BPA's Asset Management Strategies Agency Overview

Aging Infrastructure

System Capacity and Flexibility Needs

Technological Opportunities and Risks

Increasing Compliance Requirements

Final Version

Post Integrated Program Review

October 2012

AGENCY OVERVIEW

INTRODUCTION

BPA's mission is to provide the Pacific Northwest with reliable, adequate power and transmission services at low rates and to mitigate the impacts of the federal hydro system on fish and wildlife. The four pillars of the agency's vision are: system reliability, low rates, environmental stewardship and accountability to region.

Assets such as hydroelectric plants, transmission lines and substations, information systems and investment in fish and wildlife mitigation enable BPA and its Federal Columbia River Power System (FCRPS) partners to deliver this mission and vision.

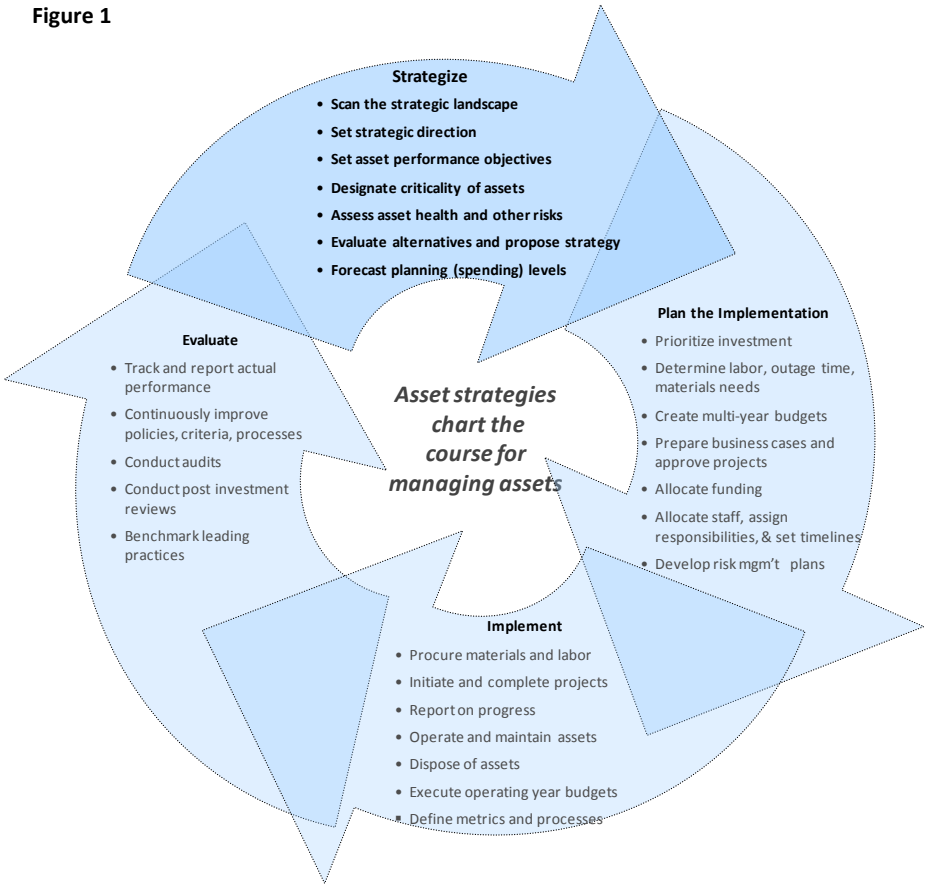
- BPA provides about 75 percent of the Pacific Northwest's high voltage transmission. The transmission system includes more than 15,000 miles of high voltage power lines, a dependable network of transmission highways that deliver electricity across the Pacific Northwest and into California, Canada and Montana. BPA manages the real-time operation of this system and provides the maintenance, replacement, upgrade and expansion of infrastructure needed to meet a range of customer needs for service and interconnection.
- Approximately 80 percent of BPA's firm power supply comes from 31 federal hydroelectric projects at costs among the most affordable in the nation. BPA's power is emission free.
- Energy efficiency accounts for BPA's largest resource acquisition over the last 29 years. BPA has acquired more than 1,200 average megawatts of energy efficiency savings – more than twice the energy that Bonneville Dam produces in a year.
- BPA funds and co-manages the largest fish and wildlife program in the nation. BPA invests over $400 million of ratepayer funds every year to protect fish and wildlife affected by the development and operation of the hydro system. The investments are driven by biological performance. The investments include: dam modifications, flow and spill operations that make fish passage safer, land and water acquisition and restoration activities that improve fish and wildlife habitat, funding that supports fish hatcheries as well as fish research and monitoring.

Asset management strategies set the direction for maintaining, replacing and adding capabilities to the power and transmission systems. The strategies chart the course for managing equipment and facility health, performance and costs. The goal of the strategies is to maximize the long-term operational and economic value of the assets. The goal is reached if the following two standards are met:

- Assets operate efficiently and effectively and provide the capacity, as well as capabilities needed to meet health and safety, reliability, availability, adequacy, environmental, security and other standards.
- Total economic costs are minimized over the long-term. Total economic costs include not only BPA's costs to maintain, replace and expand assets but also the costs that customers and others may bear should the assets fail to perform (customer outages).

Asset strategies generally cover a 10-year planning horizon, and they consist of asset performance objectives and targets, assessments of asset health and other risks, evaluations of alternative courses of action and recommendations for a program of investment and maintenance. The strategies are developed as part of an asset management cycle depicted in Figure 1.

Figure 1

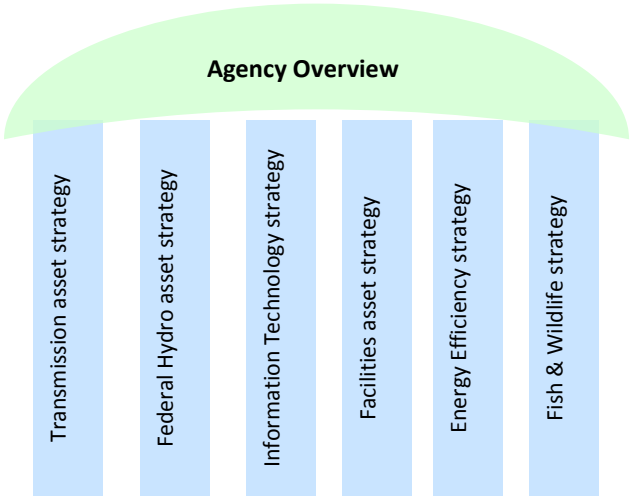


In 2006, BPA's Asset Management Enterprise Process Improvement project established seven asset categories. In 2010, BPA developed asset strategies for four of the seven categories. In 2012, BPA has developed strategies for six of the seven: Federal Hydro, Transmission, Facilities, Information Technology, Energy Efficiency, and Fish and Wildlife. In addition, a supplemental strategy has been developed for Security infrastructure. An asset strategy for the remaining asset category, Columbia Generating Station, has not been developed for this year's CIR process; however, Energy Northwest has developed a long-range capital investment plan that will be presented during the 2012 IPR.

Asset strategies now include prioritization criteria for capital projects and proposed lists of major capital projects. The prioritization criteria and prioritized lists of major projects are driven by the objectives, risk assessments and strategic choices in the asset strategies.

BPA's business units develop their asset management strategies under the guidance of agency policies. Once drafted, the strategies undergo internal review and then stakeholder review during the CIR process.

Figure 2



The purpose of this Agency Overview is to integrate and give context to the strategies that have been developed for each asset category. It covers the following:

- Assets covered
- Strategic challenges
- Strategic priorities
- Project prioritization
- Process for approving and monitoring capital projects
- Metrics for monitoring asset management performance

Full versions of the draft asset strategies are available online.

1.1 ASSETS COVERED

Federal Hydro assets comprise 31 hydroelectric plants with over 200 generating units. Installed generating capacity is 22,060 megawatts; in an average water year, 76 million megawatt-hours of electricity is generated. 21 of the plants are owned and operated by the Corps of Engineers and 10 by the Bureau of Reclamation.

Transmission assets include 15,200 circuit miles of high voltage transmission lines, 251 substations, 368 communications sites and 266,600 acres of transmission line corridor rights-of-way. Transmission assets also include hardware and software applications for grid operations. BPA owns or leases the Transmission assets.

Facilities assets include substation control houses, administrative offices, maintenance shops, warehouses and other nonelectric plant. BPA owns 1,013 buildings at 434 sites in five states. BPA leases another 12 buildings.

IT assets include desktops, laptops and other office automation hardware and software; servers, operating systems and other data center hardware and software; data, voice and video networks systems; and applications for a range of business purposes. These assets are owned by or licensed to BPA.

Energy Efficiency assets include measures and projects in all end use categories – residential, commercial, industrial and agricultural. Examples include building envelope measures to reduce heat loss/gain and infiltration; lighting measures that reduce energy consumption; and heating, ventilating and air conditioning systems and water heating equipment that are more energy efficient. These assets are owned and operated by end use electric customers served by BPA preference customers.

Fish and Wildlife assets include more than 450 fish and wildlife projects in the Columbia Basin. The projects include habitat restoration, research, fish hatcheries, conservation land acquisitions, predator control and culvert replacement. The assets also include fish and wildlife improvements at federal dams and fish hatcheries. The assets are owned and operated by federal and state agencies, conservation organizations, tribes and private property owners.

Not covered at this time, the **Columbia Generating Station**, a nuclear generation plant owned and operated by Energy Northwest.

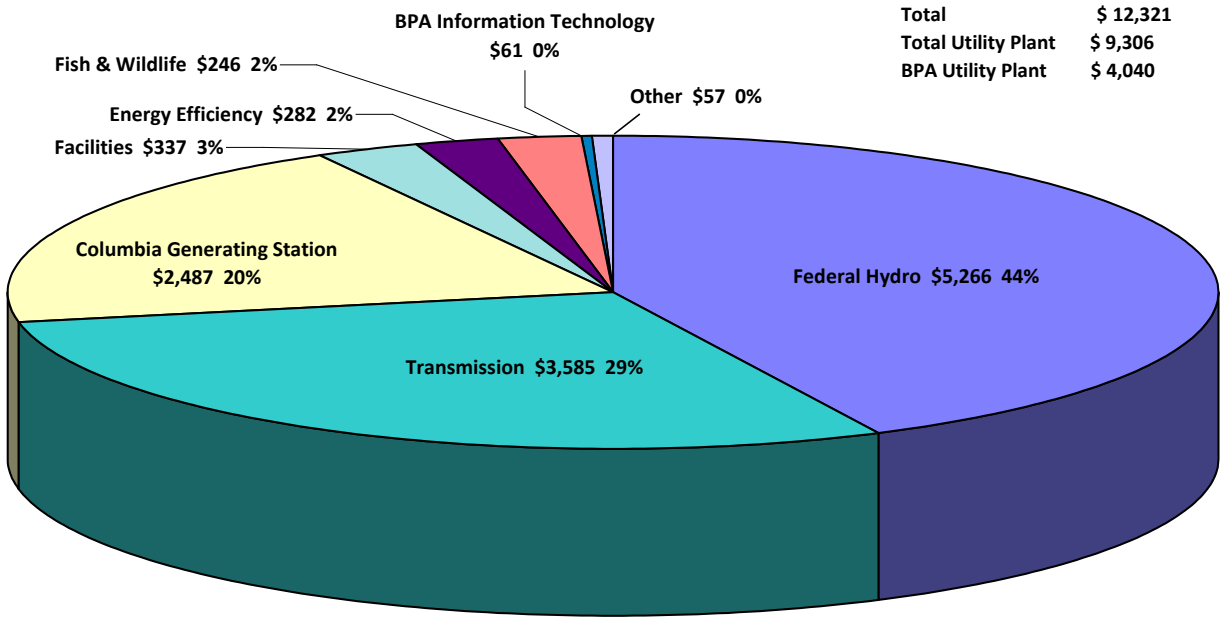
As of September 30, 2011, the Federal Columbia River Power System cumulative historical investment net of depreciation was $12.3 billion as shown in Figure 3.

These investment totals include:

- Utility plant (Federal Hydro, Transmission, Facilities, IT and "other"),
- Columbia Generating Station (treated by BPA as a capitalized contract) and
- Fish and Wildlife and Energy Efficiency assets (treated as regulatory assets).

Figure 3

FEDERAL COLUMBIA RIVER POWER SYSTEM & THE COLUMBIA GENERATING STATION
Historical Investment Costs for Assets In-Service
After Depreciation
as of September 30, 2011 ($Millions)



1.2 STRATEGIC CHALLENGES

An aging infrastructure

The majority of the transmission system and its high voltage power lines and substations are more than 40 years old. Much of the critical infrastructure needs to be replaced or upgraded so that systems continue to provide reliable service and needed capacity and capabilities.

The average age of the federal hydroelectric plants is about 50 years, with some that exceed 60 years. In some cases, federal hydro assets are reaching and exceeding the end of their expected service lives. Maintaining the availability and increasing the efficiency of the plants is critical to ensuring that the region has an adequate, reliable and low-cost power system.

After years of underinvestment, the aging, deteriorating state of facility assets has become a serious issue. Most facilities were built before 1960, and, as a result, do not comply with current life safety, fire protection and seismic codes. This presents risks to personnel and

operations as well as to the preservation of these assets. Many of the facilities contain building materials that are deemed to be hazardous, such as asbestos, polychlorinated biphenyls, lead and mercury. Many buildings and systems have exceeded their design life many times over. In other cases, maintenance has been deferred, and assets are subject to break-fix maintenance only.

Figure 4 illustrates the aging asset issue for two groups of transmission assets. The first chart shows the age demographics for alternating current power transformers, and the second shows the same data for wood poles. These charts indicate that 40 percent of AC power transformers are over 50 years old although they have an expected life of 45 years, and almost 30 percent of wood poles are over 50 years of age with an expected life of 60 years. Eight percent of the wood poles are beyond their service life, with 20 percent to 35 percent reaching their expected service life within 10 years.

Figure 4

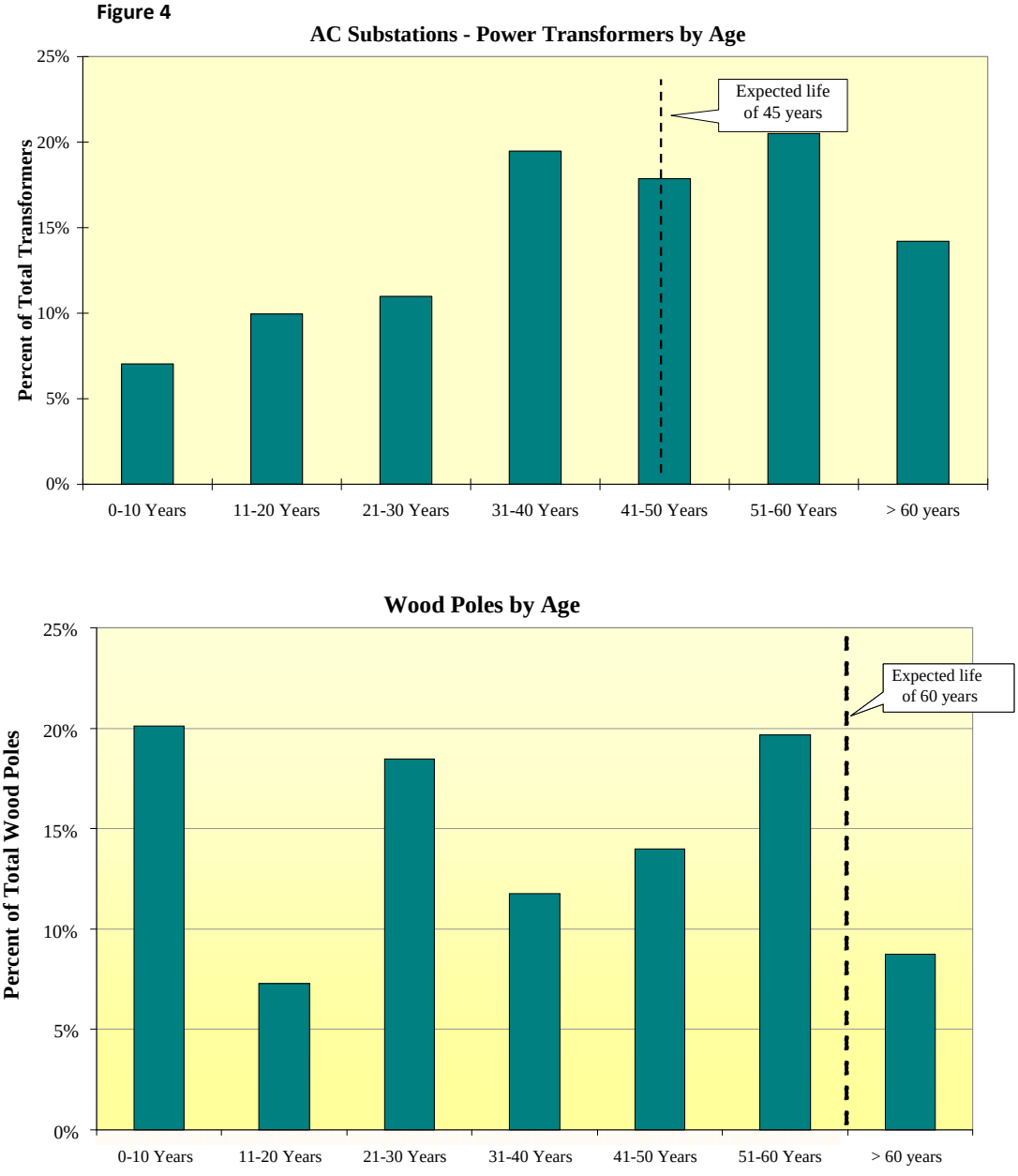
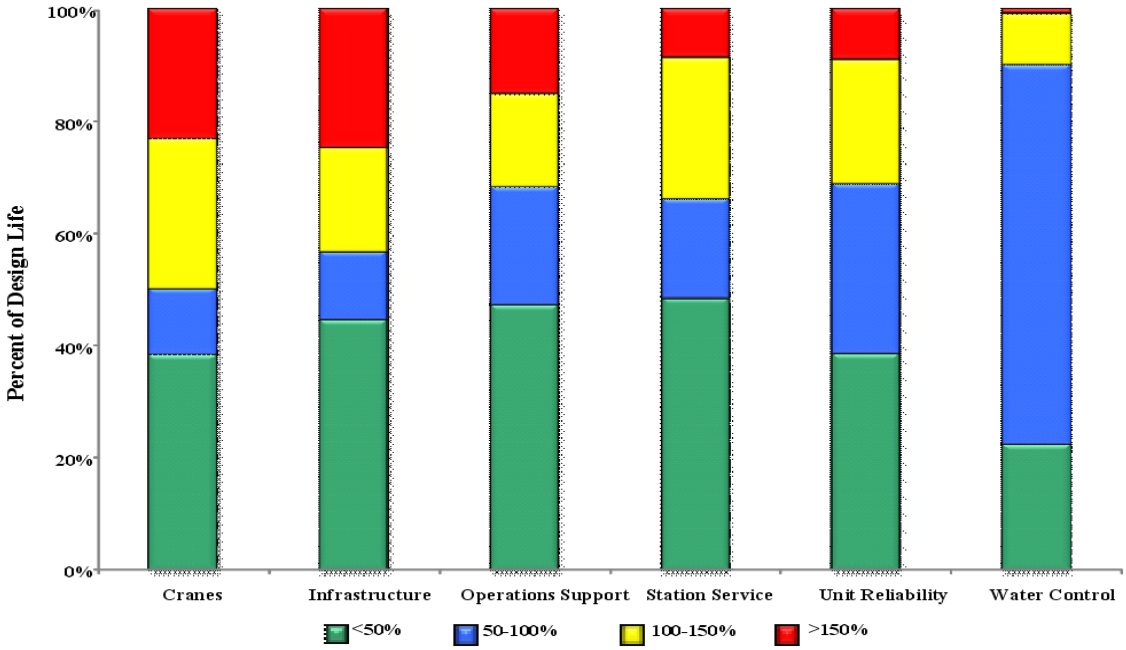


Figure 5 illustrates the age of federal hydroelectric assets. Large portions of hydro equipment have exceeded design life, which includes nearly 50 percent of cranes and infrastructure equipment.

Figure 5



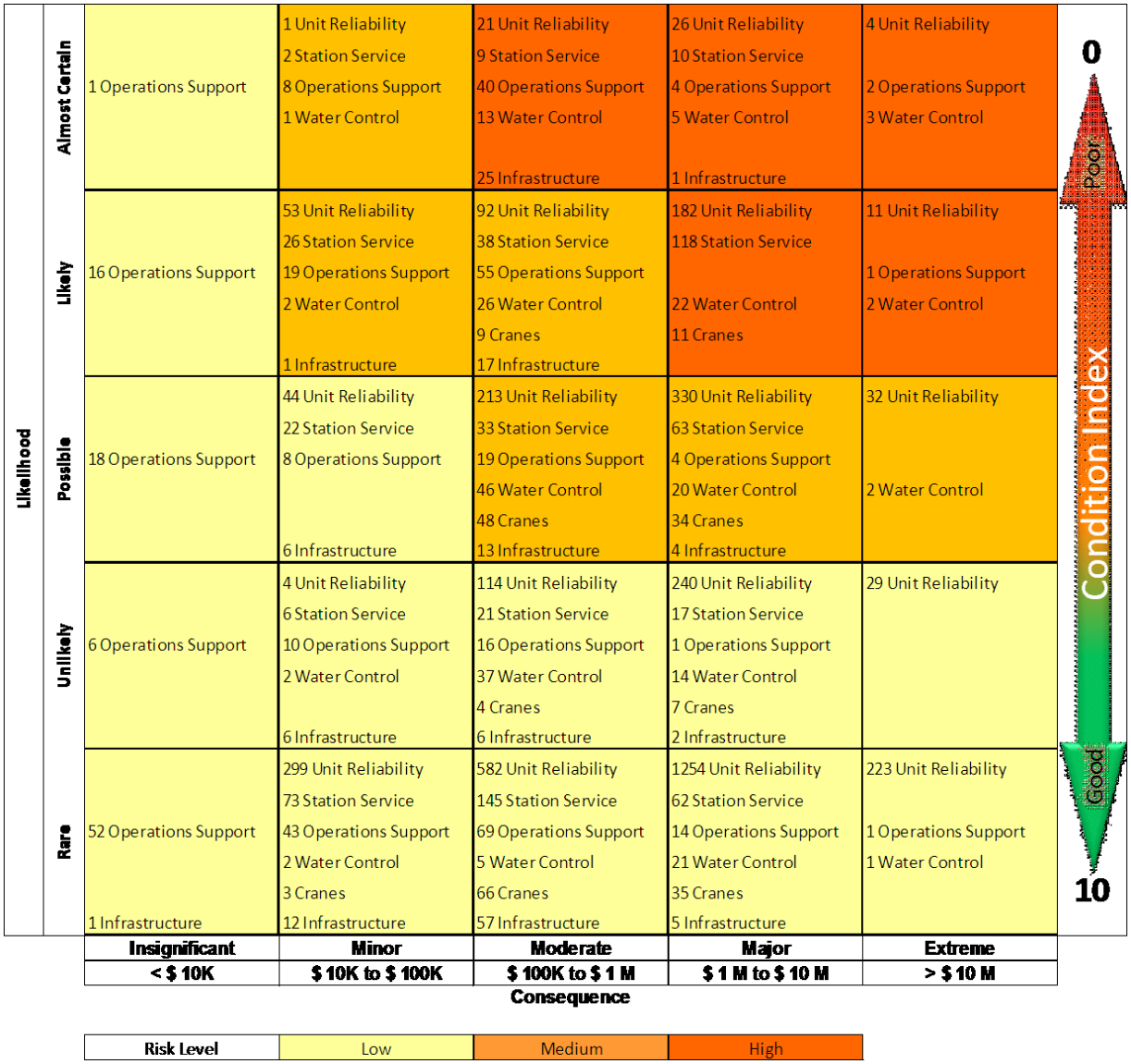
Age by itself does not determine when an asset should be refurbished or replaced. The physical condition along with the performance, maintenance and repair cost history of equipment and facilities are often significant drivers for planning and prioritizing maintenance and replacements.

To illustrate, Figure 6 is a risk map excerpted from the Federal Hydro Asset Strategy. The map shows the equipment units that are likely or not likely to fail based on health assessments (shown in rows). Health assessments involve inspections to examine the physical condition and performance of equipment and facilities to ascertain the risk of failure and other risks. The risk map also shows the potential ranges of financial impact if equipment were to fail (columns). Hydro equipment failures can lead to reduced levels of generation, which in turn can lead to reduced sales or increased purchases of costly replacement power. Failures can also lead to increased repair, replacement and other costs.

Figure 6 shows that a substantial number of critical hydro equipment units are in need of replacement if failures and large financial losses are to be avoided (the red and orange zones on the map).

Comparable risk assessments are prepared for each asset strategy. The risk assessments play a key role in prioritizing refurbishment, replacement and certain upgrade investments, as explained later.

Figure 6

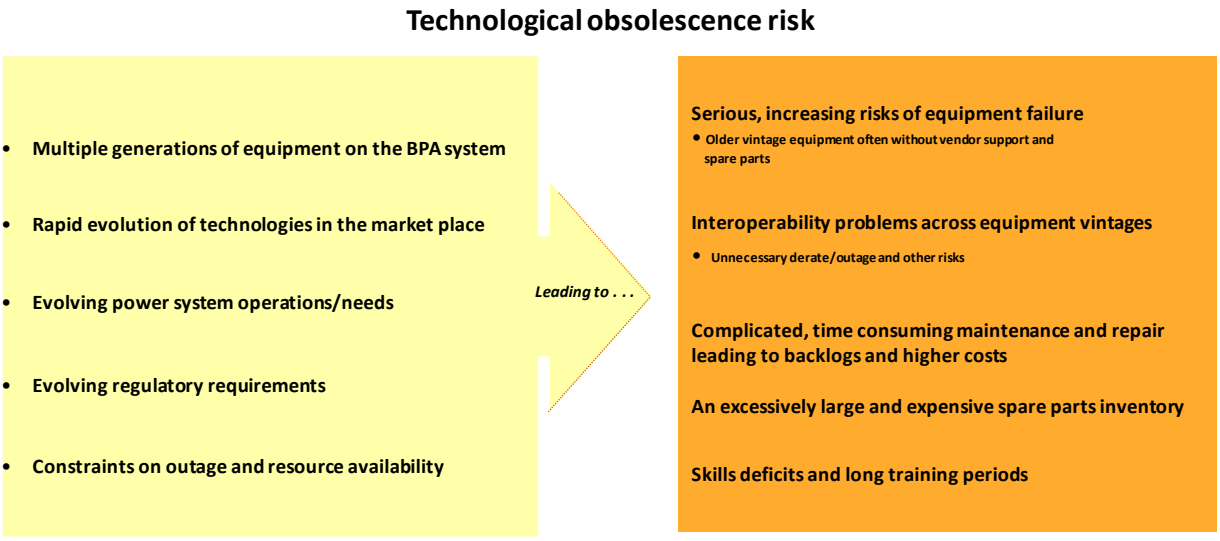


Likelihood	Insignificant	Minor	Moderate	Major	Extreme
	< $ 10K	$ 10K to $ 100K	$ 100K to $ 1 M	$ 1 M to $ 10 M	> $ 10 M
	Consequence				
Almost Certain	1 Operations Support	1 Unit Reliability 2 Station Service 8 Operations Support 1 Water Control	21 Unit Reliability 9 Station Service 40 Operations Support 13 Water Control 25 Infrastructure	26 Unit Reliability 10 Station Service 4 Operations Support 5 Water Control 1 Infrastructure	4 Unit Reliability 2 Operations Support 3 Water Control
Likely	16 Operations Support	53 Unit Reliability 26 Station Service 19 Operations Support 2 Water Control 1 Infrastructure	92 Unit Reliability 38 Station Service 55 Operations Support 26 Water Control 9 Cranes 17 Infrastructure	182 Unit Reliability 118 Station Service 22 Water Control 11 Cranes	11 Unit Reliability 1 Operations Support 2 Water Control
Possible	18 Operations Support	44 Unit Reliability 22 Station Service 8 Operations Support 6 Infrastructure	213 Unit Reliability 33 Station Service 19 Operations Support 46 Water Control 48 Cranes 13 Infrastructure	330 Unit Reliability 63 Station Service 4 Operations Support 20 Water Control 34 Cranes 4 Infrastructure	32 Unit Reliability 2 Water Control
Unlikely	6 Operations Support	4 Unit Reliability 6 Station Service 10 Operations Support 2 Water Control 6 Infrastructure	114 Unit Reliability 21 Station Service 16 Operations Support 37 Water Control 4 Cranes 6 Infrastructure	240 Unit Reliability 17 Station Service 1 Operations Support 14 Water Control 7 Cranes 2 Infrastructure	29 Unit Reliability
Rare	52 Operations Support 1 Infrastructure	299 Unit Reliability 73 Station Service 43 Operations Support 2 Water Control 3 Cranes 12 Infrastructure	582 Unit Reliability 145 Station Service 69 Operations Support 5 Water Control 66 Cranes 57 Infrastructure	1254 Unit Reliability 62 Station Service 14 Operations Support 21 Water Control 35 Cranes 5 Infrastructure	223 Unit Reliability 1 Operations Support 1 Water Control

Risk Level	Low	Medium	High

Technological risks and opportunities

For some classes of equipment, such as telecommunications and control systems equipment, technological obsolescence has emerged as a major risk factor. BPA's system contains multiple generations of telecommunications and control systems equipment, which has led to interoperability problems and increasing maintenance and repair costs. Meanwhile, the rapid evolution of technologies has led to shortages of spare parts and skills deficits for repairing older equipment.



Technological obsolescence risk is distinct from failure risk. Obsolescence risk can affect equipment maintainability, interoperability, and the duration of a curtailment/outage should a failure occur. Equipment may be in healthy physical condition, but technologically obsolete. Conversely, equipment may be in poor physical condition, but technologically up to date.

New technologies present opportunities for greater efficiency and effectiveness. For example, evolving server technologies and the onset of "cloud-based" services should enable BPA to meet a steep growth in information requirements more cost effectively.

As another example, BPA and several other utilities in the Western Interconnection are deploying a synchronized phasor measurement system with selected smart grid functions. The synchrophasors will enhance real-time information on grid performance, which will, in turn, help reduce the risk of large-scale outages, enable faster restoration of the system, increase transfer capacity and enable better management of transmission congestion.

Technological advances are instrumental to the success of many industry-wide initiatives, including integrating intermittent generation, enhancing the reliability and efficiency of system operations, deploying demand response programs and enabling energy storage devices. However, cyber security compliance requirements must be satisfied in order to use the new technologies.

Increasing demands on the power and transmission system

Renewable portfolio standards in the West continue to drive wind energy growth. In the Pacific Northwest, 6,500 MW of wind energy were operating by the end of 2011, and forecasts indicate this could rise to as much as 10,000 MW by 2020. In the BPA balancing authority area, 41 wind projects totaling over 4,700 MW have been interconnected into the transmission grid, which has required BPA to construct numerous substations and tap lines. Most wind projects are concentrated in the Columbia River Plateau where there is access to BPA's transmission lines and the interties to California. This concentration produces large unexpected swings in aggregate generation output, which requires BPA to provide significant balancing reserves to preserve reliability.

Planned coal plant shutdowns and other state renewable policy decisions and incentives are expected to contribute to continued growth in renewable resource development in the Pacific Northwest. The rapid pace of wind growth is expected to ease over the next two to four years.

Contributing factors include a volatile global and national economic environment and uncertainty about whether production tax credits or other federal alternative energy incentives will be extended. In addition, California – which was once expected to meet a significant portion of its renewable portfolio standard needs with Northwest wind energy – is now expected to rely primarily on its own in-state resources, including wind, solar and distributed generation. Despite this change, BPA still expects as much as 6,000 MW of wind energy to be operating or under construction in its balancing authority by the end of 2013.

The Northwest transmission grid and federal power system are operated in ways not originally envisioned due not only to the ramp up in wind generation, but also to changes in markets and transmission patterns. Several transmission paths are at or near their capacity limits. Among other effects, transmission congestion can force a change from the optimal dispatch of generating resources, which can in turn lead to higher regional costs for delivered power. Further, a heavily loaded system constrains the agency's ability to take line or substation assets out of service for needed maintenance, repairs and replacements.

Demands are increasing on the federal hydro system as well, including competing requirements to conduct fish operations, ensure flood control and provide balancing reserves for renewable energy. In sum, new capacity and flexibility will be needed to meet tariff and regulatory requirements and to provide adequate, efficient and reliable transmission and power services.

Increasing compliance requirements

Reliability standards

The Energy Policy Act of 2005 subjects utilities to a wide range of North American Electric Reliability Corporation reliability standards that are enforced by the Western Electricity Coordinating Council. The challenge that BPA and similar entities face is the amount and rate of change in reliability standards since their inception. Since 2007, reliability compliance standards have steadily increased and are expected to continue to increase over the next several years. These standards create funding, labor and outage requirements for the agency.

Security and continuity of operations requirements

Growth in regulatory requirements for protecting BPA and other national critical infrastructure has been rapid. The requirements are outlined in presidential decision directives issued by the North American Electric Reliability Corporation, Federal Energy Regulatory Commission, U.S. Department of Energy and U.S. Department of Homeland Security.

Keeping a balance between compliance-driven initiatives and risk-based protection programs is a challenge. Compliance requirements for physical security have left the agency with little discretion for funding protection strategies based on BPA risk assessments.

BPA's information technology systems must also conform to federal and industry mandated laws and regulations, including the Federal Information Security Management Act of 2002. 42 of BPA's systems are deemed to be critical business systems. These systems support power and transmission scheduling and marketing and must be available around the clock seven days a week. Continuity of operation requirements have been established for these systems.

Endangered Species Act requirements

The FCRPS biological opinion (BiOp) is the federal plan for operating 13 Main stem hydroelectric dams while protecting Endangered Species Act-listed salmon and steelhead on the Columbia and Snake rivers. Since 2001, the FCRPS BiOps (2000, 2004, 2008 and 2010 Supplemental) have been in litigation. Under the biological opinions, flows, spills and dam operations are provided for fish spawning, rearing and migration. While the most recent federal District Court decision left the 2008/2010 BiOp in place through 2013, the Court remanded the BiOp back to the federal agencies to produce a new biological opinion in 2014 that evaluates actions that are "reasonably certain to occur."

1.3 STRATEGIC PRIORITIES

For FYs 2012-2017, the agency is pursuing six strategic priorities, four of which have a direct bearing on its investment and maintenance strategies.

- Preserve and enhance the value of the generation and transmission system.
- Implement the agency's Endangered Species and other fish and wildlife related responsibilities.
- Advance energy efficiency.
- Expand capabilities and resources for balancing system operations.

The goal is to preserve and enhance federal generation and transmission assets and the economic, environmental and operational value they produce for the region while anticipating and adapting to industry developments and regulatory change.

Transmission

Significant investment is needed to sustain and expand the transmission system. This investment will refurbish or replace aging equipment, integrate wind and other new generating resources, and remove constraints that limit economic trade or the ability to maintain the system.

To *sustain* existing transmission assets, Transmission Services is maintaining or replacing high-risk, obsolete and maintenance-intensive facilities and equipment to preserve the system's reliability performance. Asset strategies have been developed for eight sustain programs: steel lines, wood lines, rights-of-way, alternating current substations, direct current substations, power system control, system protection control and control centers. In each of these programs, proposed investments are based on the criticality of the asset and its health condition. Highest priority is assigned to the most critical assets at greatest risk of safety and health issues, operational failure, obsolescence, environmental damage or security shortfall. This asset criticality and health condition-based approach serves to maintain reliability and manage other risks while optimizing the use of limited funding, labor and outage time.

Over the years, the Transmission and Facilities asset categories have accumulated sizeable backlogs in making replacements. To address this, BPA is implementing a multiyear ramp up in replacement and maintenance programs. With its 2010 asset strategies, BPA, with the support of its customers and other stakeholders, committed to implementing long-term risk-informed

programs for replacements and maintenance. Stable, predictable levels of funding for replacements and upgrades are essential if asset age and health risks are to be managed efficiently and effectively.

To this end, BPA is setting a floor on funding transmission asset replacements. The floor is set conservatively at the level of annual depreciation expense for transmission assets. This means that the funding for transmission replacements would be set at a level no lower than the original actual cost of the equipment and spread pro rata over the average expected service lives of the equipment (as of the end of FY 2011, this amount was $128.7 million). Additional amounts may be added to this floor annually to fund backlog reductions and cover commodity and equipment price escalation.

During the past two years, Transmission Services has begun implementing an economic value-based method to better determine the level of effort that is needed for each sustain program and the priorities that should be set when replacing equipment. This new, leading practice method involves: assessing the health condition of equipment, the likelihood of equipment failure, the potential for line derates and outages should equipment failure occur, and the economic losses that BPA, customers and regional end users might suffer as a result. The method produces a risk-informed prioritized program of replacements and internal process improvements designed to minimize BPA costs and customer value losses from equipment failures over time. The method has been applied to power system control assets, and a project that applies the method to all control system assets is nearing completion. The method will be extended to remedial action schemes and other selected assets in FYs 2013-2014.

Repair versus Replace?

Life cycle costing plays a big role when deciding whether to maintain and repair equipment in declining health or to replace it.

Repair versus replace decisions affect equipment reliability -- and long-term costs and cost savings. Sometimes it is more economic to replace equipment early, ahead of the end of its service life.

Additional details available online.

To *expand* transmission, Transmission Services is proposing significant investments in infrastructure to meet generation interconnection and customer service requests, relieve congestion and meet load requirements. These investments fall into four areas, that together, assure compliance with reliability standards and guidelines; provide a reliable transmission system for open access, per NERC criteria; provide relief for transmission system congestion; and enable contractual obligations to be met.

- *Main grid*: Expands the main grid to interconnect new wind generation and provide new point-to point service through projects such as the 28-mile Big Eddy-Knight 500-kV line and the 38-mile Little Goose-Lower Monumental 500-kV line. The timing of projects, such as these examples cited, may be adjusted to respond to market conditions.
- *Area and customer service*: Provides facilities to support customer loads (230-kV and lower).
- *Interregional paths*: Provides lines and facilities that interconnect with transmission providers and generating resources between the Pacific Northwest and other regions (500-kV and lower).

- *Upgrades and additions*: Upgrades the capacity and capabilities of substations, transmission lines, control center systems, telecommunications equipment and other electrical equipment.

BPA will continue to develop innovative approaches to planning transmission development in the region. To support the load growth and marketing needs of the agency's transmission customers, BPA is collaborating with stakeholders to revise and enhance its policies and processes in three areas:

- *Network transmission.* BPA continues to strengthen network planning processes to better anticipate the ongoing transmission needs of network integration transmission service customers.
- *Network open season.* This addresses the process for managing transmission service requests and identifying and subscribing new transmission infrastructure.
- *Generation interconnection*. This addresses the process for connecting new generation to the grid.

The objectives of these efforts include: promoting more efficient and effective regional transmission planning processes and timelines, clarifying rights and responsibilities for BPA and its customers, ensuring equitable cost allocation, reducing financial risks to BPA and its ratepayers, and mitigating stranded investment exposure.

Generation

With the goals of providing low cost, reliable power and being a trusted steward of the FCRPS, BPA is making ongoing investments in FCRPS hydro assets in collaboration with the U.S. Army Corps of Engineers and the Bureau of Reclamation. The purpose of the investments is to:

- supply reliable, low-cost generation through proper operation, inspection and maintenance;
- mitigate risk of power generation failures by replacing or refurbishing equipment;
- increase the efficiency and capability of power facilities where economically feasible;
- ensure that safety and environmental requirements are met; and
- meet FCRPS commitments for fish and wildlife and cultural resource programs.

The investments are targeted in six areas: unit reliability, water control, station service, operations support, infrastructure and cranes. Unit reliability is by far the largest investment category, ensuring the full and reliable performance of equipment such as turbines, generators, transformers, exciters and governors. Among the largest investment programs in flight are the Bureau of Reclamation's 10-year rehabilitation program for powerhouse units at Grand Coulee Dam and the Corps of Engineers' replacement of turbine runners to improve unit performance at Chief Joseph Dam.

Integrated transmission and power activities

To anticipate the changing demands of the industry and BPA's stakeholders, the agency is exploring new approaches to operating the federal generation and transmission system and maximizing the value they produce for the region.

- Through initiatives in pumped storage, demand response, smart grid and technology innovation, BPA is evaluating cost-effective solutions that meet its business needs.
- BPA will seek new ways of capturing the value of excess hydro power through surplus sales into the energy, ancillary service and emerging capacity markets as well as through structured storage and shaping products with the potential to better monetize federal hydro capacity.
- BPA will improve planning, coordination and practices in and between its transmission and power systems to improve their flexibility and alignment. Examples include coordinating hydro operational impacts on transmission line loadings and line outage planning, and exploring new technology applications for energized maintenance to increase transmission line availability.

Advance energy efficiency

Meet 85 percent of the load growth of regional public utilities through energy efficiency and conservation over 20 years.

Energy efficiency is BPA's priority resource for meeting load growth for the customers the agency serves. It is the lowest cost and least risk resource in the Pacific Northwest. Together with its public power customers, BPA aims to achieve 85 percent of public power's 20-year load growth from energy efficiency consistent with the Northwest Power and Conservation Council's Sixth Power Plan targets.

According to the Plan, the population of the Pacific Northwest will increase from about 13 million in 2010 to 16.7 million by 2030. Load is projected to increase from 21,000 aMW to 28,000 aMW. The implication is that the region will invest in energy efficiency rather than new generation facilities for 85 percent, or 5,900 aMW, of the expected load growth.

To meet the 85 percent target, the agency is pursuing energy saving strategies in three areas.

- *Utility program savings*. Utility programs will represent the bulk of savings accomplishments. The efforts will emphasize the following efforts.
    - Infrastructure support, which includes developing policies to encourage energy efficiency, improving the region's ability to achieve energy efficiency through regional programs and funds for utilities, reaching out and engaging with customers and other project implementation stakeholders and providing technical support for project implementation.
    - Acquisition funding and support, which is provided in the form of incentive dollars to help customers achieve cost-effective energy efficiency.
    - Innovation in new technologies, which continues to find new ways to save energy at the lowest possible cost.
- *Market transformation savings.* Market transformation savings will leverage the regional market's power to accelerate innovation and adoption of energy efficient products, services

and practices. Examples include collaborating with manufacturers to integrate energy efficiency in their product designs and with architects and builders to promote early adoption of energy efficient designs and practices.

- *Nonprogrammatic savings*. Nonprogrammatic savings will target energy efficiency that occurs outside of utility programs or market transformation efforts. For instance, thousands of compact fluorescent light bulbs are purchased and installed in the region without the use of utility financial incentives, making these efforts extremely cost-effective.

Expand balancing capabilities and resources

Expand BPA balancing authority capabilities and customer access to flexible balancing resources in order to support reliability and renewables.

Variable energy generators play an integral role in the regional power system, making significant clean energy contributions to the region's resource portfolio and providing significant economic value to some of the most financially distressed rural communities. Along with state renewable portfolio standards, innovative BPA transmission policies and processes for transmission service requests have helped spur the region's renewables growth.

The continued growth of wind also requires that BPA and the region jointly understand and manage the costs and risks that come with increased variability in the region's resource portfolio so that the reliability and cost effectiveness of the system can be sustained. The federal hydro system has been the principal source of balancing reserves to manage fluctuations in wind generation, but these supplies are limited and could be exhausted by 2013.

It is vital to broaden customer access to nonfederal balancing resources while enhancing the operational tools of the BPA balancing authority, developing new products and increasing coordination within and across the region's balancing authorities. To achieve this, BPA is pursuing several strategies.

- *Oversupply.* In collaboration with regional stakeholders, the agency is developing durable solutions to address occasional events that produce an oversupply of power. This can result from concurrent high wind and high water events, especially during the spring runoff season.
- *Balancing services*. Energy Efficiency is taking a systematic approach to leverage both federal and nonfederal resources to provide balancing services to meet BPA's obligations as a balancing authority. This approach can act as a bridge to a possible regional imbalance market or can function as a stand-alone approach. This strategy has four goals:
    - Reduce generation imbalance demands on the BPA balancing authority.
    - Expand the supply of generation imbalance resources, such as pumped storage.
    - Better manage generation imbalance reserve deployment.
    - Consider a regional imbalance market.

These strategies may lead to new investments in communications and control system infrastructure, new information technology solutions, acquisition of energy storage and demand response capabilities, and transmission integration requirements.

Implement Endangered Species Act responsibilities

Endangered Species Act responsibilities include implementation of hydro, habitat and hatchery actions that effectively and efficiently advance the recovery and restoration of fish, including salmon, steelhead, sturgeon, and bull trout.

BPA invests over $400 million every year to protect fish and wildlife affected by the development and operation of the Columbia River hydro system. The investment portion of this funding includes capitalized habitat restoration, fish hatcheries, conservation land acquisitions, predator control and culvert replacements. Fish and wildlife improvements at federal dams and fish hatcheries are also included.

BPA's long-term objective for Fish and Wildlife is that, "BPA's Endangered Species Act, NW Power Act, National Environmental Policy Act, Fish Accords and other environmental responsibilities are met using a performance-based approach." Within this context, the agency's strategic priority to implement its Endangered Species Act responsibilities has three main thrusts.

- *Biological performance.* BPA has committed to a range of biological targets to guide its hydro and habitat mitigation.
- *Regional partnerships.* As environmental steward for the FCRPS, BPA implements its hydro, habitat and hatchery mitigation projects in close partnership with state and tribal governments and other federal agencies. BPA also collaborates with BPA customers, river users, conservation groups and an array of stakeholders to meet its many environmental responsibilities.
- *Ongoing litigation.* The federal plan for Endangered Species Act compliance for the Main stem dams on the Columbia and Snake rivers is one of the most extensive, complex and comprehensive biological opinions ever developed in the U.S. BPA will continue to implement the 2008/2010 BiOp and will work with federal agencies, stakeholders and the Court to produce a new BiOp in 2014.

To meet this challenge, BPA and its partner agencies are expending significant resources to meet the performance requirements of the 2008/2010 BiOp while also initiating an intensive effort with the region to specify actions to improve salmon habitat and evaluate biological benefits.

1.4 PRIORITIZING PROJECTS

BPA and its FCRPS partners face growing investment requirements to replace and modernize aging infrastructure, add transmission capacity to meet loads and integrate generating resources, and meet regional commitments for energy efficiency and fish and wildlife restoration.

At the same time, BPA's access to low cost sources of capital is constrained. Traditionally, BPA has relied on its authority to borrow from the US Treasury to finance federal investments in the power and transmission system, but this source of capital is capped by law and may be fully utilized as early as 2017. Additional sources of funding must be developed if future investment needs to be met. To this end, BPA has developed an Access to Capital Strategy. The strategy is

directed at providing reliable access to cost-effective sources of capital over a rolling 10-year period. See http://www.bpa.gov/corporate/Finance/Debt_Management/presentations/access-to-capital.cfm

BPA lacks an agency-wide method to prioritize diverse capital projects. Indeed, a systematic, value-based method for prioritizing capital investments across business units is a leading practice among top performing utilities. During the Capital Investment Review (CIR) in Spring 2012, BPA proposed to develop an agency method for prioritizing investments and workshops were held to discuss alternative approaches and a timeline. Stakeholders then submitted comments and recommendations for BPA's use in developing its methodology.

Since then, BPA has designed a prioritization process. Process testing and implementation planning is now underway. BPA intends to begin implementing the methodology in early spring 2013.

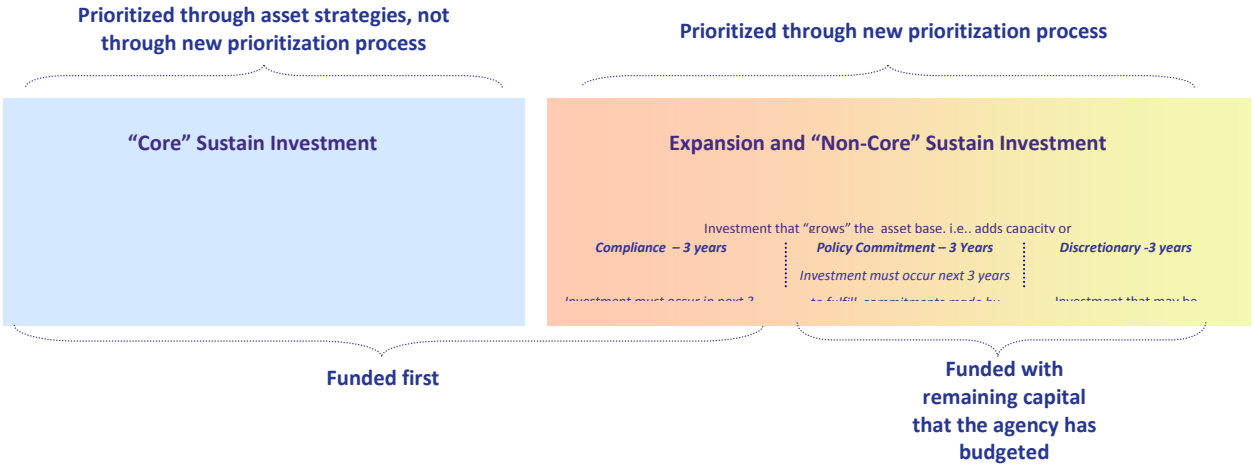
BPA's goal is to create an agency-level process that:

- Furthers the agency's strategic priorities/objectives
- Provides a "level playing field" for projects with different risk/cost/benefit characteristics from various asset categories
- Optimizes the agency's investment portfolio within capital, labor, rate, and other constraints
- Ensures decision-making is risk-informed and supported by thorough analysis
- Provides transparency both internally and externally
- Enables efficient, timely decision making
- Enables BPA to track the performance and measure the realized value from investments

The methodology and process will be directed at maximizing the long-term operational and economic value of assets.

Investments covered by the new prioritization process

The new process will cover investments that are not "core sustain" in nature, as depicted below.

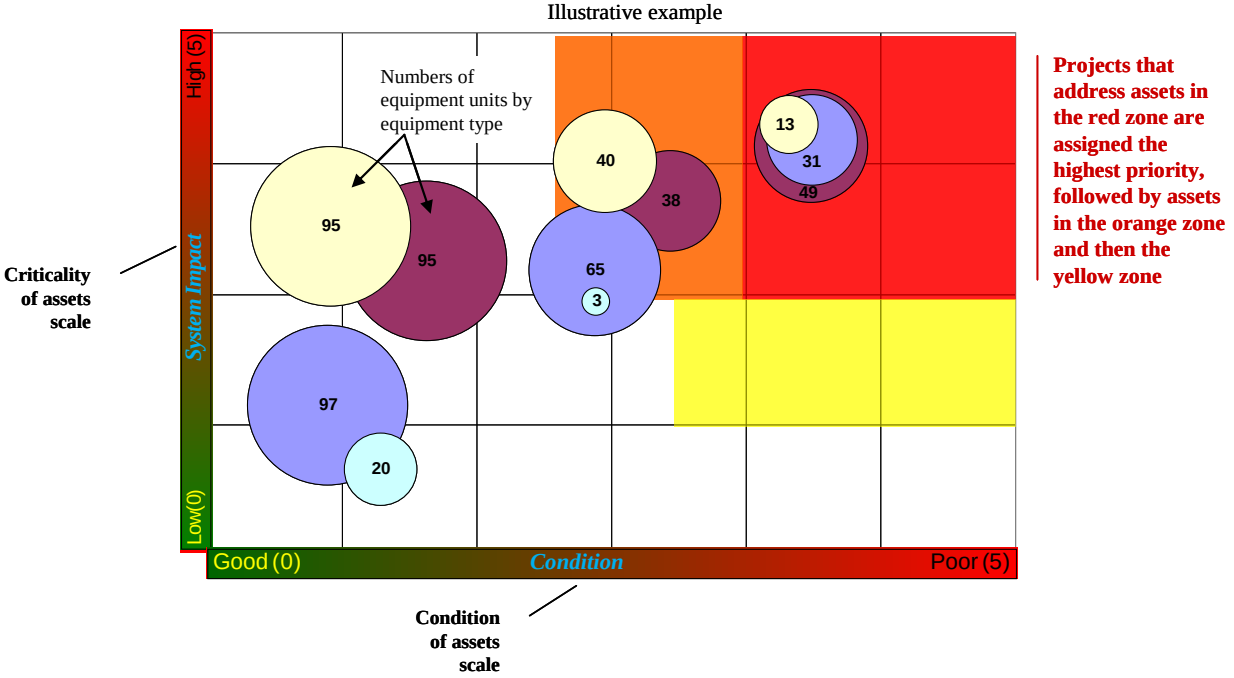


For purposes of this process, core sustain investments are defined investments the primary purpose of which is to replace or refurbish existing assets in order to maintain performance and capabilities. Core sustain investment is prioritized through condition-based risk assessments, in which the highest priority is assigned to the most critical equipment and facilities at greatest risk of failure, obsolescence, safety issue, or other risk factor. Included are upgrades necessary to make core sustain investment viable, such as access roads that enable line replacements. This prioritization of core sustain investment occurs within the asset strategies that are developed by each BPA asset category. Figure 7 illustrates the prioritization method used for sustain investments.

Figure 7

Risk-based prioritization of "sustain" projects

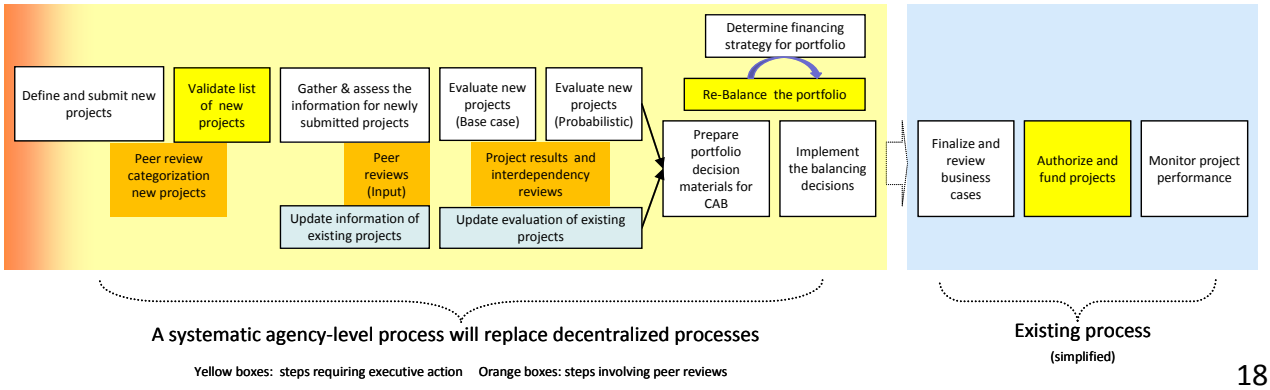
Illustrative example



In no case are sustain projects canceled or deferred if it would lead to a violation of standards, tariff provisions or other legal commitments and requirements. Emergency situations take precedence.

Expansion and "non-core" sustain investment will be segregated among three categories, compliance, policy commitment and discretionary. These categories are important because the metrics and methods used to evaluate projects in each category will be different. Figure 8 defines the categories and prescribes their treatment.

Figure 8



The new agency-level process is designed to create a level playing field across diverse projects, enhance transparency, improve analytical rigor, and build an integrated, holistic approach to developing and selecting investments. Checks and balances have been designed into the process to ensure consistency and safeguard against gaming (e.g., peer reviews).

Projects and project portfolios will be evaluated through use of three "tests" – strategic fit, value contribution, and feasibility.

The strategic fit test will measure the importance of the project in relation to the six strategic priorities that the agency adopted:

- Preserving and enhancing the assets and value of the generation and transmission system;
- Recommending a course of action for the 2014/2024 Columbia River Treaty Review;
- Advancing energy efficiency;
- Expanding system balancing capabilities and resources;
- Meet Endangered Species responsibilities; and
- Deepen operational excellence and employee engagement in every aspect of our business.

The value contribution "test" will assess the costs and benefits of each project from a regional and a BPA perspective using two metrics: (1) net economic benefits ratio and (2) net present value -BPA cash flows. Benefits and cost and benefit uncertainties will be quantified more fully and more systematically than BPA has attempted before. The feasibility test will evaluate the affordability, revenue requirement impact, and execution risks of project portfolios.

Figure 9

Expansion and Remaining Sustain Investment

Investment that "grows" the asset base, i.e., adds capacity or new capabilities, or that increases operational output or productivity. Also includes sustain investment that is "non-core"

	Compliance Investment must occur during 3-year prioritization window to comply with contracts, orders, directives	Policy Commitment Investment must occur during 3-year window to fulfill commitments made by the agency	Discretionary May be preferable that investment occur during the 3-year window, but can be deferred
Driver of investment	Projects in this category must be essential to the agency's ability to comply with a signed contract, regulatory directive, or an executive or judicial branch order or directive. The contract, order or directive must compel BPA to make an investment; failure to make the investment timely would result in a violation. To be eligible, the investment must be authorized and work must begin by no later than the end of the 3-year prioritization window.	Projects in this category are essential to meeting commitments made by the agency. The commitments require that BPA invest in transmission to meet tariff provisions, NOS policy commitments, and load service obligations. Policy Commitment may also include investments in fulfill BiOp and fish accords and fulfill agency commitments to fund conservation to meet Council's Power Plan. (Treatment of FWL and EE investments will be determined in Phase 2 .) The commitments require that projects be authorized and that investment begins by no later than the end of the 3-year window. A failure to make the investment during the window would result in serious reputational risks and legal risks	Expansion and "non-core" sustain investments that may be highly valuable, but that may be deferred beyond the 3-year prioritization window Includes economic opportunity investments to reduce operating costs, enhance revenue, improve internal efficiency Also includes "Compliance" and "Policy Commitment" investments if the investment can be deferred to year 4 or later. (Investments can move from the discretionary category to the categories at left over time)
Discretion on whether and how to invest?	Little or no discretion on whether an investment needs to be made. The purpose and nature of the investment are largely mandated	Little or no discretion on whether an investment needs to be made, although changes in customer needs, market conditions, and other external factors can cause shifts in the composition and timing of the investment. Discretion is normally available on investment alternatives	Discretion on whether to invest and on investment alternatives
Discretion on timing of investment?	Little or no discretion on timing of the investment. Often the investment is mandated by date certain. Project must be authorized and work must begin by no later than the end of the 3-year prioritization window in order to comply	Some discretion on timing of the investment. Timeline for completion is driven by agency commitments – must begin during the 3-year window to avoid reputational and legal risks	
Examples	Signed LGIA agreement, if the agreement requires investment during the 3-year prioritization window Investment in new security equipment to meet NERC CIP, if investment is required during the 3 years	Investment to meet load service obligations, if necessary during the 3-year window Network open season-driven investment, if necessary during the 3 years Large generator interconnection projects, if LGIA is not yet signed, but investment is anticipated to be necessary during the 3 years Information systems to meet regional dialogue commitments SLICE application	New or expanded maintenance headquarters or new office building Keys Decoupling, addition of a hydro generation turbine (e.g., Dworshak 4th unit), and turbine runner replacements for efficiency benefits only New IT applications driven by business process efficiencies such as TAS, Service Connection Acceleration of a transmission sustain investment program
Treatment in prioritization process	For these projects, the strategic fit test is deemed to be met. While capital costs are estimated and vetted, the economic value test does not apply. Projects in this category are not priority ranked based on economic value. Like Core Sustain, these projects are funded ahead of Policy Commitment and Discretionary investments	Strategic fit test is deemed to be met. Economic value test applies. These projects are priority ranked along with discretionary investments based on economic value. They are flagged, however, and the CAB will likely fund these projects ahead of discretionary investments	Strategic fit and economic value tests apply. These projects are priority ranked along with Policy Commitment projects based on economic value. They are funded after projects in the Core Sustain, Compliance, and Policy Commitment categories

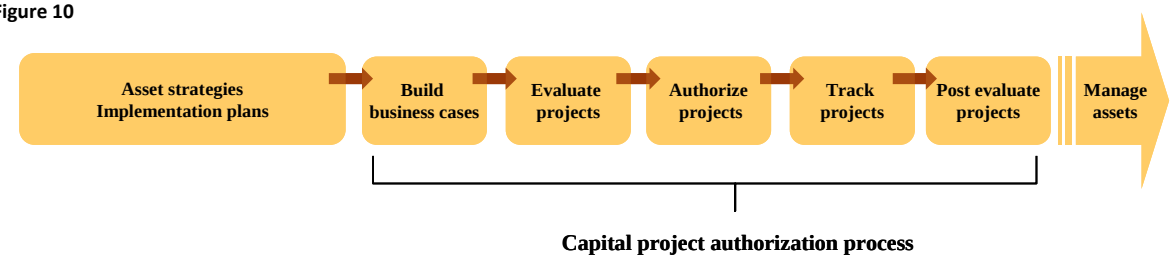
Once projects have been evaluated, they will be rank ordered using the net economic value ratio. This rank ordering is a preliminary ordering that will be considered by the Capital Allocation Board, the governing body for the new process. The CAB may make changes to portfolio – defer, accelerate, remove or add projects – by taking into account such factors as:

- The portfolio's effectiveness in delivering the agency's strategic priorities
- Project interdependencies (e.g., overlaps and gaps, sequencing)
- Cost and benefit uncertainties/risks
- The availability of labor resources and planned outage time needed to execute the portfolio as proposed
- The availability of capital for projects
- The portfolio's impact on power and transmission revenue requirements and rates
- Expectations for portfolio performance
- The net impact of any changes on economic value

A fuller description of the planned process, including a mock-up of decision support materials, is available here. This site will be updated from time to time as the process is implemented and results become available.

The prioritization process does not, by itself, authorize projects or fund them. All capital projects – whether sustain, expand mandatory or expand discretionary – must be vetted and authorized through BPA's capital project authorization process. Projects with an estimated capital cost of $3 million or more are subject to agency-level review and approval through a process managed by the agency's Capital Allocation Board. Once prioritized, capital projects must be justified by means of a business case and submitted to a rigorous review, authorization and tracking process as depicted in Figure 10.

Figure 10



Business cases must identify whether the project was part of the business unit's asset strategy. Projects that were not included in an approved asset strategy are subject to further scrutiny to determine why they were not included. BPA's policy on capital project authorizations is available online. Through regular updates to its Asset Management site, BPA makes available to customers and other stakeholders a synopsis of each approved major project, a quarterly project performance report and a six-month forecast of major projects expected to be submitted for authorization.

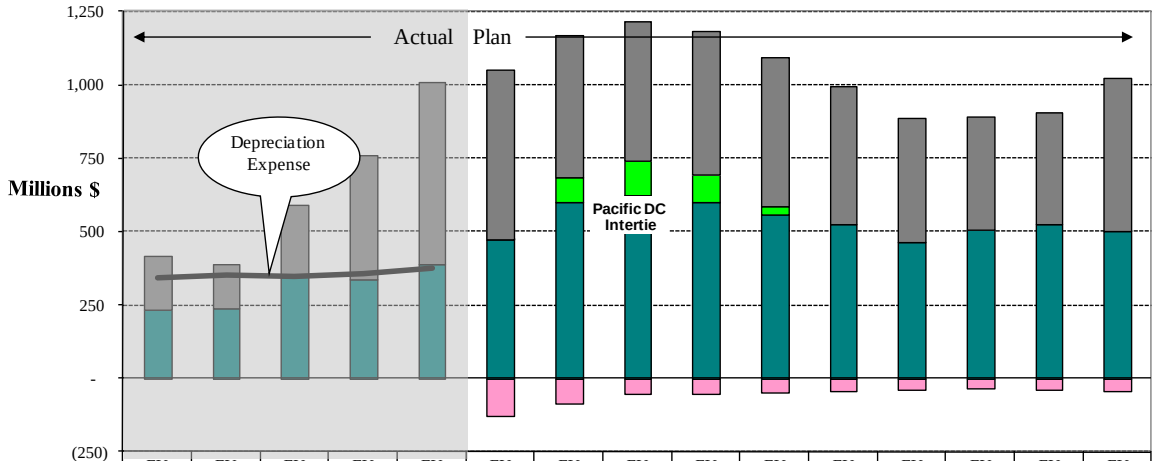
COST PROJECTIONS

Capital Spending

In 2009, BPA began a robust program to replace and renew aging assets in poor condition and expand transmission capacity to integrate wind resources and meet load obligations.

Over the last five years, replacements and renewals represented about 40 percent and expansion-related investment represented about 60 percent of total capital spending. Going forward, BPA proposes to continue its program of replacements and renewals at levels that peak in FY 2013-2014. Over 90 percent of sustain investment is directed at maintaining the system's reliability and availability.

Figure 11
Agency Total Capital Expenditures*
Expand vs. Sustain Investment

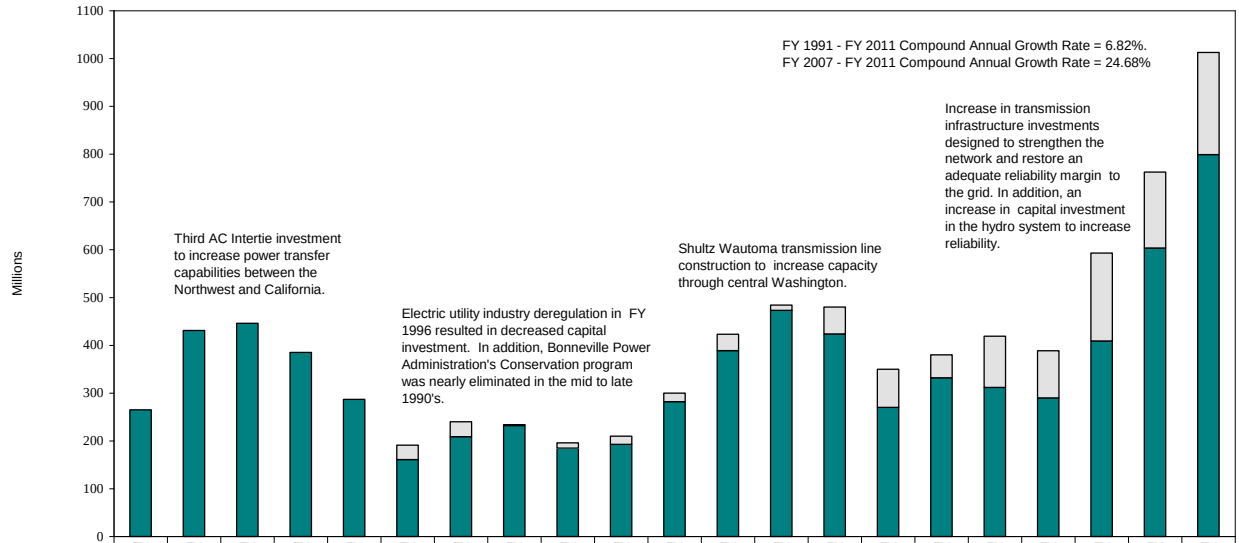


	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Total BPA Capital	419	389	593	761	1,012	927	1,086	1,167	1,134	1,050	953	851	856	870	984
Expansion	187	149	247	426	623	579	485	479	490	509	469	421	384	382	522
PDCI	-	-	-	-	-	1	85	116	94	28	-	-	-	-	-
Sustain	233	240	346	336	389	473	601	624	602	560	526	467	508	525	504
Lapse						(126)	(85)	(52)	(51)	(47)	(42)	(37)	(36)	(37)	(42)
Depr Exp	344	354	346	355	377										

* Includes AFUDC, Transmission and Corporate indirects

Figure 12

Actual Capital Expenditures
(With AFUDC and Corporate Overhead, Nominal Dollars)



	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
PFIA Actuals	0.0	0.0	0.0	0.0	0.0	30.0	31.0	2.0	11.0	17.0	18.0	34.0	11.0	56.0	80.0	48.0	107.0	98.7	184.0	158.7	213.5
Capital Actuals	265.0	431.0	446.1	385.3	287.0	161.0	209.0	232.0	184.9	192.8	282.0	389.0	473.0	424.0	270.0	332.0	312.0	290.0	409.2	603.6	799.0
Total Actuals	265.0	431.0	446.1	385.3	287.0	191.0	240.0	234.0	195.9	209.8	300.0	423.0	484.0	480.0	350.0	380.0	419.0	388.7	593.1	762.3	1012.5

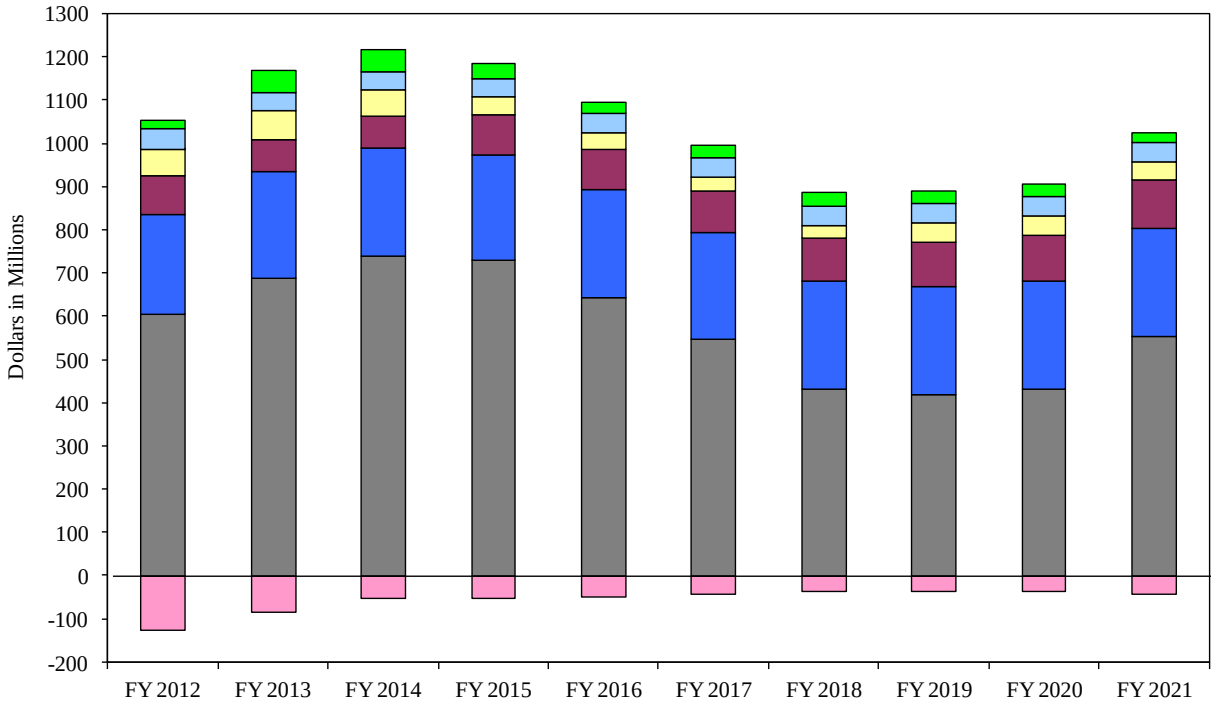
PFIA includes Projects Funded in Advance, Master Lease, Customer Financed Projects, Third Party Financed Projects, and Revenue and Reserve Financed Projects.

Projected capital spending over the 10-year planning horizon is depicted in Figure 13. The highest capital spending is projected for FY 2013-2014, driven largely by some large expansion projects.

Figure 13

Projected Investment by Asset Category

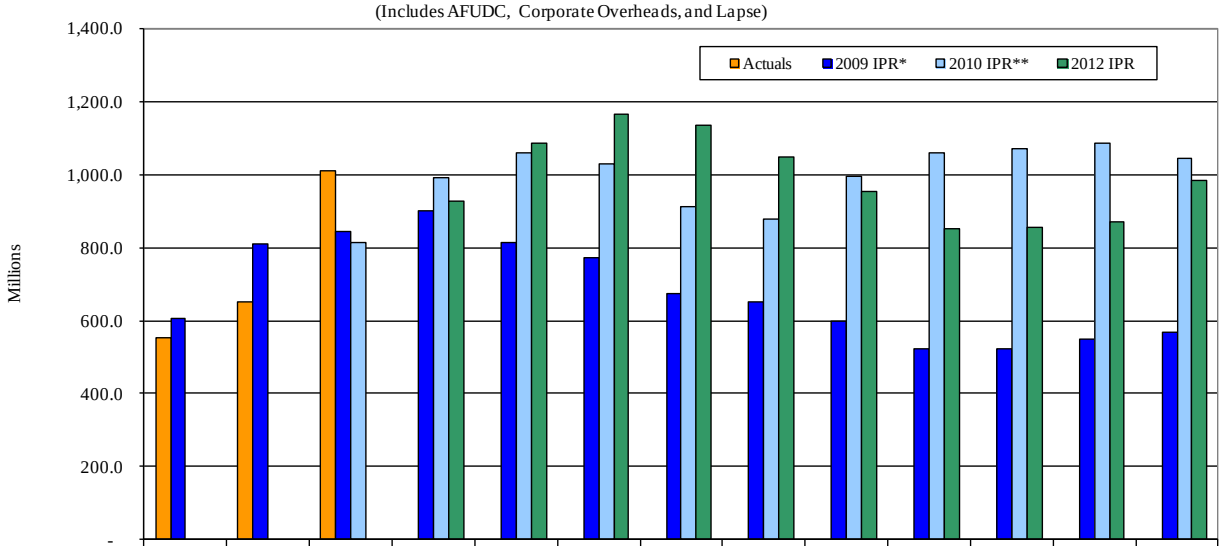
(Includes AFUDC, Corporate Overheads and Lapse)



	FY 2012	FY 2013	FY 2014	FY 2015	4-Year Total	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	10-Year Total
Facilities	14.2	42.5	34.2	28.5	119.4	21.1	20.6	25.1	24.7	24.8	20.5	256.2
Security	4.2	8.3	16.7	4.1	33.3	5.9	7.1	5.7	4.1	2.0	1.0	59.1
Information Technology	48.8	41.6	42.6	43.6	176.6	44.7	45.7	45.1	45.3	45.3	45.3	448.0
Fish and Wildlife	59.8	67.1	60.3	41.8	229.0	36.7	30.8	28.6	44.8	45.0	43.6	458.5
Energy Efficiency	89.0	75.2	75.2	92.0	331.4	94.8	97.6	100.5	103.5	106.7	109.9	944.4
Federal Hydro	230.6	248.3	249.8	245.1	973.8	248.3	244.3	249.9	250.7	251.5	253.2	2,471.7
Transmission	606.5	687.8	740.0	729.6	2,763.9	645.7	549.4	433.2	418.8	431.3	552.8	5,795.1
Lapse	(125.8)	(84.7)	(52.3)	(50.6)	(313.4)	(47.1)	(42.1)	(36.9)	(36.0)	(36.6)	(42.2)	(554.3)
Total	927.3	1,086.1	1,166.5	1,134.1	4,314.0	1,050.1	953.4	851.2	855.9	870.0	984.1	9,878.7

Proposed long-term capital investment levels shown in Figure 13 are consistent with the 2012 IPR Final Closeout Report. Capital investment levels within individual strategies will be consistent with the IPR Final Close-Out Report or any differences will be noted in those strategies.

Figure 14
Comparison of Capital Spending Forecasts
(Includes AFUDC, Corporate Overheads, and Lapse)



	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Actuals	553.5	651.5	1,012.5										
2009 IPR*	607.0	809.1	844.7	902.4	812.3	773.2	674.5	652.0	597.1	521.6	523.7	548.4	569.0
2010 IPR**			815.3	992.6	1,059.9	1,028.8	911.1	879.4	997.4	1,058.7	1,072.3	1,085.9	1,044.3
2012 IPR				927.3	1,086.1	1,166.5	1,134.1	1,050.1	953.4	851.2	855.9	870.0	984.1

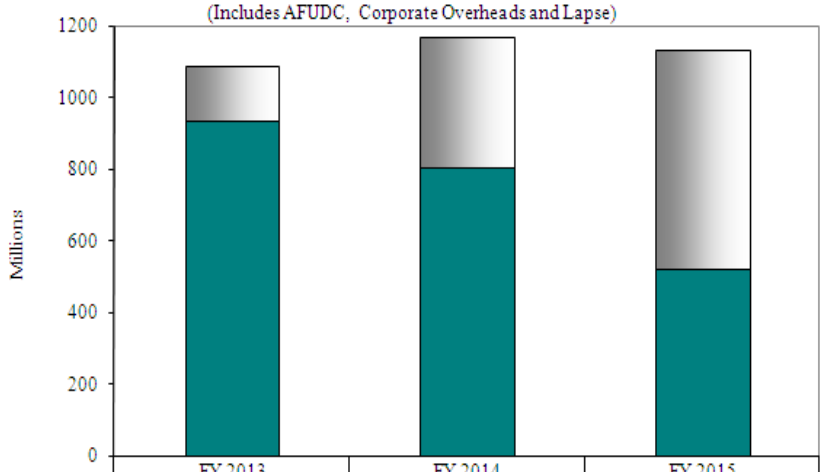
*FYs 2015 - 2021 are forecasts from the 2009 repayment study
**FYs 2018 - 2021 are forecasts from the 2010 repayment study

Figure 14 compares the 2010 IPR and the proposed 2012 CIR initial capital investment levels.

Before the CIR, a large share of FY 2012-2015 estimated capital spending had been authorized through BPA's capital authorization process.

For purposes of Figure 15, "authorized" is defined as projects/ programs that have been presented in a business case and approved through the agency's capital authorization process. Early stage approvals, such as National Environmental Policy Act studies for transmission projects and approval to proceed with alternative analyses for information technology projects, are not considered authorized. Most fish and wildlife and all energy efficiency projects are deemed authorized.

Figure 15
Portion of Capital Programs Authorized
(Includes AFUDC, Corporate Overheads and Lapse)



	FY 2013	FY 2014	FY 2015
Total	1,086.1	1,166.5	1,134.1
Not Currently Authorized	152.1	361.6	612.4
Authorized	934.0	804.9	521.7

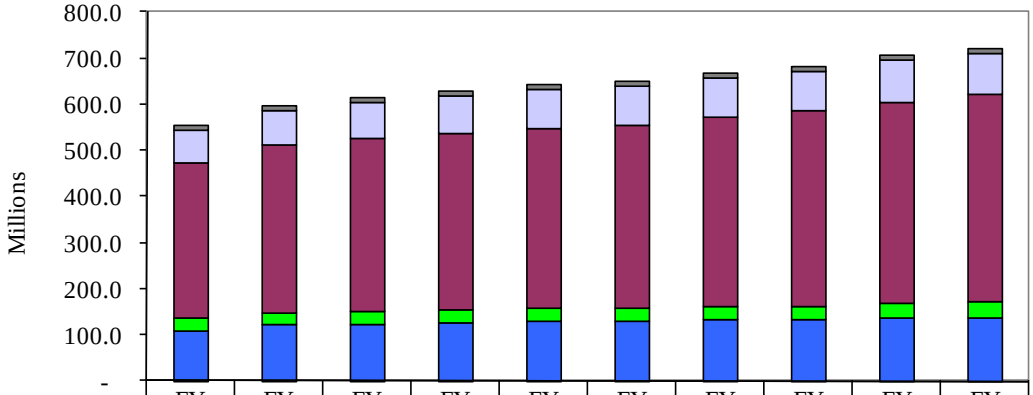
Maintenance and other asset-related expenses

Maintenance and some operations activities play a critical role in sustaining the performance and service lives of transmission and power system assets. As assets age, maintenance requirements tend to rise. The rise in maintenance expense can be offset through replacement or refurbishment of assets that are in deteriorating health. Figure 16 depicts estimated spending for asset-related operations and maintenance expenses.

Common planning assumptions used to develop asset strategies and spending forecasts are available online. Common planning assumptions include inflation, overhead cost, market price and other assumptions.

BPA places emphasis on developing and tracking asset performance objectives and targets. The detailed asset strategies include a large number of metrics for tracking asset performance. Additional details on asset performance metrics can be found online.

Figure 16
Asset Related O&M Expense



	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Total	553.7	597.4	613.9	629.8	643.4	650.1	668.5	681.7	706.5	721.6
Other	10.0	10.1	10.8	11.8	10.6	10.9	11.0	11.1	12.2	11.6
Information Technology	71.3	75.4	79.0	83.2	84.4	84.5	85.0	85.4	89.5	88.7
Federal Hydro	337.0	363.7	373.7	380.9	392.3	395.9	410.4	422.7	435.4	448.4
Facilities	25.9	26.1	28.0	28.1	28.6	29.2	29.7	30.1	34.5	35.1
Transmission	109.5	122.0	122.4	125.7	127.5	129.6	132.4	132.4	135.0	137.7