

Bonneville Power Administration

PTR System

Alternative Analysis Report

BONNEVILLE
Power Administration



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1. Executive Summary

The Northwest region currently operates and maintains a system to track and report energy efficiency efforts called the Planning, Tracking and Reporting (PTR) system. This report intends to lay out available options and associated costs and benefits to allow stakeholders to make an informed decision on the future direction of the system.

CGI was engaged by Bonneville Power Administration (BPA) to collect requirements and conduct an options analysis for the PTR. Regional PTR stakeholders will then evaluate the options and select the strategic direction for the PTR. Whichever option is selected, the requisite steps in a technology project will need to be completed; detailed requirements, design, development and testing before implementing the next iteration of the PTR in time for the 2012 rate period.

The CGI team approached this project by interviewing stakeholders, the current system vendor, users and administrators to gather requirements, understand the current system and understand key drivers for change. Additionally the team evaluated the current platform against other energy efficiency tracking and reporting systems.

The requirements are documented in the "BPA Requirements" document. The requirements are divided into current requirements to be carried forward, current requirements that are to be made obsolete and future requirements. The CGI team then applied the CGI 5-R evaluation methodology against the PTR system. The typical five options available to the regional PTR stakeholders are to Retire, Retain, Replace, Renovate, and Rewrite the system. Specifically, in evaluating each option, criteria including business value, customer satisfaction, total cost of ownership, return on investment, technical soundness, supportability, time to market, risk and infrastructure flexibility were considered and scored. These scores and the overall total score for each option are tabulated and explained in more detail in the subsequent sections of this document.

Over the course of the project certain shortcomings within the sphere of the PTR became evident, these key drivers should be considered especially important as agents of change to the status quo. Any future system needs to address the clear technology obsolescence evidenced in the PTR assessment. Additionally an approach to enhance technical capabilities will clearly add business value to the project, with three capabilities singled out, document management, reporting services and workflow based work management. Improved technical flexibility will allow for easier extension of current functionality in the future and reduce the need for programmer involvement when reacting to business or legislative changes. It is clear that the road ahead is paved with change, legislative changes like I-937 and possible regional or national initiatives around carbon tracking both demand PTR to be more responsive to change. Finally, the current system does not allow for automation in business process flows and identification of redundant steps, promoting inefficiency. Usability of the system, including time needed for training, was a consistent roadblock in our collection of user experiences.

In summary it appears that the best options going forward are either to renovate or rewrite the system. The renovate option would drive an extended timeline to make piece-meal changes to the platform. In contrast, the rewrite option will execute in one project a complete change from the old PTR to the new system. This report is intended to provide sufficient information for the PTR stakeholders to make an informed decision.

2. Introduction

2.1. Background

BPA was created by an act of Congress in 1937 to produce, distribute and sell power in the wholesale market in the Pacific Northwest. Currently BPA provides 45% of the power generation capacity in the region and has a long history of energy efficiency.

BPA works closely with the Northwest Power and Conservation Council (the Council) to establish standard measures, reporting and data stores to allow transparency in the conservation efforts. The Council is responsible for the power planning and setting of conservation targets for the Northwest based on a 20-year plan which is updated every five years. In order to support standard measures the Council established the Region Technical Forum (RTF).

In 2001 the Council along with Synergy Consulting, Inc. launched and maintained a system for tracking of conservation discounts called the Conservation and Renewable Discount (C&RD) program. BPA has played a significant role in terms of funding and coordination since the inception of the system.

In 2005 in conjunction with the RTF, the Council launched the PTR system. This upgrade of the C&RD system was to allow tracking and reporting for the Conservation Acquisition Agreement (CAA) and Conservation Rate Credit (CRC) programs. In 2007 a new funding source, High Water Mark (HWM), was added to the PTR system to track utility self-funded conservations efforts so they would count toward future net energy requirements in an effort to prevent second tier energy rates. In 2008 the PTR system was modified to allow utilities to track conservation efforts for the Irrigation Rate Mitigation Product (IRMP) program.

In 2006, voters from the state of Washington passed Initiative 937 (I-937) that requires large utilities (>25,000 customers) to use the PTR system to report on their conservation activities. Utilities have to gradually increase the amount of new renewable resources in their electricity supply to 15 percent by 2020. Electric utilities also must acquire all cost-effective energy conservation resources in their service territories beginning in 2010.

BPA utility customers submit their Energy Efficiency (EE) reports to BPA using the PTR system. After the EE reports have been approved, BPA extracts monthly CAA invoice data and semi-annual CRC report data from the PTR, transforms it and enters it in BPA's EE database; the EE database serves as BPA's official repository of data related to conservation expenditures and accomplishments (energy savings achieved). For the most part, these two systems were independently designed. Prior to April 2007, each system was managed by different EE organizational units at BPA.

During the current three-year rate period (FY2007-09), BPA expects these two systems (PTR system and EE database) to process over \$70M and 50 aMW of conservation activity each year for over 125 utilities in the Pacific Northwest region.

Beginning in FY2010, BPA Energy Efficiency acquisition targets will be based upon the Council's Sixth Power Plan (for the FY2010-FY2014 period). Beginning in FY2012, BPA will begin selling power under new long-term wholesale power contracts that were signed in 2008. Under the new contracts BPA will operate in two-year rate periods. These new 20-year contracts include the shift to tiered pricing for the energy sold by BPA. The Contract High Water Mark (CHWM) established in the contract will provide a price signal for customers to minimize their above-HWM purchases, which are expected to be higher cost than the BPA Tier one rate.

2.2. PTR Overview

Currently, there are five major components involved in the regional energy efficiency tracking and reporting activities, as shown below in Figure 1. With the exception of each utility's own internal tracking system, there are four core components: the PTR, the offline calculators, the EE database and the ProCost Model. These components are not well integrated at the moment. Thus a lot of manual effort is needed to extract, transfer and load data between components.

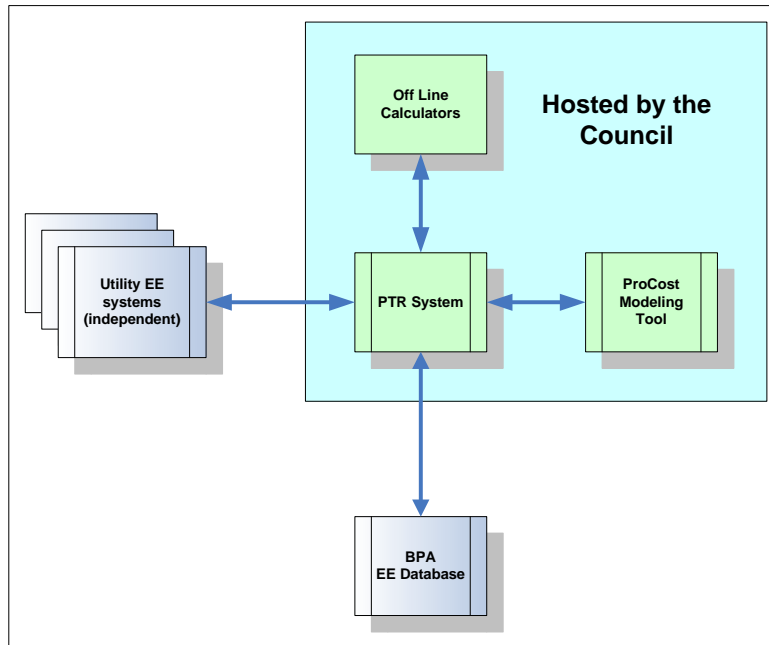


Figure 1 PTR System relationships

BPA uses the PTR system to track and report energy efficiency accomplishments in the region. It is hosted by the Council. The PTR system provides a web interface for utilities to report their conservation activities. The PTR system also implements BPA conservation program business rules. In addition, it functions as an interface for agency contract administration staff to review and approve reports and invoices for BPA funded conservation and customer side renewable resource activities.

Because the core PTR system doesn't offer all engineering calculations needed for energy efficiency tracking purposes, various offline calculators like the custom project, lighting, and SIS calculators have been developed. These offline calculators utilize a Microsoft Excel file format with embedded formulas and macros of varying complexities. While the offline calculators are portable, the data transfer between the calculator and the PTR is not fully automated at the moment.

In addition to the offline calculators, the EE database also exchanges data with the PTR manually. After reports and invoices have been approved in the PTR system, portions of the data are extracted from the PTR system and sent to the EE database. Utility payments are prepared using data maintained by BPA in the EE database.

The ProCost Modeling tool is a VBA spreadsheet-based program used to compute the cost-effectiveness of conservation measures. The numerical data generated by ProCost is used to evaluate the utility and

total resource cost (TRC) cost/benefit ratios, energy and peak impacts and carbon offsets for proposed measures. When approved, cost and benefit information for deemed measures will be made available to utility users via the PTR.

2.3. CGI Study

CGI was selected through a competitive solicitation to develop a long-term strategy for energy efficiency reporting in the Northwest. The CGI approach consisted of a data collection phase and an analysis phase. The Alternative Analysis Report is produced based on data collected from the following:

- High level system analysis performed by CGI of the existing system
 - Interview sessions held with key stakeholders
 - Documentation of the existing system provided by Synergy Consulting, Inc.
- High level future system requirements as documented by CGI
 - Documented requirements for new features, functionalities
 - CGI's past energy efficiency expertise
 - Industry best practices and technology trends

CGI then applied their 5-R methodology to produce the alternative analysis report. This methodology evaluates the 5 R's - Retire, Retain, Replace, Renovate, and Rewrite.

The first alternative, to Retire the system, is appropriate when the functions performed by the system are no longer needed. The second alternative, to Retain the system, maintains the status quo and involves making no major changes to the existing system. The third alternative, to Replace the system, requires the project team match the documented requirements with a commercial-off-the-shelf (COTS) package. The fourth alternative, to Renovate the system, offers the opportunity to evolve the existing system to a state that meets the future requirements by implementing up-to-date technology and architecture and adding possibly features that are not present in the current system. The fifth alternative, to Rewrite the system, allows the current system to remain in operation while implementing best-of-breed technology and architecture platform to develop a replacement without impact to the users.

Of the alternatives, it seems clear that Retire is not an option because the functions performed by the existing system will remain critical to the energy efficiency tracking activities for the region for the foreseeable future. It's mentioned here solely for the purpose of completeness.

2.4. The Purpose for this Report

The intent of this document is to present an analysis of the alternatives for upgrading the PTR system in order to help BPA, the Council and other regional stakeholders develop a long-term plan that will support the planning, tracking and reporting for the energy efficiency program in the region. After evaluating the current systems, interviewing users and stakeholders and gathering high-level requirements, for each viable option, this report provides discussions of feasibility, relative outlay estimates and the resulting benefits. This study is only a portion of the larger project that includes phases for design, development, testing and implementation of a new PTR system to coincide with a rate period beginning in October 2011.

This document was produced at the conclusion of the high-level requirement phase (see "BPA Requirements" document for full detail) of a larger project. In order to understand the level of detail and goals of this phase the entire timeline is shown below in Figure 2 with the completed phases shown in gray. Regardless of the option picked; the subsequent phases will need to be executed; the scope and nature of the phase will clearly be dependent on the choice that is made.

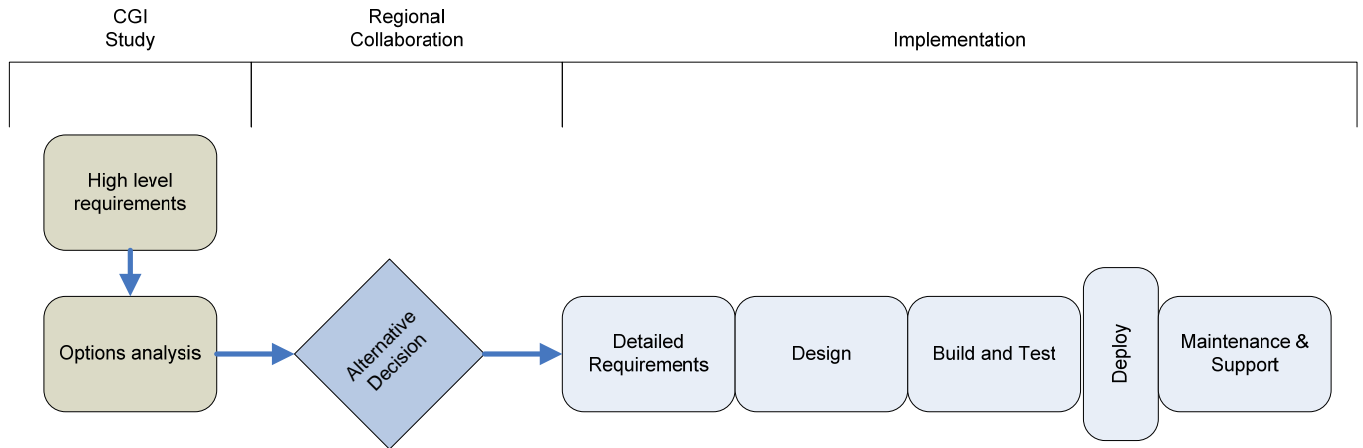


Figure 2 Project Timeline

The high level business requirements define the needs and features of the system at a coarse-grain level so that overall system scope and capabilities are well documented. The alternative analysis report describes different options that can be used to fulfill the high level business requirements and the pros and cons of each alternative. The actual project phases will depend on the replacement option chosen. After a decision is made, an RFP process is likely to be required. The following are general discussions of the lifecycle phases that are expected to apply to this project:

- Detailed Requirements Phase – The goal of this phase is to drill-down to document requirements and functions in fine detail and to set the stage for design. Additionally, the requirements will be prioritized allowing the team to separate the required functions that are needed for the first rollout from those that can be delivered in a future iteration. A test plan and supporting scripts or Use Cases drafted in this phased will be used for testing later.
- Design Phase – The goal of this phase is to design solutions for the user interface, business rules specification and data integrations that will constitute the new PTR. These designs will be presented in screen layouts, navigation wireframe, process diagrams, data models, technical architecture designs and performance specifications. These deliverables will be used in the next phase.
- Build and Test Phase – During this phase the actual system is coded to the design specifications. The test documentation drafted previously will be instrumental in testing the system to make sure it meets all the stated business requirements. When the technical team is satisfied, users will be asked to take part in User Acceptance testing prior to delivery of the new system. When all testing and bug fixes are complete, training on the new system will begin while the system is in the test environment.
- Deploy Phase – This is the phase where the fully tested system is prepared and made available in the Production environment. Data converted from the old system will be loaded in the databases supporting the new system. Users will be required to transition to the new system immediately to prevent confusion. A Rollback Plan will be ready just in case a problem arises.
- Maintenance and Support Phase – This is the phase where the support team will “keep the lights on” including necessary bug fixes and functional enhancement rollouts. Generally this team will not be working on major releases for the software. This team provides support contacts for users and continues to track change requests regarding functionality.

An additional document presents the high-level requirements as gathered by the stakeholders of the PTR system through interviews is attached. This document can be used to trace through requirements at later

stages in the development process, and should provide the basis for a detailed requirements analysis at the Detailed Requirements stage of the development process.

3. System Lifecycle Assessment for PTR

In November 2005, the Council initiated development of the current PTR System by Synergy Consulting, Inc. However, the PTR system was adapted from an even older system that had been developed in 2001 called the Conservation and Renewables Discount (C&RD) System. Though extensive changes and enhancements have been made in an effort to keep the system productive, PTR's capabilities to adapt and evolve have been severely limited by the original hardware and software choices.

All technology-based systems will eventually become obsolete. The fact that PTR has lasted this long is a credit to the designers and implementers that built and maintained it to this point. But, the time has come when it makes business sense to take advantage of new technologies to improve the functionality, efficiency and cost profile for PTR. CGI groups system technologies and products in four major categories:

Emerging:

These are technologies that have not yet been widely adopted, but are promising, and should be evaluated for inclusion in an ideal architecture for future implementation within an organization. A subset of such technologies in the emerging category will inevitably be designated as "current" architecture as they mature.

Current:

Current technologies are proven, effective, widely adopted and well supported. When implementing a new system from scratch, an organization should select technologies within the "current" category whenever possible.

Twilight:

Twilight technologies still work, and may be supported, but have been (or soon will be) replaced by newer versions of similar technology. An organization should be developing a plan to migrate away from technologies in the twilight category.

Obsolete:

Obsolete technologies may still work, but the manufacturer has dropped support from their customer offering, except by special arrangement. Newer versions of the technology are now listed in the previous categories and are widely accepted and proven. Extraordinary measures may need to be taken to keep the technologies operational. Ideally, an organization should replace technologies before they become classified as obsolete.

Below, Figure 3 depicts CGI's assessment of the PTR system in terms of technology system lifecycle.

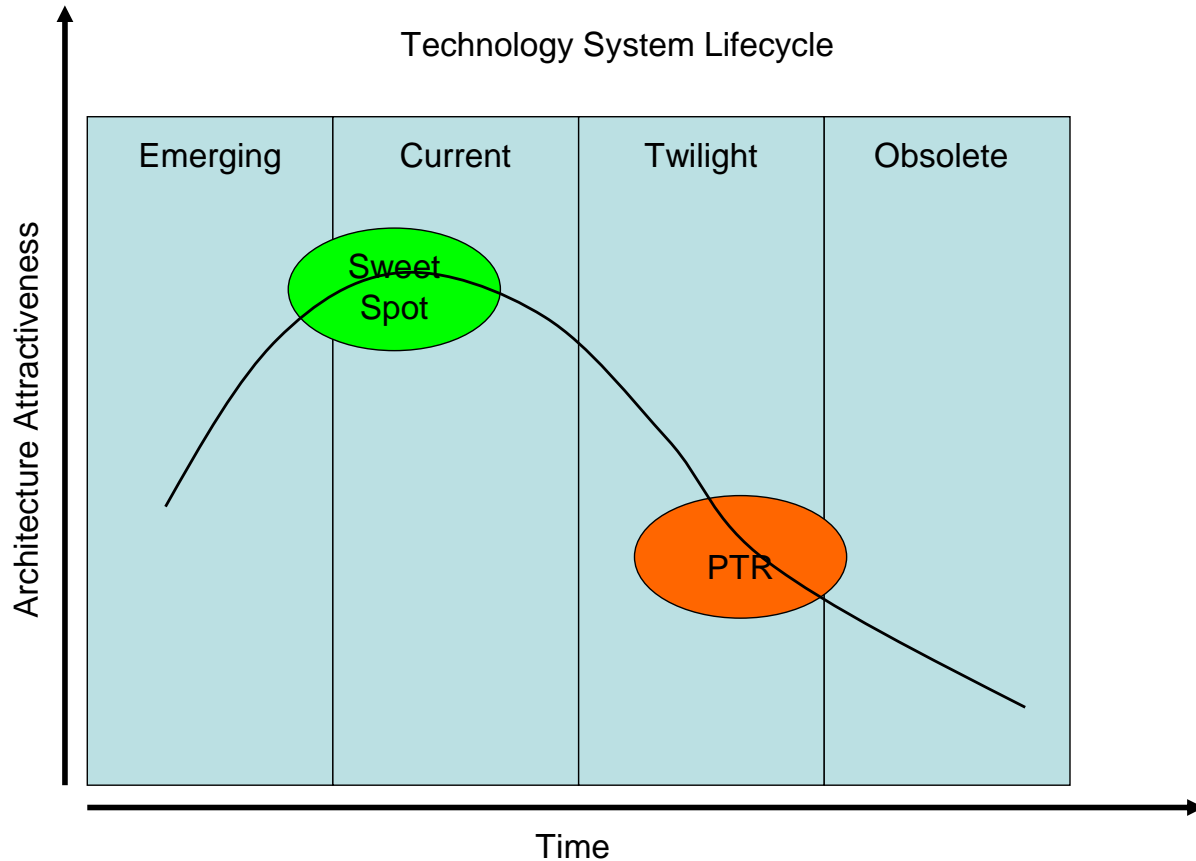


Figure 3 Technology System Lifecycle

The black line depicts how a typical technology/product might progress through different lifecycle stages – from Emerging → Current → Twilight → Obsolete. CGI believes the PTR system as a whole is deep in the “Twilight” stage and will soon slide into the “Obsolete” stage in the very near future. Systems in this area are difficult to enhance and maintain. Parts may be hard to find and the expense to keep the systems operational increases while reliability diminishes. Those conditions contrast noticeably with the green “Sweet Spot” which is shown in the desired system stage. Maintaining and enhancing systems there is faster, much less complicated and therefore much less costly.

As detailed below in Table 1, the rationales behind CGI’s assessment are:

- All key technologies/products used by the PTR system have lost or are about to lose “vendor provided mainstream support”.
- Suitable “Current” technologies/products are readily available.
- Industry best practice recommends an organization to build fully integrated systems versus systems with multiple components that require manual steps to accomplish integration.
- Industry best practice recommends that an organization leverage proven, mature, open source technologies/products to reduce costs and risks. Acceptance of these products has been gaining momentum over the last 5 years.
- Industry best practice recommends that an organization replace technologies/products before they enter the “obsolete” stage to reduce operational risk and support costs.

Table 1 examines the software technology stack currently in use. The PTR Technology Area, PTR Product Name, PTR Lifecycle Assessment, Vendor Release Date, Mainstream Support Retirement Date and the Current Replacement Options are represented.

PTR Area	PTR Product Name	PTR Product Lifecycle Assessment	Vendor Release Date	Mainstream Support Retirement Date	Current Replacement Options
User Interface	ASP/HTML	Twilight	1999	3/31/2005	AJAX Framework Modern UI Widget
Programming Platform	Classic ASP/VB 6.0	Twilight	1999	3/31/2005	.NET 3.5 Java/J2EE
Web Server	Internet Information Services 5.0	Twilight	2000	6/30/2005	IIS 7.5 Open Source Apache HTTP Server 2.x
Database	SQL Server 2000	Twilight	2000	4/8/2008	SQL Server 2008 Oracle Database 11G Open Source MySQL
Operating System	Windows Server 2003	Twilight	2003	7/13/2010	Windows Server 2008 Various flavors of Linux / Unix operating system
Productivity Tool	Office 2003	Twilight	2003	4/14/2009	Office 2007
Hardware	x86 Pentium-IV family	Twilight	2000	No end date	Virtualization based approach like VMWare or Java Virtual Machine(JVM) running on multi-core CPU
Reporting Engine	SQL	Twilight	Vendor neutral	No end date	Dedicated Reporting Service Engine SQL Server Report Service (SSRS 2008) Crystal Reports Open Source alternative like Jasper Report
Document Management Capability	N/A	N/A	N/A	N/A	Open Source package like Nuxeo or CGI EE Framework

Table 1 PTR Technology stack evaluation



4. Key Drivers for Change

There are several drivers for change related to the PTR system. Understanding these factors is useful in considering the various options ahead and assessing the current situation. The key drivers are described in this section.

4.1. Address Technology Obsolescence

Today, the PTR system as a whole is approaching the end of its useful life. Although the PTR system is still fairly reliable and useful, changes are harder to implement. The PTR software environment was examined in the previous section. Clearly, most of the software in use today is ready to be retired. If nothing is done in the near future, the PTR system will face significant support risks, from both functionality and security perspectives.

Functionally, developers will find it more difficult to fulfill the business requirements because vendors will stop adding features to the software used to develop and enhance the system. From a security perspective, the system will be increasingly vulnerable because vendors will stop providing necessary security patches. Aside from those support risks in the future, software obsolescence has caused many other issues. For example, the PTR users who have Excel 2007 must remember to save Custom Project calculators as an earlier version to be compatible with Microsoft SQL Server 2000.

Aging hardware and database server infrastructure is another aspect of the existing system. Such obsolescence results in sluggish performance, often during periods of peak demand. During our interviews, it was revealed that the current usage pattern is highly uneven. During peak usage times, when most end users need to file their reports before the deadline, system performance slows dramatically. The current system design and hardware platform does not scale, even though performance during non-peak times is generally satisfactory.

As a mitigation strategy, CGI recommends the regional PTR stakeholders to replace the existing obsolete technology stack with a current programming platform such as Java/J2EE or Microsoft .NET as soon as possible

4.2. Enhance Technical Capabilities

In addition to technology obsolescence, there are three core technology components that are missing or inadequate in the current PTR system. These components are reporting services, Workflow Capability and Document Management.

Reporting Services: In the current PTR system, reports are handled by SQL. End users have complained that certain complex reports are hard to read on screen and are little better when printed. Without a dedicated reporting engine (like SQL Server 2008 reporting service), despite the efforts of the current support staff, it's difficult to code user-friendly reports in a cost-effective manner. A reporting engine will give end users added capabilities to filter, sort, group and sum data effectively. As reporting needs become more and more complicated over time, industry best practice recommends using a dedicated reporting engine instead of SQL.

Workflow Capability: The next missing component in the current PTR implementation is workflow capability. Workflow capability refers to software development that is driven by events or processes and allows a business to streamline operations, automate tasks, customize processes and increase efficiency. From a technical perspective a workflow approach will improve coordination of parallel work processes, facilitate a higher level of reuse (e.g., activity level reuse), and improve process execution visibility and tracking.

Document Management: Over the years, CGI has observed that document management capability is often overlooked in the initial design of many EE systems. However, legislative changes or the business' desire to reduce paper usage have added credence to including a document management capability. A full-fledged commercial document management system like Documentum is expensive to implement and often overkill for most EE systems. CGI recommends the regional PTR stakeholders start to consider adopting a basic document management component (using open source package or custom development) that will enable users to:

- Upload documents of all types (e.g., completed Excel calculators, engineering documents in Word format, PDF report, etc.) so that users won't need to send separate emails.
- Link uploaded documents to corresponding projects.
- Search and retrieve documents using efficient indices.
- Categorize documents using document meta-data structure.
- Collaborate and track document lifecycle.
- Reduce process paper trail.

CGI recommends the regional PTR stakeholders include these missing technology components as part of the PTR replacement strategy.

4.3. Improve System Flexibility

During our interview sessions, people made it clear that more changes, not less, are coming to the EE programs in the future. This is especially true for BPA as it prepares for the rate period beginning in October 2011. Three factors around system flexibility need to be addressed by the PTR project; technical evolution, adapting to changing business requirements and changes imposed by legislation.

Technical Flexibility

CGI recognizes that the following PTR system technical components lack flexibility:

- Inflexible data model – The current data model of the PTR system is not structured and normalized properly. Key subject areas such as the Measure Catalogue and Funding Source need to be redesigned. Changes to the current design would be hard to implement. For example, it's difficult to manage the measure start and end dates in relation to the start and end date of the shopping cart.
- Non-standard taxonomy – Certain terminologies and processing models used by the PTR system (for example, shopping cart metaphor, "order" in the context of reports and invoices etc.) are outdated. Users commented they found them to be confusing to use.
- Inadequate System Logs and Archiving -- The system log design in the PTR System was inherited from the C&RD. Logs are not well organized and do not provide useful information as intended. As a result, some technical support tasks require direct access to the database. There is also no mechanism in place to support archiving very old data for measures, reports and shopping carts. Many users simply mark carts as deleted to make them invisible. The accumulation of data such data consumes memory and drags down system performance as well.

Business Requirements

During the interviews, several areas were recognized where business flexibility was needed. The current platform either complicates or simply doesn't support these needs.

- Users have expressed desire to report activities more frequently (quarterly vs. semi-annually) which differs from the current policy and system programming.
- Users have requested more flexibility to handle various existing or new funding sources.
- Rapid changes to BPA business requirements are driven by BPA's desire to meet the need to establish ever-increasing MW target.
- Business rules flexibility – Currently business rules for similar functions are not coded and managed in one place. Instead, they are duplicated in as many different places. This results in

poor supportability. By re-architecting the system, most business rules will be coded and managed in a central place.

- Reduced need for programmer intervention – By shifting certain business rules to be configurable they can be changed by a system administrator without the need for a programmer.
- Role-based capabilities will enable levels of system administration based on role assignments. This would allow, for instance, a Measure Administrator to configure measures while a Rule Administrator would focus on managing implementation of Business Rules.

Changes in Contracts and Regulation

Energy Efficiency is gaining political significance and all regional players are seeing an increase in legislative changes that need to be accommodated. There are two changes that the new iteration of the PTR will need to accommodate:

- New BPA 20-year power contracts will establish multiple rate tiers for BPA's power customers. The design of the new PTR system must be capable of collecting and storing savings-related information within this context.
- Beginning in 2010, as a result of the I-937 legislation, utilities serving more than 25,000 customers in the State of Washington will be required to use the PTR system to report their conservation activities. During interviews with utility representatives, CGI recorded requirements that would enable them to use their own forecast of avoided cost to determine cost-effectiveness. This will require improved integration of the Council's ProCost model into the PTR system. This legislation may increase the size of the PTR user base. The larger data volumes and additional processing will put more strain on the aging software and hardware platform that is in place. Without major hardware and software enhancements, it is very unlikely that the current system will be able to accommodate the peak usage requirements.

In addition, EE program topics are evolving and as they attain prominence, PTR will be expected to adapt to accommodate the necessary tracking and reporting:

- Carbon tracking. Indications from a Federal and Western Region perspective point to a need for recording carbon tracking information. This may translate to the need to calculate carbon savings using certain load shapes and incorporating sources of electricity into the energy efficiency calculations.
- Capacity tracking. A future system may need to track capacity reductions based on energy efficiency or demand response programs that may be linked to specific hours or days.
- Additional mandates in other northwest states for visibility into EE results similar to that of Washington State.
- The need for more public access to conservation information that has been collected.

In summary, as the rate of change accelerates, it puts tremendous pressure to architect a modern modular loosely-coupled system that facilitates this type of change. The associated non-functional requirements such as performance characteristics during peak time and availability will further dictate a scalable hardware platform that's not tied to just the Microsoft windows platform. If no major actions are taken, it will be increasingly difficult, if not impossible, to accommodate the type of changes described in the "BPA Business Requirements" document, let alone in a cost-effective manner.

4.4. Automation

Two aspects of automation should drive change. The first is an examination of the cradle to grave EE processes with the goal of making the overall process more efficient. When undertaking an effort on the scale of replacing PTR, the opportunity should be taken to view the entire set of efficiency business program processes from a holistic perspective. This will allow the project team to engineer the process from a "clean slate". During CGI's analysis of the current system, it noted that the current processes are not optimized and the system depends upon a number of manual steps and weak data integration. Such processes are less efficient to run and more costly to manage over the long run. In order to align the

system and better meet the regional PTR stakeholders' long-term mission and strategic goals, the project team should examine the processes and reengineer them along with the technology components.

The CGI analysis has produced a high level process flow. A process re-engineering effort will examine low level process and data flows both internal and external to the system. Understanding the process and data relationships will enable design decisions to be made regarding both automated and manual processes that need to be improved. Process reengineering efforts can be as complex as system engineering and will require similar cycles of analysis, design and evaluation to ensure the results increase the ability of the system to contribute efficiently to the business process.

The second aspect of automation is the identification of manual tasks that can be automated to improve efficiency, reduce errors and lower costs. Several of the manual tasks present today are candidates for automation. These will be included in the process re-engineering effort described above. Understanding the process and data relationships will enable design decisions to be made regarding manual processes that need to be automated. A few of the candidate manual processes are discussed here. All have been identified in the requirements:

- Integration: Industry best practice calls for data to be transferred between systems using automated integration utilities rather than manual steps. For example, currently the EE database and the PTR database are integrated using manual processes. The process requires that a BPA staff member manually extract data from the PTR database, transform it into a format compatible with the EE database, and finally run a script to upload the data into the EE database. CGI recommends that for the short term, an automated process be employed to extract, transform and load (ETL) data. This will serve to integrate the EE database with the PTR database. It's a cost conscious approach, but does not address the long-term concern that the two databases are still separate entities. As part of a new system, this integration could be addressed at the data design level and eliminate the need for an ETL step in the process.
- Calculators: Not all offline calculators can be uploaded. Some must be routed through email to communicate necessary documentation to the Contract Officer Technical Representative (COTR).
- Reporting: Users are required to download and execute the same processes every month in order to produce information that is pertinent for their organizations.

4.5. Improve System Usability

The design of the current system causes user dissatisfaction and higher supporting cost.

- High Learning Curve for new and infrequent users – Many new users report that they are confused when they first start to use the system. There were no clear instructions or tutorials to help them get started. The system isn't intuitive enough to be self-explanatory. However, as users become more experienced, most of them report that they are able to perform basic functions. Other users who use the system sparingly (i.e., twice a year to report activities) also reported that they frequently forget what they have learned because of the long interval between usage.
- Navigation pattern – Because of the aging technological platform, navigation in the existing system is predominantly sequential. Users are sometimes confused as to where they are or how to back out of the existing transactions without losing valuable information or re-entering data.
- Lack of customization for the end user – In principle, the PTR system needs to handle users of varying technical sophistication and usage patterns. The system, however, was not designed to offer adequate customization that would enable basic users to skip certain complicated functions. For example, certain users of the system want to see only menu items or measures that are applicable to their specific businesses, or to customize a project template so that it only includes pertinent steps.
- Excel integration issues – Microsoft Excel is used mainly for three purposes today, i.e., ProCost model maintenance, offline calculators and as a data extraction mechanism for further offline

processing. Excel offers superior portability and end user familiarity. However, there are many challenges because of this usage pattern:

- Offline calculator version compatibility (some users use outdated calculators because of mistakes)
- Supportability for multiple versions of Excel (2000 vs. 2003 vs. 2007)
- ProCost model maintenance difficulty outside of core personnel
- Excel download size limitations

4.6. Reduce Long-term Cost and Risk

Updating the technology platform will allow the PTR system to reduce long-term maintenance cost and associated business risk. In particular:

- Long-term support risk – Because the products/technologies in place today are in their twilight stage, manufacturer support will be harder and more expensive to acquire. It’s conceivable that manufacturers will cease to support those products/technologies completely in the near future. This will leave the service vendor that is supporting the PTR system solely responsible for infrastructure maintenance.
- Knowledge transfer risk – As key resources who are familiar with the existing applications and architecture retire or leave, replacement resources will be difficult to find and much less knowledgeable in the legacy system.
- Disproportionate cost to routine maintenance task – Because of the aging platform, developers are devoting disproportionate time/effort to routine maintenance, in stead of focusing on strategic business initiatives. Developer productivity could also be greatly boosted if developers are no longer forced to use outdated tools such as legacy Integrated Development Environments (IDEs).
- Talent Retention Risk – Developers are motivated by learning and using the latest tools. Their careers depend on staying current with technology as it advances. It will be difficult to hire and retain staff that is expected to learn and maintain systems based upon twilight technologies/products.

5. Alternative Options

5.1. Assessment Criteria

Table 2 below explains all criteria that CGI uses to quantitatively assess each alternative, their definition and associated key drivers the criterion is intended to address:

Criteria	Definition	Key Drivers Addressed
Business Value	How effective and comprehensive the approach is strategically aligned to meet the stated regional PTR stakeholders’ business requirements – existing or future.	Improve System Flexibility Improve System Usability Automation
Customer Satisfaction	How effective the approach will meet or exceed customer satisfaction.	Improve System Usability
Total Cost of Ownership (TCO)	Using a holistic view, the sum of initial and ongoing system total costs, including potential new system design/development, long-term maintenance and ability to leverage free/open source software packages.	Reduce Long-term Cost and Risk

Criteria	Definition	Key Drivers Addressed
Return-on-Investment (ROI)	From both financial and business perspective, this is the high-level estimate of the cost/benefit analysis of the proposed alternative, taking into account the initial and ongoing costs, the avoided cost for potential enhancements and maintenance, and the expected benefits to meet future business requirements changes.	Reduce Long-term Cost and Risk Automation
Technical Soundness	A measure of how well the proposed alternative addresses critical technical and non-functional requirements, including those related to technical architecture, usability, system reliability, scalability, security and disaster recovery.	Address Technology Obsolescence Enhance Technical Capabilities
Supportability	A high-level assessment of the proposed alternative's serviceability, adaptability and extensibility. This is a measure of how easy and cost-effective the solution can be modified to accommodate changes in requirements, or scaled to handle increases in transaction volume.	Reduce Long-term Cost and Risk
Time to Market	This measures how quickly and flexibly the proposed alternative can be carried out to provide full business value to the regional PTR stakeholders.	Improve System Flexibility
Risk	A high-level assessment of the financial, technical, organizational and operational risks associated with adopting the proposed alternative.	Reduce Long-term Cost and Risk
Infrastructure Flexibility	This measures how flexible is the underlying architecture so that infrastructure pieces can be changed if necessary (e.g., operating system changes from windows to Linux, database changes from one vendor to another etc.) or additional best-of-breed components can be introduced easily for mix-n-match.	Reduce Long-term Cost and Risk

Table 2 Assessment Criteria

The assessment consists of an examination of each option and evaluating each of the assessment criteria by applying a score. The scoring is as follows:

- Most Favorable: A score of 5 out of 5.
- More Favorable: A score of 4 out of 5.
- Favorable: A score of 3 out of 5.
- Less Favorable: A score of 2 out of 5.
- Least Favorable: A score of 1 out of 5.

A “perfect” solution will attain a score of 45 because CGI uses nine assessment criteria.

5.2. Assessment Rankings

Alternative 1 – Retain

This is the “do nothing” alternative. It assumes that the regional PTR stakeholders can continue to use the PTR system, the EE database and ProCost tool in their present forms. This option presses forward

without any significant enhancement to the features or functionality of the existing applications. It also means that all system applications and databases will continue to operate on the same technology platform. The existing platform will need to be retrofitted to meet future changes.

The pros of the retain alternative are:

- Low initial cost.
- Low risk in the very near-term since the system is still somewhat reliable and is handling the existing business requirements.
- Implementation-wise, this alternative allows the regional PTR stakeholders to stay the course. They can continue to contract with Synergy for routine application maintenance and enhancement of mandatory functionality changes.

The cons of the retain alternative are:

- Does not effectively address any of the key drivers identified in this document.
- The system is approaching the end of its useful life. Reliability, maintenance costs, etc. will become more problematic.
- Realistically, the regional PTR stakeholders might not be able to retain the application in its current form for very long. It will be very challenging to address user and legislative requirements as the new rate period starts.

The assessment details are presented below in Table 3:

Criteria	Evaluation	Score
Business Value	This alternative will meet the existing business requirements somewhat, but not effectively, and will be extremely difficult to meet future requirements.	Less Favorable
Customer Satisfaction	This alternative will not meet customer satisfaction effectively because of the inherent shortcomings of the existing system.	Less Favorable
Total Cost of Ownership (TCO)	This alternative will have low near-term cost, but very high long-term cost because of ongoing maintenance and eventual replacement.	Favorable
Return-on-Investment (ROI)	This alternative does not have compelling ROI even though it has low near-term cost. Over medium or longer term, this alternative will require the regional PTR stakeholders to spend a disproportionate portion of the cost on routine maintenance vs. strategic initiatives.	Less Favorable
Technical Soundness	This alternative does not have sound technical architecture for reasons already explained in previous sections.	Less Favorable
Supportability	This alternative has very low medium- to long-term supportability.	Least Favorable
Time to Market	This alternative allows the PTR system to leverage existing assets but requires additional effort to retrofit the system to meet future requirements.	More Favorable
Risk	This alternative carries low near-term risk as the system is relatively stable, but medium- to long-term risks (e.g., key staff leaving, platform mainstream support retirement, not able to meet future business requirements etc.) are very high.	Less Favorable
Infrastructure Flexibility	This alternative will continue to tie the system to the Microsoft platform.	Favorable

Table 3 Retain Assessment

Alternative 2 – Replace (COTS)

COTS stands for Commercial Off-The-Shelf. In the software world, it generally refers to software packages that are ready-made and can be installed to carry out certain business functions without major customization efforts. For example, the Microsoft Office Suite of products are COTS products that are used for personal productivity purpose. Under this alternative, the region PTR stakeholders will need to find an applicable COTS package that can be utilized to fit the specific business requirements without requiring a major customization effort. An applicable COTS package is one that meets 80 percent of the system needs with the current product, requiring only minor modification to meet all the system requirements.

The pros of this alternative are:

- Immediately available – the regional PTR stakeholders take ownership of the COTS upon purchase. It shouldn't take a long time to install and configure the product.
- Don't have to reinvent the wheel – COTS software is expected to be able to perform the required functions out-of-the-box.
- Technical Support – Most COTS vendors are prepared to provide user and technical support for their product for an annual fee.
- Implementation-wise, for typical COTS acquisitions, the PTR project would be able to select a specific COTS product, negotiate a purchase agreement with the vendor and contract with the vendor for installation and technical support.

The cons of this alternative are:

- Product Limitations - The COTS may not be able to provide one or more of the required key features. There could be cases where enhancements or manual "work-arounds" are required, or where the vendor recommends changes to process/system requirements to better fit with the existing product.
- Vendor Dependency - The PTR stakeholders will have little or no control as to when updates, bug fixes or new features will be available. If the PTR stakeholders are the only customer experiencing a specific issue, it could be a long time before it is addressed, if ever.
- Potentially higher cost – Vendor contracts will include expensive annual licensing and maintenance costs.

To the best of CGI's knowledge, there are currently no energy efficiency COTS applications that can meet the bulk of the regional PTR stakeholders' business requirements out-of-the-box. That is because of the unique nature of the EE Program requirements such as the need to deal with different funding source or to interface with IOUs directly.

CGI is including an EE software vendor list in the appendix section. None of these vendors have a COTS package that can fulfill the PTR business requirements without enhancements. However, they have worked in the energy efficiency business space and could be invited to participate in a future RFP process for a rewrite of the PTR system.

Because there is no suitable COTS package available on the market, CGI will not evaluate this alternative against our assessment criteria.

Alternative 3 – Renovate

Traditionally, an organization chooses renovation to leverage their existing assets or to extend the life of the application or to decrease risks of the on-going operations. Renovation is iterative and incremental in nature. In contrast, a rewrite accomplishes all of the required changes at the same time.

Under the renovate alternative, the system would be enhanced in small steps over multiple phases. Each phase would implement a new version of the PTR system. The changes could involve upgrading to new technology, user interface improvements, database redesign or adding new functionality. For the PTR system, this alternative will require the PTR stakeholders to divide the project requirements into manageable tasks. It will be necessary to determine the functional enhancement and technical infrastructure improvement to be included in each phase required to renovate the targeted parts of the system, and deliver the enhanced components at the end of the phase.

The pros of this alternative are:

- It allows the PTR stakeholders to deliver incremental improvements (both features and platform) faster. When the iterations are complete, *most* of business requirements will effectively be met.
- It allows the regional PTR stakeholders to manage risks effectively for each phase because each phase is smaller, thus easier to estimate and manage.
- It allows the regional PTR stakeholders to eventually move the PTR to a sound technical architecture and platform.

The cons of this alternative are:

- Breaking the work apart introduces additional complexities. It will be necessary to determine what business functions can be included in each phase because of its dependencies on the underlying technical infrastructure.
- For the first few iterations, there will be limitations in terms of what can be achieved in each phase because developers will be somewhat restricted by the existing technology and architecture.
- Because not all system components are renovated at the same time, reworks can be required for “components already renovated”, additional regression testing will be needed, thus prolonging the overall project schedule.
- Users will be disrupted by multiple releases; including the need to be trained multiple times when each phase is deployed into production.

Industry best practice indicates that renovation usually makes the most sense when:

- Large residual value remains in legacy assets. This would be the case if many of the current code or system components can be effectively reused by the new application.
- There are very few new requirements.
- Delivering the whole project in one “big-bang” is too complicated or risky to manage.

These conditions do not apply in the case of the PTR system. This would indicate that while renovate is a viable alternative, it is probably not the optimal choice.

It's also worth noting that it's usually desirable to start the renovation process using a bottom-up approach. The project effort would start with the database tier, then the middle tier business service components and last the user interface presentation tier.

As an example, CGI would evaluate planning phases based upon the following specific renovations. While this is not a complete description of the effort for each phase, the key goals are identified.

- The transactional database can be upgraded first to Microsoft SQL Server 2008.
- The database schemas can be adjusted and normalized somewhat to better accommodate business requirements.
- The user interface and middle tier can be renovated/replaced later using the Microsoft .Net platform to further enhance system functionality.
- Microsoft SQL Server 2008 Reporting Services can be added to address the reporting needs.

The assessment details are presented below, in Table 4.

Criteria	Evaluation	Score
Business Value	This alternative will meet most existing and future business requirements effectively. Microsoft .Net platform and other product offerings (such SQL Server 2008 suite of products) are viable technical upgrade choices. However, because of the nature of renovation approach, there could be limitations as to what can be achieved during each renovation stage.	More Favorable
Customer Satisfaction	Because of the incremental nature of this alternative and the inherent limitations of what developers can achieve, this alternative will give regional PTR stakeholders the ability to meet customer satisfaction somewhat effectively.	Favorable
Total Cost of Ownership (TCO)	Because of the incremental nature of this approach, it could incur additional cost in terms of repeated retrofitting efforts. For example, developers will not be able to remodel the database schema in an optimal way if they are not allowed to rewrite the middle tier business service code at the same time. Delicate planning and coordination will be needed because of the dependencies between different technical components of the PTR system. Another consideration is licensing cost. Since Microsoft will be the sole vendor for key technologies of the future PTR system, the regional PTR stakeholders will be subject to Microsoft licensing agreements. Microsoft is known to make licensing changes that are not in the best interest of its customers.	More Favorable
Return-on-Investment (ROI)	This alternative will not require a big one time investment upfront, rather, the investment will spread over the total renovation period. This alternative will allow the regional PTR stakeholders to meet the overall business requirements somewhat effectively.	Favorable
Technical Soundness	This alternative does not give developers the complete freedom to revamp the whole system at once. As a result, certain technical compromises may have to be made to accommodate the incremental nature of this approach. A sound modern technical platform will still be the end result.	Favorable
Supportability	This alternative will offer superior long-term supportability. But in the short term, supportability for the legacy components will continue to suffer. From a supporting resource perspective, this alternative will require a bigger team during the renovation phase, but supporting resource needs will be reduced once the renovation is completed.	More Favorable
Time to Market	This alternative will enable the regional PTR stakeholders to move to the eventual target state in multiple steps, effectively making the whole process longer than a complete rewrite while delivering incremental improvement faster.	Favorable
Risk	Renovating the system in an incremental fashion will enable the regional PTR stakeholders to manage risks effectively for a particular phase. However, the less than ideal freedom to re-architect the system in comprehensive manner will incur some risks by itself. Microsoft is a very strong vendor, but there is always vendor risk when. Last but not least, there is budget risk to accurately estimate the total cost for the renovation effort since the engagement will be divided into multiple phases.	Favorable

Criteria	Evaluation	Score
Infrastructure Flexibility	Because the eventual system will continue to be tied to Microsoft offerings, licensing requirements and upgrade cycles, there is limited infrastructure flexibility if the regional PTR stakeholders want to switch vendors or hardware/software. And it's conceivable that the regional PTR stakeholders might be forced to move the system yet again to another "up-to-date" platform somewhere in the future, say 5 years.	Favorable

Table 4 Renovate Assessment

Alternative 4 – Rewrite

The fourth alternative for the regional PTR stakeholders is to rewrite the PTR system using a contemporary platform and technical architecture. For example, using Java/J2EE and Service-Oriented Architecture (SOA) for system development will enable better use of current database and hardware platforms. The system can be fully redesigned and developed to provide a flexible and extensible set of business processes. This would provide the opportunity for the regional PTR stakeholders to address all the key drivers cost effectively. As with the renovate option, the development work and subsequent support could be performed primarily by a contract vendor.

The pros of this alternative are:

- It allows the regional PTR stakeholders to design and develop the new system from the ground up. Design and development would be independent of the existing legacy application, thus giving the regional PTR stakeholders the capability to meet *all* business requirements in a cost-effective manner, which was not possible in the renovate approach.
- It allows the regional PTR stakeholders to build a system that offers superior long-term supportability and maintainability, thus reducing long-term risk and cost.
- It allows the regional PTR stakeholders to build a system that is as user friendly as possible to meet or exceed customer expectations and reduce user training needs.

The cons of this alternative are:

- The regional PTR stakeholders have to maintain two teams in the interim – one to maintain the existing legacy PTR system and one to design/develop the new system. These efforts will require a larger upfront investment.
- Because the enhanced business functions will be delivered all at once, the system may require significant time to develop.
- There are inherent risks for a system rewrite as complex as the PTR system.

Another related consideration in the rewrite approach is the choice of the development platform. It's technically possible to rewrite the PTR system using either Java/J2EE or .NET. These two tool suites have dominated application development market as of late. For the reasons detailed below, CGI feels the Java/J2EE platform is the preferred choice in a rewrite scenario.

According to Gartner Research, Java is currently used by approximately 70 percent of corporations/organizations. (Source: "Leading Programming Languages for IT Portfolio Planning," Gartner Research). In a separate report, Gartner predicts that "80 percent of all commercial software will include elements of open-source technology by 2012. Many open-source technologies are mature, stable and well supported. They provide significant opportunities for vendors and users to lower their total cost of ownership and increase returns on investment." (Source: "Predictions for IT Organizations and Users in 2008 and Beyond", Gartner Research)

CGI recommends that the regional PTR stakeholders consider adopting a robust and open application development platform like Java/J2EE and utilize proven open source products to conduct future application development. CGI has observed that many of its utility clients have adopted Java/J2EE as the



default platform for their organization. Recently, one of the nation’s largest utility companies on the West Coast decided to use the Java/J2EE platform to rewrite its 20-year old energy efficiency tracking system. Overall, CGI feels this strategy aligns well with industry best practices.

From the implementation perspective, this alternative will require the regional PTR stakeholders to conduct a formal RFP process to choose an experienced vendor to design and implement the solution. The regional PTR stakeholders can use the vendors listed in the appendix section as a starting point, send them the RFP document and the high level business requirements document. Vendor responses would be evaluated based on cost, schedule and how effectively the proposal addresses the key drivers identified herein.

The assessment details for rewrite are presented in Table 5.

Criteria	Evaluation	Score
Business Value	This alternative will meet all existing and future business requirements effectively. A complete rewrite will allow the regional PTR stakeholders to take a holistic view of the comprehensive needs for Energy Efficiency tracking and to have more flexibility to integrate ProCost and the EE database, i.e., to streamline and potentially fully automate the integration process.	Most Favorable
Customer Satisfaction	This alternative will allow regional PTR stakeholders to meet or exceed customer satisfaction effectively as they will be able to design and develop a system that is custom-tailored for the end users from the ground up.	Most Favorable
Total Cost of Ownership (TCO)	A key differentiator of this approach is the availability of abundant free and open source software that is cost effective to integrate to expand the system capability. There is little or no licensing cost to adopt the Java/J2EE platform itself or the open source packages such as a reporting engine. Cost effective and often free product support is readily available via online developer communities. The ecosystem of the Java/J2EE platform and the complementary open source community will continue to feed each other and drive future innovation.	Most Favorable
Return-on-Investment (ROI)	This alternative likely results in lower software licensing costs. There is a large initial system development cost, but it allows the regional PTR stakeholders to meet all existing and future business requirements effectively and avoids costly long-term maintenance.	More Favorable
Technical Soundness	This alternative will enable the regional PTR stakeholders to adopt the best-of-breed technologies/products that are available today and have the ultimate freedom to architect the system to meet the stated business requirements.	Most Favorable
Supportability	This alternative will offer superior long-term supportability in a cost effective manner.	Most Favorable
Time to Market	A system rewrite will take time to design and implement. However, modern Java/J2EE technologies have matured greatly over the years. There are abundant tools and packages available to help developer boost productivity and avoid starting from scratch (e.g., feature rich IDEs like Eclipse, code generation tools etc.).	Favorable
Risk	A rewrite of a system of large complexity always carries considerable risks. However, Java/J2EE platform has proven repeatedly that it's mature enough to handle complexities required by a modern Energy Efficiency tracking system. Regional PTR stakeholders should also consider hiring an experienced vendor to further mitigate rewrite risks.	More Favorable

Criteria	Evaluation	Score
Infrastructure Flexibility	This alternative will afford the regional PTR stakeholders utmost flexibility for software and hardware platform choices because of the unique characteristics of a Java/J2EE based solution (Java/J2EE utilizes the Java Virtual Machine technology and can be deployed on any modern hardware/software platform where a JVM is available, including Windows, Linux, Unix or even Mainframe).	Most Favorable

Table 5 Rewrite assessment

A summary of CGI's assessment is presented below in Table 6

Assessment Factors	PTR Alternative Options				
	Retain	Replace (COTS)	Renovate	Rewrite	Retire
Business Value	2	N/A	4	5	N/A
Customer Satisfaction	2	N/A	3	5	N/A
Total Cost	3	N/A	4	5	N/A
Return on Investment	2	N/A	3	4	N/A
Technical Soundness	2	N/A	3	5	N/A
Supportability	1	N/A	4	5	N/A
Time to Market	4	N/A	3	3	N/A
Risk	2	N/A	3	4	N/A
Infrastructure Flexibility	3	N/A	3	5	N/A
Overall (out of 45)	21	N/A	30	41	N/A

Evaluation: **5** Most Favorable **4** More Favorable **3** Favorable **2** Less Favorable **1** Least Favorable

Table 6 Assessment Score Summary



6. Recommendations

The findings of this report clearly show there are significant opportunities for the regional PTR stakeholders to improve the PTR system. Options have been discussed that will help the PTR system avoid foreseen costs and risks. With these opportunities clearly identified, the issue becomes how to realize the savings.

CGI identified four basic alternatives, all of which address the major project initiatives. Each has its own set of unique challenges, risks, and benefits. For the project to succeed, it is imperative that the regional PTR stakeholders choose vendors that are not only technically competent, but experienced in the Energy Efficiency business domain.

Based on CGI's past industry experiences in the Energy Efficiency business domain and related industry best practices, CGI recommends that the following principles be followed to address the key drivers identified in section 4:

- Choose an enterprise grade programming platform, .NET or Java/J2EE being the two viable choices. CGI's preference is Java/J2EE for reasons already detailed in the previous section.
- Leverage best-of-breed open source technology whenever appropriate to save cost and boost system capability. The regional PTR stakeholders should only use industry leading and proven technologies/products to avoid unnecessary risks.
- Start with a flexible and properly normalized data model, especially in key subject areas like measure catalog (separate savings from costs), program and funding source (introduce concepts like dynamic attributes so changes can be more flexible), rate period and funding cycle management etc.
- Architect a system with automated integration capability via web services, ETL or similar technologies.
- Be sure to logically separate the transactional processing database component from the reporting component.
- Introduce customizable templates and workflow capabilities to handle complex custom projects.
- Focus on system usability by utilizing robust AJAX user interface widget library (effective tabbing, auto-complete data field etc.), streamline navigation pattern and reduce manual data input.
- Create a robust system administration interface to better address maintenance tasks. For example: management of certain volatile business rules; changes to reference data without coding changes; permitting direct data edits via SQL database operations.
- Include document management capabilities in the system design from the inception.
- Include a dedicated reporting service engine in the system design from the inception. SQL is only suitable for simple ad-hoc reporting purposes.
- Require the hosting vendor provide dedicated hosting hardware/software for the PTR system to avoid unnecessary "spill-over" from co-hosted systems.
- Maintain the new system by replacing technologies/products as they are about to enter "obsolete" stage.

In addition there are several functional recommendations that CGI believes will support better business practices, and result in a robust PTR system.

ProCost

CGI's recommendations will focus on those three usage patterns:

- For ProCost, from an industry best practice perspective, ProCost should be built as an integral component of the tracking system. Measure catalog and associated savings and cost data are

critical components of any tracking system. Building ProCost as a component of the system will greatly improve ProCost maintenance and reduce measure data errors.

- For offline calculators, it would be possible to build online Excel-like web-based e-spreadsheet using a modern .Net/J2EE platform. But users have expressed a desire to keep the calculators portable and offline. Anticipating the user resistance and additional programming cost, CGI recommends keeping the calculators offline. Longer term, it may be possible to build the online e-spreadsheet calculator to introduce users with the capability and help them migrate gradually.
- For Excel data extraction, it's essential for the new system to keep and enhance the ability for users to extract data into Excel. The current size limitation placed on exports is due to the aging platform and can only be addressed if a new platform is introduced.

Finally, it is extremely important to note that regardless of the alternative selected, the regional PTR stakeholders must take a holistic view to deal with the expected changes for the coming rate period. Completion of the proposed updates to the technology platform by itself is not a panacea. A sound technology choice must be coupled with business process reengineering (including appropriate change management) that will enable the regional PTR stakeholders to manage business and risks effectively.

7. Appendix – Additional Vendors

CGI has conducted a high level assessment of the following vendors that are offering service in the Energy Efficiency business domain that might have a COTS product that merits further evaluation.

- Conservation Services Group (<http://www.csgrp.com/>)
- crmOrbit Inc. (<http://www.crmorbit.com/index.html>)
- Frontier Associates LLC (<http://www.frontierassoc.com/>)
- Nexant Inc. (<http://www.nexant.com/>)
- Paragon Consulting Services (<http://www.paragonconsultingservices.com>)
- The Cadmus Group (<http://www.cadmusgroup.com/>)
- Savant Technologies
- IBM (<http://www.ibm.com>)
- KEMA (<http://www.kema.com>)
- Vertex Group (<http://www.vertexgroup.com/>)
- ICF International (<http://www.icfi.com/>)
- Energy Solutions (<http://www.energy-solution.com/>)
- Cognizant Technology Solutions (<http://www.cognizant.com>)
- Oracle (<http://www.oracle.com>)
- SAP (<http://www.sap.com>)

To the best of CGI's knowledge, none of these vendors currently offer an Energy Efficiency package solution capable of meeting the PTR project requirements. This coincides with CGI's understanding that the EE market is highly fragmented and business requirements are very diverse because of differing state regulations and utility company requirements/infrastructure/standard/preferences. Therefore, no vendor can offer a mature, EE program all-in-one COTS product capable of meeting the requirements of so diverse an audience. There is also a lack of critical mass for development of a standard set of EE program requirements that can justify a vendor's investment for development of a COTS product. However, it would be reasonable, based on their experience, to select candidates from these vendors to participate in the RFP process for the selected replacement alternative.