a structurally sound building which is past due for modernization of building systems and finishes as well as expansion to accommodate regional growth occurring over the past decade.

What assumptions are behind the investment need?

Assumptions: Unclear - probably not an "assumption": 1) Desparate MHQ group functions at Redmond, workflow improvements, safety and security are below likel? BPA MHQ operations and well below the potential benefits proposed by the 10 Year MHQ Strategic Plan 2-4 are good:(2) The MHQ field installations will continue to be integral to TF and BPA for the duration of the projected life of the facility (50) years. (3)The Redmond MHQ's central location relative to other field sites will continue to validate this location as a high priority investment. (4) The Redmond MHQ's importance to regional transmission reliability will remain at or above it's current state for the forseeable future.

What actions would we take if this investment were not made?

Smaller deficiencies would likely be prioritized with some improvements made through expense funding. Larger deficiencies would be kept at status quo. Targeted future investment alternatives will be considered Not sure what this means or whether its relevant here: but they will not be presented under the 10 Year MHQ Strategic Plan.

What investment alternatives were considered and why are they not recommended?

Alternative #1, Status Quo: Continued use of existing facilities with targeted, incremental improvements made over an extended period of time through FAM expense dollars. Larger program components will not be adressed through expense funding. Alternative #2: Proceed with building reinvestment but relocate Regional Office to leased facility. Alternative #3: Provide funding for building upgrade and new Regional Office, while identifying low cost off-site options for large conference room. The three alternatives listed are not recommended as preferred because in each case they do not comprehensively address the number of deferred maintenance items across the Redmond MHQ facilities nor do they capture economies of scale gained by consolidating multiple facility requirements into one project. The most cost effective opportunity to optimize facility performance and support TF operations at the Redmond MHQ is through holistic planning across the Redmond site and MHQ facilities. Alternative #4: 1 for 1 Replacement facility based on the 10 Year MHQ Strategic Plan concept model. This alternative is only viable if?

Who would benefit from this investment?

(deleted first sentence) TF expected benefits include: workflow improvements, more efficient materials management, improved work environments, safety and security improvements, enhanced team building and staff communication and managerial oversight (co-location). Facilities asset management benefits include: reduced near term and deferred maintenance/replacement costs, better facility adaptability and flexibility for evolving operational needs and future expansion options. BPA expected benefits include: advancement of sustainability initiatives, compliance with federal, state and local regulations including all applicable building codes, enhanced facility support for transmission reliability,

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs

Timing of investment				Range of investment costs (Direct Capital Costs)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Jan-18	Mar-18	Sep-18	$7,850	$10,350	$12,200	$0	$0	$1,238	$3,758	$7,830	$12,825	4%	30	50	70

What drives the investment costs to be low or high?

Low case: Facility deficiencies and TF operational goals are addressed using straightforward strategies that can be appropriately staged for cost effective on-site continuity of operations and are contained to specific facility locations. Sitework (utilities, hardscape, yard storage, site drainage, etc.) require only minor improvements/modiications. Unclear, incomplete sentence: High case: Capital renewal costs are sufficiently high to recommend a 1 for 1 facility replacement as the most cost effective alternative necessitating both new facility cost projections and
O&M costs not estimated at this time.

How will asset O&M costs change with this investment?

	Before Investmen	After Investmen	Change
Average annual first 10 years	Not assessed		
Present value:			

Snohomish MHQ Upgrade
Classification: Discretionary
Sponsoring Asset Category: Facilities

What is the proposed investment?

A Maintenance Headquarters facility to replace existing Snohomish MHQ facility comprised of new administrative and high bay (vehicle, storage and shop) buildings to centralize personnel, provide safe and efficient working spaces and improved vehicle protection. The project also proposes decommissioning outdated/ineffective facilities which are not cost effective capital renewal targets.

Why is this investment needed?

The Snohomish site houses administrative staff/craft personnel in a number of aged buildings including a 1971 Maintenance Building, a Regional Office modular trailer, a 1950 maintenance building, and a NERC-CIP control house. The large number of craft personnel in the Snohomish Control House creates one of the top NERC-CIP traffic sites in the agency with increased risk for NERC-CIP violations and fines. Additionally, as regional responsibilities for the Snohomish area have grown there is a pervasive lack of space and storage for materials and equipment experienced by MHQ functional groups which affects productivity and lifespan of parts and equipment.

What assumptions are behind the investment need?

Assumptions: (1) The MHQ field installations will continue to be integral to TF and BPA for the duration of the projected life of the facility (50) years. (2) The Snohomish MHQ will remain critical to regionalal transmission reliability for the forseeable future.

What actions would we take if this investment were not made?

Without a significant capital renewal investment, expense dollars will be required to meet Snohomish MHQ mission objectives. Smaller, targeted investments spread out over a longer period of time will be necessary to address urgent facility-related operational inefficiencies, pressing maintenance issues, emergency failures, and safety issues. A feasible solution addressing existing space constraints beyond the proposed alternative and status quo requires an in-depth investigation and would likely require a separate capital investment. MHQ functions will continue in the short to mid-term with increased potential for NERC-CIP Control House violations/fines and deferred maintenance will not be comprehensively addressed.

What investment alternatives were considered and why are they not recommended?

Status quo: Maintains continued use of existing facilities with no alterations or changes. Status Quo Plus: Control House/Maintenance Building/Regional Office building upgrades will include reactive renovations, relocations, expansions, upgrades, and demolition over a protracted time frame to provide a substitute level of performance to that provided by a holistically planned MHQ upgrade. Modular buildings which don't meet functional requirements will be added to address space constraints. It is determined that this approach is a less cost effective long-term strategy. Additionally, it does not address TF mission objectives including co-location of Snohmish crews, supervisors and the District Manager. Status Quo and Status Quo Plus alternatives will not have the expense dollars required to address the extensive backlog in deferred maintenance.

Who would benefit from this investment?

TF expected benefits include: workflow improvements, more efficient materials management, enhanced work environment, safety and security improvements, work environment conducive to team building, staff communication and managerial oversight (co-location benefits). Facilities Asset Management expected benefits include: reduced near term and deferred maintenance, better facility adaptability and flexibility for evolving operational needs and future expansion options. BPA expected benefits include: advancement of sustainability initiatives, compliance with federal, state and local regulations including all applicable building codes, and enhanced facility support for transmission reliability.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Costs)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Jan-17	Mar-17	Sep-17	$7,360	$10,850	$11,700	$0	$1,300	$3,945	$8,205	$0	$13,450	3%	30	50	70

What drives the investment costs to be low or high?

Low case: Facility deficiencies and TF operational goals are addressed using straightforward strategies that can be appropriately staged for cost effective on-site continuity of operations and are contained to specific facility locations. Sitework (utilities, hardscape, yard storage, site drainage, etc.) require only minor improvements/modiications. High case: Capital renewal costs are sufficiently high to justify complete on-site facility replacement as the most cost effective alternative to addressing facility deficiencies and achieving TF project goals and objectives. O&M costs not estimated at this time.

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	Not assessed		
Present value:			

Southern Idaho Communication Upgrade
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

This project upgrades communications equipement in Southern Idaho to comply with WECC class 1 standards and provide Operational communication into the Regional Maintenance Office. Includes a new radio site along with radios, towers and a cabinet. The project would replace analog with digital equipment and avoid the need to build two new radio stations for VHF into the mountains of Central Idaho.

Why is this investment needed?

Southeast Idaho is currently served with a minimal communications system. BPA is seeking to remove all analog radios, which this project would accomplish. BPA also depends on foreign communications (State of Idaho) that don't meet our required availability and reliability requirements. With growing communication requirements causing the need for RAS and critical transfer trip (TT), the quality of our communications needs to be improved. RAS is starting to be needed in Southern Idaho, and with the proposed Boardman to Hemingway line, higher system reliability requirements are expected across Idaho.

What assumptions are behind the investment need?

The Boardman to Hemingway line will be built. The current Memo of Understanding with the US Bureau of Reclamation (USBR) will be upgraded to an agreement that allows for bandwidth exchange.

What actions would we take if this investment were not made?

Defer the project and wait for an operational requirement, then start again. The problem with a deferral is that the implementation schedule would become seriously compressed.

What investment alternatives were considered and why are they not recommended?

Do nothing.

Who would benefit from this investment?

BPA's Idaho Region, USBR, Idaho Power and PacificCorp would all see benefits.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Sep-16	Jul-17	Sep-17	$5,400	$5,600	$6,000	$0	$0	$1,400	$4,900	$700	$7,000	0%	15	20	25

What drives the investment costs to be low or high?

Costs would be lower if not all sites need a separate engine generator building. Costs could be higher with land and environmental issues. Also space was promised in others' buildings, but agencies do change their minds.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$1,225	$1,276	$51
Present value:	$1,611	$1,680	$69

Lewiston MHQ Facility
Classification: Discretionary
Sponsoring Asset Category: Facilities

What is the proposed investment?

A new BPA owned MHQ Facility located inside the Washington border to replace the leased Idaho Lewiston MHQ. The proposed investment is to be built in accordance the 10 Year MHQ Strategic Plan Guidelines. It is projected to house 12 MHQ staff. This is a smaller MHQ operation which does not require a TLM crew or HMEM Garage.

Why is this investment needed?

The existing leased facility is dilapidated and poorly maintained, lacking in shop space, materials and equipment storage, office space and yard storage . There are two vehicle bays although only one is usable. The facility is not part of the BPA communications network and available bandwidth is unreliable, occasionally dropping signal or unable to provide video. There is a large mezzanine space that BPA pays as part of the lease however it remains largely unutilized as there is no convenient way to vertically transport parts and materials. The location of the facility is several miles east of the Washington border requiring all BPA Washington employees to pay Idaho taxes.

What assumptions are behind the investment need?

Assumptions: (1) The MHQ field installations will continue to be integral to TF and BPA for the duration of the projected life of the facility (50) years. (2) BPA MHQ installations will remain critical to regional transmission reliability for the forseeable future.

What actions would we take if this investment were not made?

Productivity would remain below optimum levels. Materials and equipment will not meet optimum levels of life expectancy driving up cost of operations. Ability to accommodate future growth will be capped by limits imposed by the existing facility.

What investment alternatives were considered and why are they not recommended?

There are two identified alternatives: (1) Status Quo Plus (retain lease with minor facility modifications) -- not considered as cost effective facility improvements are limited for leased properties (2) Alternative lease location. Not considered as a first alternative as availability of a facility of proper size, configuration, cost, location and lease terms is unlikely.

Who would benefit from this investment?

(deleted first sentence for brevity) TF expected benefits include: workflow improvements, more efficient materials management, improved work environments, safety and security improvements, enhanced team building and staff communication and managerial oversight (co-location). Facilities Asset Management expected benefits include: Better facility adaptability and flexibility for evolving operational needs and future expansion options. BPA expected benefits include: advancement of sustainability initiatives, compliance with federal, state and local regulations including all applicable building codes, and enhanced facility support for transmission reliability.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Costs)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-16	Jan-19	Mar-19	Dec-19	$7,825	$9,400	$11,150	$0	$0	$0	$1,119	$10,519	$11,638	4%	30	50	70

What drives the investment costs to be low or high?

The low investment reflects a smaller scale MHQ facility in conjunction with low cost property acquisition of land and standard site development costs. The high investment reflects higher labor costs, property acquisition costs and elevated site development costs.

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$0	$331	$331
Present value:	$0	$1,080	$1,080

L0322 Klondike-Blalock Reinforcement Mobile Transformer
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

This alternative is for a 24/32/40MVA, 115KV/69KV mobile spare transformer for use at DeMoss, Fossil, Goldendale, and Bald Mountain. The mobile spare transformer would be stored at John Day or Big Eddy Substations. This alternative will not require a land acquisition or environmental/cultural work.

Why is this investment needed?

When BPA upgraded the De Moss-Fossil line to 115 kV, we left a 69 kV load without backup points of delivery. This affects the Wasco County PUD service area and would result in towns being black in the event of an outage. The DeMoss substation expansion would re-establish the backup and would provide support in case of planned and unplanned outages.

What assumptions are behind the investment need?

The assumption is that BPA should restore the backup service that we provided to Wasco County PUD before the 115 kV upgrade of the De Moss-Fossil line.

What actions would we take if this investment were not made?

If this investment were not made, we would risk customer outages for a longer than desirable length of time.

What investment alternatives were considered and why are they not recommended?

The other alternative that was considered was to expand DeMoss substation and add a 115/69 kV transformer, high side and low side breakers, arrestors, and bus work. This alternative is not recommended because it is much more expensive and would require land acquisition and environmental/cultural work. It would also only provide benefit to one site, instead of the four sites benefited by the mobile spare.

Who would benefit from this investment?

This investment would benefit the customers served from the De Moss, Fossil, Goldendale and Bald Mountain substations.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Oct-15	Oct-16	Oct-17	$1,134	$1,330	$1,525	$0	$0	$0	$1,663	$0	$1,663	0%	30	45	75

What drives the investment costs to be low or high?

Low investment cost: on time delivery, low vendor quote, low environmental mitigation costs; High investment cost: late delivery, high vendor quote, high environmental mitigation costs in case of oil spill

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$5	$5
Present value:	$0	$13	$13

Sacajawea to Ice Harbor-Franklin 115kV #1 Line
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Construct a ~0.5 mile 115 kV transmission line from Sacajawea Substation to tap the Ice Harbor – Franklin 115 kV #3 Line south of the river crossing.

Why is this investment needed?

This project will provide additional transmission capability to serve the Tri-Cities Area, and relieve the generation restrictions at Ice Harbor in anticipation of the next contingency operation. This project also provides operational flexibility at Ice Harbor for the Army Corps of Engineers to transfer generator units during BPA outages. Upgrades to communications and control and to system protection equipment will be installed to enhance system stability and provide required reliability.

What assumptions are behind the investment need?

What actions would we take if this investment were not made?

Do nothing and continue to curtail Ice Harbor generation after the loss of the McNary transformer bank in anticipation of the next contingency.

What investment alternatives were considered and why are they not recommended?

Do nothing and continue to curtail Ice Harbor generation after the loss of the McNary transformer bank in anticipation of the next contingency.

Who would benefit from this investment?

Ice Harbor generation would benefit due to to minimizing curtailments. However, we have since learned that there is a plan to add a second McNary transformer bank, which would solve the problem of curtailing Ice Harbor for loss of a single transformer bank. Also Operations would benefit due to simpler operation of the transmission system.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Apr-17	Apr-18	Sep-18	$2,360	$2,770	$2,883	$0	$0	$173	$2,770	$519	$3,463	0%	50	60	70

What drives the investment costs to be low or high?

Low cost assumptions were that the project would be constructed with in-house resources and environmental review would require a categorical exclusion only. Base cost assumptions were that this project will be constructed by contractor and that evironmental review would require a categorical exclusion only. ROW will be adjacent to the existing Sacajawea to Ice Harbor-Franklin #2 Line, with no new access roads required. Line construction costs from estimate No. LX-32162-1 $338K. Communications equipment is limited to a few additional SCADA points with no fiber. High cost assumptions are that construction would be by contractor, that an environmental assessment would be required, with Western Ground Squirrels or cultural artifacts found that require mitigation. Line Construction Cost $400K.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$24	$56	$32
Present value:	$100	$235	$135

Structured Data Management (SDM)
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

BPA is engaged in a multi-year plan called IGLM (Information Governance and Lifecycle Management) to improve the way the information assets are managed. IGLM is comprised of three projects: 1) Communications / e-mail – focus of FY12 and FY13; 2) Unstructured Data Management (UDM) – approved for FY14; and 3) Structured Data Management (SDM). The SDM investment proposes to 'scale up' the software and hardware being installed by the UDM project to provide comparable capabilities for structured data (i.e., data contained in structured databases such as SQL and Sybase). These capabilities include: records and retention management, categorization (metadata), and searchability (legal hold and eDiscovery capabilities).

Why is this investment needed?

BPA creates/receives large amounts of data and information that must be treated as an asset of the agency and as government property. Without policies and technology solutions, BPA is unable to comply with legal and regulatory requirements,including Federal Records Act and OMB directives. One of these directives requires implementation by 2016. Federal Rules of Civil Procedure (FRCP) 2006 revisions on e-discovery requires new capabilities to find, preserve, review and produce all relevant electronically-stored information (ESI) in the event of litigation. Lack of policies and technology solutions lead to inefficient management of information assets including labor-intensive searches for data, needless duplication (data burden), delays in responding to requests for information, and poor data quality. Under the status quo, there are risks of: 1) unauthorized destruction of information assets; 2) sanctions and remediation costs; 3) sub-optimal litigation strategies; and4) sub-optimal responses to audit and investigations.

What assumptions are behind the investment need?

BPA's objective is to fully comply with legal and regulatory directives within the timeframes outlines by directives. It is also assumed that the current, manual state of managing and accessing agency information assets does not comply with those directives and requirements.

What actions would we take if this investment were not made?

We would continue with the status quo of manually managing and accessing structured data.

What investment alternatives were considered and why are they not recommended?

The status quo of continuing the manual state of managing and accessing agency information assets - including, in some cases, the lack of ability to produce data artifacts - was considered. It is not recommended because it: 1) does not provide compliance; and 2) exposes BPA to litigation, audit, and sanctions risk, and (3) requires excessive labor hours to implement.

Who would benefit from this investment?

BPA organizations; BPA customers in the form of reduced BPA legal risks and costs; and Executive branch agencies, including DOE, DOJ, and OMB.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Jun-16	Sep-16	Sep-17	$2,450	$2,700	$3,200	$0	$1,720	$1,780	$0	$0	$3,500	23%	5	7	10

What drives the investment costs to be low or high?

Costs will be lower or higher based on whether the momentum and resource expertise developed during the Phase 2 UDM project is carried over into this investment or interrupted (since this alternative is posed as a 'scale-up' of the Phase 2 UDM solution). Costs (specifically licensing costs) will also be lower or higher based on scope determinations of the number of databases to be covered.

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$0	$3,505	$3,505
Present value:	$0	$2,053	$2,053

Business Systems Disaster Recovery
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

This investment alternative calls for BPA to develop, own, and operate data center capabilities that are redundant and remote from the Portland HQ data center that supports non-critical business applications. The business applications covered are essentially those covered by the IT Virtualization and Consolidation (IVC) project, namely, financial, procurement, billing, and other business-essential applications (nearly 300 total). The redundant data center would be housed in the Eastside Alternate Operating Facility under construction at Munro. The investment involves acquiring and installing data center hardware and software; integrating existing systems to provide fail-over capabilities; and creating and modifying internal processes.

In 2009, IT launched an infrastructure a project to modernize data storage and data centers. While in progress, decisions were to break the project into several projects, including IVC. The IVC is scheduled to be complete in October 2014, and it is installing high-density servers and racks and adding new software tools to support non-critical business-essential systems. The IVC includes no geographic redundancy, and this is what prompts this investment proposal. IT currently only supports disaster recovery for one non-critical system, which is ProWatch, due to NERC/CIP compliance.

Why is this investment needed?

The objective is to ensure that non-critical but essential business systems remain available should a seismic, severe weather, cyber attack, fire, or other event brings the HQ data center down. The investment creates redundancy for business systems comparable to the redundancy that BPA is installing for control center and scheduling operations. Multiple single points of failure have been identified with the current IT environment – points of failure that would be remedied by a redundant data center that is geographically remote. Extended loss of these data center services can result in lost productivity and disruptions in revenue flows, financial processes, procurement processes, and other business-essential functions.

What assumptions are behind the investment need?

- The set of applications covered by the investment are consistent with the agency's Business Impact Analysis (BIA). Additional review is needed to better specify the systems for which data center support must be made redundant and to better specify work-arounds and timelines for their return to operation.
- The data center space created at the Munro facility will be sufficient to house the redundant data center. The facility is assumed to remain operational even if a subduction zone 9.0 quake occurs off the coast of the Pacific Northwest.
- Probabilities of disruptive events used in the modeling are consistent with probabilities compiled by the Security and Continuity of Operations program. The probabilities would escalate over time.

What actions would we take if this investment were not made?

We would continue with operating a single data center for business systems.

What investment alternatives were considered and why are they not recommended?

Alternatives considered were:
1). Status Quo
2). Replicate systems at BPA's Munro facility
3). Outsource redundant systems to a cloud-based data center provider

In addition to the alternatives, what was also considered were:
1). The impact of productivity loss due to system outage.
2). The impact of extra time required to handle the backlog of work caused by the data center outage.
3). The impact to BPA with events that caused application downtime for periods of:
1 day; 2 weeks; 1 month; 4 months; 6 months and 12 months

Who would benefit from this investment?

Internal BPA users of non-critical business systems. Customers and other entities with whom BPA does business.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Apr-15	Sep-17	Sep-17	Sep-18	$9,075	$13,756	$21,015	$0	$800	$8,254	$5,502	$0	$14,556	5%	4	5	7

What drives the investment costs to be low or high?

The scope of applications for which data center support is made redundant; server and software costs; labor time and rates; and integration costs.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$86,892	$161,674	$74,783
Present value:	$36,312	$67,641	$31,329

Garrison East Transmission Project
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Replace line relays at Garrison on Broadview #1 and #2 500 kV lines, Upgrade existing series cap on east side of Garrison 500 kV substation
Reconnect 500 kV line reactors to bay 5 at Garrison substation, Add high speed ground switches at Garrison on Broadview #1 and #2 500 kV lines
Add metal oxide varistors at Garrison 500 kV substation, Communications facilities including WMRAS outputs, 50% of the cost of the Colstrip Coal Plant Sychronous Resonance Filters

Why is this investment needed?

This investment is needed to increase the total transfer capability of the Montana to Northwest path by 500 MW. Increasing the TTC of the path allows new wind generation resources in Montana a way to reach the BPA network. Increasing the TTC of the path gives transmission service requests from the 2010 Network Open Season a way to reach the BPA network.

What assumptions are behind the investment need?

That additional total transfer capability is needed

What actions would we take if this investment were not made?

There is no work around. If this investment is not made, the transfer capability of the Montana to Northwest path cannot be increased. In addition, the Montana to Washington Project will need to be cancelled. Without the Garrison East Project, the Montana to Washington Project does not provide benefits.

What investment alternatives were considered and why are they not recommended?

1) Do nothing.
2) Build new 500 kV transmission lines from Garrison Substation to Ashe Substation (GASH Project) (preferred)

Who would benefit from this investment?

Northwestern Energy, Gaelectric, PowerEx

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Mar-15	Dec-17	Dec-18	Dec-19	$34,000	$40,000	$43,000	$0	$2,500	$7,500	$30,000	$10,000	$50,000	0%	15	20	35

What drives the investment costs to be low or high?

For low: on time schedule, in house construction; High- schedule delays and contract construction

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

Business Enterprise Services Strategy (BESS) initiatives
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

Business Enterprise Services Strategy (BESS) initiatives is a potential suite of investments in technological solutions and redesigned business processes to optimize the effectiveness and efficiency of enterprise-wide systems through improved IT system integration, improved data quality, improved process design, and reduced business process and IT O&M costs. The enterprise-wide systems include, for example: Peoplesoft Financials, Peoplesoft HCM, CARS (Dept. of Treasury), Hyperion Asset Suite, CHESS, CASCADE, Customer Portal

Why is this investment needed?

BPA lacks an integrated agency level strategy, guiding principles and governance to optimize enterprise systems' effectiveness and efficiency, resulting in cost and resource redundancy, poor data quality and siloed decision making. Pertains to BPA's Enterprise Services and Systems: Human Capital, Finance, Customer Relationship, Supply Chain Management, Asset Management.

What assumptions are behind the investment need?

BPA lacks a cohesive strategy for enterprise services/systems that leads to ineffective and integration of processes and systems, inconsistent or unreliable data, missed opportunities for low cost technological solutions, and higher than necessary costs to operate, maintain, and support the systems.

What actions would we take if this investment were not made?

The status quo would continue, with a lack of cohesive strategy, siloed initiatives, data quality issues, and higher than necessary costs

What investment alternatives were considered and why are they not recommended?

Issues of objectives, desired long-term outcomes, and scope have not been determined in full, nor have business requirements been fully gathered and vetted. Alternatives will be defined and assessed at that time.

Who would benefit from this investment?

Users of enterprise-wide processes and IT systems. The IT organization through reduced investment and maintenance and support costs. BPA customers, through reduced BPA overhead costs.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Feb-15	Dec-19	Dec-19	Dec-20	$4,400	$5,800	$10,150	$0	$200	$3,194	$1,022	$3,384	$7,800	26%	5	7	10

What drives the investment costs to be low or high?

Cost assessments not completed at this point.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years			$0
Present value:			$0

Not assessed

Business Intelligence Competency Center (BICC)
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

Invest in process design and technological solutions to improve the agency's data quality and stewardship. Includes
(1) Identifying and establishing processes and practices to ensure reliable and accurate data, to include fostering a BPA-wide Data Quality/Stewardship program
(2) Analysis of and testing of tools to ensure and support data quality,
(3) Identifying and establishing processes and practices to enable access to data using a BPA -Wide Common Information Model
(4) Analysis of and testing of tools for a business intelligence toolset,
(5) Acquire and install the software tools necessary to support a Data Quality and Business Intelligence program

Why is this investment needed?

The investment is needed to aid the business-driven governance body focused on BPA's business intelligence and data quality strategy. An enabler of improved data-driven business processes, the Business Intelligency Competency Center (BICC)'s goals are to strengthen data quality and data stewardship throughout BPA by (1) establishing a roadmap for building out the necessary business intelligence infrastructure, (2) managing the business intelligency portfolio, (3) developing an integrated data set with data-meaning defined by the business, (4) Establish a BPA Common Information Model based on industry standards and (5) identifying and acquiring software tools for accessing that data. Due to poor data quality, data is often inadequate in terms of completeness, format and currency, is not measured in terms of purpose and fitness for use, and is not applied consistently.

What assumptions are behind the investment need?

BPA seeks to implement a coordinated, cross-agency data quality/data stewardship strategy that requires the acquisition and installation of data quality and business intelligence software tools.

What actions would we take if this investment were not made?

If the investment were not made, business intelligence initiatives (including data stewardship) would continue to be siloed and largely uncoordinated across the agency as a whole. Business intelligence initiatives would continue to be funded via a siloed approach, with tools being purchased for the specific project without understanding what tools may best suit the agency as a whole. In additional, without realiable data quality and a BPA-wide Common Information Model, analysis from silo-ed business units may yield diverging results which would require staff hours to resolve, adversely impact the quality of decisions, and reduce the agility & speed of making business decisions. Lack of funding would also not create the atmosphere necessary for a comprehensive BPA-wide Data Quality/Stewardship program.

What investment alternatives were considered and why are they not recommended?

(1) Status quo: BI projects will continue to be funded on a per project basis with BI tools being purchased for each specific (siloed) project. (2) Another alternative would be to establish the governance body to review and prioritize all BI initiatives (i.e. manage BI as a portfolio) as well as spearhead the research necessary to determine a BI toolset that can be used for BI initiatives agency-wide. This would include full testing of the toolset. 3). Yet another alternative would be take the above and also initiate an BPA-widee Data Quality/Stewardship program for ensuring all organizations have cleaned their data and are basing their decisions on accurate information.

Who would benefit from this investment?

Business units BPA wide responsibe for the quality of their data. Business units BPA-wide responsible for analysis and making decisions based on their data. IT organizations responsible for acquiring, developing, implementing and maintaining and supporting IT systems. BPA organizations generally with responsibility for managing and using data and information for decision-making and internal control purposes.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-16	Sep-17	Sep-17	Sep-18	$1,200	$2,100	$3,000	$0	$0	$0	$2,100	$0	$2,100	0%	5	7	10

What drives the investment costs to be low or high?

Process design costs, software acquisition and integration costs, and training and other implementation costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years			$0
Present value:			$0

Not assessed

Billing Information System Upgrade
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

Acquire, install, and implement a billing information system to replace BPA's current billing information system for wholesale power sales and trnasmission sales contracts. Alternatively, develop such a system using in-house resources.

Why is this investment needed?

BPA's customer billing and contracts system (CBC) uses the Lodestar software system. In 2015, Oracle plans to release a new Java-based version of Lodestar. The version of Lodestar that BPA currently uses includes proprietary coding, and a new Lodestar release would require a complete re-write to accommodate the customizations BPA has required. For an additional cost, Oracle will continue to support the current version of Lodestar through 2018, however, Oracles support for the current version would stop then. Late note: Oracle has now announced that its replacement of Lodestar will be delayed by two years, meaning that this replacement may be deferred by two years. This change will be reflected in the next round.

What assumptions are behind the investment need?

Oracle will release a new version of Lodestar that will not include the functionality BPA would need for billing under its wholesale power sales and transmission sales contracts. Oracle will discontinue offering support for the current version of Lodestar after 2018

What actions would we take if this investment were not made?

We would contract with Oracle to provide support to the current version of Lodestar for as long as Oracle is willing.

What investment alternatives were considered and why are they not recommended?

Prior to implementing this project, an alternatives analysis will be conducted to examine the alternatives of status quo, COTS systems, Loadstar v2, or development of an in-house system.

Who would benefit from this investment?

BPA power sales and transmission sales customers. BPA staff involved with billing and contracts management functions

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Feb-15	Dec-19	Dec-19	Dec-20	$8,000	$10,000	$12,000	$0	$0	$800	$8,000	$2,000	$10,800	7%	5	7	10

What drives the investment costs to be low or high?

Labor hours to define requirements. If a third party solution is acquired, then software acquisition, integration, testing, training, and other implementation costs would drive costs lower or higher. If an in-house soluction is decided, then labor hours and costs to design, program, integrate, test, train and otherwise implement the system would drive costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years			
Present value:			

Not assessed

Boardman to Hemingway
Classification: Discretionary
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

A 300-mile 500 kV transmission line that would extend from a new substation near Boardman to the Idaho Power/PacifiCorp Hemingway Substation. BPA would participate in the project as a joint owner of the line and also (1) acquire partial ownership in transmission facilities currently owned by Idaho Power and PacifiCorp and (2) sell transmission assets owned or planned by BPA, as follows:

- BPA would receive assets sufficient to serve the forecast loads of its SE Idaho customers, from Hemingway substation through Midpoint substation, Borah substation, Kinport substation and to Goshen substation.
- BPA would also acquire portions of various facilities between Goshen substation and SE Idaho Customers' PODs on PacifiCorp's system, which are currently served under the GTA.
- PacifiCorp would acquire ownership in BPA assets sufficient to serve a portion of PacifiCorp loads in central Oregon.
- Idaho Power would acquire ownership of BPA assets between the Mid-C market hub and either Grassland or Longhorn Substation (near Boardman) sufficient to make use of Idaho Power's eastbound capacity on B2H.

Why is this investment needed?

BPA has contractual and statutory obligations to serve loads in SE Idaho. PacifiCorp (PAC) has terminated the South Idaho Exchange and the General Transfer Agreement (GTA) with BPA. BPA must identify another means to deliver power to the BPA preference customers currently served by these two contracts. In October, 2012, BPA announced that it had completed an initial prioritization of potential service arrangements to serve BPA's southeast Idaho loads (SILS). BPA has identified the option of "Boardman-to-Hemingway (B2H) with Transmission Asset Swap" as the best option for SILS and concluded that it should be advanced by the agency in the near term as the top priority among the options.

What assumptions are behind the investment need?

This investment assumes: (1) that BPA will minimize the need for OATT service from PacifiCorp in several of the options by serving two large pockets of SE Idaho Load using federal transmission facilities; (2)anc illary services will be provided from the FCRPS for directly connected loads, and purchased from PacifiCorp for loads served by transfer; (3) The most significant set of assumptions made in the analysis of the portions of load served by OATT is the forecasted cost of OATT service from PacifiCorp. In order to forecast PacifiCorp OATT rates, the team analyzed the stated timelines in PacifiCorp's Integrated Resource Plan (IRP).

What actions would we take if this investment were not made?

In the absence of additional transmission facilities, in order to serve the SE Idaho loads, BPA will need to acquire energy within or near PacifiCorp's eastern system (PACE) and deliver it via Network Integration Transmission Service across PacifiCorp's transmission system to SE Idaho loads. Under most, if not all purchase scenarios, BPA will need to secure transmission capacity from Idaho Power to move purchased power to Goshen, in light of the system ownership arrangements that currently exist between PacifiCorp and Idaho Power in southern Idaho. In addition, depending on the location of specific power purchase or purchases, BPA may also need to secure transmission rights from transmission providers adjacent to PACE to get the energy to a point on PacifiCorp's system.

What investment alternatives were considered and why are they not recommended?

Option 1: Power Purchases & OATT Service Arrangement Description (Do Nothing Case)
Option 2: Boardman-to-Hemingway with OATT Service (eliminated)
Option 3: Boardman-to-Hemingway with Transmission Asset Swap (Recommended Alternative)
Option 4: MSTI with Tap to Goshen Substation (eliminated)
Option 5: BPA 500 kV Construction – Montana to Goshen Substation (eliminated)
Option 6: BPA 230 kV Construction – Montana to Goshen Substation (eliminated)

Who would benefit from this investment?

BPA, PacifiCorp and Idaho Power will all benefit from joint ownership of the line. In addition to the transmission revenue, Idaho Power says the line would increase system reliability, increase overall transfer capability and allow Idaho Power to import hydro, thermal and wind generation from the Boardman area.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-18	Sep-21	Sep-22	Sep-23	$250,000	$300,000	$400,000	$0	$0	$0	$0	$375,000	$375,000	0%	50	60	70

What drives the investment costs to be low or high?

1. B2H transmission project is unable to be permitted, or that costs and significant delays occur due to unforeseen challenges to transmission siting.
2. Complexity of the deal could mean significant delays increasing the risk that the cost of materials and labor could increase.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

Capability Upgrades for Planning and Operations in Power Services (CUPO)
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

A 5-year program of investments in software and process design to address gaps that will develop in power operations and planning. The specifics of these IT projects are undefined at this point, but potential gaps include:
a. New energy/capacity markets will likely develop as a result of 15-minute scheduling or a need to acquire additional balancing reserves. The current and planned set of decision support tools probably will not be sufficient for these evolving changes.
b. The development of an Energy Imbalance Market (EIM) will require management of supply and demand and reserves, and delivery of capacity by congestion zones, or flowgates,

Why is this investment needed?

Power Services believes that the next several years will see a continuation of the dramatic changes we have seen in the electric industry over the past decade. The growth of renewable generation, the creation of new types of energy/capacity markets, the introduction of new technologies, and the creation of new regulatory policies all result in challenges in maintaining a reliable operation of the FCRPS while meeting high-priority operational objectives and keeping rates as low as possible.
Power Services also believes that our current set of tools barely meet the needs of today's world and the tools that are currently being developed have a risk of large gaps as the

What assumptions are behind the investment need?

Gaps will arise in modeling/analytical capabilities that must be closed as markets, regulatory requirements, and demand response evolve and as new technologies evolve

What actions would we take if this investment were not made?

BPA would not be able to realize the full benefits of new markets, technologies and policies. Puts at risk our ability to meet the high-priority operational objectives of the FCRPS and making revenue targets that ensure Preference Customer rate assumptions are met. Would have to rely on manual processes to implement new policies, markets and technologies. Finally, BPA would have to spend significant funds that we don't need to, and miss opportunities to significantly reduce our costs, if this CUPO proposal (or a similar one) is not implemented.

What investment alternatives were considered and why are they not recommended?

Status quo. The investment's objectives, scope and requirements will be shaped and defined over time, and alternative solutions will be identified and considered at that time.

Who would benefit from this investment?

Power Services' planning and operations functions. IT organizations responsible for planning and executing information technology projects to support these functions. BPA customers through reduced long-term costs. Stakeholders in nonpower operation of the FCRPS (e.g., fish interests, irrigation interests.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete															
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	Post 2017	Total	% of Investment that is expense	Low	Base	High
Oct-14	Sep-19	Sep-19	Sep-20	$13,000	$20,004	$27,000	$0	$1,540	$4,617	$4,617	$9,230	$20,004	0%	5	7	10

What drives the investment costs to be low or high?

Process and system design costs; software acquisition costs; integration costs; and training and other implementation costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

EIM Potential Technology Enhancements
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

Information technology and process changes would be required across BPA. The new internal capabilities (supported by automation) include (note: specific technology platforms have not yet been identified for these capabilities): Manage Resource Plan, Manage Ancillary Services Reserve Plan, Submit Schedules to Market Operator, Manage Offer Submittal to EIM, and Process Market Instructions. Additionally, enhancements would be required to these systems: Automatic Generation Control (AGC), Supervisory Control and Data Acquisition (SCADA)/State Estimator, Congestion Management tools such as the Integrated Curtailment and Redispatch System (iCRS), Transmission Scheduling Tools such as the Transmission Scheduling Automation System (TSAS), Agency Load Forecasting (ALF) system, Real Time Load Monitoring (RTLM) for Power Services, River Modeling (Columbia Vista), Agency Metering System (AMS), Billing / Invoicing Shadow Settlement (Customer Billing Center (CBC)). Additionally, certain EIM scenarios would require significant new installation of metering for operational purposes.

Why is this investment needed?

If BPA chooses to participate in an EIM, investment in technology is required internally to enable BPA's participation. The EIM is a new paradigm for BPA which requires more granular bidding, scheduling, and settlement than in the past. Additionally, BPA must be able to communicate real-time operating information to the EIM market operator, and receive operating instructions back from the market operator. Each of these requirements translates into new or updated automation within BPA. Without the investment in the necessary automation, BPA will not be able to participate in an EIM. Correspondingly, the required automation is not necessary if BPA does not decide to participate in an EIM.

What assumptions are behind the investment need?

BPA chooses to participate in an Energy Imbalance Market

What actions would we take if this investment were not made?

See alternatives 1-3 below

What investment alternatives were considered and why are they not recommended?

Alternative #1 – Status Quo BPA chooses not to continue with NWPP MC forum and addresses industry changes on our own or through other forums. Alternative # 2 – Enhanced Market/Operational Tools (EMTs) – Joint Initiative BPA works with other willing participants to implement EMTs. Alternative # 3 – Following Reserve Assistance Program – Data Collection Pilot BPA participates with other willing NWPP MC members to develop a data collection framework and goals and identifies appropriate data elements that could serve multiple purposes in the long term. Alternative # 4 – Energy Imbalance Market BPA commits, with other willing NWPP footprint participants, to further develop an Energy Imbalance Market in the NWPP footprint through funding (several sub-alternatives)

Who would benefit from this investment?

This investment is contingent on the region and BPA deciding to move forward on forming an EIM. As such, the costs and benefits of the project are integral to the costs and benefits of EIM. The beneficiaries are the same as those of an EIM.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Jan-16	Dec-19	Dec-19	Dec-20	$6,885	$8,500	$11,900	$0	$0	$2,350	$850	$6,800	$10,000	15%	10	15	20

What drives the investment costs to be low or high?

The set of systems that the EIM adopts; the scope of BPA systems that would be affected; the cost of software and hardware acquisitions; integration requirements across affected systems; and the cost of process changes

How will asset O&M costs change with this investment?

	Before Investmen	After Investmen	Change
Average annual first 10 years			$0
Present value:			$0

Not assessed

Transmission Asset Portfolio Management System
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

This project will design and implement a new asset portfolio management tool for Transmission Services to enable TS to efficiently plan, prepare and track an executable asset plan. This investment will deliver three primary items: 1) Streamlined business processes to manage the transmission asset portfolio; 2) New information technology to store and manage the required data; 3) Deployment and adoption of these new capabilities within the business.

Why is this investment needed?

This investment is needed to replace our patchwork of generic tools with one designed to manage asset portfolios. Today, each step along the asset management and planning process through the execution tracking process is supported with autonomous tools – typically MS-Access databases or MS-Excel spreadsheets. Transmission tracks thousands of projects and metadata over a 10- to 30-year life period. Data does not naturally flow from one step to another and people are forced to replicate and reconcile data every step of the way. It is also extremely difficult to track the progress of the asset programs from planning through execution. This is inefficient and error-prone, and it slows the pace at which

What assumptions are behind the investment need?

Existing tools and processes are inadequate and inefficient to manage a large and growing portfolio of transmission assets

What actions would we take if this investment were not made?

Our asset portfolio management functions will continue to run using the existing manual capabilities. They will experience the same inefficiencies as today, and projects will face similar backlogs and hurdles making it through the planning, approval, and execution steps. While these methods are inefficient and error-prone, there is potential for larger impacts. Because these functions appear to be a bottle-neck for preparing and tracking capital projects through execution, the health of the transmission network may continue to decline, perhaps at an accelerated pace. This significantly increases risk and jeopardizes our ability to meet stakeholder commitments. For example, at present, BPA SAIDI and SAIFI

What investment alternatives were considered and why are they not recommended?

(1) Status quo and (2) design and install new processes and technology. Issues of objectives, scope, and requirements have not been determined, and thorough identification and assessment of alternatives has not been completed. Depending on requirements, the solution could leverage an existing internal technology – such as perhaps an additional PeopleSoft module. Or it may be determined that no existing in-house technology can meet the requirements and a new technological solution is required.

Who would benefit from this investment?

BPA organizations involved in planning, formulating, approving, and executing Transmission Services' asset management strategies and plans. BPA transmission customers, through reduced risks of BPA asset failure, obsolescence and other risks and long-term BPA costs

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Sep-16	Sep-16	Sep-17	$4,500	$5,000	$5,500	$0	$2,500	$2,500	$0	$0	$5,000	0%	5	7	10

What drives the investment costs to be low or high?

Process design labor hours and costs; software acquisition costs; system integration costs; training and other implementation costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

What is the proposed investment?

The proposed plan of service is for BPA to build a new 230 kV, three breaker ring bus substation with a tentative name of Ashley Creek that will loop into BPA's Noxon-Hot Springs #1 230 kV line. The substation will be expandable to a breaker and a half scheme. The customer will build a facility adjacent to the BPA substation, installing a 230/115 kV transformer, breaker, and associated equipment. The customer will also build a 3 mi 115 kV line connecting to BPA's Ashley Creek substation.

Why is this investment needed?

This is an LGIA project. On February 29, 2008, PPL Montana, LLC (PPLM) submitted an interconnection request to the Bonneville Power Administration (BPA) seeking interconnection of 95 MW of existing hydro generation. PPL Montana is receiving service from Northwestern Energy but was interested in connecting to the BPA system instead. PPL Montana is currently trying to sell the generator (as well as all generation facilities in Montana), and is not interested in developing the alternate transmission plan that would connect them to our system. However, they would like to leave the request in the queue should the new owner be interested in the plan of service. A potential new owner is Northwestern Energy, therefore they would not be interested in this plan of service.

What assumptions are behind the investment need?

The assumption is that the new owner of the generator will be interested in developing the alternate transmission plan that would connect them to our system.

What actions would we take if this investment were not made?

BPA is obligated under the OATT to provide this transmission service upon the customer's request. There are no other viable alternatives to interconnect the project.

What investment alternatives were considered and why are they not recommended?

Due to the lack of other BPA facilities in the area, there were no alternatives considrered. A tap on the line was not acceptable from a technical standpoint, so only a 230 kV ring bus substation was studied in the Feasibility Study and the Interconnection System Impact study.

Who would benefit from this investment?

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Sep-17	Sep-18	Sep-21	$8,500	$9,500	$11,500	$0	$0	$1,781	$7,719	$2,375	$11,875	0%	30	45	60

What drives the investment costs to be low or high?

The low cost is based on in-house labor, low material costs, and minimal environmental mitigation. The high cost is based on contract labor, more extensive environmental mitigation, and land acquisition. The high case also assumes that it will be necessary to rebuild 2 miles of structures to install the overhead groundwire (with associated land acquisition and road work).

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$18	$18
Present value:	$0	$51	$51

G0105/G0432 enXco's Desert Claim Wind Project
Classification: Policy Commitment
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The proposed investment is a new three-breaker ring bus substation with the planned name of Reecer Creek, on the Covington-Bettas Road No 1 230 kV line. BPA will provide revenue metering and telemetering on the 230 kV side of the transformer. The project will also install (5) 7 MVAR shunt capacitors and (2) 6 MVAR shunt reactors to maintain system voltage and adequate reactive margin. An additional 10 miles of fiber is being added, and it is unknown at this time whether the structures can support the additional fiber. If they cannot, structure rebuilds may be required. Land acquisition is also necessary.

Why is this investment needed?

Desert Claim is a wind project seeking interconnection to the BPA system for a proposed 176.4 MW load request. The project is located north of Ellensburg, Washington. BPA's existing transmission infrastructure cannot fulfill the customer's load service. This is an LGIA project. For this project to go forward, the following steps must be completed: (1) BPA must complete the project studies associated with the project (2) BPA and customer must complete any NEPA review, (3) BPA must authorize the project, (4) the parties must enter into a LGIA with BPA, and (5) the requestor must provide an advance of capital to BPA before construction begins. At this point, the project is at step two. The estimated probability of this project moving forward during the 3-year prioritization window is estimated at 10 percent.

What assumptions are behind the investment need?

This investment need assumes that the customer would like to proceed with this project. The estimated likelihood of the project moving forward within the FY 2015-2017 prioritization window is 10%.

What actions would we take if this investment were not made?

BPA is obligated under the OATT to provide this service upon the customers request. This is a LGI project. There is no other viable technical alternative to interconnect the project.

What investment alternatives were considered and why are they not recommended?

The other alternative that was considered was to have the Desert Claim wind project connect at Bettas Road Substation. However, Kittitas Wind, who owns the site, would not allow Desert Claim access to their site.

Who would benefit from this investment?

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs

Timing of investment				Range of direct capital costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Aug-17	Aug-20	Feb-21	Feb-23	$6,000	$9,000	$12,000	$0	$0	$0	$563	$10,688	$11,250	0%	99	99	99

What drives the investment costs to be low or high?

The low case is based on in house construction and lower than expected equipment prices. It also assumes normal site conditions.The high case is based on the risk of work taking longer than expected, and it is also based on line work being required for the fiber additions.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$9	$9
Present value:	$0	$89	$89

Transmission Aggregated PFIA Projects LT $3M
Classification: Policy Commitment
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

The following customer funded projects are included in this submittal: TS0140039- G0416 Green Wing Energy's Christmas Valley solar project- $837, TS0140085- G0444 Longview Fibre Generation Project Phase III - $1,077K, TS0140153- G0233 Miller Ranch - $700K, TS0140079- G0239 Montague II Wind Project- $1,089K, TS0140030- G0313 Everpower's Coyote Crest Wind Project- $2,896K, TS0140106- G0445 (Chapin Mtn.) & G0448 (Connor Ridge)- $192K, TS0140081- G0395 eXenergy Dev't Group's Bonanza Bar Wind Project (Minidoka PH) $1,663K

Why is this investment needed?

This investment is needed to meet customer requests for interconnection/service under the OATT.

What assumptions are behind the investment need?

The assumptions are that our scope is estimated closely and that the customers can obtain sales agreements, receive permits, and complete funding.

What actions would we take if this investment were not made?

These projects are non-discretionary and we must meet them to comply with our OATT.

What investment alternatives were considered and why are they not recommended?

There are no viable altenatives to connecting these generation requests.

Who would benefit from this investment?

BPA, it's stakeholders, and the individual generators requesting service.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Sep-17	Sep-18	Sep-20	$6,100	$7,317	$10,200	$0	$2,287	$2,287	$2,287	$2,287	$9,146	0%	30	40	70

What drives the investment costs to be low or high?

This group of projects is contingent on customers obtaining sales agreements, receiving permits, and completing funding requirements. Some of the projects have not been fully defined at this point, and the base case reflects (1) cost estimates in studies for the requests in which a study has been completed and (2) an average estimate of $1.5 million each for projects that have not yet been studied. Changes in scope may cause costs to be higher or lower. Delays in customers finalizing agreements on their end may result in higher materials and labor costs. One or more of the projects may never come to fruition, which would also result in lower costs.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

What is the proposed investment?

The proposed investment is a new 500 kV substation tentatively named Stanfield on the BPA McNary-Calpine 500 kV line. The 500 kV substation would require a 3 breaker ring bus in a breaker and a half configuration, which would provide 3 line positions; two line positions to loop in the McNary-Calpine 500 kV line, and a third position for the Project. The developer will provide a 230/500 kV transformer and build a 230 kV line from their collector station to the BPA owned Stanfield substation.

Why is this investment needed?

Heppner Wind is a 201 MW wind project seeking interconnection to the BPA system. The project is located in Morrow County, OR, about 5-10 miles east of the town of Heppner along HWY 47. With BPA's existing transmission infrastructure, we cannot fulfill the customer's requested load service. This is an LGIA project. For this project to go forward, the following steps must be completed: (1) BPA must complete the project studies associated with the project (2) BPA and customer must complete any NEPA review, (3) BPA must authorize the project, (4) the parties must enter into a LGIA with BPA, and (5) the requestor must provide an advance of capital to BPA before construction begins. At this point, the project is at step two. The

What assumptions are behind the investment need?

The assumption is that the Heppner Wind project will go forward.

What actions would we take if this investment were not made?

BPA is obligated under the OATT to provide this service upon the customer's request. Other technical alternatives for interconnection have been eliminated through the study process.

What investment alternatives were considered and why are they not recommended?

A potential interconnection was studied on the John Day-Marion 500 kV line, but it was significantly more expensive. This and all other options were eliminated through the study process.

Who would benefit from this investment?

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

CIR February 21, 2014

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-16	Sep-18	Sep-19	Sep-20	$15,000	$20,000	$45,000	$0	$0	$0	$3,750	$21,250	$25,000	0%	99	99	99

What drives the investment costs to be low or high?

The low cost is based on the scope proceeding forward as described above, with normal site conditions, in-house construction, and on-time equipment delivery. The high cost is based on the risk of BPA having to provide a transformer bank in addition to the defined scope. It is also based on contract construction, and more expensive equipment prices.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$15	$15
Present value:	$0	$122	$122

Transmission Aggregated A & CS projects LT $3M
Classification: Policy Commitment
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Northern Wasco County People's Utility District's (Northern Wasco) has submitted a Line and Load Interconnection request seeking to increase load served by the Bonneville Power Administration's (BPA) Discovery-Chenoweth No 1 115 kV transmission line. To respond to the request, BPA will need to upgrade the 0.24 mile Discovery-Chenoweth No 1 transmission line. The upgrade will include a re-conductor and new switches at Chenoweth.

Why is this investment needed?

BPA entered Northern Wasco's request into the Line and Load Interconnection Queue as Request No. L0355. The request was made pursuant to our Customer Load Service Policy under the BPA OATT and our Line and Load Interconnection Queue requirements. Northern Wasco is seeking transmission service from an existing line via a line extension to serve new loads within their territory. If the investment were not made, we would not be compliant with our OATT and the customers would be able to file suit.

What assumptions are behind the investment need?

The assumptions are that Northern Wasco will follow through with their request for service.

What actions would we take if this investment were not made?

This is a customer-driven project and if we do not serve them, we would be in violation of our OATT.

What investment alternatives were considered and why are they not recommended?

There are no viable alternatives to meeting this customer request.

Who would benefit from this investment?

BPA and its stakeholders as well as Northern Wasco.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-14	Jun-16	Sep-16	Jan-17	$900	$1,000	$1,500	$0	$625	$625	$0	$0	$1,250	0%	30	40	70

What drives the investment costs to be low or high?

This project responds to a new customer request and the scope and timing have not been fully determined at this point.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$0	$1	$1
Present value:	$0	$2	$2

Monroe 500kV Reactor
Classification: Compliance
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Expand the yard at Monroe Substation and add a 500 kV, 180 MVAR shunt reactor with three 396 kV arrestors, one 500 kV breaker and one disconnect switch onto the North Bus.

Why is this investment needed?

The reactors are needed to minimize the necessity of taking lines out of service during times when the system is experiencing high voltages. This action weakens the grid and lowers the reliability of the system. BPA planning guidelines state that 500kV system voltages should be kept to 1.1 per unit or less. Historical data shows that we have been violating that guideline in this case. In order to limit voltage levels during low load hours, Operations has been opening lines, which causes a large increase in work load for technical operations because they need to simulate all possible contingencies in addition to the opened lines. Most 500kV substation equipment has a maximum voltage rating of 550kV, and there are risks of equipment damage/failure if that rating is exceeded. There is also risk of the system getting out of sync during a high voltage event. Current NERC VAR standards discuss a voltage band, but at this time high voltage violations are not being assessed. This project will benafit generators by eliminating risk of equipment damage and/or separation. There are operations benefits as the system will be much easier to study and operate without having to open lines to lower high voltages.

What assumptions are behind the investment need?

The study was done assuming peak load hours.

What actions would we take if this investment were not made?

BPA will continue to have to open up transmission lines in the Puget Sound area to counteract high voltages.

What investment alternatives were considered and why are they not recommended?

Do nothing and continue to use sectionalizing around the Puget sound during high voltage conditions.

Who would benefit from this investment?

Customers served in the Puget Sound area will benefit by reducing high voltages that could cause equipment damage. Also, BPA operations and maintenance personnel will benefit by having a safer working environment.

Timing and costs of the investment

(2014 dollars in thousands)

Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Dec-17	Dec-18	Dec-18	$6,806	$8,012	$8,374	$0	$0	$1,502	$1,502	$7,011	$10,015	0%	30	40	50

What drives the investment costs to be low or high?

The low cost assessment assumes construction is performed by in-house rather than contract resources, road does not require widening, a bio-swale is not needed, mitigation credits are not needed, a CX (Categorical Exclusion) for environmental work is used, and no or very little fill is needed for expansion of the sub. The base cost assessment assumes construction is performed by contractor, the road needs widening, a bio-swale needs to be developed, the slope for expanding the sub is slight, an environmental CX is needed, mitigation credits are acquired, and the mimic bus needs to be moved. The high cost assessment assumes contruction is performed by contractor, the slope is very steep, two oil containment units and a containment pond need to be installed, mitigation credits need to acquired, and environmental permitting is delayed.

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	$388	$422	$33
Present value:	$900	$977	$78

ETC Scenario Analysis
Classification: Discretionary
Sponsoring Asset Category: IT

What is the proposed investment?

As the second phase of the STAR Program, the ETC Scenario Analysis initiative will begin developing a risk-informed inventory management strategy by implementing 2 sub-projects: 1) ETC Scenario Analysis/ETC Selector Tool Enhancements – to study ranges of inputs to ETC and to select an ETC based on risk tolerance. 2) Develop a Risk Informed Capability – Methods to analyze ranges of inputs to and outputs from powerflow calculations to arrive at a risk tolerance and TRM. (ETC=Existing Transmission Commitments, TRM=Transmission Reliability Margin)

Why is this investment needed?

The STAR Program (Sustainable Transmission that is Available and Reliable) was formed with the mission to maximize use of the transmission system through stream-lined, cost-effective and sustainable processes and programs that optimize transmission availability in accordance with reliability standards. This mission was developed in response to the following problems: 1) The mitigation of NERC ATC MOD compliance violations requires coordination over multiple business lines. Oversight of the resolutions is required. 2) It is suspected that the end to end management of transmission capacity is not optimized. The STAR Program developed a future state design that if implemented would result in 100%

What assumptions are behind the investment need?

Successful, timely implementation of the Powerflow Information Storage and Balancing Tool and Commercial Tool Integration with PISB projects. Successful, timely implementation of the ATC Situtational Awareness Tool Phase 2 (AST 2), which must be completed to provide data for running ETC scenarios and comparing the results to actual flows. As ETC Scenario Analysis is planned, the ASAT 2 project may be combined into this initiative given the initiative's dependence on ASAT 2 for success.

What actions would we take if this investment were not made?

Transmission capacity would continue to be managed in a non-optimal way, with conservatism imbedded in ETC, TTC and TRM in an opaque and inconsistent way. Operations and Marketing & Sales will continue to be unable to make risk- and cost/benefit-informed decisions on sales policy (e.g., limiting hourly or long-term sales), probability of congestion and how this is affected by sales policy, and whether to build or accept increased risk of congestion/curtailment.

What investment alternatives were considered and why are they not recommended?

Status quo. The investment scope and requirements will be defined, and alternative solutions will be identified and considered at that time.

Who would benefit from this investment?

Transmission Service organizations responsible for planning, evaluating and marketing transmission sales and for ensuring compliance with NERC requirements. Transmission customers seeking access to BPA's transmission grid.

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of direct capital costs			Fiscal year flow of investment expenditures (Base)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-15	Dec-16	Dec-16	Dec-17	$250	$1,000	$1,500	$0	$0	$1,000	$1,000	$0	$2,000	50%	5	7	10

What drives the investment costs to be low or high?

Process design costs, software acquisition and integration costs, and training and other implementation costs

How will asset O&M costs change with this investment?

	Before Investmen	After nvestmen	Change
Average annual first 10 years	$0	$0	$0
Present value:	$0	$0	$0

I-5 Corridor
Classification: Policy Commitment
Sponsoring Asset Category: Transmission Services

What is the proposed investment?

Construct two new 500kV Substations, Castle Rock and Sundial, and a new 79-mile 500kV transmission line to serve loads and accommodate transmission service requests along the I-5 corridor on the South of Paul and South of Allston Paths.

Why is this investment needed?

BPA needs to increase the electrical capacity and transfer capability of its 500-kV transmission system between the Castle Rock area in Washington and the Troutdale, Oregon area, in response to growing local demand for electricity and firm transmission requests that BPA has received to move power across this portion of its system. A new 500-kV transmission line would increase the 500-kV transmission capacity in the southwest Washington/northwest Oregon area and allow BPA to provide for local load growth, maintain reliable power, and accommodate requests for long-term, firm transmission service. The new facilities would eliminate a transmission capacity constraint for this area, provide an additional electrical pathway, and increase system capacity. Continuing to use BPA's existing transmission system in this area without a new transmission line would cause BPA's transmission system to become overloaded at certain times of the year.

Growing summer peak loads, new power plants that have interconnected to BPA's transmission system north of the South of Allston (SOA) path, and, to a lesser extent, power transfers from Canada through the Northwest to load centers south of the Portland metro area are causing and will increasingly cause congestion on the SOA path during the summer months. This compromises the reliability of the transmission system to serve loads. This project will provide capacity to support increasing generation and loads in the area and allow BPA to export power to balance generation and loads for our customers. Also single line loss of either the Allston-Keeler or Keeler-Pearl 500kV lines could cause violations of NERC TPL-002 and WECC category B Standards (System Performance Following Loss of One Bulk electrical System Element). The standards say the system must be stable and thermal and voltage limits within ratings and no loss of demand or curtailed firm transfers.

What assumptions are behind the investment need?

Key driver: Summer peak load conditions simultaneous with high transfers north-to-south along the main grid transmission system down the I-5 corridor.
Combination of load service and accommodating 2008 Network Open Season requests determined original need date of 2016. The need date is now determined to be 2018, which assumes that Pearl Bay Addition Upgrades (TFY100141) and Pearl 500 kV Upgrades (TS01400240) projects will be authorized and completed by 2016
Existing NERC and WECC Reliability Standards for Planning were applied to establish performance requirements. (New standards have recently been approved but not in effect yet)
Existing RAS applied (2700 MW gen drop for SOA path, and 2700 MW gen drop + (spell out acronym) SOCSS for Paul-Allston path)

What actions would we take if this investment were not made?

With the current forecasts for load growth, BPA's analysis indicates that by Spring 2018 the existing transmission system's capacity on the SOA path will likely be reached and could require BPA to reduce power deliveries to the Portland area. Actions would include cutting schedules on the path (which results in curtailments of transfers on the path, starting with non-firm transfers). Generation re-dispatch is being considered as an interim solution if the project cannot be energized by the need date of Spring 2018.

What investment alternatives were considered and why are they not recommended?

Do nothing and curtail generation/north to south transfers across the I-5 corridor.

Who would benefit from this investment?

Local loads in the southwest Washington/northwest Oregon area and requestors of long-term, firm transmission service

Timing and costs of the investment
(2014 dollars in thousands)
Corporate overheads and AFUDC not included in capital costs)

Timing of investment				Range of investment costs (Direct Capital Cost)			Fiscal year flow of investment expenditures (Base) (Direct Capital Cost plus Transmission Indirects)						Cap/Exp Split	Economic Life of Assets		
	Complete										Post		% of Investment			
Start	Early	Base	Late	Low	Base	High	2014	2015	2016	2017	2017	Total	that is expense	Low	Base	High
Oct-08	Sep-18	Sep-18	Sep-20	$440,000	$459,607	$528,000	$11,000	$62,500	$209,250	$209,250	$82,510	$574,509	0%	50	60	70

What drives the investment costs to be low or high?

Investment cost totals above include not only forecasts for future years, but also FY09 through FY13 actuals.

Uncertainties regarding land acquisition for the preferred route (may be more difficult to acquire than expected), potential legal challenges resulting in project delays and increased costs, fluctuations in cost of materials (such as tower steel), possible mitigation for wetlands impact greater than anticipated (there are wetlands throughout the project area and it is possible that mitigation will be more extensive than expected, leading to increased costs).

How will asset O&M costs change with this investment?

	Before Investment	After Investment	Change
Average annual first 10 years	Not assessed		
Present value:			

Capital Investment Review

Financial Disclosure

This information has been made publicly available by BPA on February 18, 2014 and contains information not reported in agency financial statements.