

Conventional vs. Market Transformation Energy Efficiency Programs

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ABSTRACT

This paper will examine the relationship between the corporate culture of a utility and its ability to design and implement market transformation energy-efficiency programs. The conventional DSM initiatives often produce impressive results by focusing on mainly short-term measures that are associated with tangible energy savings. Even with limited access to energy efficiency dollars, utilities often rely on their own internal marketing and sales resources to design and implement DSM initiatives. The traditional utility culture is to "assume full control" and these initiatives are designed to accommodate this cultural bias. The market transformation programs, by contrast, are designed to induce lasting structural and behavioral changes in the market and they have to rely on third parties and a wide range of market participants for effective program implementation. These initiatives, however, often run counter to the utilities' traditional style of operation. It appears that as a pre-requisite, utilities need to engage in "internal corporate transformation" before they can become effective as agents of change in the marketplace.

This paper will provide a brief account of the industrial energy efficiency plan of Enbridge Consumers Gas, one of the largest gas distribution utilities in North America. This plan includes both conventional and market transformation initiatives with varying program designs and implementation practices. The intent of this analysis is to illustrate the contrasting characteristics of the two approaches and discuss their chances of success in relation to the utility's internal business culture.

Introduction

The energy industry in North America is currently going through the most fundamental restructuring that any conventional market has ever experienced in recent memory. De-regulation, unbundling, privatization, and the growing mergers and acquisitions constitute the day-to-day events and the driving forces that have already changed the face of this industry and continue to fuel its rapid transformation. While the ramifications of these changes remain largely uncertain, one thing is fairly clear: to survive and to succeed in the emerging competitive energy market, gas and electric utilities have no choice but to re-invent themselves into dynamic and fundamentally transformed organizations. This seems to be true especially for distribution utilities that are being subject to growing competition in their own home-base where they used to enjoy unquestionable customer "loyalty" within the captive markets of their franchise territories.

The need for change within a utility structure often becomes most pronounced in the marketing and energy efficiency functions. Marketing is by definition the window through which a utility sheds its monopolistic tendencies from the past and introduces a market-oriented culture throughout the company.

An important aspect of a utility's break from its monopolistic past is to move away from conventional energy efficiency programs to those of market transformation. The conventional approach may be summarized as:

- Short-term horizon for energy efficiency results (one year)
- Focus on site-specific projects and measures (one-off impact)
- Heavy reliance on utility's internal resources
- Tendency to insist on utility's full control over all interactions with the customers
- Heavy emphasis on technology and technical expertise in program designs and hiring practices
- View energy efficiency as a response to government regulations

Market transformation approach, by contrast, may be defined as:

- To make energy efficiency an integrated part of day-to-day activities in specific industries or markets. This may take the form of introducing energy efficiency as a new line of business to an industry or it may be manifested as a change in an industry's decision making process.
- To make high efficiency technology or equipment a market standard
- To change or influence government policies to incorporate energy efficiency
- To help build energy services industries that can grow profitably without subsidies
- To design programs with heavy reliance on non-utility resources (third parties) to allow energy service companies to participate and grow, and to build an energy efficiency line of business that would outlast utility programs.

Enbridge Consumers Gas, a leading gas distribution utility in Canada, serving about 1.5 million customers, is facing these challenges by introducing an ambitious "operational excellence" business model to be implemented in all facets of its operations. One of the key functions leading the charge in this undertaking is the marketing/energy efficiency department.

Enbridge is currently embarking on a challenging marketing campaign in its service territory with a target of over 50 million m³ gas savings to be achieved in the fiscal year 2000. For the industrial market alone, which will be the focus of this paper, this plan calls for up to 20 million m³ gas savings to be realized through a mixture of conventional and market transformation initiatives.

The following is a brief account of the gas utility's industrial energy efficiency programs.

Conventional Technology-based Incentive Programs

The following conventional DSM initiatives represent the utility's first generation of industrial energy efficiency programs.

- Boiler Efficiency/Steam Saver
- HVAC Audit Program

These programs are designed to focus on specific technology areas and are applied across the board to all mid to large-size industrial (and large institutional) customers. These initiatives

are primarily implemented using the company's internal resources of up to 10 highly skilled and experienced energy management consultants (EMC). The EMCs identify energy efficiency opportunities in customers' facilities, initiate energy audits, facilitate follow-up activities and offer program incentives to encourage customers to take action. These programs, particularly the Boiler Efficiency, have been very successful in meeting and surpassing their m³ gas saving targets. In fact, the actual gas savings achieved through these initiatives have so far exceeded the company's most optimistic expectations. In view of this success, the company's current DSM plan calls for the enhancement and continuation of these initiatives for at least another two years.

Boiler Efficiency/Steam Saver Program

Enbridge Consumers Gas (ECG) initiated the Boiler Efficiency/Steam Saver Program in 1997. The purpose of the program is to identify energy losses in medium and large steam boiler plants and to offer financial incentives to encourage customers to implement the recommended measures.

Large boilers, unlike the smaller residential units, are not categorized in convenient standard low/mid/high efficiency levels. The manufacturers' efficiency levels for industrial boilers are very close to each other and are often specific to unique applications. To promote energy efficiency in this market, one needs to focus on the performance optimization, maintenance and tune-up, and operational waste reduction.

ECG offers to cover 2/3 of the cost of the initial boiler plant energy audit to a maximum of \$4,000 per project. Furthermore, once the customer takes action and completes the installation of the recommended energy efficiency measures, ECG rewards the customer with an additional financial incentive based on the actual gas savings to a maximum of \$30,000. The specific measures targeted in this initiative may include combustion improvements, heat recovery, steam trap surveys, as well as insulation, steam distribution, and condensate return improvements.

The Steam-Saver boiler audits are highly structured and detailed. The recommendations are specific and the implementation of the measures requires close supervision by ECG's technical staff. The professional expertise needed to complete Steam-Saver projects are currently hard to find outside the ECG organization.

In the first three years of the program, ECG has managed to generate more than 20 million cubic meters of gas savings (out of an estimated potential of 95 million m³). This is an impressive record for a program that almost entirely relies on the utility's internal resources for its implementation.

Notwithstanding its short-term success, the program's longer-term impact in the marketplace remains uncertain and at best appears to be limited. The technical expertise that has been accumulated over three years of program implementation primarily resides within ECG. If ECG's boiler program were to cease today, this accumulated knowledge would likely fade away as well. Clearly, the main barrier to energy efficient operation of boiler plants is the lack of awareness and know-how and ECG is not transferring this know-how to other market players effectively.

HVAC Audit Program

This program was also introduced in 1997 and is currently being re-designed and enhanced for re-introduction in year 2000. The purpose of the program was to encourage industrial customers to understand and improve the existing HVAC systems in their plants. The incentive structure was similar to that of the Steam-Saver initiative, offering the customers 2/3 of the cost of the initial HVAC audit plus further financial contributions offered towards the m3 gas savings from installed energy efficiency measures.

From the outset, HVAC program seemed to have difficulty in raising the profile of HVAC systems and convincing the customers to take advantage of the potential gas savings. Once again, ECG relied on its own resources to market and sell this initiative. From a technical perspective, the customers were encouraged to look at their HVAC system as one single integrated entity and aim for an optimal efficiency set point that would achieve maximum energy savings and improved performance. This turned out to be technically too complicated a program for not only the customers but even the professional HVAC auditors practicing in this field. While the program was technically comprehensive, in terms of the market place, it did not deliver its message effectively and failed to reach the customer groups with the most acute HVAC problems. This program is currently being re-designed for implementation in 2001.

Summary Assessment

The two DSM initiatives described above, irrespective of their varying success in producing results, may be characterized as first generation energy efficiency programs. The characteristics of these programs may be summarized as:

- focus on technology
- lack of target marketing or lack of emphasis on market conditions
- one time improvements / no structural or behavioral change in client's business practices
- minimal influence over equipment manufacturers or other third parties
- focus on short term savings with an impressive record of producing results

Ironically, utilities seem to be attracted to these programs just as much for their shortcomings as for their merits. Regulated utilities, by and large, are used to providing their commercial and industrial customers with engineering consulting services as a part and parcel of their regular customer service. They are technically oriented and have limited experience in market segmentation or in developing in-depth analysis of customers' wants and needs. They also adopt a one-to-one protective approach to customer service. Utilities see themselves as having the best interest of the customers in mind. Since they work with captive markets of franchise territories, they tend to believe that, unlike other third party market players, they are the true source of objective information and therefore they are in the best position to protect their customers from other profit-oriented energy advisors. Given this approach, it is not surprising that DSM programs are often designed to rely heavily on utilities' internal resources for implementation where they can assume full control of the interactions with their customers with limited participation or leveraging of the third parties.

Market Transformation and 3rd Party Leveraging

The following initiatives represent Enbridge Consumers Gas' second generation energy efficiency programs signaling a gradual move towards a market transformation approach:

- Monitoring and Targeting
- Co-generation - Market Power Players Initiative
- Utility-Insurance Joint Program

Notwithstanding the exceptional performance of the conventional energy efficiency programs, it has become increasingly apparent to ECG that the company needs to increase its effectiveness by leveraging external third party resources and by ensuring that energy efficiency is increasingly accepted as an integral part of the everyday market activity. Accordingly, the emphasis in the above listed initiatives is no longer on technology but on markets and on strategic alliances with the other market players such as manufacturers, distributors, associations, energy management firms, industry consultants, government entities, etc. The ultimate goal in this endeavor is to transform the market to embrace energy efficiency, as a form of good business practice, both in the short and the longer term.

Monitoring and Targeting Program

This program was initiated in 1999 to encourage industrial (and commercial) large volume customers to develop the capability to monitor their gas, electricity and water usage and to target specific areas to identify energy efficiency opportunities.

Monitoring and targeting (M&T) is not a new concept in the energy field. In England, M&T firms gained currency in the early 1980s, and to this day, they continue to thrive in that market. It is not the first time for ECG to work on this initiative either. In 1996, ECG attempted to launch a similar program without success. The approach was then to select a specific computer hardware/software product to allow ECG to launch its own M&T line of business. It did not work; most probably because ECG is a utility company and not a computer software/hardware firm.

In North America, M&T is still a rare phenomenon, particularly in the industrial sector. The main barriers to M&T appear to be lack of awareness among industrial clients coupled with the lack of experience and expertise on the part of the existing system integrators.

ECG's new monitoring and targeting program does not subscribe to a specific software/hardware product. Instead, ECG is attempting to identify qualified energy management system integrators and assist them in building a stronger business in this field. This is just as much an educational process for the third parties as it might be for the utility and its customers. ECG has already forged a partnership with a number of major system integrators in the market and the initial response from the customers has been extremely encouraging. Monitoring and targeting primarily relies on non-utility expertise and resources to initiate and implement projects. While the immediate target for ECO is to achieve short-term energy gas savings generated through specific projects, the ultimate and longer-term target is to build a mature and experienced industry in the energy monitoring field.

Monitoring and targeting program provides assistance in four ways:

- identifies and recommends companies with experience in system integration and energy management systems
- assists in exploring financial options
- provides a gas-meter leasing option
- provides incentives based on gas savings - \$0.05/m³ to a maximum of \$30,000.

Monitoring and Targeting is considered a market transformation initiative because of the following characteristics:

- Based on ECG's direct experience with more than 200 large industrial customers, it appears that most plants, even those of large and sophisticated organizations, pay their energy bills without a basic understanding of their energy profiles and patterns of usage. The lack of awareness in this regard is the most serious barrier to promote energy efficiency in this sector. Equally lacking is the development of an industry that can provide these customers with cost effective and user-friendly integrated monitoring systems. ECG's program is designed to accelerate the development of such an industry and at the same time raise awareness among industrial establishments about the potential benefits of energy profile analysis.
- More than 20 years experience in England has demonstrated that monitoring and targeting can have a profound effect on industrial decision making processes including the procurement of more energy efficient equipment and machinery. Monitoring and targeting is a pre-requisite and a door opener for all other energy efficiency initiatives.

Co-generation - Market Power Players Initiative:

With deregulation of the electricity market, the days of building large, utility-owned generating stations are over and co-generation is expected to emerge as one of the most promising and energy efficient alternatives in the energy market.

The benefits of co-generation include:

- on-site generation - reducing need for additional transmission and distribution infrastructure
- avoidance of transmission and distribution line losses
- greater efficiency in terms of fuel to power ratio
- greater overall thermal efficiency gains within a plant

In spite of these benefits, this remains a low growth industry with an uncertain future. To address this problem, ECG has been organizing a number of co-generation workshops to identify and seek solutions to technical and structural barriers. The results, so far, indicate that some notable market barriers include:

- the difficulty to find vendors that are specialized and experienced enough to carry out credible technical and financial assessment of co-generation prospects. Similarly, there are far too few qualified companies in the market with experience in the installation and operation of co-generation systems.
- co-generation projects are too complicated and difficult to get off the ground. The decision-makers need to understand the energy market trends and utility regulatory

rules and the uncertainties that directly affect them. They must deal with a large number of players (manufacturers, financial institutions, utilities, consultants, contractors, etc.).

- The technologies involved (reciprocating engines and micro-turbines) and their energy efficiency features appear to be attractive and somewhat uniform across manufacturers and markets. However, the long term performance and the actual costs of operating and maintaining these systems appear to be a concern to investors. This is a particularly serious issue in this industry where simple pay-backs are on average in the range of 4-7 years. There seems to be a lack of structure in the market to monitor and facilitate the flow of information to increase awareness and to instill confidence in the potential investors.
- Changing regulatory rules and the uncertainties associated with the electricity industry appears to be the most discouraging elements to potential investors. This industry needs to develop a structure to influence, understand and manage the changes in regulatory rules.

ECO's co-generation program is designed to increase customers' awareness and to facilitate the development of new projects by working with all the key players in this industry.

The program consists of the following elements:

- "power players agreements"
- free pre-feasibility assessment
- financial incentives towards total thermal efficiency gains
- financing option
- awareness - co-generation workshops

The power players agreements consist of negotiated arrangements between ECG and major manufacturers of co-generation equipment as well as engineering consultant firms, and other key third parties. The intent is to generate leads, educate potential clients, and jointly remove market barriers. ECG has already managed to finalize four "power players agreements" with major co-generation manufacturers. As a part of these agreements, the four manufacturers are currently training ECG's co-generation specialists on the features of their products and services. ECG, in turn, is offering to generate leads, carry out free pre-feasibility assessments, and facilitate project development. Furthermore, ECG is offering a financing package to assist the investment process and provide energy efficiency incentives towards estimated gas savings from thermal efficiency gains. ECG is also active in working with industry associations and the government to lobby for competitive and realistic regulatory rules in relation to co-generation projects.

In brief, ECO is attempting to build awareness about co-generation and its energy efficiency benefits and to develop market structures and processes that would support the long-term growth of this market. This approach is in contrast to the conventional programs where the focus is on short-term hits by offering financial incentives to address mostly perceived financial barriers.

Utility-Insurance Joint Program

ECG is currently in the process of negotiating with two major insurance companies to introduce energy efficiency audit and improvements into their regular inspection services.

While insurance companies have always been concerned about the quality of maintenance of large industrial equipment such as boilers or HVAC systems, they have not necessarily paid attention to energy efficiency improvements even though these improvements often promote better maintenance and operating condition. For example, ECG's standard energy efficiency boiler plant performance test and audit includes combustion improvements such as boiler tune-up, burner repair, and re-vamped combustion control systems. These measures contribute to the efficiency as well as safety and longevity of the equipment.

One of the insurance companies we are negotiating with has a 40 member inspection team and the company has already decided to use this team to develop a separate energy services line of business to promote energy efficiency as well as better maintenance practices. ECG and the insurance inspection team have already started a joint project with a major industrial client.

If successful, this would simply amount to introducing energy efficiency into the day-to-day activities of the insurance industry that is likely to put greater pressure on equipment manufacturers to further improve the efficiency of new products. Should this business grow roots in the insurance industry, energy efficiency would become an integrated part of this market with or without incentives from a utility or the government. In other words, this would be a clear instance of market transformation.

Insurance is an old and prosperous line of business with a promising future ahead of it. The insurance companies ECG is working with insure almost all the large industrial boilers in the utility's service territory and accordingly they have access to all the boiler plans in the area. Should energy efficiency audits and improvements become a routine part of their inspection practices, this would amount to a significant structural change in this market.

The insurance companies in question, so far, are intrigued with the idea and are moving forward albeit in small and measured steps. The reaction from within the utility, on the other, has been somewhat mixed and less enthusiastic. This program calls for the promotion of energy efficiency using insurance companies' inspection specialists, as opposed to relying exclusively on the utility's internal resources. Under this initiative, the utility would not necessarily participate in every project and would not have direct control over every transaction with the customers. In brief, this does not fit the utilities' traditional pattern of DSM activities. ECG's sales group, initially, responded to this program by openly expressing their concerns over job security. Clearly, they took the insurance inspection group as direct competition. They also showed concerns about ECG losing control over its relationships with its customers. Lastly, there were concerns about the insurance companies' perceived lack of technical expertise. These objections were strong enough to delay the program for sometime. Fortunately, given ECG's serious attempts over the last two years to break away from the old utility culture, the lack of enthusiasm was not widespread enough to stop the program. In a broader context, however, this shows that potentially the utility's internal resistance can pose an effective barrier to market transformation initiatives.

Summary Assessment

The three programs described above are categorized as market transformation initiative based on the following characteristics:

- focus on markets and market players
- emphasis on long-term and lasting changes in the market
- attempts to bring about structural or behavioral change in client's business practices
- influence over equipment manufacturers and other third parties
- heavy reliance on non-utility resources to maximize third part participation

In this paper, market transformation is applied to specific markets and industries and the focus is on the development of specific private sector expertise and lines of business that can promote energy efficiency without utility or government intervention. The aim in this approach is to help build market structures that can sustain the type of energy efficiency activities that in the past utilities and governments used to assumed responsibility for.

ECG's M&T initiative entirely relies on partnering with major system integrators in the marketplace to implement projects. The goal is to assist, guide, and influence our partner to accelerate the development of this industry while at the same time raise awareness among our customers in this regard.

Co-generation is a promising alternative to the traditional methods of electricity generation. This is also a potential source of significant energy efficiency gains. ECG, once again, is attempting to work with a large number of market players including manufacturers, consultants, contractors, government, and financial institutions to streamline the decision making processes and to facilitate the development of co-generation projects.

Finally, the utility-insurance initiative is a targeted attempt to incorporate energy efficiency considerations into day-to-day activities of this industry. If successful this will be a long-term and sustainable change in this marketplace.

The industries' response to these initiatives has been extremely positive. The reaction from within the utility, however, has been mixed and less than enthusiastic. The potential reasons for this reaction include:

- Job security - ECG's internal sales staff consider program implementation to be their main area of responsibility. Although they have always welcomed assistance from third parties on occasions, they seemed rather concerned about a deliberate attempt to rely on external resources, as a preferred option. The utility-insurance initiative, in particular, was faced with opposition on this ground and the issue was resolved, at least for the time being, by ensuring that all projects would be jointly implemented with direct involvement of ECG staff.
- Control over customer relationships - ECG's corporate culture encourages a strong belief in assuming a protective role towards customers. ECG's sales staff tend to see themselves as the providers of objective information and advise against most other market players. Accordingly, there is a reluctance on the part of ECG's sales staff to relinquish control over customer relationships. In relation to the monitoring and targeting program, for example, the staff showed a general sense of lack of trust and confidence in almost all system integrators. There is still a strong tendency on ECG's staff to oversee and supervise specific M&T projects and command the overall

relationship with the customers. To break away from this belief system and to begin trusting the market forces to sort out the differences among third parties is a barrier that we have yet to overcome.

Conclusion

In this paper, market transformation is defined as a set of lasting structural or behavioral changes in the marketplace. Frequently cited examples of market transformation programs include educational and awareness initiatives. Given the inherent difficulty in demonstrating the market impact of awareness campaigns, industry critics and regulators often view the evaluation metrics of these programs with skepticism. The three market transformation programs described above, by way of contrast, are not solely educational as their targets include both short-term energy saving results and longer-term impacts that aim to induce greater awareness and behavioral changes within specific industries. They rely on a wide range of market players for program implementation and aim to develop lasting businesses to promote energy efficiency as a part of normal market operations. They also make demands on their host utilities to part from the traditional DSM practices.

Monitoring and Targeting relies on system integrators in the marketplace for program implementation and it has short term gas saving targets with the expectations of an expanded industry for energy management systems in the future. Co-generation program attempts to bring a large number of key players together to remove both structural (regulatory rules) and behavioral barriers. Utility - Insurance initiative represents a window of opportunity to introduce energy efficiency into an industry that is normally not inclined to focus on this issue. A common element among all these initiatives is the tendency to use third parties and other key players for program implementation. Without this element, the longevity of program impacts and therefore market transformation would be in doubt.

The traditional utility corporate culture has the potential to become a barrier to market transformation programs. Large utilities are in an ideal position to solicit willing business partners but they would have to relinquish control over their relationships and interactions with their customers; they need to shed their protective attitude and have greater confidence in the efficiency of competitive markets.