PARTNERING FOR

CANADA's NUCLEAR FUTURE

CANADIAN NUCLEAR ASSOCIATION

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Presented by

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The challenges facing the North American electric utility industry are well documented in the face of industry deregulation, electricity commodity trading, the amalgamation of utilities into larger entities, the joint venturing of electricity and gas utilities, and the commodity trading of electricity. These common challenges are being exasperated by additional pressure on public utilities (such as the Canadian provincial utilities and the Tennessee Valley Authority to privatize to add competition and reduce dependence on governments.

Many of the responses to these challenges have included a highly integrated strategy depending on strategic partnering in many forms to pull together organizations with common objectives and complementary resources to resolve problems.

Partnering vs Partnership

The term "partnering" is often misunderstood with the legal entity of a partnership. Partnering is an evolving relationship that could one day lead to a partnership or joint ownership as the relationship and the complexity of the projects being undertaken increase as illustrated in Figure 1.

It is important to develop good working relationships as a vehicle towards eventually proving that a partnership is in the best interest of the two organizations. However, it is extremely important also to differentiate and realize that the relationship two organizations currently enjoys may just be a good working relationship and having not crossed the partnership barrier.

Outside of the utility industries, many common well known companies have made partnerships and partnering a major strategic thrust of their business as illustrated in Figure 2. Within the utility business, many of the international projects are successful because of the elements of partnering developed as part of the strategy to win in the developing countries of the world. The lack of a local infrastructure to take the responsibility and risk associated with any of the upfront features has naturally attracted partnering. Cononcepts and business relationships have evolved to provide a package to the ultimate customer which has turnkey or EPC (engineering, procurement and construction) responsibility and risk. This is extremely important as project financing tends to drive these projects significantly and the financial institutions are looking for this single point responsibility to be tied to the financing package.

In order to understand the evolution of the partnering process, it is important to understand the final evolution point to this stage which is "partnership" between the two organizations.

Partnering:
Evolution to a Partnership

I N C R E A S I N G

Risk/Benefit

Complexity

Figure 1

Corporations with Active Partnering Philosophies

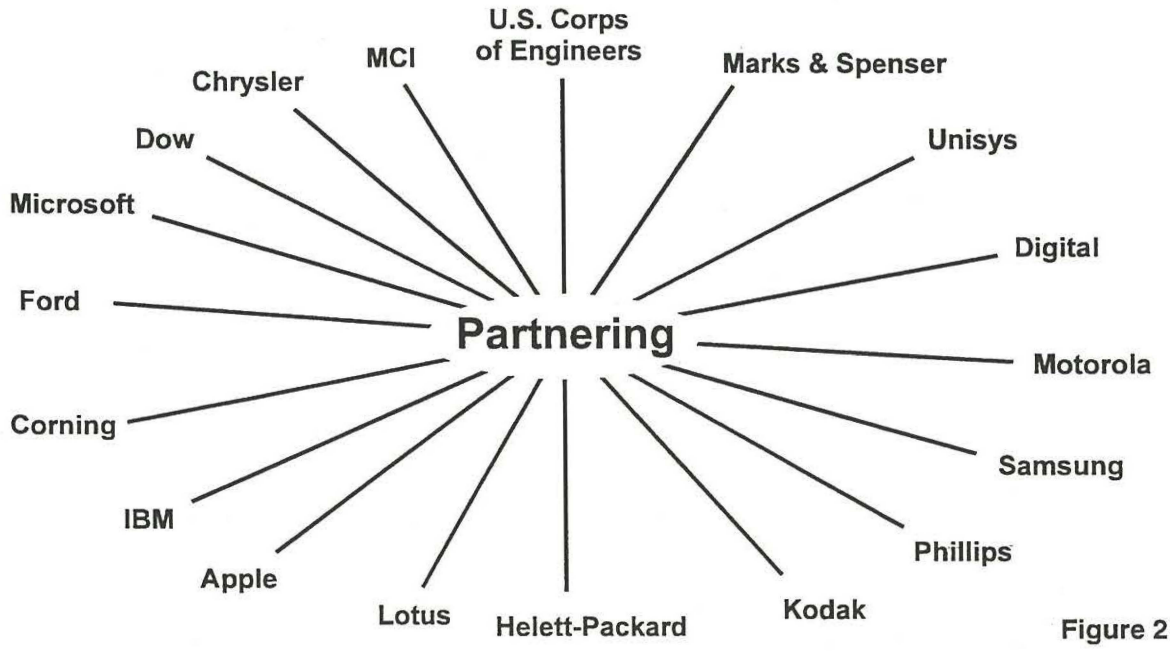


Figure 2

Partnership

Partnership will evolve when both organizations invest knowledge, assets, capital, personnel and facilities jointly to be more competitively joint than apart.

The benefits anticipated by this major commitment include increased financial strength and resources, improved risk management, and greater opportunity to grow through innovation.

If the partnership is based on trust, a winning attitude, mutual commitment and common expectations then incentives can be utilized to enhance the relationship's performance.

The implementation process must encompass both short term and long term goals so that both organizations can readily identify and feel good about the direction that the partnership is going and that the financial, risk and growth objectives which were drivers for the formation of the partnership are realized.

The working relationship as it evolves through the various phases of partnering have to converge in a trusting mutually beneficial attitude by both organizations resulting in a minimal amount of second guessing and a willingness to support each other with objective points of view.

The ability to set up common goals to monitor the end result and be satisfied that both organizations can track the successes and identify the corrective measures during the life of the agreement is extremely important.

As the relationship evolves, a requirement will develop to converge systems and practices within both organizations. It is extremely important when faced with a project or task that the best people from either organization are positioned on a project team. Disparities in pay scales, quality system practices, engineering standards and many other practices and company systems all lead to additional effort which should be directed instead towards the project goals and challenges.

As the partnership evolves, the free exchange of relevant technologies and standards as well as joint research and development will enhance the partnership and make it succeed.

Having looked at the ultimate relationship, ie: a partnership, the partnering philosophies and development of relationships between organizations should evolve naturally based on growing mutual improvement and results based on the strength and the working relationship and the partnering principles being utilized to develop that relationship.

The Chrysler Example

A well known example is the approach that Chrysler has taken with its suppliers. Chrysler's supplier management evolved between 1989 and 1994. The development of supplier relationships which bring the supplier into the team during the conceptual and specification preparation phase of a project (such as a new vehicle development cycle) develops supplier accountability for design, prototype and facility investment while developing incentives to continually improve the output, production and cost performance to Chrysler.

The complex evaluation of supplier performance, SCORE (Supplier Cost Reduction Effort), results in a continuing upgrading and enhancement to the supplier management process as well as providing the critical feedback to the suppliers and joint preparation of strategies to deal with the product issues at hand.

The results of this program have been dramatic:

1. Increase in sales between 1987 and 1996 (see Figure 3)

2. Increase in net income between 1987 and 1996 (see Figure 4)

3. 40% time reduction in a new vehicle development cycle.

4. A $75M savings on vehicle development costs for recent vehicle model launch and a 15% vehicle launch savings for the 1998 model over similar costs in 1993.

5. A reduction in the number of suppliers and end contracting costs.

6. Chrysler has seen an increase in market share and profitability. The market share increase of 2.5% from 1987 to 1994 has resulted in the highest market share the company has seen in 25 years.

7. Increasing stock prices (see Figure 5).

The profits per vehicle have increased from approximately $250 in the 1980's to $2,110 in 1994. This has all been accomplished despite several product recalls and recent labour unrest.

Chrysler Sales

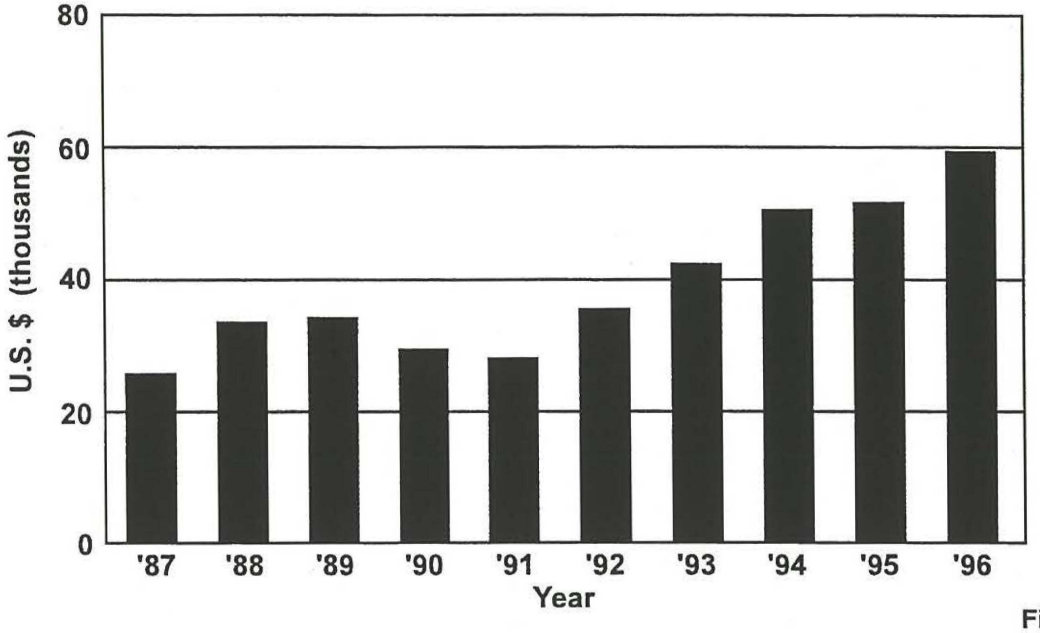


Figure 3

Chrysler Net Income

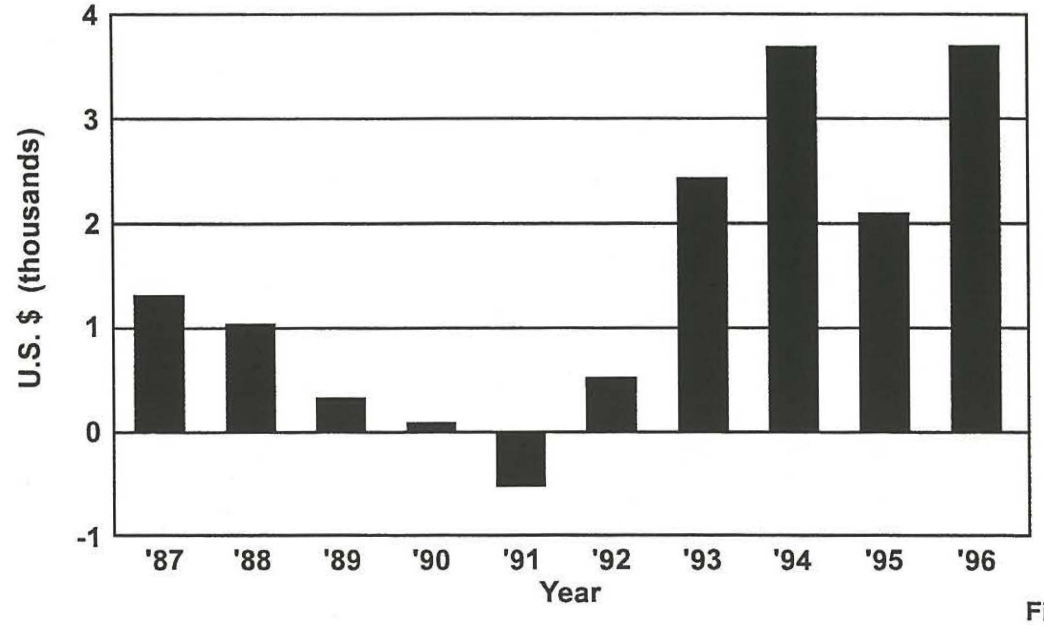


Figure 4

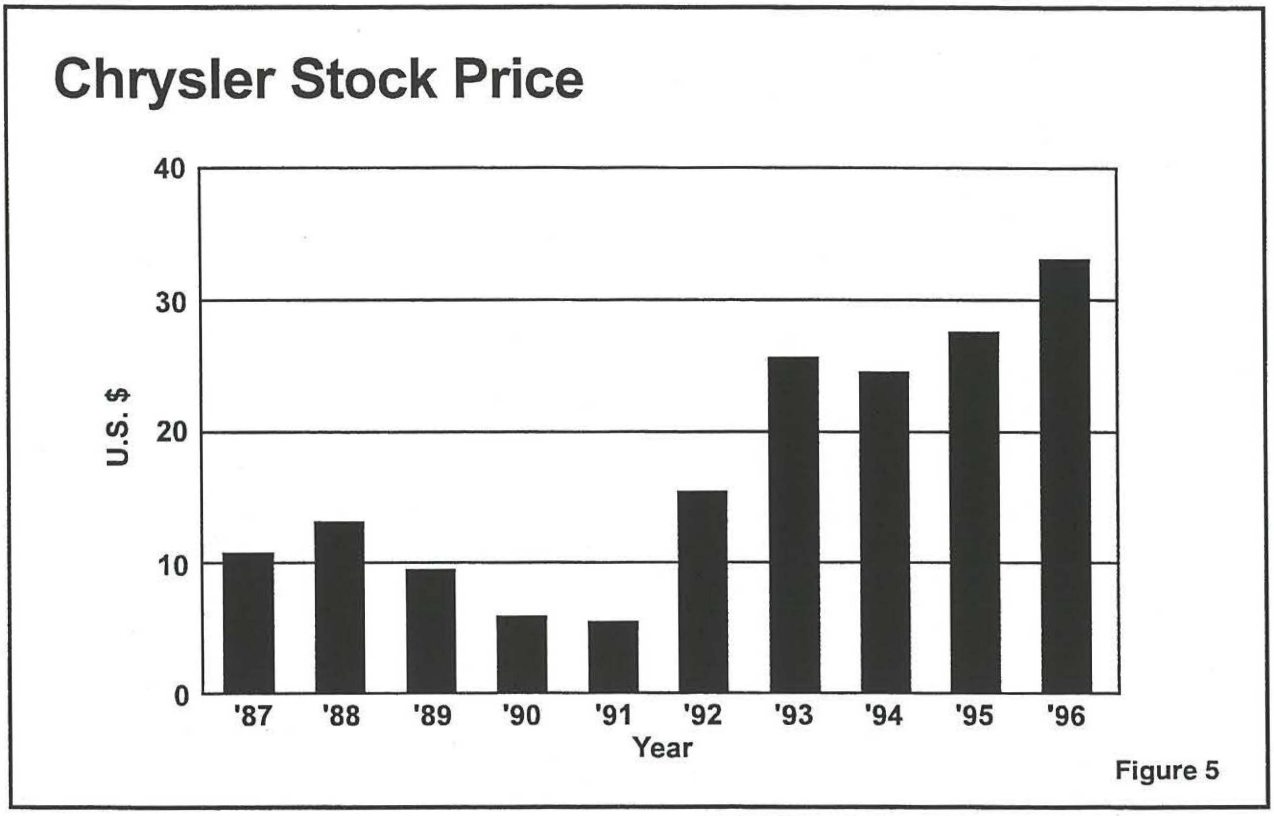


Figure 5

Electric Utility Partnering

The application of partnering to the challenges being faced by the electric utility industry should start with a look at the traditional vendor/utility relationship which had been the model in the 1970's and 80's.

The utility has multiple vendor relationships possibly with divergent goals from either the project goals or the utility's motivation in proceeding with the project.

The tender process and subsequent evaluation is a lengthy process which is tied to the supply of the products detailed in the technical and commercial specification which is the basis for the project at the risk of the utility.

The vendor utility relationship goes through many emotional and trust peaks and valleys during the evaluation of the tenders and the subsequent contractual process partly because of the strict rules of confidentiality and fairness which limit the openess of the dialogue of the two parties.

It is difficult to factor in long term benefit into the tender process so the results of the considerable effort in forming a contract result in a short commitment to each other.

The duplication of resources provides a critical inefficiency especially if there is a time limitation on the delivery of the product or service.

As mentioned in the introduction, the deregulation of the North American electric industry has a significant impact on the utilities including increased competition among themselves and an emphasis on cost reduction as a way to improve the relative competitiveness of the utilities to one another.

Also, the competitive bid process is being recognized as being costly. This which reduces the flexibility of the utility to respond to changing situations, requires a large effort by the utility to maintain the relationships necessary to deal with issues such as security of supply, meeting policy requirements for numbers of bidders and to extract the necessary information from vendors by communicating with a larger number of vendors in this constrained dialogue process.

The effects of this traditional approach have been further impacted as the Canadian nuclear utilities move away from an engineering and construction phase to an operating emphasis. The number of companies in Canada with specific CANDU expertise, have reduced over the years and it is apparent that it is in the best interest of both the utility and the vendors to be more proactive in developing and maintaining key relationships.

B&W Partnering Experience

Babcock & Wilcox (B&W), since 1980, has used a variety of contracting and partnering forms to develop global strategy to the supply of its products, both fossil and nuclear steam generating equipment.

A strategic mix of consortium, strategic alliances, and joint ventures have provided the impetus for B&W to lead in worldwide market share in many of the categories including the supply of nuclear replacement steam generators to the United States since 1992.

With the projected growth of the installed capacity in China alone to increase 140 GW in the next 10 years, Babcock & Wilcox, in 1982, formed a joint venture with the Beijing Boiler Works to establish a manufacturing facility in this critical market. The principles developed in that manufacturing joint venture have been applied and improved upon, such that manufacturing joint ventures now exist in Indonesia, India, Egypt, Mexico and Turkey (see Figure 6). It is coincidental that many of these countries are also critical CANDU countries.

The Chinese joint venture manufacturing operation in Beijing is now three times larger than the Canadian manufacturing facility in Cambridge, Ontario however only represents 15% of the installed boiler manufacturing capacity in China. The facility has doubled in size just to maintain that market share. The critical market decision to form a joint venture in this country has allowed B&W to play an active role in the market without over exposing the company in any one country.

Major fossil boiler contracts, such as Suralaya in Indonesia which comprised 3x600 MW coal fired turnkey plants, were secured through a consortium to supply the boiler island, turbine generator and shared facilities of the power plant. B&W scope was approximately four times larger than the traditional boiler pressure part scope that B&W would have been satisfied with ten years earlier. The customer, which was the utility in Indonesia, had a project structure with clear accountability to the consortium members lead by B&W and was an innovative evolution from B&W's supply of the previous four Suralaya units.

In the nuclear field, a strategic alliance with Hanjung in South Korea has resulted in the supply of steam generators and all the critical heat exchanges to the Korean Wolsung Units 2, 3, and 4 while addressing the capital requirements for increased Korean scope in these critical projects. This strategic alliance has also been resurrected for the China project at Quishan where B&W is a subcontractor to Hanjung for the supply of steam generators and critical heat exchanges following the Wolsung example. The program includes the contracting of these critical key components to the CANDU plants because of insufficient Canadian EDC financing. This freed up the EDC funding for other activities which have benefited all of the other CANDU suppliers and AECL in the process despite diluting B&W's scope.

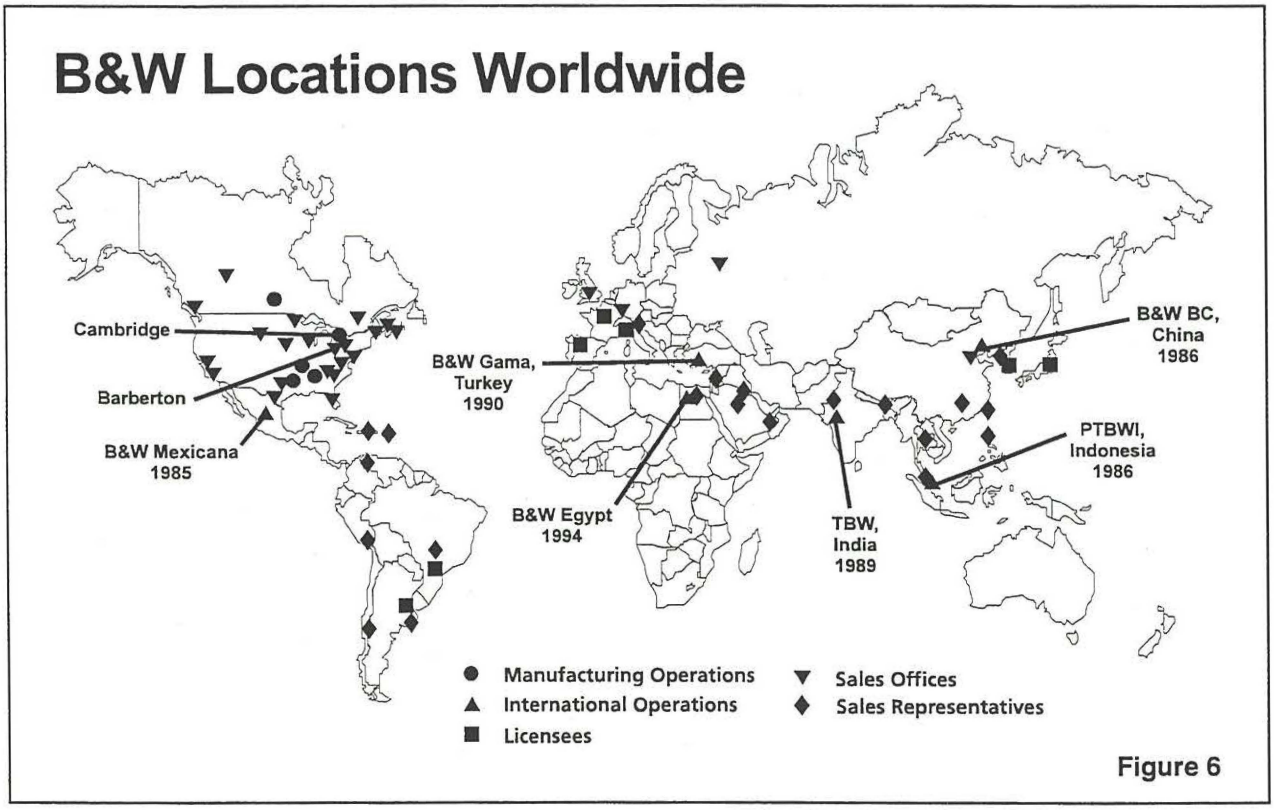


Figure 6

Utility Partnering

The new approach for potential for utility and supplier relationships in the utility industry can provide benefits for the utilities which include:

1. Well defined project scope
2. Defined resources for the duration of the project
3. Open book approach to risk sharing
4. Access to relevant or first-of-a-kind technologies
5. Reduction in duplication of resources
6. Reduction in the number of suppliers and associated administrative costs
7. Increased flexibility to change scope schedule and schedule other project parameters

The benefits, of course, to a supplier such as Babcock & Wilcox include:

1. Reduced sales, proposal and rebid costs
2. Well defined scope with upfront input from the supplier
3. First-of-a-kind and other risks are shared
4. Incentive programs are opportunities for improved performance and schedules
5. Lower costs resulting from more efficient staffing and personnel utilization
6. All this results in a more competitive offering by the supplier for future success.

This new approach would start with integrated customer supplier teams which would collaborated early in the project which will result in a shared open input to the development of the specification. This shared planning phase will evolve into more productive work being completed at the start of the project execution phase than the tender and reactive process that was the norm ten years ago.

The collaboration also includes shared resources, risks and rewards resulting in shared solutions.

The long term relationship of a multi year or even multi site and potentially multi-product nature will result in significant continuous improvement opportunities. The partnership principles which B&W has applied in various forms would include:

1. ***Trust***

   The use of open book estimates and relating back to actual costs from previous contracts greatly enhances the buy-in from both sides as to the real cost of the proposed project.

   The principles can include: limited audit rights, agreed upon profit margins, and confidentiality to ensure that there is a perception of security in the dealings that will evolve into the personnel relationships.

2. *Management Committee*

The performance and cost goals would be established and modified as the relationship evolves. Short term and long term priorities will be maintained resulting in opportunities for closure to projects sooner resulting corrective actions to optimize and improve the efficiency of the next project.

The complexity of new undertakings would be developed within the management committee so that objectives and structures are put in place to help initiate these new initiatives.

3. *Core Team*

The identification of a core team with a mandate on an individual project to chose the best of each organization will help integrate design and planning phases and to create cost estimates and schedules which will reflect a high assurance of project performance.

The team will have access to many different benchmarking standards and statistics and by sharing these, again the risk is managed better.

4. *Risk Sharing*

The pooling of risk and shared overrun and underrun that runs through defined incentive programs all lead to significant risk realization and reduction.

There is an open atmosphere for the discussion of first-of-a-kind issues and buy-in from both parties in the implementation of this first-of-a-kind technology that will result in better project performance over its lifetime.

The lessons learned process should be open and honest resulting in defined improvements which should be then the basis for the initial evaluation in the next lessons learned.

5. *Terms of Payment*

Cash flow is important in every organization. By jointly ensuring that no negative cash flow is encountered during the project, unforeseen cash cost of money duplication will be avoided.

6. *Period of the Agreement*

The real cost savings can be achieved through multi-year or multi-site arrangements.

The experience within the utility industry with self monitoring programs exemplified by B&W and Pacific Gas & Electric's partnerships on continuous performance measurement. This measurement looks at the following factors as they inter-relate for every project.

1. Safety and environment
2. Performance limits and guarantees
3. Joint cost management
4. Scope development
5. Regulatory, community and labours
6. Schedule
7. Coordination and management effectiveness.

Similarly Duke Power has a Supplier of Excellence Program which could be compared to the Chrysler Scope program as a method of recognizing and continuing to develop supplier confidence within the utility itself.

Nuclear Outage Case Study

It is useful to apply these principles to an example based on a traditional nuclear plant outage cycle compared to a similar outage cycle using the partnering model.

The outage cycle shown in Figure 7 would include a tendering period consisting of the development of a specification and tender package over a three month period. The preparation of the proposal by the vendor and the contract review could take another three (3) months. This results in an efficiency of maybe 30% towards productive output expended resources applied to this process from the process which can be applied to the actual planning and preparation for, in this case, a utility outage. This may leave a very tense planning phase of one month in employing the combined resources of both the utility and supplier of 20 people resulting in a two (2) month outage execution with a total resource leveling of 50 people.

If that were compared to a typical partnering outage cycle management as shown in Figure 8, a total of four to six senior people would be employed for three months looking at relationship management issues, initially to secure a partnering arrangement and on subsequent outages, dealing with the lessons learned and other activities associated with the relationship.

Traditional Outage Cycle

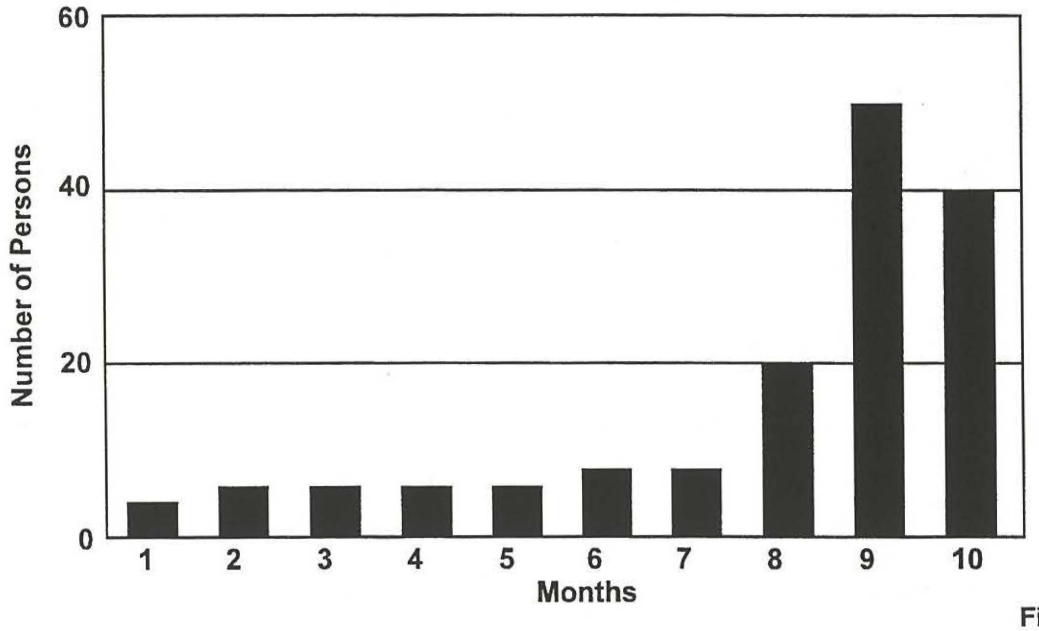


Figure 7

Partnership Outage Cycle

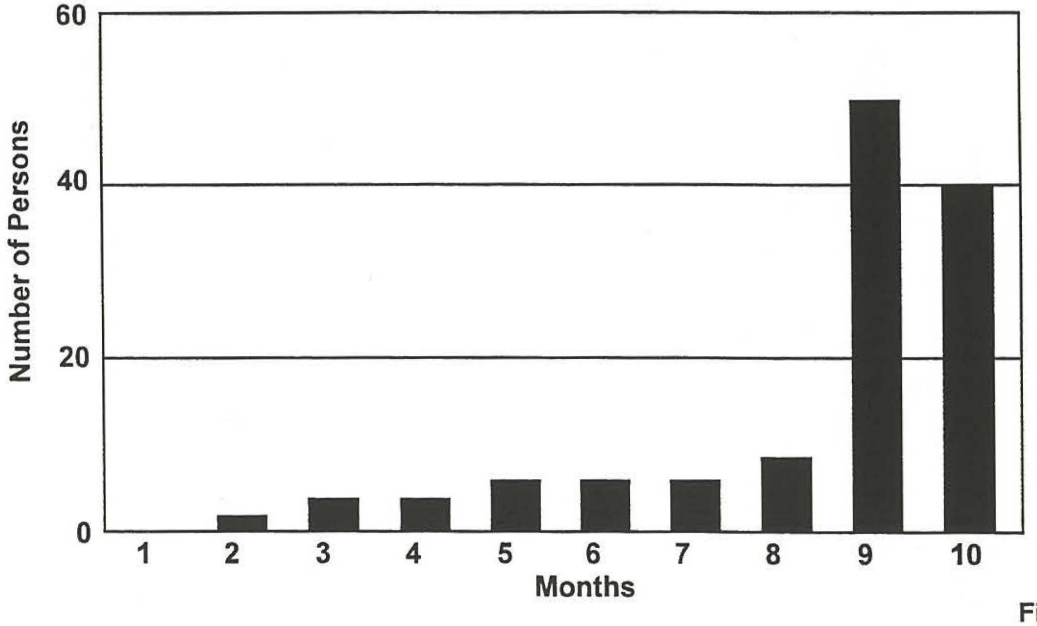


Figure 8

The planning would commence immediately towards the outages preparation with a similar outage performance of two (2) months.

Figure 9 illustrates the Outage Preparation Cycle. Figure 10 shows a comparative output toward the actual execution of the outage based on the earlier start to direct outage planning by the combined resources of the supplier and the utility resulting in a net 10% higher productive output in person months than the traditional model.

The costs to the project of the personnel employed over that period of time as shown in Figure 11 (at an assumed cost of $2,000 per person per month) has resulted in an approximate 20% savings in cost by utilizing a partnering approach.

By adjusting the quality of the production output to factor in availability of key personnel (as a function of demands on this time as the outage approaches) the impact on productivity is more positive as shown in Figure 12.

The overall result is a 30% efficiency improvement to the utility, reduced risk due to more productivity being employed before the outage, availability of key personnel at both the utility and the supplier to be involved in planning exercises way ahead of the outage further improves communications where in the traditional sense a lot of key planning is done at a time when key personnel in both organizations have internal issues to deal with as well as the external planning issues.

In conclusion, Henry Ford was quoted as saying "Coming together is a beginning, keeping together is progress, working together is success".

The future of the electric utility industry in North America will depend on the ability of organizations to work together and chose smart partners and the opportunities for the Canadian Nuclear Industry will depend upon the establishment of mutually inner-dependent relationships today.

Outage Preparation Cycle
excluding the outage duration

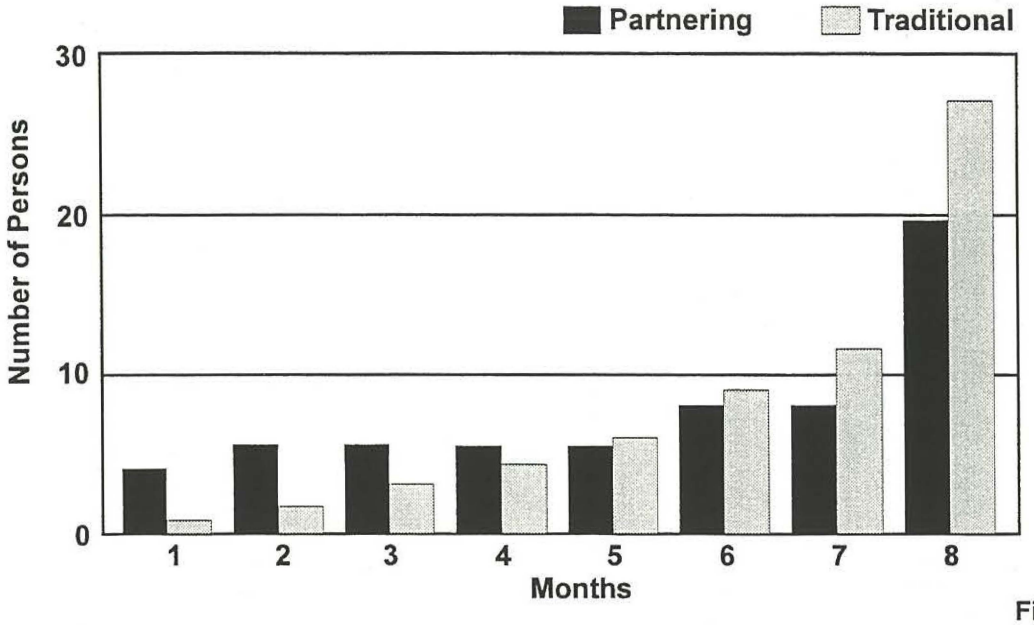


Figure 9

Productive Output
cumulative

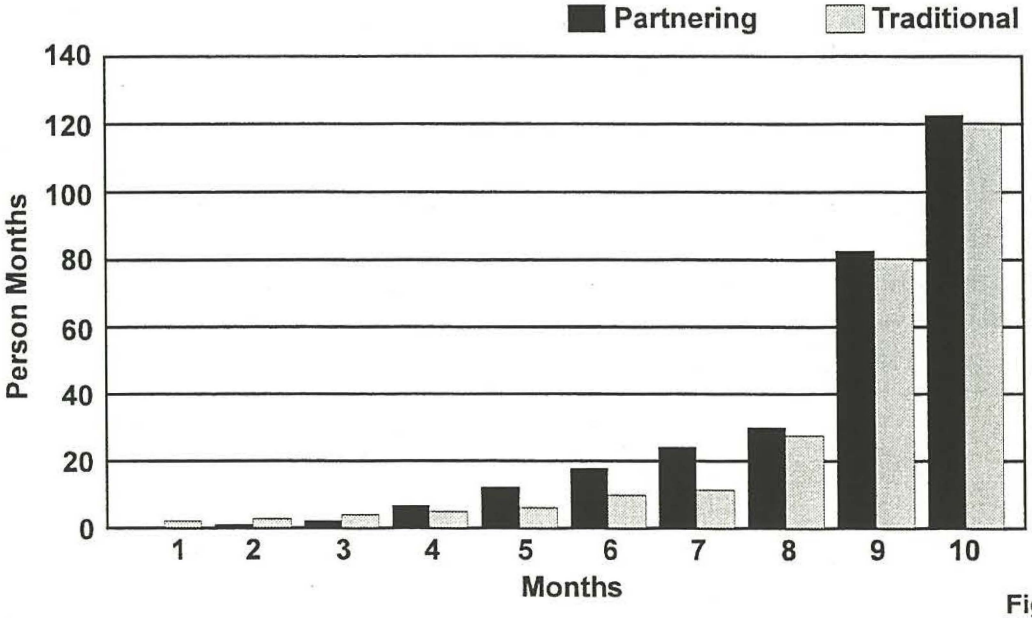
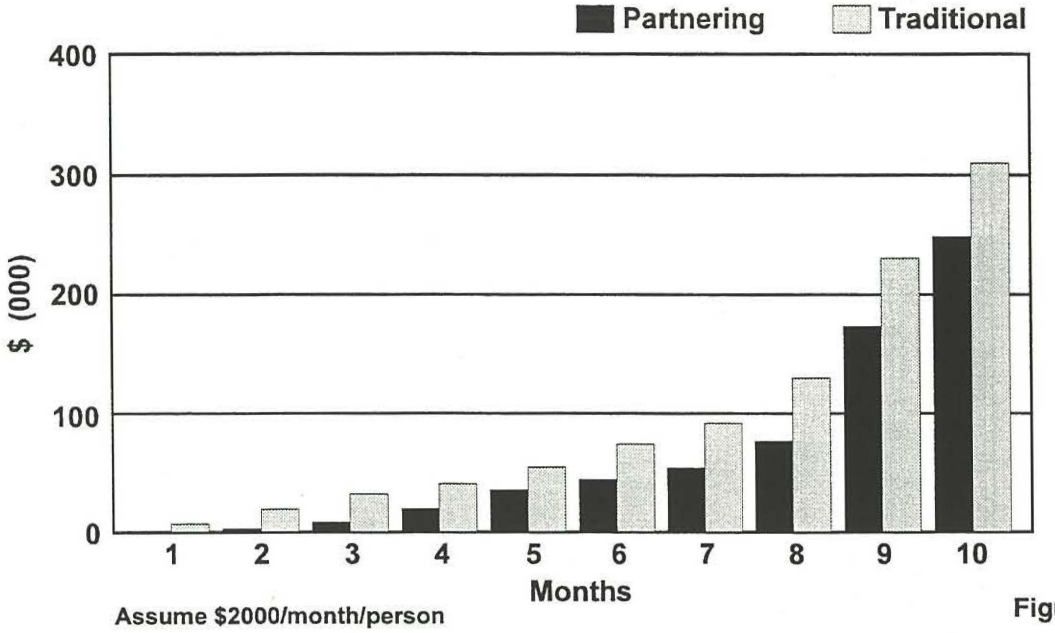


Figure 10

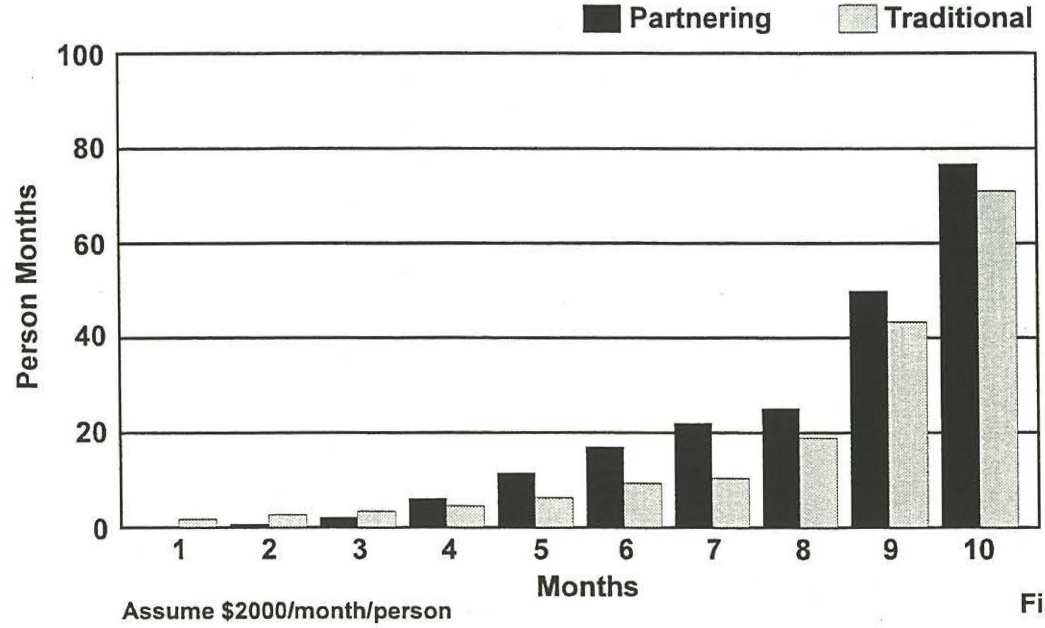
Cost Comparison
cumulative



Assume $2000/month/person

Figure 11

Productivity
key personnel availability factored



Assume $2000/month/person

Figure 12

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