Out from Under the Trees—Successful Energy Conservation Accomplishment Reporting Mechanisms

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ABSTRACT

This paper describes an exemplary conservation accountability system for a major municipal electric utility in the Pacific Northwest. Systematic conservation reporting mechanisms provide multiple benefits to the energy utility and, by extension, to any organization providing utility demand-side management services. The foundations for excellent conservation accomplishment reporting are laid in reliable financial accounting and program database systems, in deliberate program evaluations, in annual program performance audits, and in structured tools for generating higher level summaries. These tools are given added value by regular, cumulative reporting and publication. The historical perspective afforded by these mechanisms allows for informed projections of technical potential served and unserved, and pinpoints emerging trends and gaps in service. A systematic approach to accountability reporting hands managers a persuasive tool that establishes credibility, documents strategic achievements, explains conclusions and decisions, and guides policy.

Why Come Out from Under the Canopy?

A systematic conservation reporting mechanism provides multiple benefits to the energy utility. Stepping back to view the forest of demand-side management (DSM), with a comprehensive reporting mechanism in hand the utility can track changes over time, see trends, and act on emerging gaps not being served. This tool can be used to continually update utility programs and services. Most importantly, a systematic mechanism enables the utility to identify broad overall strategies and opportunities, going beyond the typical program-specific evaluation focus down under the canopy. Lack of an overarching accountability system can jeopardize the utility's ability to manage energy conservation programs and provide meaningful or persuasive feedback to planners, policy analysts, and decision-makers. Regular maintenance of accountability structures also captures collective knowledge and enables succession planning, as the DSM work force turns over and ages. Seattle City Light embodies much of its collective conservation knowledge in the *Energy Conservation Accomplishments* (ECA) report, which is the major document produced out of the accountability system.

An independent evaluation of Seattle City Light operations states that, "In our view, the *Energy Conservation Accomplishments* report is one of the best utility DSM reporting mechanisms we have ever seen. The report is well laid out, easy to follow, and provides the capability for an external, independent review of conservation program performance." (Khawaja et al. 2001)[1] Based on a decade of continuity and expertise in preparing this annual historical document, the underlying analytical structures and protocols, and other government reports based on the accountability system, the evaluator-editor offers this description in the hope to support similar processes at other utilities. The remainder of this paper describes the ECA report, explains some of the underlying concepts, structures and protocols, and lays out a schematic of how it is put into action to reassess all aspects of the utility's conservation endeavor.

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[1] Khawaja (et al 2001) also goes on to state, "In fact, *quantec* is currently conducting a similar program review for another utility, but the lack of report or database that summarizes conservation accomplishments is jeopardizing our ability to provide meaningful feedback."

On the Surface: The ECA Report

The Energy Conservation Accomplishments (ECA) report is a historical monitoring and performance measurement tool, not an evaluation of programs, although it draws upon the results of numerous evaluations. The report (see Tachibana & Pearson 2001)[2] provides a cumulative historical view of the conservation and efficiency mission at Seattle City Light. This report has been updated and published annually for over 20 years by the utility's evaluation unit. The cumulative record compiles detailed performance data for a quarter century of both active and discontinued energy conservation programs. Seattle City Light has made it a practice to publish the ECA report within the City, and also disseminates it upon request to outside parties and organizations. Each year upon print publication, three copies of Seattle City Light's ECA report are filed with the Seattle Public Library in the Government Publications collection. These copies are available as references to the general public. The report is now also posted on the utility Web site in Acrobat Reader (.pdf) format to further the goal of public dissemination. Within City government the report is made available in print and on compact disk (CD).

Underlying the ECA report are structured tools, conceptual definitions, and process protocols. Annual database audits minimize double counting or undercounting (gap) errors. The supporting documentation, presented in hundreds of footnotes, is a major strength of the report for evaluators and managers. The footnotes allow the serious user to probe into sources of data or estimates, any necessary adjustments, assumptions, and other contextual comments. Estimation of project impacts draws upon many evaluation studies performed by the utility's in-house evaluation unit. The final section of the ECA report contains a bibliography of conservation-related studies performed at the utility since 1980. This listing of over one hundred publications includes process and impact evaluations of residential and commercial-industrial programs, as well as cross-sector and miscellaneous research projects, the annual historical accountability reports, and papers published in other books, journals, and conference proceedings.

The structured tools used to produce the ECA report also enable government reporting[3] to the Federal Energy Regulatory Commission (FERC) and the U.S. Department of Energy (DOE), as well as auditable statements of net public purpose spending in relation to retail electric sales. Along with the underlying structural tools used to produce it, the ECA report remains the sole comprehensive performance monitoring mechanism for conservation at Seattle City Light. This section of the paper will describe the report; the following section will explain the accountability structures and processes that lead to report production.

Along the Trunks & Branches

The ECA report is laid out to reflect the utility's organization of conservation programs by sector and 'umbrella' program identities.[4] The ECA report has four chapters describing the programs, as well

[2] Prior editions also include contributions from B. Coates, J.C. Shaffer, M. Little, D. McLaughlin, J. Nelson, W. Adefris, D. Sumi, R. Bradley, T.M. Newcomb, and C. Weiss.

[3] Such federal reports include the FERC form EIA-861 Schedule V, "Annual Electric Power Industry Report: Demand-Side Management Information" and the DOE form EIA-1605, "Voluntary Reporting of Greenhouse Gases."

[4] The utility offers many programs and efficiency services organized under 'umbrella' identities that make conservation support appear relatively seamless to customers. For example, the Built Smart umbrella-program offers separate multifamily new construction paths for market-rate developments, affordable housing, and nonelectric projects requiring lighting and/or appliances only. The Multifamily Conservation Programs offer separate paths for to enroll standard-income, low-income, and common-area lighting projects. The Energy Smart Services umbrella-program encompasses standard incentives, customer incentives, tailored agreements, facility assessments, design assistance, commissioning services, and so forth. The utility also offers stand-alone programs that advance the efficiency, for example, of specific appliances or lighting technologies, or that target smaller-scale services to specific neighborhoods and client groups (like low-income customers).

as the opening chapter that sets them in context of the overall conservation endeavor, and the closing bibliography chapter. The report contains separate chapters for the residential and commercial-industrial sectors, which are further divided into active programs and discontinued programs. (The latter may continue to generate energy savings for the utility but no longer subscribe new participants.) These four chapters currently contain entries for six active residential, five active commercial-industrial, eight discontinued residential, and eleven discontinued commercial-industrial program entities.

Summation. Besides the program entries containing narration, tables, and footnotes, the ECA report begins with a summary chapter to ground these activities in context. This chapter provides a history of conservation planning and accomplishments at the utility, including extensive highlights and narratives for the most recent calendar year. Seattle City Light engages in many conservation activities to champion supply-side management, efficiency innovation, sustainability, market transformation, and other community benefits that do not fall under the purview of individual demand-side management programs. These narratives tell a fuller story of all those activities and endeavors. The summation chapter also 'rolls up' quantitative data from the individual program entries, by sector, presenting tables of participation, energy savings, expenditures, outside-agency funding, along with explanatory discussions. To these summaries the opening chapter adds tables and discussions of DSM staffing and budgets, customer excess cost and loan repayments, community benefits (including climate protection), customer bill savings, as well as indicators of productivity and progress toward conservation plan goals.

Program Entries. Within each of the four following chapters, entries for individual DSM programs follow a common format. Each program entry contains a narrative program description, a statement (and quantification where possible) of the eligible population, a statement of measure lifetimes, description and tables about participation and energy savings, description and tables about program expenditures and regional funding, and numerous footnotes to identify sources and provide supplemental details. To the extent possible, tables of participation, savings, costs, and funds share a structure that is parallel across programs. Some tables are modified to express unique program structures and service sub-sectors. The common elements of the four program chapters are electricity savings, expenditures, and funding.

Electricity Savings. Each program entry contains a section on participation and program impacts. The set of tables for electricity savings quantifies by calendar year the participants served and energy impacts. A program participant may be a unique project, building, building unit, or person. Energy impacts include first-year energy savings per participant, group energy savings in the year from cumulative participants, and the average load reduction in the year from cumulative active measures. Footnotes to the table also supply group totals of first-year energy savings for each annual cohort of new participants. In programs of long duration, tables may run across several pages. Separate tables may appear for programs that make a managerial distinction between contract activity and project completions (most importantly, in programs where participation may extend across two to five years).

Expenditures. Each program entry contains a section on the utility cost to deliver the program. The set of tables for expenditures quantifies by calendar year the utility expenditures, as defined by the City of Seattle financial management system. Categories of expenditure include program administration for Seattle City Light and for collaborating City agencies, and DSM measure, rebate, or incentive payments. Costs are reported as paid or accrued during the calendar year (including the closing 'thirteenth period' accounted for on December 31st of each year). Utility expenditures do not include encumbered budget authority extended from one managerial year to another. Reporting of DSM measure costs may be further differentiated into three categories: actual expenditures paid in year, total expenditures for projects completed in year (including prior year payments), and incentive payments committed by contract during the year.

Another facet of measure cost not reported in the program tables (but touched on in the footnotes) is customer cost. This reflects the portion of measure cost paid by customers that was not channeled through utility control (as when the customer has acted as their own installation contractor). Utility incentives are designed to cover costs that are incremental over alternative, less efficient choices, and sometimes an additional level of motivational incentive. Full installation costs may reflect the value to the customer of other amenities. However, the true incremental cost is often not known, while the full cost could exceed the minimum necessary to obtain the efficiency benefit; and in programs with a rebate format, the customer cost may also not be discernible or reported. For these reasons, estimates of customer contributions are documented solely in program entry footnotes or in the underlying reporting system. However, they are available for reporting in contexts that require them, as in some government reports.

Funding. Most program entries contain a section on outside funding for conservation, where a contractual relationship existed to purchase the resource from Seattle's municipal utility. For many years the only source of outside conservation funding was the Bonneville Power Administration, which partially reimbursed qualifying expenses from programs run along BPA guidelines. Revenues are also received from participating customers paying excess up-front costs for measure costs not covered under program protocols, when the utility serves as a general contractor directly paying installation contractors. Another source of revenue was from customers repaying utility loans for weatherization measures, the monies for which were protected by utility liens against their property. In accounting terms, these revenues were paid into the general utility fund and did not augment conservation budgets (except insofar as total utility revenues are used in setting divisional budgets). However, in some reporting contexts the contribution of these funds toward conservation acquisition is acknowledged and depicted. More recently funding has been received from the Northwest Energy Efficiency Alliance, and to a limited extent from other area utilities, to defray costs of operating a lighting design lab on behalf of the region. Accounting mechanisms have been changed to allow some of these funds to directly augment this particular operating budget. While BPA and outside funds are reported in the funding tables, customer excess cost payments and loan repayments are documented solely in program entry footnotes.

Underlying Structures: Into the Details

In order to produce the ECA report and information used to reassess the conservation endeavor, one must master the structural terms, tools, and protocols. This requires diving below the canopy to inspect the undergrowth. Figure A depicts an inverted monitoring tree, moving from data sources to end product, final-most of which is the ECA report. This tree is structured by the sources of data, collation processes (e.g., payment matching), the process for performing annual activity audits, sources of projections and estimates, the cross-linked workbooks with multiple parallel spreadsheets used to compile audit results, and methods to assemble the data into various reports. Protocols describe standardized decisions for handling processing and reporting dilemmas.

Following Cross-linked Pathways

Accountability reporting at Seattle City Light is a highly structured process that takes one from program files to forecasts, from technical potential to policy review. Some of this structure is revealed in the annual published ECA report on historical DSM activities. Other parts of the structure are only apparent from cross-linked spreadsheets that make up the analytical substrate for that report. At the source, multiple program and financial databases and files are tapped. Evaluators extract data to monitoring spreadsheets, for compilation and analysis for each DSM program. Cross-linked electronic spreadsheets facilitate further analysis, quality control, summarization, and reporting at the sector-level. Summaries at the utility level enter into other spreadsheets for calculation and annual reporting to federal agencies and the public.

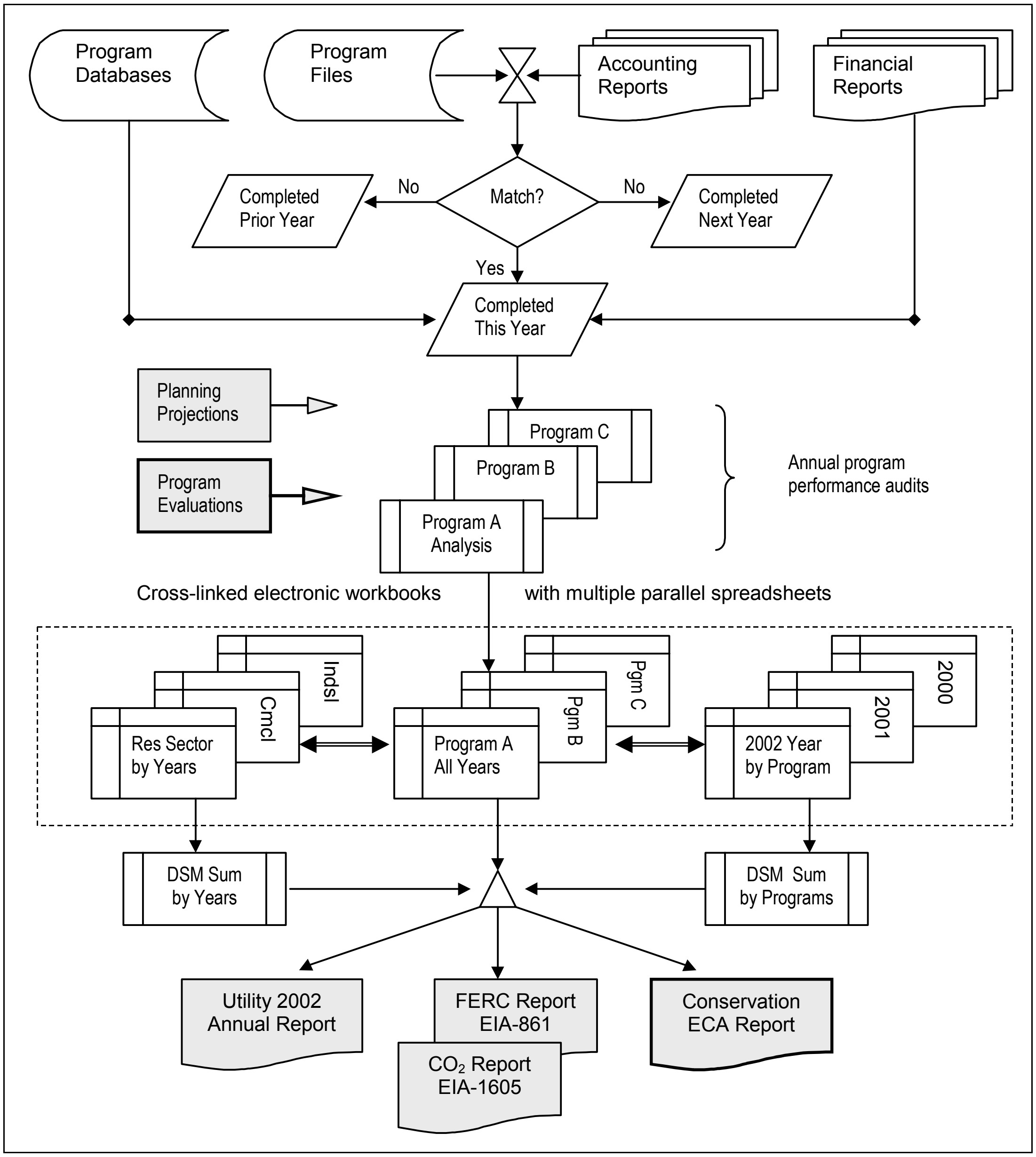


Figure A. Tracing the Inverted Monitoring Tree, from Roots (data) to Fruits (reports)

Raking the Twigs & Leaves

For evaluation of DSM program impacts, we in the business have become familiar with terms and adjustments like treatment vs. control group, pre- vs. post-measurement, gross vs. net savings, interaction, take-back, persistence, free riders, free drivers, spillover, market transformation, and so forth. When turning from evaluation to accountability systems, there is a new laundry list of terms and concepts to learn and apply (see Table 1). These concepts are important to understand the multiple paths to decision making at Seattle City Light, and how these have formed the mold for our DSM accountability reporting structures. These terms, concepts, and applications are ordered by protocols that transform data into information, and information into action. Beginning with three categories of cost, this information is used for resource management and future planning of conservation strategies, tactics and operations.

Table 1. Structural Concepts and Terms for DSM Accounting

Reporting Terms	Underlying Concepts	Applications
Program expenditures(administration, measures); Customer contributions	Cash flow and accrual (not budget encumbrance); customer excess cost	Cost calculation; setting incentive levels
Contracted vs Completed in year	Budget vs Job tracking; Staffing vs Resource acquisition	Productivity review; resource management
Completion approved vs Paid in year	Tracking vs Financial system dates	Legal/accounting definition; reporting gap management
Cumulative payments for completions in year	Alignment with completed savings	Cost-effectiveness calculation
Kilowatt-hour, megawatt-hour electricity savings (kWh, MWh)	Avoided energy generation or purchase	First-year, current year savings
First-year savings from current year participants	Organizational productivity	Acquisition pipeline, planning models, productivity review
Current year savings from cumulative participants	Resource in production; load impact	Planning, forecast models; trans. to customer bill savings
Median residual lifetime	Half-life; simplifying concept	Tracking savings depletion
Savings stream depletion	Persistence, measures degraded or taken out of service	Resource plan, forecast models
Cumulative savings over life of program	Historical retrospective; Viewpoint on scale of endeavor	Trans. to atmospheric impacts
Average megawatt savings (aMW)	Utility system load reduction (not peak reduction, in Seattle)	Expressed with T&D credit
Transmission & distribution credit (T&D)	Avoided line losses from generation or wholesale sources (5.2%)	'Busbar' savings, included in load reduction estimates
Levelized cost	Present value of savings over measure life at utility's real discount rate (3%)	Simple economic comparison of alternative resources
Nonenergy and non-economic benefits	Public good, customer amenity value, property value, business production, etc.	Complex economic analysis

Program Cost. Program cost information is used for budget tracking and resource management, utility cost measures, future financial planning and forecast models. The source for program cost data is the City's financial management system, as matched to program databases and files. (The matching process incidentally serves as a secondary quality control mechanism, as it occasionally identifies bookkeeping errors.) Program administration cost consists of staff labor, supplies, services, and associated overhead; these are accounted for in the calendar year when salaries and invoices are paid. Measure cost incorporates invoices for wholesale product purchases, and vouchers for payment on customer and trade ally contracts (which may include both incentive and customer 'excess cost' amounts). According to established accounting rules, invoices are considered 'paid' in the calendar year when work is 'substantially completed' (usually, inspected and approved for payment by program staff). If the payment check cannot be cut by year-end the expense is 'accrued' and considered the same as if paid from cash flow. However, approval dates in the conservation program database may not match accounting journal dates during year-end processing. For this reason it is a challenge each year to collate data sources and define projects actually 'completed' (paid) within the calendar year (see Figure A). Some journal entries are identified as 'encumbrances,' which are used to track budget-year authority locked into specific multi-year project commitments that have not met the accounting definition for 'substantially completed.'[5]

[5] Encumbrances are not regarded as expenditures. As partial or full payments come to be made on previous encumbrances (or project commitments are cancelled), those encumbrances are liquidated and deleted from the future

Customer Cost. Customer cost information is used to calculate customer and service-area cost indices and for analyzing incentive levels. The sources for customer cost data are program databases and supporting files. Accounting for customer costs of efficiency measures is not straightforward when the measure replaces failed equipment or is installed in a new facility. Customers do not usually have a competing bid for standard equipment, against which to judge the incremental cost of the efficient alternative. Where the utility acts as a general contractor paying installation contractors, the total job cost will be known but the incremental cost of the efficiency measure may not be distinguishable from the cost of other amenities desired by the customer. For projects in which the customer pays the contractor directly and receives a program rebate, even the total job cost may not be known to the utility. For this reason, customer contributions to the incremental cost of an efficiency measure (over non-efficient alternatives) must be estimated. This is usually done in the course of a detailed program impact evaluation, from which deemed ratios can be derived for future projection in the ECA report. This is an inevitable source of error in estimating the total cost to the customer, service area, and Pacific Northwest region of the conservation resource.

Project Cost. Project cost information is used for quality control on data tracking, to align costs with impacts, and to help in setting incentive levels. As with customer costs, the sources for cost data on individual conservation projects are program databases and supporting files. *'Actual expenditures paid in year'* represent monies spent for projects receiving partial or full incentives during the year. Some of these projects may have received an earlier partial payment in a prior year, or be scheduled to receive another partial payment in a future year. The project is regarded as completed in the year when the final (or only) payment is accounted. Costs identified as *'total payments for projects completed in year'* represent all the customer incentive payments for a project ending during the year; these measure incentives were paid over the life of the project and include any partial payments actually paid in prior years. *'Incentive payments committed by contract'* represent the expected cost of projects authorized by the utility. Projects contracted by the utility during the calendar year signal the potential energy savings that will be realized when the projects are completed. This is sometimes referred to as the production 'pipeline.' In programs dealing with new construction, as well as many commercial and industrial projects, jobs may take several years to move from the contract stage to completion.

Program Savings. Accounting for program energy savings follows a set protocol based on planning projections, impact evaluations, and verification processes. Estimates of energy savings have multiple applications, including measurement of organizational productivity, the acquisition pipeline, and resources in production, for translation to atmospheric impacts, and in resource planning and forecast models. The utility protocol has been to use planning projections of energy savings per participant project until metered verification or the first impact evaluation has been completed. Thereafter, evaluation findings of net savings are substituted for earlier projections. With each subsequent evaluation of a program, historical reporting is revised retroactively for the period evaluated. Prospective values are deemed based on analysis and forward projection of evaluation results, as appropriate and when program measures are revised.

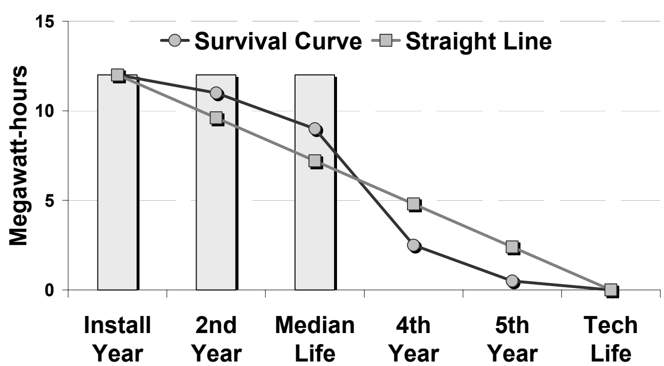
In order to assess productivity, production, and external benefits, there are three levels at which energy savings are accounted: current year incremental impacts, cumulative impacts, and aggregated cumulative impacts. In the accountability reporting system, '*first-year energy savings*' are the annualized net[6] electricity savings acquired from the cohort of projects completed in a given year. Net

production pipeline. Payments and accruals for projects in partial progress are not flagged by the budget year authority under which they were originally encumbered, so the cash-flow accounting system does not allow for perfect reconciliation of budgets with expenditures.

6 *Gross energy impact* is an estimate of change in electricity from before to after the period when participants take program-related actions. Gross savings do not distinguish naturally occurring conservation from effects attributable solely to the program. *Net energy impact* is an estimate of electricity savings attributable solely to implementation of the program; that

energy savings are counted in the calendar year when measure installation is completed, to facilitate alignment of savings with expenditures and corresponding external funding. '*Current year energy savings from cumulative participants'* are first-year energy savings from the current year cohort plus savings from all prior participant cohorts, for program measures with an unexpired lifetime; that is, energy savings realized in a given year from cumulative participants with active measures. *'Cumulative savings over the program life'* is also called 'savings since start of program.' It is the aggregate of savings acquired in each year from cumulative participants, across *all* the years from program inception through the current reporting year. This construct for the total historic stream of energy savings exceeds the actual savings experienced in any given calendar year; it illustrates the relative investments made by the utility in various resource options.

Efficiency Measure Life. Knowing the lifetime of DSM savings is necessary for tracking impacts over time, for setting parameters in resource plans and forecast models, and for reassessing the technical potential. Conservation measures each have a characteristic persistence and depletion profile. While savings from a given application may persist for the full technical life before failure, it is more characteristic among many applications that some will fail sooner than others will. Actual survival curves are typically curvilinear, expressing the compounded impact of multiple factors, some of which promote persistence and others which deplete the resource.



The energy savings realized from measures is a function of initial savings, acquired in the first year after installation, and of impact persistence over time. A curvilinear survival function, from installation to maximum technical life, may be simplified to a straight-line depletion rate (Figure B). This might be desirable in a forecast model to control the number of dimensions or independent variables. The active lifetime of program measures can also be expressed in terms of the median residual life. This is the point at which approximately 50% of measures would have been retired due to failure. Failure can mean physical degradation or breakdown, but also includes early removals due to remodeling and renovation (or dissatisfaction).

Figure B. Counting First Year Savings Through the Median Lifetime (e.g., three years)

Annualized energy savings for a participant cohort can be tracked from the first program year until achievement of the median residual life. This simplifying procedure is followed for the ECA report, rather than the more complex procedure of declining the participant cohort count or energy savings estimate in a straight-line or curvilinear fashion over the maximum technical measure life. After the median number of years has elapsed for a participant cohort, the protocol is to drop this cohort from the cumulative total of participants for which energy savings are calculated.

Cutting off tracking at the average lifetime 'squares' the area under the curve, moving the remaining technical life backward in time to the tracking period. Seattle's protocol has been to count annualized first-year savings in full in the reporting year of project completion (even though 100% of measures were not installed on January 1st). This approach simplifies tracking and is a minor source of error or uncertainty, in the context of the unknown uncertainty over actual survival curves. The stream

is, gross impacts from participants minus the energy savings that would have occurred even if the program had not been offered. Nonprogram savings are determined from baseline data or a comparison group of nonparticipants or past participants, to control for the effects of naturally occurring conservation, changes in behavior, ownership and equipment holdings, economic factors, and free-ridership. Typically evaluations at Seattle City Light have not incorporated spillover effects into estimates of net energy savings (although this protocol has been recently revisited).

of program energy savings becomes depleted when measures installed by a prior cohort (annual group of participants) reach the end of their average useful life. A program is labeled 'discontinued' if it no longer enrolls new participants. When the savings streams from all participant cohorts of a given discontinued program have reached this point, then that program is 'retired' from the conservation portfolio (although still reported in historical summaries).

Utility Resource Benefits. As a hydroelectric utility with both summer and winter peaks, but limited distribution constraints, Seattle City Light has been most interested in the averaged impact of conservation acquisitions on avoided production and power purchases. The total utility system load reduction is calculated as annual megawatt-hour (MWh) savings divided by 8,760 hours per year (i.e., 365·24). In this way average megawatt (aMW) savings are reflected as an overall trimming of energy production in every hour of the year, and are not assigned to peak or other costing periods. The ECA system allows the utility to layer estimates of aMW savings on top of utility load trends to depict what load by sector would have been, in the absence of DSM programs. This is done to demonstrate the role of conservation in containing or moderating growth. In an impact evaluation, the same analysis can be made at the sector or program level to compare load growth between participants and nonparticipants. At Seattle City Light the protocol is always, in aMW statements, to incorporate a 5.2% system average credit for avoided transmission and distribution (T&D) line losses (from generation or wholesale power sources), but never to apply the credit in statements of MWh or kWh impacts.

Community and Customer Benefits. Most conservation programs at this utility serve multiple public needs and produce benefits beyond acquisition of the low-cost energy savings resource. Estimating these benefits is crucial to complex economic measures of the total conservation impact, especially for a municipal utility like Seattle City Light where conservation is much more than an energy resource. These needs include reducing energy costs for low-income and disabled customers, encouraging maintenance and construction of affordable housing, improving indoor air quality, supporting contractors and suppliers in the local economy, increasing business productivity with measures that generate nonenergy impacts, impelling energy efficient market transformation, and so forth. These societal benefits cannot be reflected in simple levelized-cost calculations made from the ECA monitoring system, but require the type of cost-benefit analysis performed best in a program evaluation. In the context of a monitoring and accountability system such as presented in the ECA report, the lack of complex benefit information introduces uncertainty in accounting for the total value of the resource.

The utility protocol has been to publish simplified levelized costs at utility and sector levels, but not at the program or measure level. Levelized cost is a simple economic measure that ignores nonenergy and non-economic impacts, focusing instead on the core objective to acquire conservation as an energy resource. This sort of analysis is performed during program planning and evaluation phases, but is not encouraged for cross-program comparisons. The planning framework requires cost-effectiveness of each program, but the mix of end-uses and individual measures is discretionary to allow for attainment of multiple program goals. The utility prefers to direct attention away from levelized cost comparisons and toward more complex cost-benefit analyses (like net present value from multiple perspectives) for cross-program comparisons. Program evaluations of cost-effectiveness use matched cases for input of costs and savings, and better account for administrative and delivery costs, as well as nonenergy and non-economic benefits. This is especially true for programs with projects taking more than one year to move from contract to completion.

Standing Back: Grooming the Forest

Usually when the terms supply-side and demand-side management (SSM, DSM) are used in the energy industry, they refer to the commodity, electricity. Conservation at Seattle City Light means something more; it is about managing the supply of and demand for energy efficiency options, as well. As with many utilities, Seattle City Light has focused on the core DSM mission through R&D, pilots, and conservation programs. Utility sponsorship generates and concentrates, on behalf of individual customers, the demand placed on the infrastructure of manufacturers, retailers, specifiers, and installing contractors. Planning and evaluation, on the conservation demand side, foster effective application of energy efficiency measures.

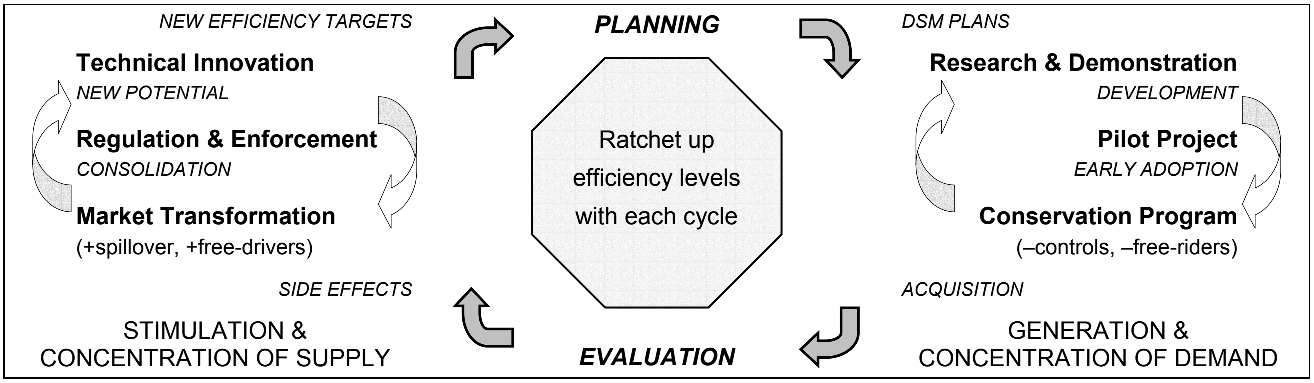


Figure C. Acquiring DSM Resources through the Efficiency Transformation Cycle

There is another side to market transformation, though. Seattle has had a major presence in advocating the setting of federal standards and energy codes, funding enforcement, tendering 'golden carrots' for technical innovation, offering manufacturer rebates, fostering early adoption, and stimulating other elements of market transformation. The utility thereby has stimulated and concentrated the supply of energy efficient technologies available to the general marketplace. Planning and evaluation, on the conservation supply side, has always been more difficult. They are key, however, to determining the timing for consolidation of gains and program exit or re-design strategies. A complete energy efficiency transformation cycle requires committed attention, to generate and concentrate the demand for energy efficiency, but also to stimulate and concentrate the supply of energy-efficient options. Both sub-cycles feed the overall mission of raising energy efficiency levels, ratcheting up with each new technical innovation and program concept (see Figure C).

From Structure into Action

In order to put the ECA report information into action, it is necessary to step back and view the trees in context of the forest and landscape. The structured reporting tools underlying the ECA report provide a useful model for energy utilities in need of historical records for program performance monitoring and feedback, accountability for the conservation endeavor, and planning of future goals to serve the public good. Table 2 names the major components in the accountability system at Seattle City Light, and describes outcomes for each element that can be measured to enable the utility to reassess each aspect of DSM programs and the overall conservation endeavor.

The Landscape—Purpose & Policy. Starting with the contextual level, executive decision-makers and regulatory bodies find comprehensive reporting to be a persuasive tool that establishes credibility, documents strategic achievements, and guides policy. The ECA report has indeed shaped conservation policy and was used recently in negotiation of power sales contracts. The time-series data on conservation programs have been used in integrated resource planning models and strategic business plans. A recent regional technical potential assessment made liberal use of conservation data drawn from the ECA report. It is the policy context that defines the role of nonenergy and non-economic benefits in the goals and assessment of conservation programs. This accountability role was key lighted in the past year when the Seattle City Council resolved to cap the utility's net greenhouse gas emissions, in support of the Kyoto Protocols. The policy context also defines the role of externalities (such as hazardous waste impacts) in conservation planning and implementation.

Table 2. The Accountability System—Reassessing Conservation by Component Outcomes

Components	Elements	Outcomes	Reassessing
Context	Values	Goods	Benefits, policy
DSM Plans	Goals	Progress	Potentials
	Objectives	Attainment	Strategies
	Budgets	Management	Tactics
	Resources	Management	Operations
	Projections	Deemed values	Evaluations
Data Sources	Program files	Project data	Accuracy
	Program databases	Data access	Completeness
	Financial records	Audit data	Comparability
Analytical Structures	Spreadsheet tools	Information	Summaries
	Protocols	Processing rules	Documentation
	Program evaluations	Revised values	Programs, methods
	Economic analyses	Indicators	Programs, benefits
Reporting Mechanisms	Audit & analysis	Quality control	Methods
	Reporting	Publication	Media, dissemination
	Maintenance	History	Trends, forecasts
	Collective knowledge	Transferability	Succession, review

The Forest & Trees—Plans & Programs. Turning to the planning level, the accountability system keeps the utility focused on conservation goals and objectives. The annual reporting mechanism puts the spotlight on high quality of services over time, on high levels of continuity in planning and reassessment of progress toward goals, and on keeping in perspective the commitment to nonenergy and public benefits. Seattle City Light has explicit goals to capture 100 aMW by a specific future date. The ECA report tracks progress toward that goal, in terms of both contractual acquisitions and energy in production from completed projects. Accomplishments can also be mapped against technical potential to determine the remaining unserved conservation potential. Like surveying a forest to locate cedars, birch, and aspen, such analysis can reveal areas where there are gaps between program or service offerings and customer efficiency needs. This analysis can also reveal where remaining economic potential is limited.

The accountability system allows the utility to reassess program objectives and to redesign programs as baseline conditions ratchet upward. Analysis can reveal patterns and trends in the ratio between incentives and total EEM costs, which can help the utility determine if and when incentive levels or mechanisms require readjustment. The utility has moved more toward streamlining and rebate formats as efficiency markets have matured, with less customer 'hand holding' as in earlier stages of conservation programs. The utility has also terminated work in sectors such as single-family weatherization due to saturation of program and customer efforts. Regular attention to the accountability system gives utility management the tools to reassess budgetary tactics and operational resources. The accountability system documents sources and logic for planning projections, which are periodically reassessed in the light of program evaluations. ECA data have provided parameters to the utility's financial forecast model, resource-planning model, and formerly to the integrated resource-planning model. ECA data continue to feed into the strategic business plan.

The Leaves & Pathways—Data & Analysis. As stated earlier, annual audits of program and accounting data occasionally reveal quality control issues that are brought to the attention of program staff and management. On occasion in the past, quite large sums of money were mistakenly accrued when they should have been encumbered (and vice versa). Preparation of the ECA report brought these errors to light; as a result, accounting requirements were made explicit in year-end protocols and staff training was instituted to prevent future occurrences (in the report these expenditure data were corrected to accord with proper accounting principles). A systematic review of ECA report evaluation sources has revealed areas where evaluation results may be dated. The review also suggested that the utility reconsider its policy on evaluation protocols with respect to claiming program benefits from 'spillover' effects (the original policy having been set by the City's executive oversight body).

The View from Here—Reports & Beyond. The ECA is useful in reassessing all the elements of DSM plans, from strategies, tactics, and operations to potential and policy review. Historical accumulation of activity data can document the phase when a program approaches measure saturation or slowed market penetration, the need to change strategies to capture more inaccessible target populations, or time to consider end-game (exit) strategies for a sector or end-use. The historical perspective afforded by the ECA reporting mechanism allows for informed projections of current conservation technical potentials. Preparation of the ECA report facilitates government reporting to the Federal Energy Regulatory Commission, Department of Energy, and Department of Environmental Protection.

Regular cumulative reporting, and publication of activity narratives as well as quantitative measures, preserves the record of DSM accomplishment in all its complexity. Maintenance of accountability structures captures collective knowledge and enables succession planning, as the work force turns over and ages. The ECA affords some degree of transferability; other regional utilities refer to the ECA documentation in planning their own energy efficiency programs. The ECA report provided a model for development of a regional reporting system. An IRT/Results Center profile of SCL was almost entirely recapitulated from the ECA report.

The ECA report reflects a diversified portfolio of programs that have evolved over the past quarter century. Think of the forest, converting solar energy to potential energy, trees moving in the wind, sheltering an ecosystem under the canopy, cycling leaves into loam, renewing itself sustainably over a lifetime that dwarfs the human scale. Like an urban forest, the conservation portfolio reflected in Seattle's ECA report has served multiple public purposes. It demonstrates increasing sophistication in a field that has branched conceptually out, from curtailment and solar energy to conservation, from design assistance and efficiency maintenance to regulation, from demand-side to supply-side management, from market transformation to sustainability.

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