

When Business Analysis Tools Need to Accompany Program Theory Evaluation within Energy Efficiency Market Transformation Efforts

Lori Megdal, Ph.D., Megdal & Associates

Richard Flood, ICF Consulting, Inc.

Beatrice Mayo, Pacific Gas & Electric Company

Tim Holmes, ICF Consulting, Inc.

ABSTRACT

A new type of energy efficiency program was recently tested in California for market transformation (MT). This involved developing and testing a franchise packet for the development of an auditor/broker business to sell energy efficiency retrofit services to small businesses (reducing the mid-stream market actor barriers through the franchise material and designing the auditor/broker business to reduce the market barriers for the small business customers). A measurement approach was developed with some elements of program theory evaluation (PTE) and from other business economics and real estate policy analysis, the use of Pro Forma analysis. Data from the operation of the program test was used to develop Pro Forma tools to assess the potential of the auditor/broker businesses to be profitable enterprises. The plans and initial Pro Forma tools were designed within the program by the program implementation team (mainstreaming evaluation within an energy efficiency MT program). This paper presents background information on energy efficiency program policy, the program being evaluated, and the evaluation plan developed to use PTE and Pro Forma analysis tools.

An Introduction to U.S. Policy for Energy Efficiency Programs

In the 1970's through the early 1990's the energy regulatory paradigm incorporated investing in energy efficiency first as a response to fear of fossil fuel shortages and rising oil prices, then to increase national security; least-cost utility planning (comparing supply-side to demand-side options); and lately, adverse environmental impacts (air pollution, greenhouse gas emissions, global warming etc.) of energy usage and production. Associated with these changing perspectives was the movement from examining the costs of energy provision from the viewpoint of the utility to a broader view of the overall costs to society.

The framework for these regulatory directions took place in a largely vertically integrated utility industry with strong federal and state regulatory review. The energy-efficiency investments were made as part of a philosophy of low-cost resource acquisition (least-cost planning and demand-side management (DSM) in place of acquiring additional supply resources). This philosophy became part of the planning process of resource acquisition in the 1980s known as the integrated resource planning (IRP) framework.

As changes in regulation (deregulation) and industry restructuring has occurred in the 1990s, the supply acquisition framework has changed to a less-vertically-integrated utility industry. In many U.S. states, Canada and many foreign countries, the supply portion of utilities has been deregulated. The remaining regulation is more focused upon the transmission and distribution element of energy provision. The IRP model, which focused on least-cost planning for new supply and demand-side energy resources, no longer fits well in a distribution-only framework. Nevertheless, policy-makers still see the positive societal and environmental benefits of energy efficiency.

Generally, the societal benefits are seen as warranting utility funds (often a surcharge or a non-by-passable wires charge on the utility bill to fund efficiency programs). Rather than purchasing resources in the form of energy saved (“negawatts”) as in the long-term planning perspective of IRP, today the impetus is to encourage the development of energy efficiency and the reduction or removal of market barriers in order to avoid societal costs such as negative environmental impacts.

An Overview of the Market Transformation Concept for Energy Efficiency Gains

Market transformation programs are growing in importance to help deal with growing concerns about greenhouse gas emissions on a global perspective and with high energy costs in certain areas of the United States and Canada. Market transformation (MT) generally refers to the process by which collective action, policies, and programs affect a positive, lasting change (or market effect) in the market for energy-efficient technologies and services.

The market transformation effort should ensure that these technologies and services are produced, recommended, and purchased in increasing quantity. Market transformation programs focus on changing the operation of a particular market. They are designed to create long-term impacts that continue to occur after the MT intervention has concluded, thus creating permanent market changes. The objective of an MT program is to reduce or remove specific market barriers, such as performance uncertainties of energy-efficient technologies, lack of information available to consumers, lack of financing, or risk tolerance (consumers may not want to be the first to try a new technology). Reducing market barriers is expected to have short-and long-term effects that increase the proportion of customers who decide to acquire more-efficient equipment or efficiency practices. The immediate objective and action is the reduction of the barrier, not necessarily affecting the final purchasing decision, which may not occur for years to come. The performance metrics or indicators of market effects developed to track program success must be sensitive to the issue that program results will not be immediate, but will likely be achieved gradually.

Planning MT efforts involves examining the market elements, steps, and actors involved in the purchase decision process. From this, market barriers are identified and strategies are designed to overcome those barriers. Most MT approaches are attempting to overcome a barrier that is stalling the adoption cycle for a particular efficiency technology or moving up in time the technology adoption cycle. In essence, the benefits are achieved by moving forward the accelerated portion of the market penetration curve, or S-curve. Measurement of the benefit of the MT effort is derived from the space between the old and the new adoption curves as shown in Figure 1.

The Small Business Full-Service Solution Program

The “Small Business Full-Service Solution” was a pilot test of an innovative market transformation program developed and conducted by ICF Consulting, Inc. (ICF) in a project sponsored by Pacific Gas & Electric Company (PG&E). With its beginnings in early 2000, this project was developed in the framework of Market Transformation (MT) goals. As such, it must be evaluated in the context of the 1999-2000 “pre-deregulation” energy situation in California, and the energy efficiency program goals of the major power utilities and California Public Utilities Commission (CPUC) at the time of program inception. Since that time, the “California Energy Crisis” has forced a shift back to more direct demand reduction programs in 2001. Although the ICF program was intended to demonstrate a business concept rather than result in significant kW / kWh reductions, the model developed may prove to be a valuable component in re-establishing sufficient infrastructure to deal with California’s energy plight.

The “Small Business Full-Service Solution” program was designed as a pilot test of a new business concept to establish “Auditor-Broker” entrepreneurs to reduce market barriers for provision of energy efficiency services to small and medium-sized commercial businesses. This market sector has traditionally been an under-served, expensive, and difficult sector to penetrate. Many analysts of the energy efficiency industry are unsure whether energy efficiency efforts can be made self-sufficient in this sector. This pilot was an effort to determine if a comprehensive services approach could become acceptable to the small commercial sector and economically viable for auditor-broker “franchisees.”

The Small Business Full-Service Solution is the archetype of the intentions of the Third-Party Initiative (TPI) effort as it provides an opportunity to test a new concept for market transformation. This element is one of the key strengths of the TPI program as found by the Evaluation of the 1998 Third Party Initiatives Program.

The Program provided several elements to help establish auditor-brokers as a new business entity, either as new start-up businesses or as business expansions for current lighting or HVAC contractors. The program tested a design to overcome supply-side market barriers that previously inhibited entrepreneurs from going into their own “mini-ESCO” energy services businesses. The development of the Auditor-Broker businesses also addresses customer, or demand-side, market barriers. In this context, customers have a method for receiving information and support that will encourage them to accept energy efficient alternatives. As the Auditor-Broker concept proliferates, and the market for their services expands, the market becomes transformed. The program theory diagram of this process is provided in Figure 2.

The intervention elements conceived by ICF are described in the *Auditor-Broker Manual*. These elements include:

- Development of a Marketing Plan
- Conducting Sales Visits;
- Energy Auditing Protocols;
- Establishment of Financing Opportunities (for installation energy efficiency measures);
- Incorporating Available Utility Incentive Information;

- Development of a Contractor Referral Network;
- Establishment of “Back-Office” Support and Customer Tracking Systems;
- Documentation of Marketing, Services, and Installation Activities (including kW / kWh reductions).

These program components were designed to aid developing an Auditor-Broker industry as either new businesses or expansions to current contractors’ businesses, increasing the number and availability of energy efficiency services providers for the small commercial sector. The program components were designed to do this by:

- Increasing opportunity awareness and lowering information costs;
- Lowering business start-up costs and reducing perceived risks through provision of a “franchise” package.
- Increasing the range of potential energy efficiency service offerings for customers at no additional initial cost; and
- Lowering marketing costs.

The program components were also designed to allow the Auditor-Brokers to be able to reduce the customer market barriers to acceptance of conversion to more energy efficient systems. The existence and promotion of A-B’s in the marketplace can:

- Reduce the “hassle factor” and transaction costs to the customer;
- Reinforce commitment to the value of energy efficiency;
- Increase the investigation of high efficiency (HE) options; and
- Increase awareness by lowering information costs.

Figure 2 Small Business Full-Service Solution Program Theory Diagram

There were also specific materials developed for the *Auditor-Broker Manual* that would allow A-B's to offer financing, contractor referrals, and promotion of utility incentives such that customers will see no- or low- first cost, and a positive cash flow scenario that would provide confidence in the expected savings. Incorporation and promotion of available utility incentives were a significant component of this initial pilot.

The pilot program investigated a variety of marketing and sales approaches, and field-tested operation of the franchise package. This provided experience-based verification of how to market such a business, and actual experience with small commercial customers, financing entities, and installation contractors. This experience provided critical information for the pilot test and, secondarily, resulted in immediate energy and demand savings.

The Market Assessment and Evaluation Plan

Significant changes have occurred from 1999 through 2001 in the environment in which energy efficiency was being implemented and evaluated in California. In the past five to seven years, California utility energy efficiency investment was directed to switch from emphasizing resource acquisition (from an Integrated Resource Planning perspective) to a more long-term strategy for market transformation, in conjunction with the movement towards de-regulation of the electric utility industry. Yet, in the past two years the California energy crisis has been repeatedly in the news with brown-outs, rolling black-outs, incredibly high wholesale electricity rates in the face of retail price caps, utility bankruptcies, and a gathering fear as to what the impacts will be on the state's economy. In this new environment, an unprecedented effort has been made in the last year to garner *immediate* energy and demand savings. The focus for current evaluation efforts is therefore also being pushed towards (again) placing greater emphasis on immediate impacts rather than those that indicate market change toward a more sustainable energy efficiency marketplace.

As the Small Business Full-Service Solution Program was a pilot test of the concept of creating profitable Auditor-Broker businesses to provide energy efficiency services to small and medium-sized businesses, it must be evaluated on these market transformation (MT) goals. Its preparation of the franchise packet and testing of the concept were its primary contract requirements.

The market assessment and evaluation plan developed, therefore, used the field experiences of the pilot program as its primary test to examine the probability that, and various cases under which, the franchise Auditor-Broker businesses might be profitable. The evaluation plan could also be alternately used to determine if services to the small commercial sector can only be provided through subsidized programs (similar to low-income residential programs) or very high utility incentives such as "direct install" programs).

The franchise materials for Auditor-Broker business development were drafted, then tested and refined through the field activities of the Program. It is possible that the creation of this type of business could serve in the current environment to help leverage other infrastructure development efforts and increase the network of firms and individuals promoting energy efficiency services. Evaluation of the circumstances that make these firms profitable could encourage the state or utilities

to provide loans or grants to help create more A-B type businesses that can generate immediate energy and demand savings.

An outline of how the developed evaluation plan could be used to evaluation this Program according to MT goals, and according to the new paradigm in California is summarized in Table 1.

Table 1. Evaluation Plan Design to Evaluate the A-B Pilot Concept Test (a) as Designed, and (b) for Application in the New California Environment

Evaluation Component	Evaluate as MT Pilot Concept Test	Providing Information Useful in New Environment
<i>Pro forma</i> analysis	Assess if and when Auditor-Broker business could be profitable	Assess if profitable Auditor-Broker businesses could be developed that could leverage and provide further outreach for demand & energy savings efforts.
Energy & demand savings (kW, kWh, and therms) Review program files	Input to customer sales process within field test. Necessary for generating enough profitable sales to support business.	Immediate need. Documented from site-specific field test work and through PG&E rebate applications (Express Efficiency Program).
End-user participant telephone survey	Measure reduction in market barriers, process evaluation	Indicate need for intervener and acceptance of small business rather than other approaches. Find rebate participants, with & after Auditor-Broker interception.
End-user rejecter telephone survey	Measure market barriers & those not reached by audit/ broker. Did they do things later on their own? Why? Why not?	Gather info on what might work with these customers. Find rebate participants. Did earlier interception influence later actions?
Subcontractor participant interview	Measure reduction in market barriers, process evaluation, influence on later actions.	Can these subcontractors possibly become Auditor-Broker businesses and expand outreach for demand & energy efforts?
Subcontractor rejecter interview	Measure market barriers & those not addressed. Did they work with energy efficiency services later on? Influenced by approach?	Can these subcontractors possibly become audit/broker businesses & expand outreach for demand & energy efforts?
Interview with field test personnel	Process evaluation. Measure reduction in market barriers & remaining barriers.	Assess auditor/ broker businesses ability to supplement other demand & energy efforts.

The developed Market Assessment and Evaluation Plan for this program encompass' general three perspectives. These are:

1. Measurement from pilot participants of direct energy and demand savings, and process evaluation of the pilot (including customer and vendor satisfaction);
2. Assessment of the extent than the design and franchise material could be used to reduce or eliminate markets barriers as envisioned in the Program Theory (from interviews with participating and rejecting customers, and participating and rejecting vendors); and
3. Development of a Pro Forma analysis tool that could be used with pilot and other test data to assess potential profitability of Auditor-Broker type businesses (as envisioned by the Program Theory).

The Surveys and Interviews

Telephone surveys lasting approximately 15 minutes were proposed with the test participating customers and rejecting customers. The survey instruments will be designed to meet the research needs detailed in Table 1. The survey will collect specific information concerning the market barriers experienced by the customer, and how the Auditor-Broker effort (test) either overcame these barriers for participants or whether market barriers still existed that prevented participation (i.e., "rejecting customer" interviews).

Information gathering from the subcontractors, both participating and rejecting, and the field test personnel should be obtained through interviews. This will allow more open discussion. As such, it is also imperative that the interviewer be experienced with trade ally "market transformation" interviews. The Interview Guides would be designed to allow open discussion while collecting specific information concerning the market barriers seen by the potential participants and how the Auditor-Broker effort (test) either overcame these barriers for participants or whether market barriers still existed that prevent participation (rejecting subcontractors). For rejecting subcontractors, the interviews need to also ascertain whether rejection occurred due to market barriers or other considerations from the contractor's perspective (inappropriate fit with current business, inability to participant currently but interested in future applications). The design of these interview questions would assess the contractors' perceived extent of the market barriers and how well the offering addressed each of these barriers. The list of market barriers to be tested is embedded within the program theory, and a more general list of supply-side market barriers. The supply-side market barriers embedded within the Auditor-Broker immediate outputs in the program theory are:

- Information search costs;
- Lack of awareness;
- Perceived market uncertainty;
- Initial business start-up costs and risks in the face of market uncertainty;
- Transaction costs; and
- Bounded rationality.

The telephone interviews of subcontractors, both participating and rejecting, will likely be 30-minute interviews that would probably require incentives. We would propose a \$50 incentive payment to all interviewees.

Additional End-Use Customer Perspective Measurement, Including kW, kWh, and Therm Estimates

Three components are proposed for the customer perspective measurement:

- Examining the customer test results for energy savings, cost-effectiveness, financing elements, and positive cash flow;
- Interviewing participating customers from the test to determine how market barriers were reduced; and
- Interviewing customers that rejected participation in the test to determine why they did not participate (what customer market barriers might not be addressed).

Using the U.S. Environmental Protection Agency (EPA) ENERGY STAR® Portfolio Manager©, and QuikScope© software, the Program analyzed several customer projects using current PG&E small commercial general service rates. An example of the basic financial parameters examined is contained in Table 2. This table also provides an example of what a successful project for the Auditor-Broker needs to look like.

Table 2. Example Financials and Cost-Effectiveness for a Typical Small Business Upgrade

Total Annual Electric Cost Savings	\$3,700
Labor and Materials Costs for Upgrade	\$9,344
PG&E Express Efficiency Rebates	(\$1,594)
Direct Installation Costs	\$7,750
Auditor-Broker Audit Fee	\$ 150
Auditor-Broker Commission @ 5%	\$ 388
<u>Loan Application Fee</u>	<u>\$ 100</u>
Total Project Cost	\$8,388
100% Financing; 5 yrs @ 5% (SAFE-BIDCO)	\$8,388
Monthly Loan Payment by Customer	\$ 159
Monthly Energy Savings to Customer	\$ 308
Monthly Positive Cash Flow (yrs 1-5)	\$ 149
Monthly Positive Cash Flow (yrs 6-15)	\$ 308

An inherent part of this analysis for every participating customer are the estimates of electric energy (kWh), demand (kW), and therm savings. These estimates are derived from customer-specific information from site audits performed as part of the sales process. Most of the energy efficiency installations also include applications for utility incentives. These incentive applications provide

further documentation of the estimated savings. Most of the incentive applications are through PG&E's Express Efficiency Program, while a few were through the Standard Performance Contracting (SPC) Program (as was applicable for the larger projects seen in strip malls or efficiency installations throughout a larger retail franchise operation). A verification summary of these kWh, kW, and therm estimates could then easily be developed in the evaluation through a review of the Program's files, an evaluation step we would recommend.

The Vision for Conducting the *Pro Forma* Analysis

A new element for this evaluation is the development of a Pro Forma Analysis Tool. When an important element of a policy program is to develop profitable businesses to continue to conduct specific efforts after the program is complete, then we feel it is important that an evaluation of the probability of these businesses potential for profitability should be an integral part of the evaluation design. This concept and the developed *Pro Forma* Tool offer a significant advancement for the evaluation field for these types of market transformation programs.

An initial *Pro Forma* Tool was developed to provide the foundation for the proposed *pro forma* analysis. The tool is an Excel® workbook with several spreadsheets. It provides clear input, calculation, and output pages to allow easy testing for profitability assessment, and sensitivity analysis.

The proposed measurement and evaluation effort with the *pro forma* analysis would consist of four tasks. These are:

1. Assess *pro forma* analysis tool for any necessary changes for types of analysis proposed (varying assumptions, detail of inputs and overall versus monthly estimates).
2. Interviewing and gathering data from Auditor-Broker test personnel to estimate input for the sale/income assumptions.
3. Interviewing Auditor-Broker test personnel, and gathering other business market information to refine business cost assumptions. Obtain this information for different types of potential Auditor-Broker business models (i.e., solely Auditor-Broker operations, in addition to offering other contracting services such as lighting contracting, or to supplement other contracting services during down times)
4. Conduct *pro forma* analysis with tools assessing profitability, income potential, and cash flow implications with varying assumptions and business models.

The initial *pro forma* analysis tool developed contains the variables, assumptions, and calculations for sales and income as shown in Table 3. The business cost categories estimated in the initial tool are listed in Table 4. There is a spreadsheet providing basic income tax percentages for federal and California quarterly estimated income tax payments. These various inputs are then brought together with subsequent timing formats, self-employment tax, and adjusted gross income factors to produce the *pro forma* output spreadsheet. This final spreadsheet presents monthly income, expenses, and quarterly taxes for assessment of monthly net levels for cash flow analysis. It then also accumulates income, expenses and pay-off of initial investment to produce a first year (initial short-term) estimate and a second year estimate (longer-term proxy) of net income available for business owner payment and retirement contributions.

Table 3. Variables, Assumptions, and Calculation Categories for Sales and Income

Variables	Average Facility Size (Sq. Ft.)
	Mark-up on subcontractors
	Hours worked per week
Assumptions	Audit Rate (% of contacts accepting audits)
	Sale Closure Rate (% of audits leading to sales)
	Field hours (per qualified lead)
	Estimated sq. ft. that can be audited in one hour
	General Business and pro-rated sick/vacation (hours/wk)
	Travel / arrange audit time (per audit)
	Sales time (hours/sale)
	Follow-up (hours/sale)
	Month lag time from lead generation to payment
	Sale value per sq. ft.
Calculated Values	Estimated Value of Each Sale
	Net (subcontractor) gross income per sale
	Time per Audit (hours)
	Monthly hours net of general business
	Hours worked to get 1 audit
	Hours worked to get 1 sales presentation
	Hours worked to get 1 sale w/ follow-up
	Number of sales per month
	Net (subcontractor) gross income per month (after lag)

Table 4. Business Cost Categories in Initial *Pro Forma* Analysis Tool (Monthly & Start-up Costs)

Rent	Legal / professional (e.g., accounting) fees
Utilities	Office supplies
Telephone	Yellow pages
Bus. Insurance	Other advertising
Car Insurance	Repairs / maintenance
Health Insurance	Dues / subscriptions
Licenses/permits	Automobile expenses
Equipment	Subcontractors (=0 as sales / income work includes net by use of mark-up factor)

Where the intent of a program is to change a market and create profitable businesses to continue this market change, we think a proper evaluation of this effort needs to include an examination of the potential for profitability. Without this type of exam, an evaluation according to the goals of the program could easily be incomplete. This project provided this type of evaluation plan to include the development of a specific tool and technique to be used within the evaluation framework to include evaluating the potential for profitability, a *Pro Forma* Analysis Tool.

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Address any questions, or requests for additional copies of this paper, to:

Dr. Lori Megdal
Megdal & Associates
198 High Street
Acton, MA 01720-4218

Telephone: 978/461-3978
Fax: 978/461-3979
E-Mail: megdal@bellatlantic.net