Multi-Criteria Decision Analysis: Managing Uncertainties in Program Energy Savings Cost-Effectively

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ABSTRACT

This paper is a synopsis of a study sponsored by BC Hydro to map and analyze the business process for the implementation and evaluation of its Power Smart Partner program, which offer a suite of energy efficiency services to large C&I customers. It describes a process for identifying the risks and uncertainties facing energy efficiency projects, assessing their relative importance, and instituting appropriate mechanisms to mitigate their likely impacts on program performance in the context of conventional portfolio management techniques. The Analytic Hierarchy Process (AHP), a method for analyzing decision situations involving multiple criteria (attributes) and multiple decision makers was used to characterize various risk factors and to develop estimates of the range of probable impacts they might have on the program's performance. The results of the study showed that the program's existing risk management procedures help improve reliability of savings by approximately 65%. Measure performance and persistence of energy savings were found to be the most important risk factors and, therefore, should be the primary focus in risk management. On-going M&V were identified as the most effective strategies for managing uncertainties in energy savings. Inspections and credit checks did not appear to be particularly effective. Credit checks also have the greatest adverse effect on customer relations, followed by financial and technical reviews. The study further found that the adverse effects of many of the identified risk factors are likely to be offset by the expected increase in future avoided costs, which enhancing the value of the saved energy by as much as 30%.

Introduction and Background

BC Hydro's demand-side management (DSM) programs are planned, implemented, and managed through the Power Smart organization. The Power Smart Partner Program (PSP) is the organization's flagship program. It has been one of the largest, most active and successful demand-side management initiatives in North America and is regarded as one of the best energy efficiency programs in its class. Through a unique alliance arrangement with vendors and suppliers and partnering agreements with commercial, governmental and industrial customers, PSP offers a combination of energy-efficiency resource acquisition and market transformation services. It relies on education, technical assistance, financial incentives and credits for self-directed energy management practices to bring about lasting change in the market. PSP participants are also offered an "e-Points" bonus, which is designed to recognize and reward the largest commercial and industrial customers who achieve a minimum of 5% in aggregate electrical efficiency improvement across all of their accounts. Since its launch in April 2002 through March 2005, PSP had succeeded in establishing over 460 partnerships that have produced nearly 700 GWh of cost-effective savings, exceeding the program's target by over two folds at approximately 80% of the expected cost. The program's annual savings goals through 2011 are expected to increase to a level equivalent to nearly one-half of the identified achievable potentials in BC Hydro's non-residential sector.

In light of the Program's relatively aggressive goals, there was a growing concern within the Power Smart organization regarding certain institutional and procedural barriers that might hamper PSP's ability to fully realize its savings targets and customer satisfaction goals. In spite of the program's demonstrated past performance, it was expected that marketing efforts would have to be intensified, and resource acquisition costs would likely rise over time as low-cost savings opportunities are exhausted and the early-adopter markets are saturated.

Late in 2005, the Power Smart Evaluation and Quality Assurance Department launched a comprehensive review and assessment of the PSP's application and implementation processes. The project was motivated principally by an interest in identifying areas where process efficiencies might be enhanced without compromising the Power Smart organization's high standards of due diligence and risk management. A preliminary step in this review was to develop a clear understanding of the application and implementation processes that were in place, to articulate their purposes, and to assess their effectiveness in achieving the program's strategic intent of maximizing the value of Program savings and enhancing customer relations, while minimizing exposure to financial and regulatory risks. The evaluation was in part guided by the quality management guidelines set forth in ISO 9000.[1]

Implementation of PSP has a complex process involving various specialized functions and procedural steps. Planning, marketing and implementation responsibilities are carried out by six specialized units within the Power Smart organization. The Business Marketing Unit is responsible for program design, planning, management and reporting energy savings. The sales team (Key Account Management [KAM]) is responsible for direct marketing the Program to customers, managing customer relationship, and tracking progress on individual projects. These activities are tracked through the sales management system, called "Converge." The Program Delivery Unit administers the application approval processes and manages and coordinates data transactions among Alliance consultants and contractors, Power Smart's Technology Solutions, the and Incentives & Rates (I&R) Units. This information is documented electronically using the Web-based Delivery Tracking System (WDTS).

The Technology Solutions (TS) Unit conducts technical review of energy studies and incentive applications and is responsible for post-installation inspections and measurement and verification (M&V) of funded projects. The I&R Unit has ultimate responsibility and accountability for due diligence and risk management on all projects. It is accountable for financial review, cost-effectiveness analysis, and final approval of energy study and incentive applications. The I&R Unit also approves incentive payments. Finally, the Evaluation and Quality Assurance (Evaluation/QA) team conducts regular process and impact evaluations of the Program and is responsible for overall quality assurance.

The process review began with a review of Program-related materials, including organization charts, Program description and procedures, planning and policy documents, contract forms, prior reports, and Power Smart's Web-based Data Tracking System (WDTS). Recognizing that analysis of a business process is best carried out as a participatory and interactive activity, a one-day workshop was held with representatives of various functional areas directly involved with the program. Staff in the Operations/Delivery group provided an initial process map, which was collectively reviewed during the workshop. To gain a better perspective on the roles, responsibilities, and views of staff in various functional areas, small group meetings were held with key PSP staff.

Understanding the views, expectations and requirements of BC Hydro's Corporate management on the program's operation and implementation processes was a key consideration in this review. In-depth interviews were therefore held with managerial staff in the Corporate finance, treasury, and risk management organizations. To provide context for the review, additional information was gathered from publicly available documents, such as best-practice reports, program filings, and interviews with seven

[1] There are eight quality management guidelines set forth by the ISO-9000: customer focus, leadership and accountability, involvement of people, process approach, systems approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationships.

utilities and publicly-funded demand-side management organizations (System Benefits Charge Administrators) in the United States offering comparable programs.[2]

Risk Management and Due Diligence

Many of the procedures governing PSP's application processing and implementation activities are designed as measures to protect BC Hydro against risks and uncertainties inherent in demand-side management investments. This focus on risk management reflects BC Hydro's commitment to satisfy the B.C. Utilities Commission's concerns about due diligence and to demonstrate prudence of its DSM investments to customers and other stakeholders. The process review, however, showed that many of these procedures add time, complexity, and additional resource requirements to the PSP implementation process. Some of these would also cause negative reactions among customers and trade allies that could lead to lower rates of program participation. Consequently, it was critical to begin by developing a better understanding of the likely risks emanating from the program and to find the best balance of risk mitigation, customer relations, and program participation rates. Four classes of risks were investigated:

1. Performance Risks
   - Availability
     - Technical (project design, measure quality, proper installation)
     - Behavioral (take-back, change in business operation)
   - Reliability
     - Persistence of Savings (measure life)
2. Market Behavior
   - Free-ridership
   - Stranded Investment (business continuity)
3. Resource Value Risks
   - Load Uncertainty (forecast errors)
   - Avoided Costs (market price)
4. Regulatory and Public Relations Risks
   - Prudence
   - Cost Recovery
   - Equity

Performance Risks

Risks in performance originate from a number of technical and behavioral sources and may affect both availability and reliability of energy efficiency as a resource. Errors in *ex-ante* technical assessment of project savings and measure under-performance related to poor quality and improper installation can have a significant effect on realization of savings. Similarly, behavioral changes such as take-back (the tendency of participants to increase consumption in response to lower effective costs) and changes in business operations (such as increases in operating hours) can reduce expected energy savings. Although more careful assessment of energy-efficiency technologies and enhanced M&V procedures have significantly improved program designers' ability to accurately determine the energy savings of various energy-efficiency measures, recent evaluations of energy-efficiency programs in

[2] PacifiCorp, National Grid, the Energy Trust of Oregon, California Energy Commission, NYSERDA, New England Energy Efficiency Partnership, and Wisconsin Focus on Energy.

North America, including PSP, have shown that actual impacts often do fall short of design expectations.

Market Behavior Risks

Behavioral uncertainties in utility-sponsored energy-efficiency programs arise principally as a result of potential free-ridership (projects that would have been implemented without utility incentives) and spillover (projects or measures that were implemented as a result of the program but received no program funding) effects. These effects are often addressed in benefit/cost analyses by adjusting the *ex-post* savings by a net-to-gross ratio (or savings realization rate). These adjustments can be especially important when programs are evaluated from the perspectives of ratepayers and the utility.[3]

Savings estimates that do not factor in the probable effects of remodeling, renovation, business closings, and turnover can lead to erroneous expectations for energy-efficiency resources. Business continuity, or the expected longevity of the participants' business can dramatically affect energy-efficiency benefit/cost calculations and result in stranded investment risks, which can be of particular concern with large industrial and commercial customers that have projects in which the utility has made sizable investments. Although good market intelligence and current knowledge of customers' operations, plans and prospects may go far in informing the utility's investment decision, in reality, the utility has only limited means of predicting, let alone averting, events such as closure and/or relocation of industrial plants or tenant turnover in commercial buildings.

Resource Value Risks

In evaluating energy-efficiency risks, it is equally important to take into account uncertainties in future loads and avoided costs since they determine the value of energy efficiency. Clearly, if loads fall below forecast levels, the need for energy-efficiency resources will diminish, thus lowering their value. On the other hand, if loads exceed forecasts then the value of energy efficiency will increase. Similarly, the value of energy-efficiency resources depends largely on avoided costs of generating energy in the future, and is thus subject to uncertainty, particularly where a market price curve is used to evaluate energy-efficiency resources.[4]

Projections of the value of energy savings - and their cost effectiveness - clearly depend on expectations of future movements in market prices, while the realized value depends on what market prices actually do. If market prices rise above the forecast levels, the value of energy-efficiency resources will increase. Conversely, lower than expected market prices will diminish the future value of energy-efficiency investments.

Regulatory and Public Relations Risks

Outside the complexities of how well energy-efficiency programs perform lies another area of concern, namely, the necessity of establishing prudence in the regulatory and public arenas. Proof of due diligence in managing program costs and justifying expenditures are of paramount importance for the purpose of cost recovery, as well as managing public perceptions. Moreover, since program costs are recovered through rates paid by all customers, participants in energy-efficiency programs stand to gain

[3] The BCUC generally requires evaluations to be performed on the basis of total resource cost (TRC) and rate impact measure (RIM) criteria. BC Hydro also uses the utility cost test when formulating the business case for the program.

[4] Avoided costs are generally determined either administratively or are market-based. Reliance on market price curves as a proxy for utility avoided costs has become increasingly common since the advent of deregulation and market reform in the electric utility industry in the early 1990s.

significantly more than those who either have not been offered the opportunity or are unable to participate in the utility's programs; thus leading to potential inequities resulting from inter- and intra-class subsidies. Intervention mechanisms, such as increasing participants' cost sharing responsibility, can help alleviate the problem. However, as the participants' share of costs increases, they are less likely to participate in the program, which can affect the program's ability to meet its targets.

The Portfolio Perspective

Applying a portfolio management approach becomes especially relevant when energy-efficiency resources are included in the mix of resource options as required in the least-cost planning framework. In a portfolio management context, planners need to evaluate all resource options, taking into account the full range of uncertainties that affect the value of each resource so that their risk-adjusted values may be determined.[5] The results of the process review indicated that several of the risk mitigation measures take by Power Smart were either overly aggressive and in some cases the levels of resources dedicated to them appeared incommensurate with the severity of the risk they aimed to address. Moreover, risks were in all cases treated asymmetrically without taking into account the upside potentials of other factors such as probable increases in future avoided costs. The results of the review suggested that the current risk assessment and mitigation approach could be improved in at least three respects.

First, it is important to recognize the relationship between severity (materiality) of the risk and returns on investment (mitigation costs). Severity of each risk needs to be determined on the basis of its probability of occurrence and its potential negative impacts, that is:

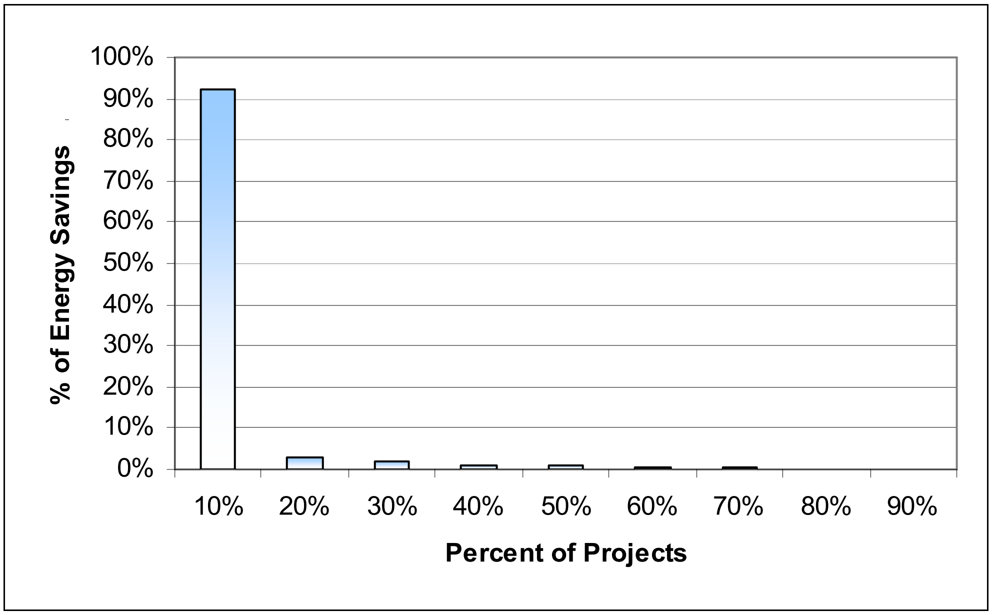
$$\textit{Risk Severity} = (\textit{Probability of Occurrence}) * (\textit{Potential Negative Impact})$$

Significance and materiality of risks vary depending on the type of risk, market segment, and program design. Managing program risks can be significantly improved through a systematic assessment that takes into account severity of risks, identifies appropriate levels of intervention that are commensurate with materiality of the risk, and, more importantly, balances benefits accruing from mitigation against its costs and potential adverse consequences such as customer dissatisfaction.

An analysis of the data available on completed PSP projects demonstrated the highly skewed distribution of the savings. As seen in Figure 1, approximately 10% of the completed projects were found to account for over 90% of the savings. Clearly, uncertainties in the top 10% of the projects pose the greatest risk. The potential payback from controlling the risk in the top 10% tier, thus could easily outweigh the risk exposure of savings from the remaining 90% of the projects. In this case, an obvious misallocation or resources could result if the same levels of risk management are applied to all projects. Second, certain risks, such as free-ridership and take-back, are difficult to quantify. These types of risk are best managed through program and incentive design such as the minimum pay-back requirement for project approval. PSP's past program evaluations have been an effective means of assessing these risks and a 5% free-ridership adjustment to savings is currently incorporated in the PSP's business case.

[5] On the supply side, at least six types of risks are typically considered: capital risks, production tax credit risks, fuel price exposure, CO_2 tax exposure, market exposure, and load uncertainty. For example, see the recent integrated resource plan filings of Idaho Power and Northwestern Energy.

Figure 1. Distribution of PSP Energy Savings



Finally, procedures for assessing risks needs to into account the probability distribution of risk factors, instead of relying on point estimates and treat risks symmetrically by considering the uncertainties related to the future value of energy efficiency resources, such as forecast errors and uncertainties in future avoided costs. Approaches to assessing and managing risks thus would benefit considerably by applying systematic portfolio modeling methods based on Monte Carlo simulations to assess the probable ranges for all relevant risk factors.

Methodology

For the purposes of evaluating the importance of risks associated with the Program's savings realization, as well as the effectiveness of various currently employed risk mitigation strategies, a multi-tiered Analytic Hierarchy Process (AHP) approach was utilized. AHP is a mathematical technique for estimating the relative importance or effectiveness of various factors in the decision making process using pair-wise comparisons. This approach makes it possible to analyze complex decision processes utilizing comparative judgments of respondents. In essence, AHP provides a framework for evaluating complex questions by breaking them into smaller, simpler and more manageable questions. For example, it is difficult for a respondent to directly answer a question such as: "Do you prefer a Mercedes to a Honda." However, respondents may easily offer a response in terms of their preferences for certain attributes of each alternative such as comfort, performance, or cost. A follow up question is then asked that prompts the respondent to indicate, on a scale of 1 to 9, their *level* of preference for, or relative *importance* of one option compared to others. Figure 2 illustrates the scaling of preferences in AHP.

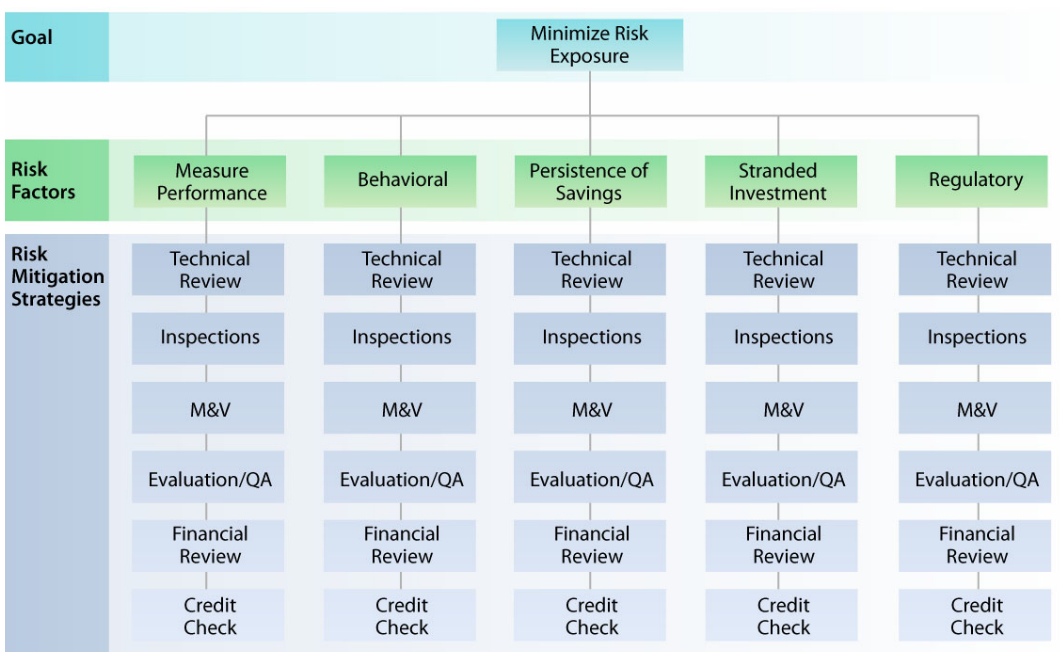
Several analytic tools are available for multi-attribute decision analysis, the main advantage of AHP is the simplicity of its underlying logic and its ability to assess the importance and effectiveness of the individual attributes and criteria in achieving a larger goal. Most importantly, the pair-wise structure of AHP questions simplifies the process of answering questions by respondents. The multi-tiered AHP analysis was used to assessed both the importance of various risk factors, as well as the effectiveness of various risk mitigation strategies. Figure 3 provides a visual representation of the hierarchical process.

Figure 2: Analytic Hierarchy Process Scales

1= One item is	EQAULLY	as	important	as	the other
3= One item is	MODERTELY	more	important	than	the other
5= One item is	STRONGLY	more	important	than	the other
7= One item is	VERY STRONGLY	more	important	than	the other
9= One item is	EXTREMELY	more	important	than	the other

(2,4,6, and 8 = intermediate values)

Figure 3: Analytic Hierarchy Process Structure



The results of these two tiers – evaluations of effectiveness of risk mitigation strategies and importance of risk factors – were then combined to offer insight into the relative effectiveness of each mitigation strategy to help ensure PSP savings realization. In addition, a separate set of AHP questions addressed the potential adverse effects of implementing each risk mitigation strategy on customer relations.

The set of responses regarding the effectiveness of risk mitigation strategies are then coupled with responses indicating the importance of each risk factor associated with reducing realized savings. Individual responses can be aggregated across the entire sample of respondents to ascertain the respondents' collective choices. The final results provide a set of "weights" that not only rank the effectiveness of each strategy at minimizing overall exposure to risk, but also quantitative information on the differences in effectiveness of various strategies. Since the resulting weights sum to 1.0, the methodology makes it possible to infer that a strategy with a weight of 0.4 is twice as effective as a strategy with a weight of 0.2.

Survey Sample

In an attempt to gain the broadest insight possible, the AHP questionnaire was administered to 35 respondents within the Power Smart organization's various units, with 18 completed responses (Table 1). Although the response rate was lower than expected, all organizational units were adequately represented. It is also important to note that unlike other statistical methods, AHP results are not sensitive to sample sizes. What is important is that all participants in the decision process be represented.

Table 1: Survey Respondents by Organizational Unit

Organizational Unit	Respondents	Percent
Program Management	1	6%
Quality Assurance and Evaluation	4	22%
Marketing	3	17%
Program Delivery	2	11%
Technical Solutions	4	22%
Business Systems	1	6%
Incentives and Rates	2	11%
Distribution Finance	1	6%
Total	**18**	**100%**

Findings and Conclusions

As noted earlier, the AHP methodology employed for this analysis was multi-tiered – evaluating both the importance of the identified risk factors and the effectiveness of existing risk mitigation strategies. The results of both tiers were then combined to determined the effectiveness of each risk mitigation strategy at reducing risks associated with realizing overall program savings. The results of each tier, as well as overall results, are summarized below.

Importance of Risk Factors

To determine the importance of each of the five risk factor associated with realization of PSP savings, the second tier of the AHP analysis asked respondents to compare the relative importance of each factor. The results of this comparison are provided in Table 3. Based on the survey results, the perceived severity of various risk factors range widely across the five examined factors. The results clearly demonstrate that Measure Performance and Persistence of Savings (0.33 and 0.35, respectively) are the most important risk factors, and therefore, should be the primary focus in risk management.

Table 3: Importance of Risk Factors

Overall Goal	Measure Performance	Behavioral	Persistence of Savings	Stranded Investment	Regulation
Savings Realization	0.33	0.15	0.35	0.08	0.09

Effectiveness of Risk Mitigation Strategies

Table 2 below lists the estimated weights for the effectiveness of the six risk mitigation strategies with respect to each of the five identified risk factors. Generally, M&V, Evaluation/QA and Financial Review were found to be highly effective across all risk factors, while Technical Review, Inspections and Credit Checks were generally found to be less effective (in descending order of effectiveness). For example, with respect to measure performance risks, M&V scored highest (0.30), while with respect to Behavioral risks, Evaluation/QA produced the highest weight (0.32). Again, the risk mitigation weights for each risk factor sum to 1.0, and it is possible to state, for example, that M&V (0.20) is perceived by respondents as four times as effective as Credit Checks (0.05) with respect to reducing risks associated with the persistence of savings.

Table 2: Effectiveness Weights of Employed Risk Mitigation Strategies by Risk Factor

Risk Factors	Technical Review	Inspections	M&V	Evaluation/QA	Financial Review	Credit Check
Measure Performance	0.19	0.10	0.30	0.18	0.18	0.04
Behavioral	0.13	0.11	0.18	0.32	0.21	0.06
Persistence of Savings	0.17	0.09	0.20	0.30	0.19	0.05
Stranded Investment	0.13	0.10	0.20	0.25	0.22	0.09
Regulation	0.15	0.10	0.18	0.27	0.24	0.06

Overall Results

Having determined the effectiveness of each risk mitigation strategy with respect to each of the five risk factors, as well as the relative importance of those risk factors, it is possible to aggregate the AHP findings to determine how effective each strategy is at reducing the Program's risks in achieving its savings. As shown in Table 4, Evaluation/QA and M&V (0.25 and 0.23, respectively) were identified as most effective. Financial Review and Technical Review (0.20 and 0.17, respectively) were also found to effectively mitigate risk the Program's savings risks. Inspections and Credit Checks, on the other hand, were not found to be particularly effective.

Table 4: Effectiveness of Risk Mitigation Strategies in Achieving Program Savings

Overall Goal	Technical Review	Inspections	M&V	Evaluation/QA	Financial Review	Credit Check
Savings Realization	0.17	0.10	0.23	0.25	0.20	0.05

In addition to the AHP questions outlined above, respondents were also asked to estimate the percent of total program savings they believe would be at risk if BC Hydro did nothing to mitigate risks. For example, respondents noted that if BC Hydro did not take any actions to combat the risks associated with measure performance, overall program savings would be reduced by an estimated 24%. Table 5 provides similar assessments for the other four risk factors. Note that the sum of the reductions is 65%. In essence, these responses may be interpreted as follows: if BC Hydro did nothing to address any of the risk factors, the program would still achieve approximately 35% of its expected savings.

Table 5: Magnitude of Risk Factors

	Measure Performance	Behavioral	Persistence of Savings	Stranded Investment	Regulation
Average Savings Reduction	24%	13%	15%	5%	8%

Applying the AHP results to the estimated potential reductions in savings offers insight into the ability of each strategy to address potential impacts of each risk factor. Using the same AHP logic as above, the effectiveness of each mitigation strategy on reducing various risks was applied to the estimated reduction in savings for each risk factor to determine the percent of savings each risk mitigation strategy ensured. Figures in Table 6 can be interpreted in a similar way as those in Table 5. Again, the sum of the weights is 0.65. Evaluation/QA and M&V collectively prevent a reduction of 31% of program savings, while Inspections and Credit Check combined can be expected to prevent only a 10% drop in savings.

Finally, respondents were asked a separate single-tier set of AHP questions regarding the impact of various mitigation strategies on customer relations. Specifically, each respondent was asked which mitigation mechanism is likely to have the greater adverse effect on customers. As shown in Table 7, Credit Checks were found to have the greatest adverse effect on customer relations (0.30), followed by Financial and Technical Review (0.22 and 0.18, respectively).

Table 6: Program Savings Achieved by Risk Mitigation Strategy

	Technical Review	Inspections	M&V	Evaluation/QA	Financial Review	Credit Check
Savings Realization	11%	7%	15%	16%	13%	3%

Table 7: Program Savings Achieved by Risk Mitigation Strategy

	Technical Review	Inspections	M&V	Evaluation/QA	Financial Review	Credit Check
Savings Realization	0.18	0.07	0.15	0.07	0.22	0.30

Future Avoided Costs

While the AHP questions constituted the bulk of the survey, respondents were also asked regarding their future expectations of avoided costs. The majority (87%) indicated that they believed avoided costs would increase over the next 10 years and two respondents expected them to remain relatively stable. Estimates varied as to the extent of expected increases in avoided costs (Table 8). While one respondent felt avoided costs would double, the majority of respondents predicted a 20% increase in avoided cost over the next decade. Overall, the average expected increase in future avoided costs was 29%.

Table 8: Magnitude of Avoided Cost Increase Over 10 Years

Interval	Number of Respondents	Percent of Respondents
1% to 10% Increase	1	8%
11% to 20% Increase	7	58%
21% to 30% Increase	3	57%
31% to 40% Increase	-	-
41% to 50% Increase	1	44%
51% to 60% Increase	-	-
61% to 70% Increase	-	-
71% to 80% Increase	-	-
81% to 90% Increase	-	-
91% to 100% Increase	1	78%
Average	**15**	**29%**

This finding suggests that, based on the respondents' point of view, the avoided future costs that form the basis for valuation of savings is more likely to increase, thus enhancing the value of conservation resources by as much as nearly 30%. The implication here is that, even if we were to assume that 30% of the savings remain at risk, the value of the associated non-realized savings is likely to be offset by future increases in avoided costs.

Recommendations Resulting From the Findings of the PSP Process Review

The findings suggest that changes to the risk management process required to improve the effectiveness and the efficiency of delivery of the program be put into effect at the earliest opportunity.

The following actions were recommended:

1. Establish thresholds for credit checks and apply credit checks selectively. For example, establish a minimum incentive level before credit checks are undertaken, and exclude some market sectors such as government and institutional facilities.

2. Re-examine the level of rigor in the performance of technical reviews. Use more information obtained from past M&V and Evaluation activities to support standardized measure savings estimates at the project level and aim for continuous improvement to estimates through M&V and Evaluation.

3. Consider sampling the inspection of small projects and a census for larger projects over an established threshold.

4. Apply M&V selectively to all large projects (establish an appropriate threshold) and sample smaller projects. For very small projects, use engineering estimates and deem the energy savings. In addition remove the link between M&V results and incentive payments.

Actions Taken by BC Hydro in Response to These Recommendations

1. Credit Checks
   A threshold of $100,000 has been established before credit checks are performed, and they are no longer performed for government and institutional customers.

2. Technical Reviews
   The recommendation to review the level of technical review process for projects has not been acted on at the time of writing, but is under active consideration.

   It was decided to start this process by narrowing the focus to a single end use area. HVAC systems were selected as the area of focus and several recommendations were made and have been acted upon. In summary it was decided to add a number of mechanical items to the component based incentive offering (Product Incentive Program). A listing of measures proposed to be added to PIP (some are complete/some still in progress):

   - Advanced Evaporative Cooler
   - Air Conditioners
   - Air to Air heat pumps
   - Chillers
   - Door Gaskets (SPC)
   - Efficient Evaporator Fan Motor (SPC)
   - Evaporative Fan Controller for Walk in Coolers (SPC)
   - Free Cooling
   - Ground Source Heat Pumps (closed and open loop)
   - Hydronic heat pumps
   - Night Covers for refrigeration display cases (SPC)
   - Premium motors
   - Pumps
   - Reflective Window Film (SPC)
   - Strip Curtains for Walk in Boxes (SPC)
   - Tank Insulation
   - Variable Speed Drives (Already in PIP, but can be expanded)

3. Inspections
   A threshold for inspections has been established for projects with electricity savings >300,000 kWh/year. For projects with savings below this number, a minimum inspection rate of 20% has been established. For projects with electricity savings of >300,000 kWh/year of electricity savings, inspections are conducted for 100% of sites, but on-site inspection is based on a sample of the relevant measures.

4. M&V

- Incentives are not linked to M&V results for projects =/< than 300,000 kWh in size
- Incentives are not linked to M&V results for projects 300,000 < 500,000 kWh in size and the incentive is <$100k
- Final 25% of incentive is linked to M&V result for projects >500,000 kWh in size and the incentive is >$100k
- M&V is not performed on projects =/<300,000 kWh in size
- For projects >300,000 kWh in size, M&V is performed on all projects EXCEPT for lighting projects 300,000 < 500,000 kWh in size. For these lighting projects, 4 out of 10 are randomly sampled for M&V
- M&V is not performed on Consultative savings projects
- Evaluations are used to assess the energy savings from consultative projects.