

## INDUSTRIAL DSM - COST REDUCTION OR COMPETITIVE ADVANTAGE?

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### ABSTRACT

For a number of years, and with varying degrees of success, Utility Demand Side Management (DSM) programs attempted to market energy efficiency to Residential and Commercial sectors. This was primarily as a cost reduction benefit. Utilities have moved the focus of conservation more directly towards the potential of cost effective DSM within the Industrial sector. This initiative is based upon the fact that we all know the potential is there, however how do we get at it? The purpose of this paper is to identify where significant energy efficiency opportunities exist and the strategy employed to realize the potential.

This paper will be presented in two sections. Firstly, it will highlight the technological advances taking place in mechanical refining in the Pulp and Paper industry. The technical section of the paper will outline refining technologies that can reduce the specific energy of mechanical refining by up to 150 kWh/ton (850 tpd pulp mill savings in the region of 44 GWh could be expected). In addition to the significant savings in energy, further benefits will be realized by the customer as increases in production capabilities and improved pulp quality. Potential project costs will be summarized and cost benefit calculations will be presented.

Secondly, the paper will review the impact of these projects from the Utility's perspective. The author is a contract program manager for two utility industrial DSM programs. Both programs encourage industrial customers to adopt technologies that are energy efficient, but primarily provide the customer with a manufacturing technology advantage. The program design leverages the process benefits to make the programs very cost efficient from the utility perspective. Thus, the program is a tool for the utility to obtain energy conservation at the lowest possible cost, and helping it to be more competitive in the deregulated environment. Hence, the bottom line, energy efficiency in the industrial sector is both cost reductive and provides a competitive advantage to the customer and utility - **Everybody Wins**.

### INTRODUCTION

Despite the great degree of media coverage and academic interest given over to it recently, competition is not a new phenomenon. The market forces symbolized by the "invisible hand" were in existence long before Adam Smith cleverly labeled them over two centuries ago. What is new, however, is the overtaking of former monopoly utilities by competitive market forces. The past few decades have seen an increasing amount of competition in formerly heavily regulated transportation and utility industries such as airlines, railways, telecommunications, and natural gas.

Many, if not all of us here this week, are aware of the pressures of change being exerted on the Electrical Utility Industry. What I find interesting at this conference is that we are all gathered here to understand how these competitive forces may play out in the future. We have with us industry representatives that, for the first time, are beginning to influence the services and the price they pay for electricity. We have Utility representatives eager to meet customer needs, but constrained by the requirements of their corporate administration, shareholders or regulator. Everybody wants to do the right thing. I would like

to propose that unique Industrial DSM projects can meet both the objectives of the industrial customer and the Utility. Either party will have to give a little but both can end up with the win/win scenario that we all strive for in a good business relationship.

I would like to focus on the Utility industry pressures for one moment. In the Pacific Northwest, we are experiencing gas wholesale prices that have fallen nearly 45%<sup>1</sup> over the last year. This places downward pressure on the cost of short term supply. The wholesale price of electricity has been correspondingly volatile with short term spot prices in the first quarter of 1995 in the 10 to 15 mil range. All of this is occurring at a time when the region continues to be in a firm deficit of 663 MW average for the 12 month period ending February 1995<sup>2</sup>. The utility industry is changing and many people think that it will be a price driven change. Deregulation is just around the corner, although re-regulation is maybe more appropriate. We wouldn't want to put lawyers out of business would we?

At the 1995 Canadian Pulp and Paper Association (CPPA) Joint Western Branches Technical Conference the theme of the conference was "Winning the Competitive Race". This puts the fear of the Utilities into perspective. The Pulp and Paper sector has long been in a competitive environment. This competition is not restricted to the land mass of North America, this is a global competitive market place for pulp and paper products. It was stated by Mr. Douglas Whitehead, President and CEO Fletcher Challenge Canada Limited<sup>3</sup>. There are four principle areas that the industry is noncompetitive and thus could determine the viability of the industry in Western Canada:

- ◊ **Fiber Supply** - "...for many decades the Canadian pulp and paper industry enjoyed a fibre supply that was both cheap and plentiful. Today that fibre supply has become scarce - and very expensive. In fact, our fibre costs in BC have pretty much doubled in the past 18 months. On a global basis, we have moved from a position in the lowest quartile to about the middle of the pack."
- ◊ **Transportation** - "...another major cost that has been and will always remain a problem for BC producers. In all cases we are an expansive ocean voyage away from our major markets - the largest population centers such as Los Angles, New York, London and Tokyo."
- ◊ **Labor Cost** - "...high compared to our competitors. We need productivity improvements."
- ◊ **Plant Condition** - "...the age and scale of our plants creates serious problems. They are too old and too small. And, frankly, there are too many of them."

This is only one executive's view point. But, does it sound a great deal different from the type of forces acting on our own business? Let me summarize at this point with the conclusion of a seasoned executive in a competitive industry. "We've concluded we don't much like the commodity business. No matter how smart we are in managing the business, how diligent in battening down costs, we can no longer assume that we can manufacture commodity products at prices that compare with low cost producers around the world. So, we are getting out of the commodity business, to the best extent we can, and becoming a manufacturer of high value specialty products."<sup>4</sup> Given this conclusion from the pulp and paper sector, would this not apply to the utility industry? Will a place not remain for DSM as a value added specialty product and service?

## TECHNOLOGY OVERVIEW

Thankfully, I have been spared the responsibility of detailing all of the emerging technical changes in the mechanical pulp and paper sector. This has been professionally accomplished within the proceeding paper<sup>5</sup> by one of my fellow colleagues from Vancouver. This will enable me to focus my attention and your time to the second part of my topic, the impact of these projects from the perspective of the customer

and the Utility and how both partners can be winners. The technologies that are identified for energy efficiency improvements include the following:

- ◊ chemical pretreatment
- ◊ electron beam bombardment of chips
- ◊ inlet or blowline consistency control
- ◊ plate design
- ◊ increased throughput
- ◊ increased angular velocity
- ◊ post refining
- ◊ high consistency screening
- ◊ thermopulping

#### **CUSTOMER INVESTMENT CRITERIA**

It is becoming apparent that the era of the mega project is over. Many believe that no new mill will be built in future of BC. Currently, no new capacity is coming on stream any where in the world, a direct result of the slump in the industry during the early 1990's. It may well be another two years before new capacity is added globally. An example of the BC situation is an investor group, under the name of Orenda Forest Products, who has planned to build a stone ground wood mill in Northern BC for the last three years. It is recently rumored that this group had purchased the idled Avenor Inc's Gold River newsprint mill<sup>6</sup>. It is stated that Orenda purchased the 200,000 tpy mill by acquiring \$200 million debt for 25 cents on the dollar. This would go to show that Orenda increased their payback on this investment by four fold. Fletcher Challenge Canada are committed to fast payback projects and will look for projects in the \$20 - \$50 million range<sup>7</sup>.

For many of us that work with utility DSM programs, the word payback is offered as a justification for the level of investment by the utility. We are comfortable with a range between one and three years. Fletcher Challenge have clearly demonstrated a commitment in this order of magnitude. I would expect the industry as a whole to not be a great deal different. The ground work for a partner to do business has been established.

#### **UTILITY INVESTMENT CRITERIA**

With the specter of competition in the utility industry, the investment criteria have changed dramatically. Falling prices mean falling marginal costs. Correspondingly, cost effectiveness criteria are dramatically reduced. Simply stated, projects with long paybacks are no longer viable investments; something else the utility industry has in common with the pulp and paper sector. No longer can the new dam or nuclear power plant be guaranteed a rate of return. Will the customer load base be there to purchase the commodity in an deregulated business? We can speculate that we have two distinct groups with the same common goal, growth, diversity and a requirement for short payback projects.

#### **JOINT VENTURE PROGRAMS**

Having given this brief overview of both industries, it would be apparent that these industries have many things in common: the need for change, and increased competitiveness. This can translate to a much overlooked opportunity and could well be a win/win situation for utilities and their large industrial customers. It may well be overlooked that participation in utility DSM programs could constitute such a partnership if the DSM program is structured correctly. We have already heard of many fine opportunities by our previous presenters. An example of such a joint venture is one created by Scott Paper and the Snohomish County Public Utility District. The utility has agreed to build for Scott, free of charge, a new power boiler and 45 MW turbo-generator; and to rebuild an existing recovery boiler at the tissue and market pulp mill, located at Everett, Washington. Scott's tasks are to oversee the construction and

operation of the facility, and will in turn receive the 180 tonnes per hour of steam which it will generate. The utility will retain ownership of the \$115 million dollar facility.<sup>8</sup>

### **THE UTILITY DSM PROGRAM**

I would like to suggest that we can operate DSM programs as joint ventures. This requires somewhat of a different culture from the one that has been typically employed to date by most utilities. Correspondingly, the customer will need to modify their expectations. Joint ventures require commitments from both parties, thus the no strings attached incentive check could well be memory of the past. Now it is quite likely that some may welcome this outcome. But those that have increased their competitive advantage through the utilization of Utility DSM programs, these customers may well not take so willingly to new era. A balance in the middle ground could be the best compromise and acceptable to both parties.

Our host for this conference has proven that Industrial DSM is a low cost power source<sup>9</sup>. The characteristic of a successful Demand Side Management program for the pulp and paper customers is as follows:

1. A low cost to the utility on a per kWh basis because the margin of profit on a per kWh basis is small.
2. Assists the utility in keeping existing customers and adding additional ones.
3. Assists industrial customers to be more competitive.
4. Is allied with productivity and reliability improvements.
5. Is flexible, should be able to address the individual energy saving opportunities of each large customer.
6. Provide the utility with opportunities of providing custom services to its largest customers.

It is important to note that programs for the industrial sector have to be designed considerably different from programs for other sectors. The following quote describes the situation:

"Many utilities offer effective residential and commercial sector programs. These programs are able to achieve high participation rates and high levels of customer benefits and satisfaction. Because of these successes, industrial programs have been developed based on the same model. But success there has been harder to achieve, even though for years it has been recognized that this sector offers huge potential in terms of energy savings. Once lighting and motor programs have been implemented, the well seems to run dry. Why, then, has the industrial sector been such a difficult market to capture?<sup>10</sup>"

### **INTEREST BASED CONCEPT (A PROCESS IMPROVEMENT PROGRAM)**

Process Improvement programs, have had substantial success in satisfying the characteristics mentioned above. They work with industrial customers to determine what is important to them and focus on that. Program design and marketing are undertaken from the customer's perspective, so the customer's needs become as important as the energy savings. The principle is simple: offer a product or a service that meets the needs and wants of your customer and you will be much more successful than if you have what you think is a terrific product which nobody wants to buy. Perhaps our traditional business activity of supplying energy from a monopoly position allowed us to forget this tenet of marketing, but for the less-traditional activity of DSM, and for the competitive utility industry structure of the future, it is essential<sup>11</sup>. Future DSM program will be driven by the market or regulators. If driven by the regulator, the emphasis of the utility will be minimizing costs. If driven by the market, the emphasis will be value added service. It is necessary to understand the market if you are to provide the valued service. Industrial customers (i.e. Pulp and Paper) typically have the following profile:

- ◊ High load factor
- ◊ Require less transmission and distribution infrastructure costs
- ◊ Often have unique service requirements (i.e. ability to start large motors)
- ◊ Add or subtract capacity requirements to a system in large increments

These customers have the following requirements:

- ◊ Reliable power
- ◊ Demand competitive pricing
- ◊ Dislike the concept of cross subsidization
- ◊ Dislike the perception of funding Residential DSM programs
- ◊ Customized services

Correspondingly these customers have the following impact on the utility:

- ◊ Profit margin on sales is usually low
- ◊ Low administration and customer service cost per kWh sold
- ◊ The customers that are the most likely to be lost to a competitor
- ◊ Few customers represent large portion of revenue

A program that has the ability to meet the above characteristics as well as meeting the need of the utility is a prerequisite. The principles are simple: offer a customized program designed to meet the unique needs of the customer. Make no commitments to the level of funding that a project may receive and make it clear that each customer and project are unique and will be treated as such.

Willis have employed this particular philosophy both in Canada and the United States and it has proven to be successful. Both the customers that have participated and the Utilities have met their objectives at the lowest possible rate of investment and corresponding impact to the ratepayer. The latter is becoming more important as competition impacts the market. Prices will fall, justification for DSM will become harder and the only survivor will be the fittest. In the field of DSM, this is the industrial process related programs.

This cost effectiveness can be demonstrated by looking in detail at any one of the projects identified above. I will give an example<sup>1</sup> of how these pulp and paper technologies compare from a Utility perspective:

Table 1

Total Project Cost	\$10,500,000
Estimated Energy Savings (GWh)	110,000,000
Estimated Demand Savings (MW)	12
Estimated Process or Other Savings	\$37,000
Simple Payback	3.8 Years
Customer Requested Incentive	\$4,500,000
Levelized Unit Program Cost (mils)	5.9
Levelized Total Resources Cost (mils)	13.3
Rate Impact Benefit/Cost Ratio	1.02
Utility Benefit/Cost Ratio	7.04
Total Resource Benefit/Cost Ratio	3.30

The figures have been compiled to demonstrate a 2 year payback project. In this particular instance, there has been additional benefits accrued to the project. The ability to produce increased pulp qualities and the value of the improved pulp is specific to each mill and the market in which it sells its product. Study of

<sup>1</sup> Post Refining 1500 tpd TMP. All figures are approximations and vary on each application (Sources are confidential).

the project would seem to draw a rapid conclusion for the desired win/win. Detailed examination of each and every project is required to fully access the benefits and the criteria by which the project will be valued. We can not stress enough the importance of the uniqueness of each customer and the circumstances of the projects those customers consider.

### CUSTOMER NEEDS

To date, most Utility programs have been based on the principle that the customers require incentives. For a number of years, the utilities have conditioned the customer in such a manner. This may well be appropriate for light bulbs and motors. We think this quite inappropriate for multi-million dollar projects that will impact the way the customers manufactures the product. We have found that projects of this nature can often be justified on their own merits and the Utility can offer other assistance to support the project. These have included:

- ◊ Engineering assistance to justify the project to management and assist in the preparation of capital authorization requests
- ◊ Project pre-monitoring to set baselines for accurate determination of project benefits
- ◊ Technical resources
- ◊ Assistance with R&D
- ◊ Incentives customized to the customers own requirements, this includes the amount, timing of payments and the terms of the contract

### UTILITY NEEDS

The range of services offered to the customer must be seen as value added service. In the era of competition, the customer must value the efforts of the utility. The partner relationship must be established. The utility will have to make any investment in such projects based on typically longer paybacks than the customers will tolerate. In order for this relationship to be a win/win, the utility will need a set of criteria satisfied, as follows:

- ◊ Established justification for undertaking energy efficiency projects (least cost supply, customer services or load shaping etc.)
- ◊ Long term contract for supply over the duration of the incentive investment
- ◊ Customer to purchase value added services
- ◊ Cost control

All of the above shall be considered by the utility to be important. The cost control aspect is the one that is becoming increasingly more significant. DSM activity is seen as an upward pressure on rates at a time when utilities are implementing all available measures to reduce costs and correspondingly reduce pressures on rates for industrial customers. We can demonstrate that the Process Improvements type of DSM program can meet all the needs of customers and utility management.

The economics of BC Hydro's Power Smart Process Improvements<sup>12</sup> program can be summarized as follows:

Table 2

Levelized Utility Costs	.32 cents/kWh
Levelized Total Resource Costs	.84 cents/kWh
Rate Impact Benefit/Cost Ratio	.97
Utility Benefit/Cost Ratio	8.74
Total Resource Benefit/Cost Ratio	3.25

## CONCLUSION

I have attempted to draw on the general trend being experienced by both industries. The cut throat nature of commodity products, and the price war that suppliers face in the market place; not an environment to savor if you are a high cost producer. I do not wish to open the discussion on the potential format that deregulation/re-regulation may take. Or the physical logistics of getting an electron from British Columbia to New York City, where the cost of generation maybe 20 mils in BC and the retail value in NYC as much as 120 mils. The theme I have attempted to emphasis is the desire for a need to change in order to remain competitive. This is apparently a common objective and thus creates the potential for a win/win relationship between customer and utility. The pulp and paper sector seem to indicate that this can be achieved with small strategic short payback investments. Not every good project will fall into this criteria; therefore, the utility DSM program may fit as a partner. One such project could determine the viability of a pulp and paper customer. I ask you to consider how many residential sub-divisions it requires to replace a 120 MW pulp and paper customer with a 70% load factor?

All utility professionals have to demonstrate prudence in the design, management and operation of programs. Within a competitive business, funding of programs already competes with capital budgets required by T&D for new sub-stations and system upgrades. In the face of the customer, we must demonstrate fiscal responsibility. Everybody likes to present the big check to the President of the pulp and paper company. But what impression do you leave behind once you have left the meeting? Who benefited? If the customer received more money then they needed, and the utility simply applied a set of standard formula; I would suggest, although conditions were met, it would not be a win/win scenario. The President might be asking him/herself, "Why did they give us all that money? We only needed 50% of what they offered. Don't get me wrong. It is nice; but how many other customer are they doing this too? No wonder our rates always seem to go up." Correspondingly, customers must take some responsibility. Provide accurate information on the investment criteria for a given project. Be open and willing to share confidential information rather than seeking to maximize the incentive dollars from the utility. We must both be willing participants in this process.

I recommend that you get close to your customers, understand what they do, and what they need to do it. Do not be afraid to ask questions. Your clients are looking for ways in which you can offer them expanded and better services. We are all in business together and we have to assume that we will have to give a little to get a little back in return. An example to this activity, is the Industrial Process DSM program. Designed to meet individual customer needs. Managed and operated with equitable judgment and solid financial criteria. Has a proven track record for meeting customer needs and utility performance criteria<sup>13</sup>. For any of these mechanical pulping technologies to be implemented successfully, it will need the joint venture type investment made possible by the Process Improvements type program, resulting in a project where - **Everybody Wins.**

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## REFERENCES

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