EXECUTIVE SUMMARY

Bonneville Power has a long and proud tradition of building and reliably operating a complex and technically sophisticated transmission system that includes 15,000 miles of line and 300 substations in eight states. BPA provides over three-fourths of the Northwest's high voltage transmission as it moves power from 31 Federal hydroelectric stations and one nuclear station to Northwest customers. BPA's large interregional transmission lines connect power systems from as far away as Canada and the Southwest and allow for the sale of surplus power outside the region and the movement of power into the region when needed.

BPA has had a venerable and reliable transmission system for many years, essentially due to its emphasis on engineering excellence. This has not changed as the BPA management continues to invest in maintaining its leadership role in extra-high voltage (EHV) transmission.

As a result BPA's Transmission Business Line (TBL) has focused on being an industry leader. While TBL clearly has staff that has pushed industry in terms of technology advancements, it will benefit from increased and consistent application of business acumen to be successful in the current electric utility marketplace. Exhibit 1 shows the current state of the Plan, Design and Build (PDB) value chain. As shown in this high-level process diagram, the team views the PDB effort as a complete process that crosses a number of BPA functions.

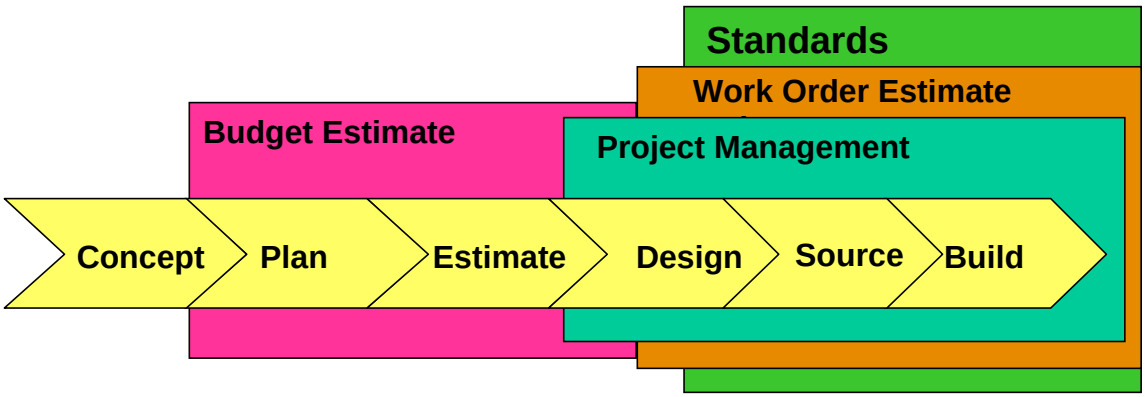


Exhibit 1 - Current Process and State

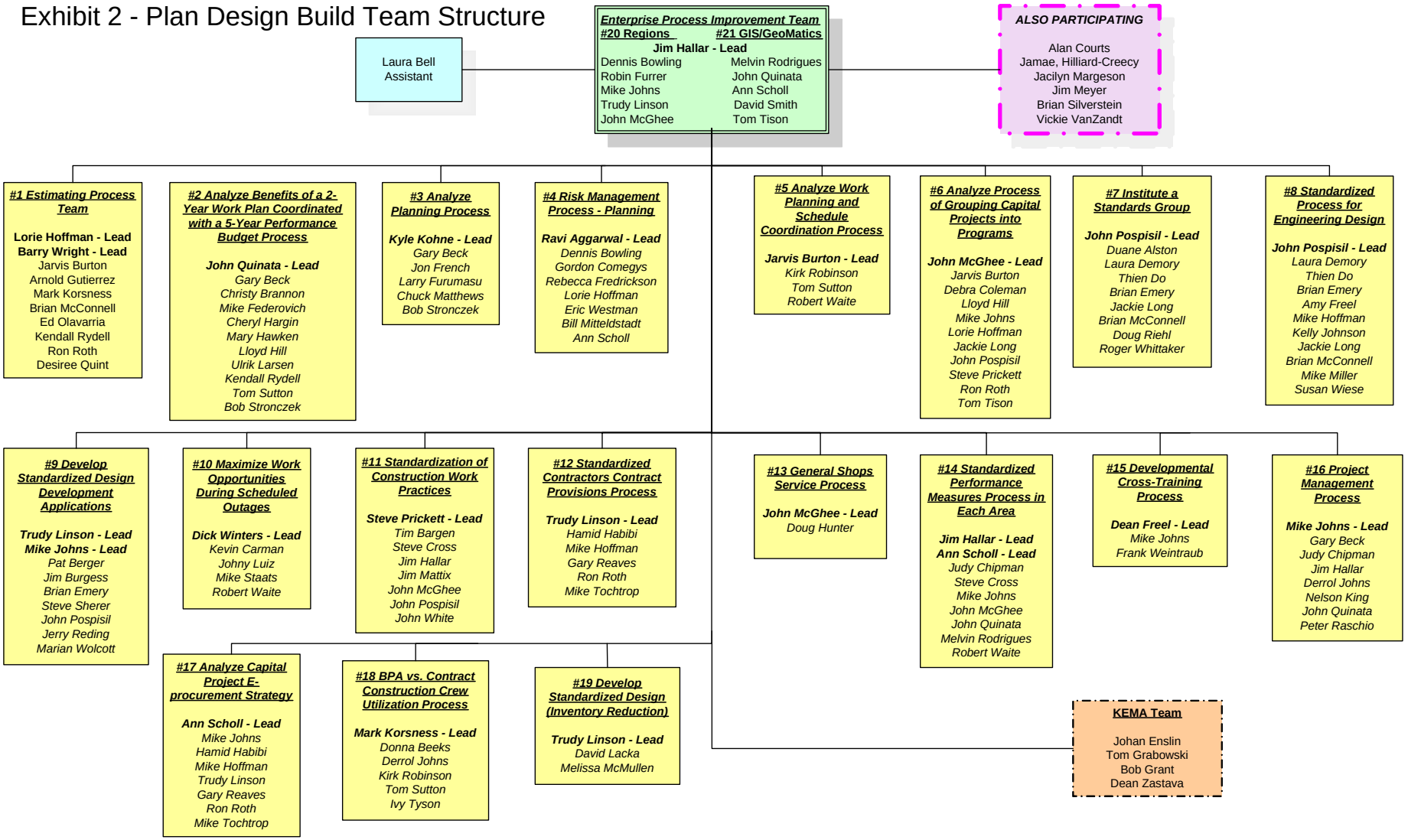
The long-line EHV transmission business is now relatively mature. The utility industry along with its consultants, vendors and suppliers has evolved so that capabilities once only available at Bonneville are now generally available. Products that once had to be custom built are now standard vendor supplied items.

There is a growing recognition within BPA senior management that the cost of maintaining the technology edge purely within the Agency is not as necessary as it was fifteen years ago. What is needed now is a more business like emphasis in its Transmission function to ensure BPA is able to meet the emerging challenges posed by competition, rising energy prices, the stochastic nature of the hydro business, the impact of the political realities and the increasing need for higher levels of reliability.

To address this shift in business philosophy, management has set out on a course to rethink the way it conducts both the core BPA business and transmission business, under two critical efforts; Asset Management Strategy and the Enterprise Process Improvement Project (EPIP). While this document focuses on the EPIP effort, there are strong links between the two efforts. Due to the tight correlation, it is anticipated that the Asset Management EPIP will be initiated shortly.

The PDB EPIP was comprised of twenty BPA teams composed of eighty-five Bonneville employees and was sponsored by TBL Senior Vice President Vickie VanZandt. Exhibit 2 shows the team configuration. Jim Hallar was appointed to manage the overall project and he was supported by 17 leaders drawn from several disciplines within and outside the Plan Design Build process. KEMA consultants and the EPIP Program Management Office supported and guided the project. The teams examined the current state processes, collected best practice and benchmark data, analyzed the results and identified 137 opportunities for improvement that fall under 21 initiatives. Some of the improvements are process improvements per-se and others more broadly impact the entire environment in which processes operate.

Exhibit 2 - Plan Design Build Team Structure



The recommendations and projected cost savings represent the collective wisdom and judgment of the team as guided by leading industry practices and benchmark data. Recommendations are well founded, consistent with leading industry practices and represent real savings opportunities. The savings are substantial and in the range of the estimates offered. The savings are produced through alteration of the macro process of Plan Design Build. Small changes upstream in the process yield major savings downstream.

An example illustrates this point:

Current state

Designers engineer a highly effective unique solution. The result is state of the art but the cost of this result is:

- Significant design engineering cost
- Difficulty with estimating due to lack of history
- Procurement challenges due to unique components that possibly require custom fabrication
- Time delays associated with all of the above
- Requirements to stock unique parts increasing inventory cost
- Learning curve in the field during construction
- Impacts management's ability to move resources to where the work demands
- Configuration management issues due to lack of experience with the unique solution
- Increased training costs for operations and maintenance personnel
- Troubleshooting difficulties due to unique issues
- Potential for bottlenecking the entire PDB process
- Inconsistent with current industry leading practices

Future state

Use of a standard design:

- Fast and accurate estimating
- Rapid and accurate design that includes life cycle cost analysis
- Facilitate the use of Standard stock items, reduce procurement spend and inventory
- Fewer red-line drawings because "as built" more closely matches "as designed"

- Minimize the learning curve in the field during construction and maintenance
- Minimize troubleshooting problems
- Decrease potential for bottlenecking and safety issues
- Promote internal standards to match vendor standard designs, the possibility of turnkey installations exists (This alone could be a large savings because some vendors offer free extended warranties with turnkey installations)
- Reduce uncertainty of standard designs also makes other forms of contracting more effective (For example bidders on fixed or not to exceed priced contracts need less contingency money built into the price for known designs)
- Continuously improve the standards in an orchestrated way to take advantage of new 'best practices and innovations' while preserving the benefits of standardization.

The Workforce

Bonneville benefits from a mature and highly competent workforce. The demographics of that workforce suggest that many of the most experienced employees will be eligible for retirement in the next five years. As these thought leaders retire, important experience and technical knowledge will be lost. Further, much of this knowledge is not formally captured for the future. These facts present four urgent needs on which Bonneville must act:

1. Capture and codify Agency specific knowledge for use by future employees
2. Reduce the complexity of its system through standardization
3. Invest in succession planning and development efforts to ensure continuity
4. Become more efficient so it can continue to function at a high level of technical competency, particularly with older portions of the system

This is especially important since a large number of experienced and knowledgeable employees are retiring.

During the EPIP process, the core team identified two additional issues that should be further studied during the implementation phase. First, is a review of the use of supplemental labor. It is the team's opinion that supplemental labor should only be used to eliminate the peak workload by contracting to perform specific work tasks. Periodic reviews should be held to determine whether contractor full time equivalents (CFTEs) should be replaced by Bonneville full time equivalents (BFTEs.) Second, the core team identified that the span of control within PDB may become too narrow as a result of retirements and the capture of vacancies as staff reductions. The team recommends including a review of the span of control to identify opportunities to re-align reporting relationships.

Overarching Recommendation:

ENHANCE PDB'S ALREADY STRONG SKILL SETS WITH A CORRESPONDING LEVEL OF BUSINESS ACUMEN TIED TO A CLEAR ASSET MANAGEMENT STRATEGY AND ALIGN NON-PDB SUPPORT FUNCTIONS

With a mature EHV industry in place, BPA can focus engineers on solving the unique problems encountered while operating an EHV system in a difficult environment with very long lines and Hydro-based generation resources.

Adding an increased emphasis on the business acumen of BPA's employees will result in better, more cost effective designs, saving millions annually in the capital program. This emphasis on business acumen will also support BPA's Asset Management strategy going forward.

The PDB proposed value chain, shown in Exhibit 3, depicts how and when critical information enters the chain along with the need to impress a high degree of standardization and business acumen on all elements of the value chain. Incorporated in the proposed value chain are the following enhancements:

- True costs are available to all so comparisons can be made to determine if portions of the work could be outsourced to achieve additional savings
- The application of tightly controlled standards are uniformly applied across the entire process
- Project management is involved much earlier in the process
- Supply Chain is involved much earlier in the process to actively manage vendor relationships and ensure lower material and equipment costs
- Estimating is providing higher quality estimates
- Strategic asset management principals can be applied to all capital projects

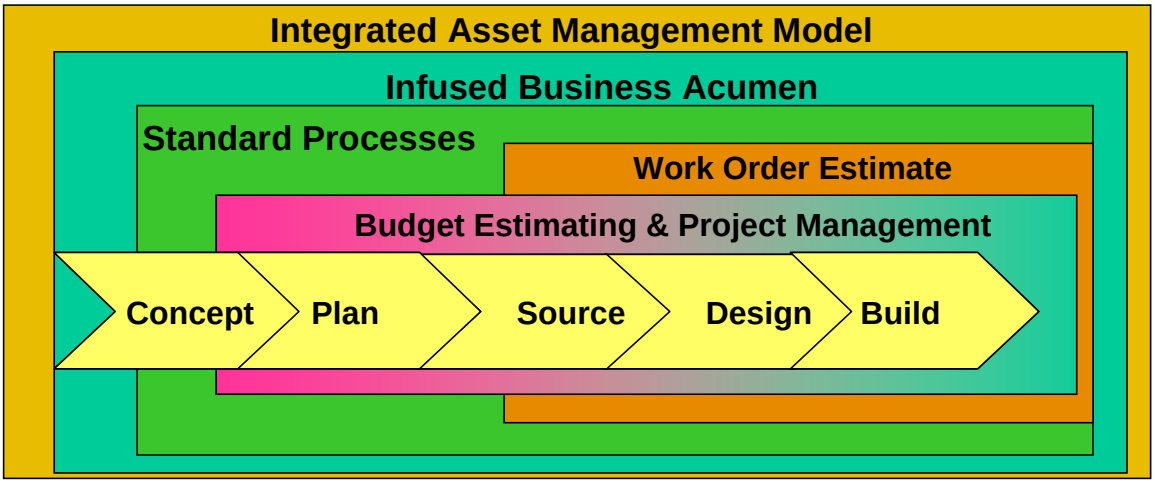


Exhibit 3 - Future State

The 21 specific initiatives are a manifestation of the concept of introducing greater business acumen into the PDB process. Pursuing all of these initiatives and their attendant recommendations, documented in the "recommendations" section will yield the cost savings in Exhibit 4.

Aligning the other TBL functions and overall BPA policies in support of PDB will further enhance the success of operating a capital construction program and save BPA $112 million net during the three year implementation effort and then $47 million annually through improved efficiencies in planning, design and construction. Further, BPA will realize a net inventory reduction, which translates into future avoided costs.

Exhibit 4 provides a high-level breakdown of both the costs and savings associated with implementing the PDB EPIP team's initiatives. To help understand the derivations of the savings the exhibit breaks them into one-time and avoided cost savings in dollars X 1000.

The projected cost savings are based upon a Capital budget level that continues at the 2004 level of $290M.

Functional Area	Number of BFTE	Number of CFTE	Total Number of FTE	Annual FTE Savings	Average One-Time Savings	Average Avoided Cost	Average Overall Cost Savings	AVG Impl Cost	AVG Net Savings During Impl	AVG Annual Estimated Cost Savings
Plan (TO)	13.2		13.2	$1,315		$2,052	$3,131	$2,978	$600	$1,756
Design (TN)	23.0	19.9	42.9	$4,292		$37,338	$40,290	$5,102	$35,953	$15,324
Sourcing (TL)	16.0		16.0	$1,600	$1,200	$7,615	$10,011	$912	$9,236	$5,243
Build (TN, TF)	52.1	16.4	68.5	$6,846		$47,765	$52,694	$12,595	$50,393	$23,457
Other (KE, J, TF, TM, TR)	14.0	0.7	14.7	$1,469	$1,965	$653	$3,818	$3,906	$498	$1,573
Inventory Reduction	-	-			$15,668		$15,377		$15,377	
Totals	**118.3**	**36.9**	**155.2**	**$15,522**	**$18,834**	**$95,422**	**$125,321**	**$25,492**	**$112,057**	**$47,354**

Avoided costs are costs that will be avoided in the future due to EPIP changes.

Exhibit 4 – Overall Cost Benefit Analysis[1]

Recommendations

Achieving this level of savings will require a change in culture as well as an attention to the business needs of BPA. Specifically, it will require TBL to take actions in the following four main process areas:

- Apply Standards throughout the Plan, Design and Build Functions
- Do Things In The Right Order While Enhancing Performance
- Levelize Workload With Planning And Scheduling Enhancements
- Intensify the use of risk management as part of a formal asset management program

These key recommendations are expanded in the following sections.

1. Apply Standards throughout the Plan, Design and Build Functions

The cornerstone and consistent theme throughout the twenty-one initiatives is the rigorous application of standards. TBL has had numerous standards for many years; however, they served as templates the designers could use to create unique designs. While this has allowed a high degree of design freedom, it has added to the overall cost of building and maintaining the transmission

[1] BFTE = Bonneville Full Time Employee.

CFTE = Contractor Full Time Employee (supplemental labor working on-site in a Bonneville office).

FTE = Full Time Employee or the sum of BFTE plus CFTE.

One Time Savings = Savings that will occur, but would not be repeated in the future; i.e., decommissioning of the Geomatics photogrammetry stereo plotter that is possible because of software (digital softcopy) capabilities.

Overall Cost Savings = Annual FTE Savings plus One-Time Savings plus Avoided Costs.

AVG Impl. Costs = Total estimated Implementation Cost.

system. The electric industry has had similar experiences and has adopted standards for material, system design, and construction. Further, there has been a broad emphasis throughout the industry on the utilization of commercially available materials. The industry has determined that dedicated in house R&D and fabrication is prohibitively expensive.

There are seven supporting recommendations each with a number of critical steps, which must be implemented, in order to provide the level of standardization required to become more cost effective in the PDB.

- Adopt consistent standards
- Standardize customer requirements and policies and clearly communicate with customers and constituents
- Design and implement a cross-training program to extend the value of PDB personnel
- Capture and share lessons learned and legacy knowledge across the PDB value chain
- Improve estimating process and accuracy
- Clarify GIS/GEOMATICS roles in TBL and enhance the technologies for GIS
- Use contracting tools to allow rapid prequalification of contractors and value sharing contracts.

The supporting activities associated with each of these seven recommendations are defined below. Numbers in parentheses are the source initiatives as described in the detailed initiative reports.

1.1 Adopt consistent standards

The electric utility industry has long accepted the fact that using standard designs and commercially available materials can substantially reduce the cost of construction and maintenance. BPA has recognized this by virtue of the fact that much of the equipment and material used on the system today is procured from vendors.

The key first step for BPA is to recognize this more formally via implementation of a rigorous standards policy and process. The next step is to reduce the extensive number of standard design templates to a few manageable ones that address the various voltages and conditions found on the transmission system. A significant part of this effort will include life cycle costing, which is a critical component of a sound Asset Management Strategy. After adopting the revised set of standards, it is imperative that BPA ensure all stakeholders are fully aware of and use the new standards and that KPIs are put in place to enforce them.

Some resistance to the adoption of standards is expected, but should decline quickly as the work force enjoys the benefits of standardization.

- Reestablish and adhere to a comprehensive formal standards program across TBL (7)
- Reduce the number of regions to effect a recognition of PDB standardization and workload levelization (C01)
- Develop a Standards Group with senior representation (7)
- The standards process will include review of industry, national and international standards. (7)
- The standards process will include vendor and commercial input regarding availability of existing and proposed materials and equipment that may meet an identified or emerging BPA need. (7)
- Include Supply Chain in the Standards Group to ensure that standards include material and inventory requirements (for example: use or dispose of old material or place in spare parts, before a new standard is adopted) (7)
- Include construction and maintenance representation in the standards group (7)
- Ensure life cycle costing is fully integrated into the standard setting process (7)
- Reduce the number of standards and link construction, contract, and material specifications at the standards level. (7)
- Include a peer review for all discipline groups to review proposed changes before standards are approved and implemented. (7)
- Business, technical, and operational standards for redundancy, alternative service, and capacity factors, consistent with national reliability requirements and anticipated future growth will be developed and maintained. (7)
- Non-industry standard requirements (procedures and testing) will be minimized for material, equipment, and construction specifications. Commercial practice will be used where economically and technically feasible. (7)
- The Standards Group will review Compatible Units (CUs) in conjunction with standards implementation (1,7)
- Use standards for: CAD (working units), GEOMATICS/GIS, Coordinate system (BPA Lambert versus Latitude/Longitude Ellipsoidal), Standard reference files per discipline, and Drawing version management (9)
- Standardize Project Management Procedures by a rewrite of the current Project Management Guidelines. These guidelines should be implemented as Transmission Business Line (TBL) Project Management Standards. (16)

1.2 **Standardize customer requirements and policies and clearly communicate with customers and constituents**

The success of using standards will hinge in part on BPA's ability to effectively communicate the value of standards to all its current and future customers as well as various constituent delegations. The point must be made that BPA has selected this strategy as a prime cost and quality control tool, in order to minimize the impact of rising costs on rates. Deviation from the approved standards, even when requested by customers will be on a minimum exception basis only.

- Update and standardize requirements for customers; e.g., Generation Interconnections (GIs) and Point to Point (PTP) service to meet the customers' needs with a structured BPA response (7)

- Establish customer interconnection requirements internally and externally, including communications to customer and constituent groups, Local, State, and Federal government representatives and policy makers. (3,7)

1.3 Design and implement a cross-training program to extend the value of PDB personnel

Cross training has long been accepted as a critical tool for utilities, although the application of its use varies across the industry. Leading practices, like those implemented by Central Hudson Gas and Electric (CHG&E), have their personnel rotating through different jobs every few years. This is especially true for the managers as it is an integral part of CHG&E's succession plan.

For BPA the team is recommending a three-tiered approach to cross training. Level 1 will be for entry engineers (up to five-years experience), who will rotate through most of the engineering and field disciplines for short tours of duty. Level 2 will be for more experienced engineers who will rotate through fewer engineering disciplines but will spend a greater amount of time rotating between the field and design. In both cases these engineers will perform meaningful work in their new assignments. Further, engineers should rotate through non-engineering functions such as Supply Chain and Financial to gain an appreciation for those functions. Level 3 will be for managers' rotation and should be for a minimum period of one fiscal year. This exposure will support BPA's succession planning efforts as well as allow for the cross-pollenization of good management practices.

- Expand new and existing employee and manager cross-training to increase individual knowledge of PDB, O&M, and T&E) and corporate (supply chain, financial, etc) activities (15)
- Develop a Cross Training Plan, including an Engineering Review Board, IDP's for each engineering discipline. (15)
- Utilize a loan/borrow concept to formalize the program and provide a supplemental budget to pay for initial reduced productivity of individuals when they first do work in a new area. (15)

1.4 Capture and share lessons learned and legacy knowledge across the PDB value chain

BPA is encountering the same challenges as industry peers, the loss of intellectual capital as retirements and restructuring continue to occur. This is especially impactful in the TBL. Much of the legacy knowledge of the system is leaving with no formal means for capturing the information. To offset this, the team recommends the creation of both a collection process and repository for this critical information. The process should also capture the lessons learned in the PDB project life cycle.

- Develop and implement a data warehouse containing lessons learned from projects. (16)

1.5 Improve estimating process and accuracy

BPA has a process in place for providing various levels of estimates as a project proceeds along the PDB value chain. While this process works reasonably well there are opportunities to improve, especially in light of BPA's planned implementation of OMB Circular A-123 in 2006. There are three main steps for continuous improvement in this process. First, finalize the estimate for a work order. Second, "backcast" actuals to original budget estimates. Third, determine root cause of any deviation greater than 10 percent and take appropriate action to apply lessons learned to future estimates. In addition, the recommended changes to the process will support better capital project budget planning.

- Improve the accuracy to 90% and improve the throughput time of the project estimate. (1)
- Clearly define and standardize estimates (1)
- Establish a common estimating database with a workload-tracking feature; i.e., the status of the estimate request (1)
- Implement Standardized Work Order Task Structure with Estimating Report format (5)

1.6 Clarify GIS/GEOMATICS Roles in TBL and enhance the technologies for GIS

GIS is a functional area within the IT (J) organization and provides the following services both directly and indirectly to the Transmission and Fish and Wildlife groups:

- GIS system support to all GIS users
- Application development in support of GIS
- Mapping services to various groups

Geomatics is part of TBL and provides a host of related services to the Transmission PDB, Maintenance, and Environmental groups within BPA. Specifically it provides the following services:

- Survey work
- Mapping services to the groups
- Photogrammetry services
- Base map maintenance

There is an unresolved conflict between these two groups since they both provide mapping services to various constituencies. This has cost implications to TBL in the form of increased overhead charges spread across

all projects. To resolve this issue in a manner consistent with the IT consolidation, the TBL (Geomatics) will be responsible for the "what" – creation of maps along with surveying. The J organization (GIS) will be responsible for the "how" -- maintaining the enterprise software system and associated databases and providing new enhanced solutions to the users.

- Reorganize the GIS - Geomatics functions to be consistent with their parent organizations and have clear roles and responsibilities. (CT02)
- Implementation of a TBL-wide Enterprise Geographic Information System (EGIS) to support Mapping and Asset Management analysis. (CT02)
- Replace analytical Plotters with Softcopy systems. (9)

1.7 Use Contracting tools to allow rapid prequalification and offer value sharing

While BPA's current method of contracting meets purchasing standards, the team determined that changes are necessary to ensure contracting tools are used that keep pace with the way TBL is planning to do business. In the future, BPA should pre-select vendors, and use a blend of traditional bidding techniques and reverse auctions to select the winning bid. In performing the awarding function, BPA would shorten the process using streamlined contracting tools to adequately obligate the contractor or vendor to deliver, while saving on bonding and insurance costs. This may involve the assumption of marginal additional risk that the team believes can be adequately managed. Supply Chain should also make use of not-to-exceed contracts with value sharing to further reduce the cost of large labor-intensive contracts.

- Make use of standard, streamlined contracts and specifications when hiring contractors and services (12)
- Promote and review existing contract tools that allow value sharing with contractors (12)
- Assume more risk based upon business analysis (save on bonding and insurance costs) (12)

2.0 Do Things In The Right Order While Enhancing Performance

Ensuring work proceeds in the proper order will assure that all the processes function in an efficient and effective manner. For example, a recent site visit found that field forces were in the process of replacing a 500KV breaker without the benefit of construction drawings. This precipitated redundant material orders being delivered to the site, causing BPA to spend more on materials than was required. Additionally, it has been reported that incomplete specifications have been used to obtain short-lead time bids from contractors, causing higher than expected bids. If the PDB process was followed, the above situations would not

have occurred. Further, key performance indicators will allow BPA management to accurately measure efficiencies and their impact on costs.

Supporting this overall recommendation are the following seven key action items:

- Identify and implement KPIs consistent with Asset Management principles
- Infuse Business Acumen with Transparent Cost Reporting consistent with leading Asset Management practices
- Modify the role of the Project Manager to ensure the most cost effective solutions are applied
- Refine PDB process to optimize information flow
- Leverage Supply Chain Capabilities to add value to PDB
- Continue to drive cost out of inventory
- Use technology to enable process improvements

Each of the seven supporting recommendations is expanded below.

2.1 Identify and implement Key Performance Indicators consistent with Asset Management principles

Sustainability of PDB future state processes demands the effective use of well defined metrics. These metrics will focus on throughput and cost to perform. Key Performance Indicators (KPI) developed for Asset Management purposes have these benefits:

- Provide a real time look into performance allowing managers to make adjustments on an as needed basis
- Determine if the EPIP initiatives are generating the expected savings
- Allow management the ability to assess the impact of new policy
- Support continuous improvement
- Increase PDB throughput by managing process and constraints

The team identified a number of actions, which in part will support BPA's move toward a formal asset management strategy and organization. The team believes that the asset management strategy will aid in determining how best to manage BPAs extensive roster of installed equipment. Maintaining and communicating metrics related to Asset Management is a recommended leading practice used at peer transmission utilities (BCTC, National Grid, and TVA) in the last five years.

- Develop key plan-design-build performance indicators (KPI) for each plan-design-build function (14)

- Implement KPIs that reflect effectiveness and efficiency, and that can be benchmarked to industry peer performance (14)
- Establish continuous improvement goals (14)
- Establish a senior management level plan-design-build performance review team that meets monthly to review and discuss performance metrics (14)
- Identify, implement, and track needed performance or process improvements (14)
- Present and discuss plan-design-build performance results with TBL Tier II Executive Team on a quarterly basis. (14)
- Directly link management performance against these measures to individual performance contracts for those managers directly responsible for driving specific performance results. (14)
- Develop a key performance indicator dashboard at the executive level, linked down to the management level with a dashboard of all the plan-design-build performance metrics. (14)
- Define metrics for cross-training goals and provide progress report. (15)
- Improve design quality (completeness and correctness) and reduce redline changes via updated and expanded design checklists (8)
- Incorporate peer reviews for larger, more complex designs as part of the design review and management control processes. Ensure that document control is fully reflected in the process. (8)
- Implement formal cross training program based upon experience. (15)
- Direct project managers to support schedule and cost metrics (16)
- Create cost and schedule reporting to performance review team change control board (16)

2.2 Consistent with leading Asset Management practices, implement transparent cost reporting to infuse a better understanding of true costs across the PDB Process Value Chain

Accurate and transparent cost reporting is a requirement for improving the PDB process. Today's practice of regularly using only direct charges for comparison to outsourced alternatives understates the true cost. All participants in PDB need to know and understand the costs attached to their decisions.

The leading practice for cost reporting and performance measurement is to collect data where and when the work happens and to make this data easily accessible across the organization.

- Increase frequency of actual verses estimated analyses both during PDB and after project completion, including Project Managers' use of earned value management reporting. (16)
- Reduce amount of peanut butter spread (overhead charges) by involving Project Mangers earlier in the process to manage scope throughout the project lifecycle, and by using fully loaded labor and equipment costs. (4,16)
- Charge all costs to specific projects (including reimbursable work). These costs include GIS maps, actual e-tag and g-tag fleet costs, reimbursable planning and design hours, and record update costs. (3)
- Make real costs visible on all levels to managers and employees by implementing transparency for internal costs and hours (3)
- Charge clients and customers the actual cost, including services. (3)

- Improve the quality of project budget estimates by involving the project manager earlier in the process (1)
- Reformat the Monthly PM Meeting and the Monthly FA Construction (donut) Meetings. (5)
- Place CAD support near or embedded in client areas (9)
- Ensure all project costs through P-D-B are charged to the appropriate work orders (16)
- Enhance the project manager's role and accountability for managing costs and schedules for support services (i.e., GIS, Environment, Legal, etc.) (16)
- Ensure employees have the tools they need to build projects in the most cost effective manner with minimal overtime (16)
- Direct both BPA and contractor field forces to optimize work site layout to minimize material chasing time and reduce potential injuries through minimized material handling (16)
- Implement digital time reporting and pre-filled time sheet forms (16)
- Reduce the cost of its fleet of GSA vehicles by 10%. (11)
- Adjust the internal accounting system to reflect the true cost of its fleet of BPA owned (E-tag) vehicles. (11)
- Discontinue in-house fabrication, sheet metal, machine, and carpentry shops (13)

2.3 Modify the role of the Project Manager to ensure the most cost effective solutions are applied

One of BPA's many successes has been the provision of a dedicated, qualified project manager to large and critical projects. Competent and skilled project managers are the keystones of an effective and efficient PDB process. The project manager at BPA is responsible for defining how a project will proceed and managing the budget. The team found that the PDB process was not always in concert with the project manager's responsibilities and authorities. Specifically, they found that the process didn't formally involve the project manager soon enough when critical project choices were being made in the planning stage. The team felt that the project managers could provide a wealth of field experience during planning and reduce potential BPA risk. There also needs to be an added emphasis on posting as-built information in support of the Asset Management life cycle.

Further, the team identified the need to refine the project manager's role and responsibilities with respect to Supply Chain. The project manager will continue to determine the material and equipment to be used according to adopted standards, while the Supply Chain personnel will ensure BPA gets the best price and commercial terms for that selected material.

- Conduct Project Strategy Meeting as a final step for the Plan of Service (3)
- Integrate the project manager into the planning process during an Alternatives Review Meeting prior to the detailed planning studies, during the Plan Of Service (POS), including the Project Strategy Meeting that is the last step of the POS. (3,16)

- Project Management Guidelines will include a requirement for the project manager to spend more time with contractors during construction to eliminate any barriers to efficient use of labor (12, 16)
- Clarify and reinforce the project decision making authority for project managers in the Project Management Guidelines (16)
- Implement and formalize a Project Management Certification Program for all Project Managers to include more business focused view, and reduce the number of Project Managers. (16)
- Include the use of project checklists in the Project management Guidelines (16)
- Direct the project manager's role in proactively managing material need dates (16)
- Clarify the project manager's role and responsibility for the upfront portion (i.e., planning, account executives, customer service engineer, preliminary estimates) of projects (16)
- Clarify the project manager's role in managing their projects using Earned Value Management principles (16)
- Define the project manager's role and responsibility for early sourcing and the inclusion of the sourcing function (16)
- Define the project manager's role in using Standards and incorporate in the Project Management Guidelines (16)
- Clarify the project manager's role and provide direction on cost overruns and schedule delays (16)

2.4 Refine PDB process to optimize information flow

The Team recommends utilization of a “Stage-Gate” approach to project estimating and approval in the future state. The Stage Gate approach means defining specific project hurdles that must be met before proceeding to a subsequent project activity.

A number of other process improvements were identified that could improve information flow, increase efficiency and free engineering resources for high value added activities.

- Integrate a Stage Gate approach to the estimating process. (1)
- Develop a more comprehensive process for initiating and completing local and O&M work that is now done on an informal basis in conjunction with scheduled project work. (5)
- Implement procedures to estimate and link reliability, operational and opportunity costs into the total cost analysis of the capital budget. (Asset Investment Strategy) (4)
- Send Work Order announcements with estimates attached and links to PRDs (project requirements diagrams defining the POS) when they are approved and issued. (8)
- Reduce search time for data about existing lines and substations, and improve the quality and accuracy of this data by linking GIS to TLDD (Transmission Line Detail Data), Project Wise, Land Information System, and other similar databases (access roads, environmental studies, aerial photograph images, etc.) (7,9)
- Eliminate repeated manual data entry between Geomatics, GIS, Power Line Systems-Computer Aided Design & Drafting (PLS-CADD) and TLDD. (9)
- Integrate the lessons learned data gathering with the project closeout process (16)

2.5 Leverage Supply Chain Capabilities to add value to PDB

Early involvement of Supply Chain will reduce material and equipment costs by avoiding premiums charged for expedited orders. Currently, as much as 80% of all requisitions don't allow adequate lead time to meet vendor lead time and Supply Chain time requirements. Fewer standard materials and moving to the two-year plan and five-year budget will allow better identification and forecasts of equipment needs. These improvements should allow Supply Chain to negotiate additional savings.

Providing Supply Chain with all the pertinent information well in advance of the bid process enables contractors to produce better and more consistent bids to BPA.

- Use reverse auctions to gain the best initial value for goods and services (17)
- Make complete project design drawings and construction specifications available to purchasing in advance to obtain prices. (17)
- Identify an executive sponsor to support reverse auctions and other e-procurement initiatives across TBL. (17)
- Conduct a pilot project using reverse auctions for construction contracts and then develop a procurement strategy based upon the pilot's results (17)
- Prepare "take-off" estimates that reflect expected current construction contract costs to determine price reasonableness of prices obtained through the reverse auction process. (17)
- Reduce purchasing costs by standardizing contract evaluation, administrative forms and aggregating orders (including using more master contracts) (12)
- Review use and establish a policy for use of supplemental labor. This will be studied in the implementation phase of this EPIP. (12)
- Reduce price of contracts through better selection of contract type and more intensive negotiations, including using not-to-exceed contracts with incentive to reduce the labor component on large construction contracts. (12)

2.6 Continue to reduce inventory cost

BPA's current inventory level is approximately $86 million with approximately $41 million supporting capital programs. This investment level is high by industry standards. Much of this inventory was built up as a result of ordering for projects that didn't materialize. Supply Chain has begun an aggressive program to reduce inventory. The long-term target is an inventory reduction of 50% of construction material. The sustained ability to keep the value of inventory down requires four key actions:

1. A coordinated utilization effort between Supply Chain, PDB, and Maintenance
2. TBL adoption of a reduced number of standard designs
3. The impact of future standards adoption on existing inventory
4. Two-year work plan

Specifically, the teams identified the following actions.

- Implement policy to require use of inventory items before buying new and review of inventory before standards are changed. (19)
- Reduce zero-use and overstock inventory. (19)
- Eliminate obsolete inventory. (19)

2.7 Use technology to enable process improvements

BPA has invested heavily in technology, but much of it is not yet fully integrated. Integrating this technology can streamline much of the design portion of the PDB process. Further, implementing a number of small initiatives around these technologies can greatly enhance their usefulness. Providing data warehouses to capture lessons learned and the knowledge base of the operating transmission system will help to mitigate future risk in both the PBD and operation and maintenance of the transmission system.

- Integrate (digitally link) TLDD line and structure data to GIS database information (9)
- Use digital signatures to expedite drawing updates/changes and manage drawing version management (9)
- Reduce number of CAD tools and transfer support and maintenance of these tools to IT (9)
- Build and implement access to lines, substations and related data via a map-like browser based interface (9)
- Develop and implement a data warehouse containing lessons learned from projects. Include both good and bad experiences. (16)
- Establish a database for each functional group with a design workload-tracking feature used for measuring performance, managing workload and evaluating process efficiencies and effectiveness. (8)

3.0 Levelize the Workload with Planning and Scheduling Enhancements

The planning and scheduling sub-process impacts the entire PDB process. In order to have a balanced workforce throughout the PDB process, a very stringent work planning, scheduling and outsourcing policy is required. In the future state the work planning process will:

- Retain the current emphasis on customer focus and openness
- Require sufficient lead time to allow proper work planning and resource allocation
- Refer short-lead time projects to qualified outside vendors
- Ensure work requests will comply with BPA standards to avoid extraordinary costs associated with non-standard work

- Integrate maintenance and capital construction work into a common workload schedule to make efficient use of resources employed on both types of work such as existing engineers, construction and maintenance crews and other resources

Work planning and budgeting have created a number of issues for TBL, specifically regarding adequate time to do the planned work. This situation impacts both the design and construction, with construction having to plan a lot of overtime to meet schedule requirements. The electric industry has recognized some of the above-mentioned problems and has adopted a practice of maintaining multi-year work plans. These rolling work plans are up to 90 % stable on an annual basis. As an example the Southern Company, has been doing this since 1996 with great success.

TVA, a Midwestern IOU and a Northeastern utility have respectively adopted two-, three- and five-year budget planning approaches. TVA has set a stability target of 80% for their two-year capital budget. BPA should consider setting a stability target as well. Critical to the overall work planning process is the emphasis to plan projects using balanced workforce criteria and outsource external pop-ups that upset the balanced resource management throughout the PDB process.

This recommendation is supported by the following five sub-recommendations:

- Develop a consistent outsourcing policy in the planning process
- Formalize an integrated Capital and Maintenance workload scheduling program to optimize resource management
- Strike a balance between internal and contracted resources
- Develop a consistent outsourcing policy in the planning process
- Improve the planning process by increasing due diligence

Each of the above is detailed below:

3.1 Develop a consistent outsourcing policy in the work planning process

Develop a consistent outsourcing policy to be used early on in the work planning process. This outsourcing policy should be implemented throughout the Plan-Design-Build process. The balanced BPA workforce will then be focused on the core PDB activities and external pop-up projects can be directly outsourced after the initial project strategy meeting.

- Plan to the approved BPA standards (7)
- Consider outsourcing reimbursable generation and capacity requests to manage planning peak workloads. (3)

- Seek reimbursement from the Northwest Power Pool (NWPP) or directly from the Northwest utilities to perform value-added services, e.g. the Northwest Area Coordinator function for developing WECC base cases. (3)
- Develop and implement tools to improve the quality of the risk-based project indices (4)
- Planning schedule should be in alignment with project duration standards and service level agreements. (2)
- Identify programs that constitute BPA core-work and staff to do baseload work in these programs with BFTE resources. (If the workload is core to BPA but is cyclical within the two-year workplan then use supplemental labor to manage the peaks.) (3)
- Institute a standard practice of outsourcing pop-up projects instead of diverting BFTE resources from the workplan. (6)

3.2 Formalize an integrated Capital and Maintenance workload-scheduling program to optimize resource management

By implementing an integrated workload and scheduling program for both capital and maintenance work, labor and equipment resources can be better planned and utilized. Large savings can also be obtained by eliminating overtime with such an integrated scheduling program. This integrated workload and scheduling program should be performed on a 2-year work plan to levelize the workforce throughout the PDB process.

- Implement integrated work planning and scheduling for both capital and maintenance work for improved forecasting of labor and equipment resource requirements. (5)
- Outsource planning, analysis, design and build of non-core work to approved consulting and engineering firms (2, 3)
- Consider expanding the use of turnkey solutions. (2, 3)
- Provide an integrated work planning and scheduling process and tool (5)
- Plan and schedule projects into a work plan that assumes 2 years between finalization of the plan-of-service and required energization date. (2)
- Improve planning look-ahead on internal non-scheduled pop-up projects by utilizing flexibility of a 2-year workplan. (2)
- Within the 2-year workplan, schedule the individual project starts and schedules to allow sufficient time for efficient and high quality design and construction and to levelize workload, based on duration standards and service level agreements. (2)
- A single work plan should be developed for all maintenance and capital projects, developed far enough in advance, to be made available for coordination efforts with System Operations. (5)
- Manage the short-term plan and schedule (two weeks to one month out) by exception (what has changed from the original long-term schedule) (5)
- Group all contractible work for a two-year work plan into programs and contract out all of the work within that program. (3)
- Develop a new tool for scheduling outages to automatically provide recognition of capital projects and maintenance work overlaps to the requesters. (10)
- Formalize scheduling process that achieves certainty of outages to maximize commitment of labor, materials, equipment and contracts. (10)

- Combine small, similar projects to attract more contractor interest and improve the flexibility of materials programs (6)
- Share annual forecast of upcoming line construction and wood pole replacement projects with Sourcing Services Manager and all contractors in the pool. (17)

3.3 Strike a balance between internal and contracted resources

In order to levelize the workload within the PDB process, a balance between internal BPA workforces and contracted resources should be achieved. The team also recommends bundling like work into programs and contracting once for the entire program. This will yield lower total contract prices and more efficient use of contracting and management resources. The decision for outsourcing should be done early on in the planning process to maximize the resource balance within BPA. The planning and analysis of non-core BPA projects, including customer requests, should be outsourced with minimal impacts on the PDB resources. The true costs, including overhead and margins, should be used when comparing internal and contracted work.

- Levelize construction workload using a Master Agreement contracting tool. (18)
- Outsource planning and analysis of non-core requests to approved consulting and engineering firms (3)
- Reduce overtime by setting the annual Capital & Reimbursable Program level in accordance with resource capabilities. (5)
- Begin forecasting workload and resource requirements using a rolling quarterly, semi-annual, and annual plan and schedule (5)
- Establish outage coordination for capital and maintenance work in either the project management group or at the TF Internal Operations level. (10)
- Expand the Capital Project Assignment Guidelines (CPAG) to document standard BPA/contract split for Preliminary Engineering, Design, and Materials as well as Construction. (6)
- Levelize workload by moving to an approved two-year work plan and five-year budget process with 80% stability over two years. (2)

3.4 Improve the planning process by a higher level of due diligence (improve management of the queue)

By developing a formal due diligence process and early filtering of generator interconnection and customer requests for point-to-point connectivity, the PDB process, application queues and resources will be better managed. Such due diligence needs to be performed in the customer service function to minimize the impact of unsuccessful requests to the PDB process. This due diligence should include filters for both technical and financial considerations. BPA should also ensure compliance with the FERC 2003 Order for Large Generation

Interconnection Procedures (LGIP) to facilitate the generation study queue more efficiently.

Internally the current two sets of system planning base-cases should be reduced to one, thus eliminating duplication of valuable planning resources. Furthermore, planning study methodologies also do not use the most efficient software tools available resulting in inefficient use of the planners' time. By the use of an integrated planning tool to do all relevant system studies, including thermal, short-circuit, voltage stability, transient stability, switching transients and reliability, enables planning resources to be more productive.

- Require that Marketing and Customer Service engineers perform greater and consistent technical and financial due diligence by filtering the number of Generator Interconnection requests in the GI queue. (3)
- Increase the due diligence on customer requests. (3)
- Develop one set of base cases and refine annual data request for conducting power system analysis. (3)
- Consolidate Transmission Planning study engineers from Network Planning, Customer Service, and Support Services for Network Planning. (3)
- Investigate the use of integrated planning tool to do all relevant system studies, including thermal, short-circuit, voltage stability, transient stability, switching transients and reliability. (3)
- Schedule issuance of work orders throughout the year to coincide with actual work start dates as defined in the workplan. (2)
- Ensure energization date is realistic from customer, system and resource scheduling requirements. (3)
- Establish criteria to ensure funding of strategic programs on an on-going basis. (6)
- Identify design types that can be contracted more effectively through firm-fixed-price contracting. Group these into design programs and institute standard practices and work tools to facilitate contracting these programs. Examples would be repetitive designs such as standard replacements. (6)
- Group prioritized capital replacement projects into functional Programs for funding approval requests. (6)

4. Expand the use of risk management as part of a formal Asset Management Program

Network planning is currently being done on a deterministic basis. There are no formal risk-based planning metrics and processes within the planning process to assess overall project risk performance. This may result in prioritization of capital projects without the benefit of risk factors as well as assumption of risk factors that are not clearly identified.

An embedded Risk Management Process, consistent with sound asset management principals, will help TBL be informed about the underlying risk factors in meeting the strategic, business, and project objectives. Capital projects can also be ranked based on their risk factors, directing resource to the area

where it has the largest impact on risk mitigation. This risk-based process can also provide adequate information to management on the commitment of and impact on BPA resources to external projects.

- All of the risk factors should be evaluated before committing BPA resources to politically sensitive projects and considerations (3)
- Require that Marketing and Customer Service engineers to perform greater and consistent technical and financial due diligence by filtering the number of Generator Interconnection requests in the GI queue. (3)
- Incorporate formal embedded Risk Management Process in the Plan Design Build (PDB) process. (4)
- Perform Cost/Benefit analysis of alternatives as part of the planning process prior to finalization of the plan of service for all projects above a specified threshold. (4)
- Ensure project risk (technical, environmental and financial) is well stated at the front end of the planning process) (4)
- Incorporate a project risk management component (+$5million) as a key requirement for planning, executing and managing projects and a core project management responsibility (16)

Note: Benchmarking of planning practices and organizations are included in the different initiatives, particularly *Initiative No. 3 - Analyze Planning Process* and *Initiative No. 4 - Transmission Planning Risk Analysis.* Additional details are included in the Benchmarking Appendix. These benchmarking exercises indicate that some utilities have started to use risk-based planning criteria that include probabilistic planning techniques. The study also indicates that some utilities have adopted a stringent queue management strategy.

Version Number	Date Issued	Issued By	Section Modified	Summary of Amendments
Final V 1	06.06.05	Bob Grant - KEMA	Various	Final Report changes to accommodate potential overall audience (acronyms, etc.)
Final V 2	08.25.05	Dean Zastava - KEMA	Overarching Recommendation	Added statement that cost savings are directly related to the size of the Capital Budget.
Final V 3	01.25.07	Dean Zastava - KEMA	Deleted Section 3.4 and re-numbered Section 3.5 to 3.4	Section “3.4 Develop a consistent outsourcing policy in the work planning process” was a duplicate of Section 3.1.