FINAL REPORT FOR THE PROJECT DESIGN
Detailed Design and Implementation Plan

Ontario Hydro

NORTHERN COMMUNITY CONSERVATION PROJECT

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Submitted by:
Sheltair Scientific Ltd. - Vancouver, B.C.
Scanada - Ottawa and Oakville, Ontario
H. Gil Peach & Associates - Beaverton, Oregon U.S.A.

H. Gil Peach & Associates/16232 N.W. Oak Hills Drive/Beaverton, Oregon 97006 U.S.A.

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1. Introduction

Ontario Hydro is planning a community-based conservation project to test a community-mobilization approach to marketing energy efficiency. The project will include residential, commercial and industrial sectors. Emphasis will be on the residential and commercial sectors.

In the first stage (Phase I), a planning process was completed to develop a cost-effective program package likely to generate interest and high participation in the community selected for the demonstration project. This report is an outcome of the planning process. The logistics of putting in place the necessary infrastructure for the project will begin on approval of the Phase II effort. This schedule would result in on-site operations beginning in September of 1990, as winter weather sets in. A series of start-up activities have been planned for the fall of 1990 and the winter of '90-'91. Comprehensive auditing will be conducted in the spring of 1991. Installation of energy saving measures is scheduled for the spring and summer of 1991, and the first post-program measurement of results will be carried out over the winter of '91-'92.

Administration and control of the project will be provided by Ontario Hydro's program testing and analysis department. Functional guidance to the consultant team of Sheltair, Scanada and H. Gil Peach & Associates is provided through the project leader and an advisory group comprised of staff from different departments. This report is the final major project deliverable in Phase I.

2. Project Objectives

Ontario Hydro's Northern Community Conservation Project (NCCP) will be a high profile, high market penetration, quick-action project designed to achieve four major objectives:

1. **Marketing:** To assess whether performance contracting is an effective mechanism for delivering community-based energy savings and demand-side management.

2. **Demand Reduction and Energy Savings:** To determine the maximum megawatts achievable through the installation of cost-effective energy saving retrofit and renovation measures.

3. **Transferability:** To assess the transferability of performance contracting to Ontario suppliers.

4. **Improving Technical Information:** To collect and evaluate data to augment existing residential and commercial sector data bases.

The Northern Community Conservation Project (NCCP) also is a demonstration project designed to reduce customer electricity costs using targeted information and incentives. The project will offer higher personal contact and higher incentive levels than are typical of general conservation campaigns. It will combine other program features such as a community assessment, a community advisory committee, high staff motivation, rigid quality control, and "one-stop service" to enhance the appeal and effectiveness of the services offered.

This program concept will be tested through a community-based performance contracting retrofit project applied to residential, commercial and industrial sectors, but emphasizing the residential and commercial sectors of the selected community.[1]

In Phase I, a detailed operational research design and project development

[1] It is expected that the community will have a population of less than 10,000 and be located in Northern Ontario.

Plan Elements

1. Project objectives
2. Project research design
3. Measures and materials installations, specifications and eligibility
4. Marketing methods to be used in the project
5. Specific implementation procedures for project advertising, measures and service delivery
6. Management procedures, including processing customer applications, quality control, approval processes and financial management
7. Development of specific performance contract(s)
8. Air quality strategy and implementation
9. Milestones for the completion of key project development and implementation tasks
10. Budgets for all key categories
11. Internal and external communication and development of advertising material
12. Field support plan, e.g., project field office, trade ally support, etc.
13. Staff and external ally development and training
14. Monitoring and tracking system that measures the effect of the project on all key result areas
15. Benchmark and follow-up information, e.g., use of such methods as follow-up surveys to obtain information on key result areas
16. Comprehensive process and impact evaluation plans

Figure 1: Operational Research Design and Project Development Plan

1. Measures to be installed in the community
2. Specifications for materials and installation methods to be used
3. Draft performance contract to be used as the basis for the development of the contract by the consultant
4. Short list of possible communities for the project
5. Detailed assessment of the proposed community

Figure 2: Information and Services Provided by Ontario Hydro

plan was produced (for plan elements, see Figure 1). The operational plan is presented as this final report. Planning results were developed by the consultants (Sheltair, Scanada, and H. Gil Peach & Associates) at the direction of the Ontario Hydro project manager and in close interaction with Ontario Hydro staff. Each iteration of the plan (initial, intermediate and this final report) was conditioned on Ontario Hydro's direction, review and approval. In addition, Ontario Hydro provided specific information to support development of the report as outlined in Figure 2.

The context in which this report was developed emphasized practical results and accountability, rather than general research. The project has been planned in conjunction with corporate strategic objectives. It will include intensive community-based marketing. We recommend that incentives cover the full cost of measures up to 100 percent of avoided cost, to gain adequate program penetration to help in planning future programs for demand-side resource acquisition. As listed in the objectives above, transferability is to be a major outcome of the project, in addition to accountable demand reduction and energy savings. The project also will provide information with which to improve efficiency of future programs, improve customer service, and lower costs of conserved energy and reduced demand.[2]

[2] This program design has profited from demonstrated weaknesses and strengths of prior work elsewhere. See, for example, Muhannad Khawaja, Thomas P. Potiowsky and H. Gil Peach, "Cost-Effectiveness of Conservation Programs: The Hood River Experiment," in Social and Private Costs of Alternative Energy Techniques, July 1990 Special Edition, Contemporary Policy Issues. This analysis shows how data from a

3. Recommended Approach to Project Evaluation

The following principles are recommended as a framework for evaluation of the Northern Community Conservation Project (NCCP).[3]

1. **Evaluate from a resource-acquisition perspective:** To be credible, the NCCP evaluation must be continued for several years, at least with billing data on a per-account level.[4] Ongoing evaluation supports strategic and resource planning and forecasting. It is also essential for improving programs.[5] Neither a one-time analysis nor analysis carried out over one pre-program year and one post-program year put demand-side resource management on a level playing field with supply-side resources. This evaluation also addresses the increasing sophistication of all interested parties in the ongoing debate regarding the viability of demand-side resource options.

    Reliability cannot be determined except through long-range measurement: Even preliminary assessments of savings require four to 10 or more years of post-program measurement.

    Plan evaluation with respect to "composite measure life" of the typical measure package installed: If the durability of measures and the deterioration of savings are to be known empirically, instead of assumed; they will have to be measured.

    Tailor funding for evaluation to economic benefits and composite measure life: Funding for each section of the NCCP evaluation should be related to the cost of the program segment to be evaluated and the relative economic value of the program

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major project can be used to improve cost-effectiveness of subsequent program efforts.

[3] Principles one through five are based on Kenneth M. Keating and H. Gil Peach, "Demonstration Projects: What's in Them for Utilities?," p.p. 85-91 in Energy and Buildings, Vol. 13, 1989.

[4] This can be semi-automated after the first year. Repeated yearly review of results can be carried out on a routine basis at low cost.

[5] See William L. Morse and H. Gil Peach, "Control Concepts in Conservation Supply," p.p. 727-735 in Energy, Vol. 14, No. 11, 1989.

segment in terms of estimates of load reduction or shifting and energy conserved. For a demonstration research project, the value of pilot transferability information may be much higher than in an expanded program. If possible, the relative economic value of the project section should be calculated by accounting for the time-differentiated costs in the same respect that generating resource planning accounts for time-differentiation of costs.

2. **State clear objectives:** The goals and objectives of NCCP must be clearly laid out in advance. Clear objectives define why the program is relevant and how research results fit the needs of program sponsors. Clear objectives for this program have been set. (See Objectives, page 2.) As stated, the objectives are clear, complementary, sound and strategic.

   Energetically restrict objectives: The NCCP should be designed so that the most information can be obtained without overloading the project with conflicting objectives. Given that cost-effectiveness is a program precondition, there are four major project objectives: marketing, demand reduction and energy savings, transferability, and improving technical information (see page 2). Any additional objectives should be screened to ensure that they do not conflict with the achievement of these major objectives.

3. **Create a climate of openness and trust:** The NCCP project should be carried out in an open and public manner so that all parties recognize that the demonstration is a fair test of the central issues.

4. **Invest in the research design:** The demonstration must be well designed so that the results relative to each of the major objectives will be scientifically defensible. Because the NCCP is intended to show that a program concept works, the resources directed to evaluation and measurement must be sufficient to rule out alternative explanations for project results. For example, a substantial investment in load research will be required if disaggregation to the level of the individual dwelling or facility is necessary to provide credible interpretation of the program's effect.

5. **Develop a high quality data base:** NCCP should be designed to carefully collect and maintain a comprehensive data base that can be used to answer unanticipated future questions. The excellence of the data base and tracking system is also key to

empirical demonstration of the reliability of the savings produced. (This is essentially a restatement of the fourth major project objective from page 2.)

Set data system goals: Specify and develop NCCP relational data base and tracking system to document quality control and provide for recall accessibility; provide adequate documentation of barriers so the gap between potential conservation supplies and achievable savings is closed; provide a documentation log; and develop a semi-automated multiyear evaluation system. The data base system should support management control, process evaluation and impact evaluation. The quality and usefulness of the data system are also the basis for modelling the transferability of the project to other parts of the Province.

6. **Develop sample for load recording:** To meet project objectives as stated (see page 2), time-differentiated measurement is required. If kilowatt-hour assertions are required as a result of the project, a sizable load research sample must be built in. Also, load data for individual buildings are required to permit analysis of savings, take-back effects, effects of occupant behaviour, and interactions of temperature and humidity. Load research is required if kilowatt-hour results are to be explained at a disaggregate level.

7. **Develop data on measure life:** Measure life data is currently only a set of assertions. This fact is the weak link in the calculation of demand-side resource cost-effectiveness. If the NCCP is to be viewed as a viable alternative to supply-side projects, composite measure life tracking is critical for calculating cost-effectiveness and cost recovery. NCCP can develop this data fairly inexpensively through reinspection, photos and long-term tracking (see 1, above, for comparable quantitative tracking).

8. **Apply the "practical relevance" test:** The NCCP evaluation effort should meet the test of relevance, specifically, that the evaluation effort be designed to produce information that might make some practical difference in a decision or contribute significantly to an objective (including increased understanding). There are several approaches to demand-side management program evaluation, and there is a trade-off

between precision of measurement and evaluation cost.[6] The intended use of the results produced by the NCCP may suggest the degree of precision that is useful.

9. **Plan also for short-term evaluation:** NCCP also should include short-term evaluation for providing feedback to the project leader. Ballpark numbers can provide temporary results until more precise numbers become available, and they can help ensure that big-investment, long-term efforts are kept on track.

10. **Provide balance:** Approach evaluation in a balanced fashion to support customer service goals (including quality materials, quality of installation, customer relations, privacy rights) while working toward goals of technical fit and credibility.[7]

Process Evaluation Plan

The purpose of process evaluation is to describe a program as planned and as delivered, documenting perceived successes and failures in program definition, administration and actual service delivery, as well as changes introduced to resolve problems and improve service.

The process evaluation will deal with qualitative analysis of the organization, administration, marketing and social perceptions in the NCCP, beginning just prior to the start of field implementation this fall. It will document implementation as the project arrives in the community, through the audit phase, and then through the installation of materials. The process evaluation also will document community, contractor and staff perceptions of the program in the winter of '90-'91 and thereafter. The objective will be to capture the intricate and complex nature of the start-up process, including the practical logistics required to supply a conservation infrastructure to a remote northern Ontario community. The process evaluation also will track relevant activities and events in the community, so that the program can be interpreted in terms of the whole fabric of community life. This will include

[6] Based on H. Gil Peach, "General Considerations for DSM (Demand-Side Management) Program Evaluation," presentation to the NARUC Energy Conservation Committee for the Great Lakes Conference of Public Utility Commissioners Regional Least-Cost Planning Workshop, April 1990.

[7] H. Gil Peach and Eric Hirst, "Factors in the Practice, Organization, and Theory of Evaluation," pp. 163-170 in Evaluation and Program Planning, Vol. 12, 1989.

tracking the formation and role of the community advisory group, as well as documenting the perceptions of contractors, customers and other parties. Both participant and non-participant observations will be documented. Program approaches and program segments will be reviewed to provide suggestions to improve the quality of service and communication.

Style and Technique

Process evaluations often are written in either an academic or technical format and style, but these have a limited audience. For NCCP, the process evaluation will be oriented toward a written history. The goal will be to write an inherently readable and interesting story, but also to cover the necessary technical content and documentation. The initial section of the process evaluation will draw from historical, interview and contemporary written materials on the community to set the project within the context of community history, groups, informal and formal communication networks, interests and concerns.[8] This report should be clear and coherent. Social science and industry jargon should be avoided whenever possible.

The basic technique to be employed in the process evaluation should be approximately monthly interviews, with sampling and re-interview of people from the range of sectors that make up community life. Although surveys are recommended (Benchmark and Follow-Up Information, below), conversations provide a much more natural and accurate approach in a community context. Additionally, the project leader should have a hot-line number so that members of the community may call in with complaints, advice and ideas for keeping the project in touch with community expectations.

[8] A formal community assessment should be undertaken (see section on marketing methods). A brief equivalent can be accomplished by covering community history and overview as a process evaluation sub-task. A prototype for this section is Flynn, Cynthia B. (1983), Community Assessment, prepared by Social Impact Research, Inc. for the Hood River Conservation Project, DOE/BP-11287-15, January.

Elements

The elements of the process evaluation should include:[9]

1. Description of the program

   a. What are the program goals and objectives?

   b. How is the program attempting to meet the goals and objectives?

   c. How is the program organized? What is the program structure and administrative and organizational process?

   d. What energy conservation measures are offered within the program?

   e. What are the educational aspects of the program, and how is the education dimension of the program intended to work?

   f. What are the linkages of the program to other programs and resources? How are these linkages intended to work?

   g. What is the flow of activity from a customer perspective, the stages or steps that participants pass through to accomplish the program?

2. Institutional questions

   a. How have program goals been modified? Are there implicit or explicit changes in goals?

   b. What factors contribute to achieving program goals? What factors impede achievements?

[9] Specification for the process evaluation is based in part on Flynn Brown, Cynthia (1983), Process Evaluation, Final Report, Hood River Conservation Project, DOE/BP-11287-6. This report can be viewed as a prototype for the process evaluation report for the Northern Community Conservation Project.

c. How does the program work, both formally and informally? What are the actual organizational processes (contract procedure, operating procedure, contractor perception, staff perception, management perception)?

d. What factors might explain any detected difference between expected and actual energy usage?

e. How can program design and/or program implementation be modified to improve the capability to achieve program goals?

3. Customer relations and marketing questions

a. Is the program meeting the target market or only segments of the target market? What elements of the program have wide customer appeal within the target market, and which elements are perceived as drawbacks by customers? Why do some customers choose not to participate in the program?

b. How did participation change over time? How did participation track with customer communication efforts? What factors might explain the participation or lack of participation achieved by the program?

c. How is the program perceived by participants? How do participants feel regarding the attitudes and technical proficiency of contractors and utility representatives?

d. Is there any detectible difference between participants and non-participants?

e. What suggestions can be made to improve marketing?

In summary, the basic method is to examine what was intended to occur, what actually occurred, the barriers to effective implementation and factors that made the program effective.

Impact Evaluation

The impact evaluation will measure savings in kilowatt-hours and demand effects in kilowatts due to the residential sector program. Savings analysis must control for background changes in energy use by residential customers (*weather-adjusted net savings per square foot of floor area by customer usage type and building type*). Results of this type will also be developed for the commercial accounts. A key policy decision in evaluation design will be to determine the extent of load recording of demand data.[10]

Impact Evaluation Design

Group	Year									
	-6	-5	-4	-3	-2	-1	0	t1	...	tn
Participants	O	O	O	O	O	O	X	O	...	O
Non-participants	O	O	O	O	O	O	O	O	...	O
Comparison Community #1	O	O	O	O	O	O	O	O	...	O
Comparison Community #2	O	O	O	O	O	O	O	O	...	O

1. "X" is treatment, "O" is observation
2. Accounts will be tracked to provide yearly updates for correction of conservation resource planning estimates.
3. Non-participants consist of all members of the customer target group category who have either not yet applied for the program or who have dropped from the program prior to weatherization.
4. Comparison communities will provide data for the comparison group.

Figure 3: Generic Residential and Commercial Impact Evaluation Design

[10] To meet project objectives as stated (see page 2), a load research sample is recommended to provide time-differentiated kilowatt results. The per-dwelling or facility measurement of load (using at least four-channel, and preferably six-channel recorders) provides a level of disaggregation that makes results credible and defensible. At the same time, however, load research is expensive, so a judgment regarding the use and value of load results in relation to cost of gathering the data is required.

Quasi-Experimental Design

An interrupted series design will require pulling data from the past six years to 10 years from archives, and continued assessment of billing data for the projected composite measure life of the program.[11] Once established, the time series evaluation of billing data may be automated through the customer accounting system so that continued reporting will require minimal effort. Dwelling characteristics, energy conservation measures installed, and a restricted list of demographic and other customer data will be collected to support analysis.

As shown in the Generic Evaluation Design (Figure 3), two comparison communities are recommended. This design provides protection against interpretations of energy savings as being a general background event and from other developments that might suggest other plausible interpretations of savings.

Criteria for selection of the project community should also be applied in selection of the comparison communities. Recommended criteria are shown in Figure 4.

Method of Analysis

The electricity consumption in kilowatt-hours per dwelling unit before and after implementation of the NCCP will be compared using 1) an interrupted time series analysis, and 2) the difference-of-means approach using yearly data.

Interrupted Time Series Analysis: The interrupted time series analysis method uses an auto-regressive moving average (ARMA) model to describe pre-weatherization electricity consumption (kilowatt-hours). A deterministic component is then added to account for effects of the NCCP.[12] The method places strong restrictions on the quality of data, but

[11] The models for this analysis are: Cook, Thomas D. & Donald T. Campbell, Quasi-Experimentation, Design & Analysis Issues for Field Settings, Boston: Houghton Mifflin Company, 1979, Chapters 5 & 6; G.E.P Box and G.C. Tiao, "Intervention Analysis with Application to Economic and Environmental Problems," pp. 70-79, Journal of the American Statistical Association, March 1975, Volume 70, Number 349. See also Peach, H. Gil, Fred Keast, Kenneth M. Keating and Michael Warwick, Research Plan: Hood River Conservation Project Evaluation, Final Report, Hood River Conservation Project, DOE/BP-11287-11. Intervention analysis is a methodological improvement over the Hood River multiple time series design.

[12] For a full description of this method, see Box & Tiao (1975) and Cook & Campbell (1979), op. cit.

has certain advantages over the difference-of-means approach:

1. The interrupted time series analysis provides a statistically valid test of the effects of conservation measures installed in any given household or commercial facility. The test is based on variations within individual households (and within individual commercial buildings) rather than across different households (or across different commercial facilities). The estimated energy savings for similar units can then be pooled to obtain overall estimates of program effects by market segment.

2. To produce short-term evaluation results, the study of program impacts can be initiated soon after the implementation of the program. It is not necessary to wait one or more full years until assessment of program impacts can begin.[13]

3. The time series approach makes it possible to study the long-term effectiveness of various conservation measures. A component can be added to the model to track the gradual decay in measure effectiveness, and the pace of the decay can be determined using statistical tests.

4. The time series approach is well-suited for case study analysis, since the tests of program effects are based on within-building information. The approach should be particularly useful in the commercial sector, where the number of facilities in the chosen community does not permit drawing even a moderately sized sample.

A minimum of six years of pre-program monthly data is required to build reliable time-series models for energy consumption in the period prior to the NCCP. The ARMA models assume a certain degree of stability or homogeneity in the time series. However, major changes or disturbances in the series can be handled through the use of indicator variables, if timing and the causes of these disturbances can be specified, and by exclusion of cases, if they can't be specified.

[13] Although technically, the interrupted time series analysis method permits such estimation, it is not recommended that payment to performance contractors be based on one or two months of metered data. We will need to run both short and long-term analysis to know how well the short-term estimates match yearly results. As with any new application of a method, it is better to be conservative until the method proves out.

Information about possible disturbances in past electricity consumption will be collected in the benchmark survey (see Benchmark and Follow-Up Information section, below). Such changes could be due to changes in occupants, number of occupants, appliances, self-installation of energy conservation measures or other factors. Weather data also will be used to adjust consumption as a function of temperature. Efforts will be made to eliminate gaps in monthly billing data, since missing values complicate analysis. Monthly billing data will be tracked before, during and following the NCCP work.

Criteria

1. Population under 10,000, depending on budget constraints (size relative to budget constraint)
2. Reasonable access by air; reasonable accessibility for materials, contractors and staff
3. Northern communities whose characteristics can be related to southern communities
4. Mixed housing, mix of incomes, household sizes, ages, sexes, range of construction types and vintages
5. Opportunity for municipal utility involvement
6. High percentage of electrically heated houses
7. Some opportunity to use local resources
8. High interest in project shown by local mayor, council and utility, as well as region and area
9. Opportunity for energy savings
10. Some commercial and perhaps small industrial customers
11. Geographically limited and definable project service area
12. No previous unusual conservation efforts in the community
13. Not a "sunset" community

Figure 4: Suggested Community Selection Criteria

The Difference-in-Means Method: The interrupted time series analysis may not be appropriate for households or businesses where the monthly electricity consumption exhibits large unexplained irregularities over the past six-year period. A second form of analysis and a standard used in many previous evaluations of energy consumption is the difference-in-means method. Sometimes this method is applied on an individual home basis with the "base year" defined as the 12 calendar months immediately prior to installation or retrofit, the month of installation skipped, and the "post-year" defined as the 12 calendar months immediately following retrofit. This form of application, however, tends to overstate savings. Instead, a more conservative approach will be used.[14] A common "base year" will be defined for the project, composed of the 12 months of the calendar year (or of an operative year) immediately prior to announcement of the project in the community. The common "post-year" will be defined as the 12 months of the first full calendar year after completion of project installations (or as an operative common 12-month period). The impact of the project will be assessed by comparing the "base year" and "post-year" energy use in the selected NCCP community and netting out the parallel result for the comparison communities.

Given the availability of data, the method will be modified to include more than one year of pre-project energy use. This should improve the procedure. The difference-in-means approach involves simple calculations and is easy to implement on the computer. This method will therefore be applied to all buildings in the study. An interrupted time series analysis will be used for early monitoring of program effects and for a more detailed analysis of the data. The use of both methods will provide for triangulation of results.[15]

Sample Design

Separate sample designs would be required for measurement of energy savings and load reduction.

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[14] The more conservative approach was employed in the study of the Hood River Conservation Project. See Eric Hirst (1987). Cooperation and Community Conservation, Final Report, Hood River Conservation Project, DOE/BP-11287-18.

[15] This is the basic research design strategy. It implements Campbell's recommendation on "multiple measures of independent imperfection."

Energy Savings Samples (kilowatt-hours): Decisions on how to perform sampling will be based on the specific profile of the community, once it has been designated. Some stratification will be needed to optimize the sample design. The analysis and generalization of results assumes random selection of households and random selection of commercial buildings.

The primary comparison group will be drawn from the comparison communities. Customers that qualify for the program, but do not participate (non-participant sample), will be included as a separate comparison group. Analysis of non-participants will permit characterization of this group in contrast to participants by age of building, type of structure, and appropriate socio-demographic or business characteristics. This information should be of use in ongoing development of marketing plans.

Load Samples (kilowatts and kilowatt-hours): A preliminary sample design for measurement of kilowatt savings for the residential portion of the project would call for a sample of 120 homes that use large amounts of electricity. A six-to-eight-channel load recorder with channels for total load, space heat, water heat and indoor temperature is proposed. In addition, each of these sites will be provided with a thorough site audit, including a complete UA description of the house, window area, PFT test of wintertime infiltration, and a description of appliances and heating system.

The sample design is based on kilowatt savings data from the Hood River Conservation Project. Single-family homes in Hood River that relied primarily on electricity as a heating fuel saved approximately 4,000 kilowatt-hours in a climate with 5,600 heating degree days (base: 65 degrees Fahrenheit).[16] For single-family electrically heated homes, the average winter peak load per home was 6.2 kilowatts prior to retrofit and 5.4 kilowatts following retrofit.[17] The standard deviation is estimated at 1.2 kilowatts.[18]

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[16] Hirst, Eric, Richard Goeltz, and David Trumble (1987). Electricity Use and Savings, Final Report, Hood River Conservation Project, ORNL/CON-231, DOE/BP-11287-16, page 4.

[17] Stovall, Therese K. (1987). Load Analysis, Final Report. Hood River Conservation Project, ORNL/CON-240, DOE/BP-11287-17, November, Page 4, Table S-1.

[18] The standard deviation is the key assumption in this sample size analysis. The sample size determination should be independently checked and re-run by Ontario Hydro load research staff using Ontario Hydro load research data from NCCP-type communities before the sample design is approved.

Using this data, the confidence level is then set to 0.95 (alpha=0.05), and power of the test to 0.90. For a one-tail t-test (the kilowatt reduction will be for the retrofit homes), the initial sample size is 39 per group. This is rounded to 40 per group and then ratioed up to 60 per group to provide an allowance for dropouts and data problems. The recommended sample size for the program is 120 homes, with 60 treatment and 60 comparison homes. The relative precision of the estimate for a group of 40 homes is 0.06.[19]

For the commercial sector, a policy decision is required as to whether load monitoring will be performed on a case study basis or on a sampling basis. This decision is probably best reserved until the community is selected. The number of channels of information collected also will be dependent on the actual commercial customers in the community.

Benchmark and Follow-Up Information

Because the community will be small, and person-to-person communications regarding "outside" events in small communities tend to be very quick and nearly universal, attitudinal surveys will be of limited value. Also, there will not be time to complete a benchmark survey before the project becomes known in the community. These realities suggest that the attitudinal sections of the benchmark and follow-up surveys be short. However, these surveys will be useful in developing information on housing stock, appliances, main and secondary heating sources, limited customer demographics and other factual data.

Benchmark and follow-up data also will be useful both in assessing project results, and in development of an approach to transferability of data developed from the project to other Ontario Hydro communities.[20]

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[19] Precision is calculated for the treated group alone, assuming only the minimum required number of cases remain after all customer dropouts and data problems. The relative precision, r, is calculated by solving: $r^2 = t^2 S^2 / M^2 n$. See William G. Cochran, Sampling Techniques, 3rd edition, 1977. New York: Wiley. p.p. 77-78.

[20] See S. French, S. Block, S. Kaplon, M. Khawaja and H.G. Peach (1985). Regional Adaptation of Results: The Transferability Study, Final Report, Hood River Conservation Project, DOE/BP-11287-2, October.

Both surveys should be of limited length to increase response. Both should be gathered from the project community and the two comparison communities. The other primary source of benchmark and follow-up data will be billing data from the customer accounting system.

4. Measures

The list of measures to be installed in the NCCP will be selected by Ontario Hydro (see on Objectives, Figure 2, page 4). However, working with an initial Ontario Hydro analysis, Sheltair has developed recommendations for the residential sector, and Scanada has led development of recommendations for measures in the commercial sector. These recommendations are attached as Appendix I.

Issues relating to measures to be used include incentive level assumptions, special calculations for low-income participants and standard cost-effectiveness tests, review of materials specifications and installation standards, and the completeness of the measures package. The National Energy Conservation Association (NECA) has granted permission for use of NECA installation specifications by Ontario Hydro and its consultants for the NCCP.[21]

Concerns include:

Residential
- Measures
- Materials specifications
- Installation specifications
- Eligibility
- Incentive coverage

[21] "The National Energy Conservation Association (NECA) is pleased to make the NECA Installation Specifications available for use by Ontario Hydro and its consultants for the Community Based Performance Contracting Retrofit Project. This permission is granted for this project only and its continued use would require consultation between NECA and Ontario Hydro. We feel that this demonstration project is important to our industry and we are desirous to assist in any way we can. ...You are welcome to use these specifications including permission to copy these to make other copies as long as their use is restricted to the current project." Letter of Laverne Dalgleish, National Energy Conservation Association/L'Association Nationale Pour La Conservation De L'Energie to Sebastian Moffatt, Sheltair, Ltd., May 23, 1990.

Commercial
- Measures
- Materials specifications
- Installation specifications
- Eligibility
- Incentive coverage

One of the most crucial concerns for the project and an issue that can affect marketing dramatically, is the degree of cost reimbursement to the customer for each measure. Full cost reimbursement would permit the project to test two fundamental barriers to penetration--physical limitations and customer preference, because economic barriers would be largely removed. Less than full reimbursement would complicate the analysis by introducing other concerns. *It is important to note that the climate for energy efficiency has changed from just "offering programs," to carefully targeted and intensively marketed resource acquisition. Full payment for measures up to the lower of the actual cost or avoided cost is essential to establish the resource potential and avoid creation of lost opportunities.* This approach is also required for the pilot, so that the high-water mark of participation can be established for refinement of program planning.[22]

Recommendation: Ontario Hydro should offer incentives up to the lesser of 100 percent of the installed cost, or the system avoided cost of the bundled package of energy-efficient measures installed in residences and businesses.

A second issue is how to accommodate customer choice of measures or materials that are not offered by the project. *It is very important that this be addressed in a way that appears reasonable and simple from a customer perspective.* True one-stop service is one of the keys to program marketing success.

Recommendation: The project leader should be provided explicit up-front discretion to accomodate customer choice of contractors (including self-installation), materials and measures (including customer-initiated proposals to meet special situations).

[22] For one example of how actual results can be used in refining program design to substantially improve cost-effectiveness of subsequent programs, see Khawaja, Potiowsky, and Peach, "Cost-Effectiveness of Conservation Programs," op. cit.

5. Recommended Approach to Marketing

Careful program design is the key to successfully achieving high customer participation rates and to obtaining expected energy savings in demand-side management programs. From a marketing perspective, the "marketing mix" is composed of product, price, place (distribution) and promotion.[23] Careful design of a community-based project using these standard marketing concepts can provide a potentially highly successful addition to current general awareness and targeted marketing efforts.[24] There are several other aspects of program design and implementation that make for success in achieving participation goals and/or in strengthening the service delivery capability. These include: *direct utility funding* (because customers tend to have much shorter pay-back criteria than the utility), *strong utility direction in planning, materials purchasing, resolving supply and logistical problems, "one-stop" service, high staff motivation, and a respectful, careful and supportive approach to the community.*

Step-by-Step Marketing Design

1. Select community for project.[25]

2. Perform a community assessment (also see discussion of community assessment, under Process Evaluation). The purpose of such a study is to discover the informal power structure of the community. This is an important element, because, *unlike normal marketing campaigns in which a 20-percent market share is considered large, and only high-income or moderately high-income segments are the usual market,*

[23] See D. Engels, S. Kaplon and H. Gil Peach, Marketing and Promotional Plan, Final Report, Hood River Conservation Project, DOE/BP-11287-9, September 1985.

[24] See S. Kaplon and T. Oliver, "A Conservation Marketing Success Story," proceedings from Demand-Side Management Strategies in Transition: Third National Conference on Utility DSM Programs, Houston, Texas, pp. 59.1-59.9, June 1987.

[25] It is important that the community be identified early, so that measures analysis and cost-effectiveness calculations can be based on the actual community's profile. It is likely that each separate community will have a different "community formula" for incentives, dependent upon the actual mix of loads in the community.

communitywide participation is critical to the success of this conservation project. This degree of participation requires understanding and cooperation of the informal power structure of the community. Thus, the model for project success, in this case, is closer to the model of community campaigning than marketing. A community assessment is usually done by a trained sociologist. Companies that can provide such studies under contract are available.

3. Form a community advisory committee that reflects the informal power structure of the community (this group may be more representative than formal community leaders). Care must be taken to include all (or at least most) subcultural elements of the community. This committee will be essential when planning strategies for gaining the participation of hard to reach segments of the community.

   The role of the community advisory committee must be defined carefully from the outset. The intent will be to secure voluntary participation of alert and thoughtful individuals active in the various groups that make up the fabric of community life. The committee will help the project by clarifying community expectations, providing advice on how to accomplish project objectives in ways that are congenial to the community and mutually understood as appropriate, and advising the company on ways to communicate project objectives and activities to the rest of the community. The project leader must represent the company in an open and direct manner to keep the community committee completely informed regarding progress and problems. The community committee's role is bounded by the project objectives (see page 2).

4. Develop marketing and promotional plan.[26] This is the first of many project activities that will involve substantial input from the community advisory committee. The plan should be broad, encompassing both internal and external parties. While the details of the plan must of necessity be developed after the community and advisory committee are selected, the broad elements and focus for the plan are outlined in Figure 5.

Project marketing should focus on building and maintaining community momentum for the timely completion of a quality project. This is done by involving the community

[26] Follows Engels, Kaplon, and Peach, Marketing and Promotional Plan, op. cit.

I. Situation Analysis

A. External Environment: What factors outside the program, including political, regulatory, economic, social and technical, will affect program acceptance?
1. Consumers: By market segment and by community grouping.
2. Employees: Role of employees in carrying out the marketing plan.
3. Trade Allies, Distributors, Contractors: Role in carrying out marketing plan. Relationships between organizations, supply logistics, mark-ups, financing inventories, etc.

B. Internal Environment: What internal Ontario Hydro factors are central to achieving marketing goals?
1. Objectives: What does Ontario Hydro want to achieve?
2. Risks and Opportunities: Identify risks and threats to the NCCP; identify opportunities and synergies possible with the NCCP. Rank each.
3. Strengths and Weaknesses: Identify Ontario Hydro strengths and weaknesses in project design and in the corporate environment.

II. Marketing Program Goals: Should be based on above analysis, and be specific and attainable.

III. Marketing Program Strategies: Outline how goals will be achieved.

A. Positioning: Statement of image to be conveyed to customers and description of the needs the service is fulfilling in the marketplace.
B. Marketing mix: Define the product, price, place (distribution) and promotion.
C. Contingency Strategies: Back-up plans if goals are not met or if crisis situation should arise.

IV. Marketing Action Plan: Detail steps for each goal and strategy, and statement of expected results.

V. Marketing Budget

Figure 5: Marketing and Promotional Plan

advisory committee in the design of the program and its marketing. It is important to be clear with the community committee from the outset about the boundaries of their role. For example, a core project objective is to determine the maximum achievable megawatts in energy savings. The committee ought to know that changing the objectives (and by implication, changing program designs such that the stated objectives cannot be attained) is not within their purview. This probably will not be a problem, except for the possible confusion over whether the project is intended to save energy or provide jobs. Another boundary for the community committee is the in-house advisory committee, composed of experts from within Ontario Hydro. Where technical issues take precedence, the in-house advisory committee will have the knowledge-base required to resolve issues, and the project leader will need to interpret technical requirements in a way that is compatible with community concerns.

The advisory committee should be asked to recommend approaches to communicate important messages, but not to create messages or decide which ones are important. They can play a significant role in reviewing proposed messages. In particular, this review could warn Ontario Hydro that a particular message almost certainly will be misunderstood and advise another means of conveying the intended information.

We recommend that Ontario Hydro use information about community beliefs and perceptions from the community assessment to draft a proposed project identity, a plan for the marketing of the project including contingencies for foreseeable situations in which repair will be needed, and the rationale for an abbreviated time frame for project completion. These should then be reviewed by the advisory committee.

Provisions should be included in the ongoing process evaluation for routinely checking community perceptions to ensure that the project itself is supporting this focus in the quality of the work being done and the quality and effectiveness of communications. This information should be shared with the advisory committee, which will be able to interpret it and suggest or review appropriate remedial action.

6. Implementation Procedures

Specification for materials and installation methods to be used will be developed or adopted by Ontario Hydro. The actual community housing stock, as well as householder preferences, availability of fuels, moisture loading of the structure, and types of mechanical systems are just a few of the characteristics that can have an impact on the practicality of the specifications. Also, the task of identifying and specifying appropriate retrofit strategies may be made more complicated by such factors as materials shortages, seasonal labour shortages, community reactions to out-of-town contractors, liabilities from working on poorly maintained housing stock, absentee homeowners, extensive use of supplemental wood heat and electric space heaters, and distorted or ambiguous costs for alternative fuels.

Measures

Measures applicable to each dwelling or business will be recommended and (unless rejected by the owner) installed. The measures will be installed to levels defined in the installation specifications. The measures will be comprehensive, addressing all appropriate electrical end uses. A "barriers report" will be filled out for measures found not applicable and any rejected by the dwelling or business owner.

Service Delivery

Installation of the measures will be done by contractor. The contractor will be responsible for using leads provided by the local office to organize and provide an energy-use analysis that will identify appropriate measures for installation. The analysis and measure installation may occur in rapid (same-day) sequence.

Lists of the measures available for residences that are electrically heated, have electric hot water or use electricity for general services, as well as separate lists of commercial measures should be available in the project office for use in presentations to customers and to community groups. Project staff need to clarify to potential participants that the company is "purchasing" energy savings from them, and the more electricity a customer uses--by heating electrically, for example--the greater is the potential for energy savings.

Application Processing

Program participation will be solicited using the approach reflected in the marketing plan and in accord with the community assessment. It may be efficient to hold "sign-up weeks" to focus attention of the staff and the community on the project and its goals. Sign-up weeks also provide a break in project routines and build a work load for measure installers. Customers who use electricity for space heat need to be identified from among project applicants. *It will be important to offer services to all customers who apply. This includes general service and water heat customers, as well as customers with electric space heat.*

Quality Assurance

The quality of the contractor's work will be directly related to the clarity of the specifications he or she is expected to adhere to and the frequency of inspections to check that the specifications are being followed. *We strongly recommend that an independent party inspect 100 percent of the work.* These inspections are critical during the start-up phase. More widely spaced or sample inspections might be used in the latter stages of the project. It is important to start by building the right habits.

Inspections should be scheduled within one day of the installers' reported completion of the job. They should be performed within one week of job completion. This responsiveness is important for three reasons:

1. It gives Ontario Hydro the opportunity to respond quickly to customers' complaints, should a job prove unsatisfactory (good customer service).

2. It provides quick feedback to the installer so that if he or she has a crew not performing adequately they have an opportunity to make quick changes before more mistakes are made.

3. If payments are partially based on quality of installation, it helps maintain the installer's cash flow.

Approval Processes

At least two project approval processes should be defined:

1. Approval to be an authorized installer in the project. This basic approval should be subject to clear conditions of performance, including warranty of work completed.

2. Authorization to proceed to install measures for a group of residences or an individual site.

We also recommend classifying infractions as either minor or major problems. Minor infractions can be addressed by notifying the contractor with an "instant memo," rather than withholding payment for the job (or excluding the account from the performance measurement group). Conversely, major infractions require non-payment penalties.

Financial Management

Financial management of the project will follow standard Ontario Hydro procedures, except that provision should be made for expedited service in the processing of invoices. Typically, the corporation will be dealing with small to medium sized contractors who will experience production bottlenecks if they experience cash-flow problems. The speed of payment for work completed is dependent on the system of approvals and review, and on the field inspection effort. Both areas require attention so that most contractor cash-flow problems can be prevented and/or dealt with:

1. It is essential that the project leader be given signature authority sufficient to provide one level of sign-off for contractor invoices at the field office level. It is not possible to provide routine head-office control through a series of hierarchical approvals for each invoice. This means that the project leader must be given authority equivalent to his or her assignment and level of responsibility.

2. The office of the comptroller and purchasing officer/invoice authorization function should be consulted with to develop a streamlined payment procedure operating out of a special revolving account, so that checks may be issued from the field office. Such a project variance could be established with clear assignment of authority to the project manager and periodic review by a key headquarters staff manager designated

by the comptroller.

3. Supply logistics are likely to involve bottlenecks between material suppliers and contractors. Provision should be made in advance to authorize issuance of checks made jointly to contractors and material suppliers. Also, pre-authorization should be established for the project leader to provide financial assurances to material suppliers, when contractors are unable to finance continued advance order of retrofit devices sufficient to meet efficient installation schedules.

4. As a general rule, a structure should be inspected and "passed" before contractor payment is made. However, at certain points in the project, contractor activity may exceed the ability of inspection staff to keep up with the work, particularly if contractors are missing on items that require a series of re-inspections. Accordingly, the project leader should have pre-approved discretion to issue payments without full inspection in those instances where contractor cash-flow and/or efficient production might be seriously impaired. This authority would be limited by the extent to which early payments to contractors were covered by additional completed and invoiced work.

5. A system of contractor penalties should be pre-established to help prevent inspection backlogs. Money collected in this manner should not be returned to contractors, but should be contributed to the project budget. For this system, major and minor defects would be classified. If fixed within 10 days of notification, there would be no penalty. But, any job that requires re-inspection *and fails the re-inspection* should receive a penalty of $75. The penalty should then double for each subsequent re-inspection of the same item, if the item again fails inspection. Exceptions would be made for legitimate supply problems. Major violations (major defects) should receive a higher penalty of $100 to start, with increments following the same pattern. Any work invoiced, but found not to have been completed, also should be assessed a penalty of $50 or $100 per inappropriately claimed measure (for example, billing for 2,000 square metres of insulation, but having installed 1,800 square metres). At a defined point, a substantial accumulation of penalties would result in withholding of additional work until the backlog of defects is cleared.[27] The system of penalties and "speedy memos" can only work, of course, if the data base/tracking system can

[27] This system would also provide documentation to support removal of a contractor from the project.

generate weekly contractor status reports (see Section 15, Tracking and Monitoring System).

Resource Maintenance

When Ontario Hydro acquires a relatively large and geographically concentrated conservation resource, the company should examine the cost-effectiveness of retaining some form of maintenance capability to service this "conservation power plant." An additional benefit of project maintenance would be the creation of a detailed data base on measure decay and failure.

Only limited information is available on actual measure life, and much of this is anecdotal or estimated effective-lifetime data. Even less is known about the rate of decline in measure effectiveness. We do know that the effectiveness of certain measures will fall off relatively quickly, and that other predictable changes (failure of water heaters, remodelling, changes in patterns of use) will also reduce the energy savings over time.

By retaining a small service capability at the conclusion of the project, perhaps linked to the community through a toll-free telephone ("the warm line"), several useful goals might be achieved. These would include:

1. Documentation of the decline in performance of installed measures.

2. Documentation of the cost and effectiveness of retaining a small ongoing delivery capability to upgrade (e.g., lighting), repair, replace failing measures and provide energy use education.

3. Testing the hypothesis that the acquired conservation resource can be maintained in a steady state at some predictable percentage of the original acquisition, in contrast with the prevailing expectation that the resource will be of continuously declining effectiveness.

In addition, some contractor presence should continue in the community to maintain the installed measures. This would include dealing with customer complaints, draining water tanks and cleaning them, providing a continuing and effective supply of energy-efficient bulbs, and other maintenance items.

7. Management Procedures

This section reviews proposed project operations, administrative procedures and organizational relationships.[28] These areas include management of personnel, the audit/retrofit/inspection process, contractors, and general project oversight and accountability.

Project Oversight

The NCCP will be managed by Ontario Hydro through its program testing and analysis department. Reporting relationships are as shown below, and will conform to existing corporate organization and structure. The project field office will be provided with sufficient scope, incentive and authority to operate with the flexibility of a small business, but with the institutional support of the utility and its services and divisions.[29] To provide flexibility and quick response to factors that are expected to affect the project, for the duration of the assignment, the project leader must have authority and autonomy comparable to that required of an independent business venture (see, Financial Management in Section 6, above).

Vice-president	Will exercise executive authority over the project.
Director	Will review progress and receive management reports.
Manager	Will review progress and receive management reports.
Project leader	Will exercise full management and administrative authority for the project, with direct responsibility for

[28] Staffing is presented in Section 13, Recommended Field Support Plan.

[29] Philips, M., Susan French, Dennis Quinn, and H. Gil Peach (1986). Field Weatherization Logistics, Final Report, Hood River Conservation Project, DOE/BP-11287-5, August; H. Gil Peach, "Evaluation Strategies and Customer Response to Energy Efficiency Programmes: Pro-Active Evaluation--Lessons for the Future," p.p. 341-351 in Proceedings of the Workshop on Conservation Programmes for Electric Utilities. Paris, France: International Energy Agency, Organization for Economic Co-operation and Development, 1989.

	project and wide scope in areas including financial management, personnel, contractor relations and project logistics.
Deputy project leader	Provides direct head-office liaison, analytic support and central communications.
In-house advisory committee	Periodically briefed on project progress, offers criticism and technical review and recommendations on issues.
Community advisory committee	Meets monthly for briefing on progress and issues. Interprets project within the community and interprets community concerns and needs to project leader and key project staff.

Retrofit Management Process

In the fall of 1990, the field office will be opened (see Milestones, Section 10), and base-line activities will be initiated (pre-program survey, radon pre-test, billing data development, installation of monitoring equipment). Also, as staff are assembled, over the winter of 1990-1991, the training consultant will provide initial training. Auditing and inspection roles will be combined. Contractors will be included in the marketing process.

1. The audit is the key to the success of subsequent sequential steps in project service delivery. Auditing will be carried out at the direction of the project leader, through the senior inspector and the audit/inspection staff. Both home energy audit and commercial energy audit procedures will be used.

2. Once the project is under way, general advertising will be used to provide information on the project to community residents. This will include talks by the project leader to community organizations, coordination through the community advisory committee, a local radio spot and occassional newspaper write-ups and advertisements. Direct mail also may be used, as well as phone contacts at the discretion of the project leader.

3. Residents may sign up for retrofit by visiting the project office or by phone. The adminstrative assistant will be responsible for maintaining a computer data file, which lists inquiries, sign-ups and any subsequent customer contacts by name, address of structure and date. At the discretion of the project leader, tear-out coupons for signing up may be run in the local paper. Also, the project leader may decide to engage staff in door-to-door visits by neighborhood in particular "sign-up week" campaigns. Door-to-door visits may also be done by members of the community advisory committee and/or by enlisting the support of Ontario Hydro retirees who have lived in the community for a number of years. Door-to-door visits may be appropriate for "last chance" sign ups near the end of the project marketing effort. When customers decide to participate in the project, a very short "reason analysis" will be used to indicate the principal and secondary reasons for deciding to participate. Also, an alternative "reason analysis" will be used to record every decision not to participate.

4. The coordinator for residential, the coordinator for commerical and small industrial, and the administrative assistant will provide confirmation of acceptance to customers and maintain computer-based scheduling for the audit that will begin the technical process. These personnel should be ready to deal with questions from owners and renters. Renters will be permitted to initiate requests for service, but initiation will require approval of the structure owner. Phone confirmation will be provided to the customer, and a packet of material explaining the project and its steps will be mailed to the customer, along with confirmation of an audit date and time.

5. Audits will be conducted by the project audit/inspection staff, supplemented at times by other staff members (considerable cross-training of staff will be required). Audits will be computerized and transmitted electronically to the data base/tracking system. Structure owners/renters will be provided with a summary of audit results. Both residential and commercial audits will include estimates of costs to Ontario Hydro and to the customer, as well as estimated energy savings and/or demand reduction from recommended measures. Auditors will be responsible for initial barrier reports, which will be entered into the project data base/tracking system.

6. Recommended measures will be bundled on a whole-structure basis (for example, the unit will be the multifamily building under one roof rather than the individual apartment unit). Separate buildings, however, even those having the same owner or

same use, will be analyzed separately. The owner will be asked to review recommendations and sign off with an authorization to proceed. With this one-step approval, the owner will have no further obligation or role until the post-weatherization inspection.[30]

7. As soon as possible following the audit, a contractor will be assigned to the job. Contractor selection and training will be directed by the project leader. Contractor assignment and scheduling will be the responsibility of the residential, commercial or industrial coordinator. Assistance in scheduling will be provided by the administrative assistant, as required.

8. Contractors will perform retrofit work. It is proposed that air sealing and insulation be carried out on a performance-contracting basis, and other work be done on a time-and-materials basis (see Section 8 and Appendix I). All work will be referenced to NECA standards. The contractor will be required to file a barriers report on each job, and these reports will be entered into the project data base/tracking system. Also, any variances from the audit must be explained to the appropriate coordinator and documented in writing.

9. There will be an inspection of each job. Inspections will be performed by the project audit/inspection staff in coordination with the structure owner. Owners will be asked to certify that, in their opinion, the work has been performed and is acceptable. In addition, the owner and/or renter will be asked to complete a brief customer service survey on the quality of work and on their observations of the interaction of staff and contractor with the owner/renter. All problems reported will be summarized each day by the administrative assistant, computerized and given to the project leader for review and action.

   Inspectors will verify that planned measures have been installed, that measures have been installed as reported, that proper materials have been used, that the quality of work meets project (or in some cases general industry) standards, and that installation has not produced any health and safety problems.

[30] The owner may propose more involvement or a customer initiated package of measures at the discretion of the project leader.

When the inspection criteria of both owner and inspector have been satisfied, the inspector will issue a Notice of Job Completion to the administrative assistant. The notice will be entered into the data base/tracking system and will trigger a payment authorization.

When the inspector finds one or more defects, they will be reported to the appropriate coordinator. Reports on defects also will be entered into the data base/tracking system and will trigger a possible penalty sequence (see Finanicial Management in Section 6). Application of penalties will be authorized by coordinators and carried out by inspectors. Collected funds will be recorded and summarized by the administrative assistant, and also entered into the data base/tracking system. In a case in which penalities increase, the project leader will direct a review of the record of contractor performance. As a result, remedial steps may be required, or the contractor may be assigned no more work until the backlog of defects is remedied, or a contractor may be removed from the project. When remedial action is required, the contractor will be considered to be on probation.

10. Contractors will be required to warrant all work for a period of one or more years following completion of each job. Inspectors will respond to customer complaints regarding defects that become apparent over time. Defects that become evident within the warranty period will be repaired at contractor expense. In addition, any damage to customer premises, equipment or grounds found by the inspection staff to be due to contractor activity shall be repaired by the contractor at the contractor's expense. Records of such events will be entered into the project data base/tracking system.

Reporting

All reports from the field office will be the responsibility of the project leader, although report production will be delegated to appropriate staff at the project leader's discretion. Reports will be developed to 1) ensure effective management and administrative controls, and 2) to establish and maintain communications regarding progress. Reports will be sent to the head office weekly and summarized in a monthly report.

8. Development of Performance Contracts

The marketing objective for NCCP is "to assess whether performance is an effective mechanism for delivering community-based energy savings and demand-side management." Other major goals include achieving maximum energy savings and demand reduction, testing transferability and improving technical information.[31] The performance contracting plan must conform to each of these goals. It must promote participation, promote maximum energy savings and demand reduction, contribute to transferability and contribute to developing technical information.

In the past, residential sector performance contracting has been noted for excellent customer relations and customer satisfaction, but not for securing reasonable energy savings. Polite, presentable and enthusiastic contractor crews can be key components of both the conservation retrofit product and its promotion. Whichever form of performance reward is selected to motivate NCCP contractors (see Options, below), contractor personnel will be trained to see themselves as members of the marketing team. In this role, they can assist the project leader in helping interpret to members of the community that demand-side projects are a win/win situation in which both the customer and the utility benefits, and that their participation may provide significant benefits to both the community and the province.

Options

There are three conceptually different options for the basic form with which performance contracting will be administered for the NCCP. These can be characterized as 1) performance *quality* contracting, 2) *measure-based* performance contracting, and 3) *classic* performance contracting. A fourth option combines the first three. These are outlined in Figure 5.

1. **Performance Quality Contracting (PQC).** Closest to the traditional fixed-price and/or time-and-materials approaches, PQC would utilize two and ideally three general contractors. The general contractors would be awarded jobs based on a scoring system, which ranks companies on the basis of timely completion at or under cost

[31] See page 2.

	Performance Contracting Approach	Measurement Approach	Payment to Contractor
1.	Performance Quality	Quality Scoring	On Inspection
2.	Measure-based	Actual and Engineering	On Inspection
3.	Classic Performance Contracting	House Meter	Up front, then transfer back
4.	Measure-based and Metered	Combination of 1, 2 and 3	Shared risk (Two-part payment)

Figure 6. Performance Contracting Conceptual Approaches

guidelines, completeness of measure package installed, customer perceived quality of service, and inspection results on quality of materials and quality of installation.

Rewards to contractor. Contractors would be rewarded for performance at two levels: first, by assignment of additional jobs and second, by a performance bonus system keyed to provision of a reliable resource acquisition for Ontario Hydro. Contractor motivation. Meet quality control, timeliness and completeness provisions to maximize profit by receiving performance rewards.

Advantage to utility. First, use of general contractors would provide a credible service delivery vehicle that would remove from the utility most of the administrative burden of residential and small commercial conservation services. Second, the competitive aspect of the performance contracting system would encourage active marketing. Third, the utility would retain the ability to ensure quality control, minimize lost opportunities and maximize reliability. Fourth, payment due upon completion and inspection of each building, hence, no long-term payment administration. Fifth, conservation infrastructure would be strengthened.

Risk allocation. This approach differs from traditional contracting approaches in that motivations for quality control and completeness of work are built in through differential rewards for demonstrated performance, rather than straight time and materials or fixed costs. Measurement is based on a scoring system tailored especially for the NCCP, but similar in type to those used in demand-side bidding programs. Risk to the contractor would be small, resulting in a small incremental payment for risk premium.

Metered data. Evaluation results based on metered and/or load recorder data would be used to provide information for resource planning, but not as a basis for contractor payment.

2. **Measure Based Performance Contracting (MBPC).** Sebastian Moffatt of Sheltair and Bob Platts at Scanada have proposed the MBPC approach. In this approach, for example, a performance contractor would be reimbursed for testable reductions in effective leakage area on a house-by-house basis.

   Rewards. Payment formulas for this and other measures would be calculated based on the "1,000 Homes Study." The effective leakage area result would be confirmed by blower door readings. Results for other measures would be based on engineering calculations. This would have the effect of consolidating infiltration and selected additional measures under a performance contract, with other measures delivered on a time and materials, bid, or negotiated basis. A necessary precondition would be the presence of at least two and ideally three contractors.

   Contractor motivation. Install measures for completeness of package, thoroughness of work, quality control (for example, achieving house-tightening goals) to maximize profit.

   Advantage to utility. As in first option.

Risk allocation. As in first option.

Metered data. Evaluation results based on metered and/or load recorder data would be used to provide information for resource planning, but not as a basis for contractor payment.

3. **Classic Performance Contracting (CPC).** Residential and small commercial jobs could be contracted to energy service company (ESCo) general contractors paid on the basis of metered savings (Figure 6). This is the approach pioneered by Jersey Central Power and Light, and refined by Northeast Utilities, Boston Edison and most recently by Central Maine Power. A demand-side resource bidding process would be conducted, with the utility providing data on the selected community and with various ESCos offering to provide fixed megawatts in energy savings for bid prices.

   Rewards. Ontario Hydro would advance payment to the contractor based on assumed savings. The contractor would then return money if savings goals were not met at the meter.

   Contractor motivation. So-called "high grade" and "cherry pick" jobs. Put in least investment to maximize metered results. Reliability beyond first year important only if tied to extended measurement period at the meter. Profit maximized by avoiding high cost and middle to marginal cost measures.

   Advantage to utility. As above, except that, to ensure reliability, payment administration would occur over several years.

   Allocation of risk. In theory, there is an explicit guarantee of performance. The contractor is responsible for finding and achieving savings. Due to the theoretical shifting of risk to the contractor, the contractor is rewarded with a sizable risk premium.

   Metered data. Evaluation results based on metered and/or load recorder data would be used to adjust payments between contractor and utility over a period of years.

	Classic Performance Contracting Feature	Community-Based Project	High-Level Concern
1.	• Home selection (cherry pick)	• Not acceptable	Objectives 1 and 2 (from page 2)
2.	• Measures selection from menu, but at contractor discretion	• Not acceptable	Objective 2 (from page 2)
3.	• House metering • Pay for each on separate calculation • Discard negatives	• Requires premium • Mix of behaviour and measure effects (generally "noisy" measurement)	Instant reading not available
4.	• Risk on installation transferred to contractor (in theory) • Risk premium	• Difficult to ensure quality control, utility completeness, inspections and long-term customer satisfaction.	Significant risk

Figure 7. Analysis of Original Performance Contracting Approach

Basic Issues

Regardless of the form of performance contracting adopted for the project, the viability of performance contracting for the northern community project rests on understanding several key issues. These include:

1. Longevity of the conservation resource.
2. Performance measurement.
3. Cost and savings optimization.
4. Risk premium and transfer of risk.

Longevity of the Conservation Resource (Reliability)

The longevity of energy savings is important, because the utility is interested in a long-term *reliable* resource. The point of conservation in the least-cost context is, after all, to avoid construction of a more costly alternative. If the conservation resource lasts about 30 years, it has value to the utility system similar to that of more traditional resources. Energy service companies usually only need to see the measure perform for a few years, those during which they are paid. At the same time, savings longevity is linked directly to the quality of installation. If the installation is well done, the measure will remain in place serving its purpose for the power system. If the installation or materials are shoddy, the measure and its ability to produce electricity will deteriorate. Poor installations have been known to be worthless within two years.

Performance Measurement

How one measures performance differs depending on one's perspective. Utilities are often interested in the net result of their programmatic efforts. For the NCCP, Ontario Hydro is purchasing a demand-side resource, and so is naturally interested in the output of the resource considered as a whole. Defensible measurement of program effects has, to date, depended on the ability to separate program impacts from other influences on energy usage. These other influences include changes in the economy, changes in the number or behaviour of building occupants, changes in the structures themselves, fuel switching, and appliance and equipment changes. The most robust measurement of net effects of utility conservation programs has been through the use of an evaluation based on a quasi-experimental design (before and after measurement of changes in electricity use by random samples of two groups, participants and non-participants). The perspective of energy service companies, on the other hand, emphasizes reductions in energy usage (for any reasons) in the buildings that have been treated on a building-by-building basis. A key difference is that reductions observed in the treated group (participants) are not necessarily due to the effect of the program. They may be entirely due to the other influences noted above.

Cost and Savings Optimization

Optimization of the retrofits from the utility perspective requires that comprehensive conservation jobs be done. Comprehensiveness ensures that multiple visits to a single job site (with attendant administrative costs) do not have to occur. Comprehensiveness includes installation of conservation measures to levels that deliver the maximum savings available, up to the price the utility establishes within a least-cost resource acquisition analysis. In the residential sector, for example, the utility optimum would include high levels of insulation in floors, ceilings and walls; caulking and weather-stripping; water heater insulation; pipe insulation; and high R-value glazing. The utility optimum would also install all of these measures in as few site visits as possible. In contrast, the incentive to the ESCo is to optimize kilowatt-hours effect for least investment. This translates into the least costly measures with the greatest initial energy usage effect per dollar of measure cost. Using the same residential sector example, the ESCo optimum would be to install caulking and weatherstripping; water heater and pipe insulation; and, possibly, insulation in high convective heat loss areas such as attic bypasses. Fewer measures and lower levels of measures result in smaller conservation effects. Due to this difference in objectives, the ESCo's optimum will normally be suboptimal to the utility, in that the energy produced will be significantly less, while the price paid to the ESCo will be close to the utility's avoided cost. *The ESCo's interest is to minimize performance risk,* possibly at the expense of the utility's long-term interest in conservation resources at reasonable prices.

Risk Premium and Transfer of Risk

For a given project budget, performance contracting requires payment of a risk premium to the contractor (who, in theory, accepts the risk usually assumed by the utility for any failure of installations to produce planned savings). Since the risk premium comes from the project budget, there is, by definition, less funding for actual measures. Yet, although the performance contractor is "at risk" for cost recovery and profit, the utility is also at risk for "phantom savings," especially if the contractor is not paid over a period of years corresponding to the composite measure life of the measures installed.

In summary, these issues revolve around a fundamental tension in the original performance contracting concept (but not in options one or two). To the degree that risk is transferred from the utility to the contractor (through any form of performance contracting), then both responsibility for completeness of measure installation and quality control (protection *against doing half a job and creating substantial lost opportunities) transfer to the contractor, and a risk premium must be paid as well. Yet, to the extent that the utility enforces quality control and completeness of measure packages installed (and therefore treats the resource on a level playing field with supply-side resources), the independence of judgement on which the contractor's profit is based is reduced. If the contractor can't pick which homes to do and which measures to put in which homes on the basis of short-run profit maximization, then the incentive for the performance contractor is reduced.*[32]

Standards for Success

Measures should be installed to levels defined by the installation specifications and cost-effectiveness limits. All work should be inspected by an independent party. Performance contracting works if:

1. actual delivery of the resource can be measured;
2. the measurement accounts for real resource performance;
3. payment is based on the results of such measurements; and
4. payment and measurement continue over the actual life of the resource.

Recommended Approach

The recommended approach is Option #2, measure-based performance contracting (MBPC). This option avoids the risk premium cost, is administratively less resource consuming than Option #3, and capitalizes on Ontario Hydro's investment in the 1,000 Homes Study to provide a current and well grounded basis for setting payment levels. In this option, performance contracting is based on the quality concerns of Option #1 (analogous to demand-side resource bidding criteria), and the (non-meter based) measurements and engineering calculations developed from the 1,000 Homes Study. The contractor is paid in full upon completion and inspection of the installations. The original contractor is finished when warranty for work completed expires. A portion of the cost-justified amount would be held to fund utility staff coordination and subcontractor involvement in maintenance work over at least three subsequent years.

[32] "Marginal measures," those closest to the cost-effectiveness limit, add greater cost for less incremental kilowatt-hour savings. For a performance contractor, the optimum is to "cherry pick" and move on. For a utility, the optimum is to acquire the available resource up to the cost-effectiveness limit.

If the company should prefer payment to be based on customers' metered savings, the recommendation may be tailored to this option as follows:

1. Metering would continue for the number of years of the average composite measure life. A strong measurement design with a comparison group would yield net savings, controlled for background changes in electricity use and weather.

2. Risk would be shared, with the utility assuming the majority of risk.

This would be a combination of Option #2 and Option #3, and would combine the quality control criteria of Option #1 with the measurement and engineering calculations from Option #2 in a first-stage payment. A second-stage payment would be based on metered savings for the community (pooled over all treated homes and commercial facilities) over a three years or longer period. The extent to which differences of interest between Ontario Hydro and ESCos can be resolved or made compatible depends on the type of contractual agreement the utility and performance contractor implement. To the extent that contractor performance is based on metered savings, this approach would provide a framework for negotiating costs and allocation of risk.

A two-stage payment system could ensure alignment of the ESCo with utility needs for measure quality, conservation resource longevity and actual energy savings. Payment for the resource would be allocated into two categories; the first would reward adherence to installation specifications (as in Option #1), referenced to the cost-effectiveness calculations based on the 1,000 Homes Study (as in Option #2), while the second would reward actual savings generated by particular cohorts of participants (as in Option #3).

Risk to the contractor would be reduced by providing payment for key measures on a fixed-cost or time-and-materials basis. Payment would be separated into a basic fee plus a portion of profit for which the contractor is not at risk (except for substandard performance in installation or quality of materials) and a second profit amount for which the contractor *is* at risk. This second amount would be associated with the business risk of the original performance contracting system and also motivate maintenance activity by the contractor during those years over which payment is made.

Set standards for installation, materials and completeness of measure packages will secure the resource, minimizing lost opportunities within the cost-effectiveness limit. This provides a win for the utility, for society and for the individual customer. The contractor is protected from the full risk associated with the early attempts at performance contracting arrangements, and also from the ethical problem of having self-interest at odds with societal, utility and customer interests. In return, the contractor forgoes a part of the risk premium, but is virtually assured of recovering costs and a small profit. This modified approach to performance contracting places limits on the risks to both utility and contractor, keeps a performance payment as a contractor incentive and puts demand-side resources on a level playing field with supply-side options.

9. Air Quality

Air quality will be an issue of concern in the NCCP. Because radon is a possibility in the community, radon readings should be taken in each building both before and after they are treated.

Because the radon issue has not yet surfaced in a major way in most communities, and testing services are not commonplace, cooperation with the appropriate public health authority may be considered. A communitywide radon survey by the public health authority prior to weatherization would establish the health authority as the community leader on the radon issue. This may be an advantage, since the problem is ultimately a public health issue.[33]

Any introduction of radon testing is likely to focus community concern in the air quality area. It can be anticipated that the "action-level" concentration of radon will be a matter for public discussion. If, by chance, pre-retrofit radon levels emerge as significant, it will be important to have the problem documented before the corporation becomes involved with dwellings and business establishments found to have a radon problem.

Alpha-track film detectors purchased in bulk should be used for both pre-test and post-test data. Term of exposure should be not less than three winter months. Although charcoal seven-day monitors are available, long term time-integrated testing is the only reliable means to estimate average daily exposure to alpha particles from radon and radon progeny.

[33] Such coordination could delay the project, and the appropriate health agency may not have understanding or expertise to deal with radon. Nonetheless, some coordination with the public health authority would be a plus for the project. In particular, the project should have a policy to not retrofit structures that are above 80 percent of the action level for radon as defined by appropriate health authorities, unless steps are taken to reduce radon to a substantially lower level. Also, information should be given to structure owners and occupants regarding radon and the levels encountered in their homes.

10. Milestones

The general project schedule calls for setting up the field office in the fall of 1990, and carrying out base-line and infrastructure work through the fall and winter of 1990-1991 (base-line radon testing, base-line survey, installation of monitoring equipment, base-line data collection from the billing system). Audits will be performed in the spring of 1991, and measures will be installed over the spring and summer of 1991. Post-installation measurement will begin in the early winter of '91-92.

The process evaluation, with a community assessment segment, should begin in the fall of 1990 and continue for the duration of the project. The benchmark survey should be performed in October of 1990 and the follow-up survey in the same month of 1991.

11. Budget and Cost

Budget and cost information will await specification of measures and designation of the NCCP community. Key expenditure categories will include: measures, administration, staff, office space, equipment, measurement, metering equipment, contracts, quality control and audits.

12. Communications Development

Advertising should be sensitive to the community context. While attracting attention, it should fit with community expectations. An insert in the local (weekly) paper could be used to announce the project and to explain some of its key features.

Advertising Materials

Expensive looking advertising materials should be avoided. A good strategy is to convey pride in the community. Materials should include an explanatory brochure, an artistic poster and promotional items (balloons, thermometers, efficient light bulbs, etc.). They should all convey a theme or identity for the project.

The project leader should make the usual round of business and social club speaking engagements. A carefully selected community advisory committee can and should be used to empower important segments of the community social structure to support and protect the project's interests as well as to help the project avoid local pitfalls.

Communications Development

A communications plan should be developed in consultation with corporate affairs, social and community studies specialists and corporation communications staff. This plan should take into account issues and concerns identified in the community assessment study.

Internal Communications

Communications targeted to Ontario Hydro staff should be early and thorough. The employees of Ontario Hydro are the company's best method of making sure that the reasons for doing the project are well understood throughout Ontario.

External Communications

This project has measurable value to Ontario Hydro in demonstrating commitment to energy conservation, and it will build competence in the staff and confidence regarding the resource. It fits well within the least-cost planning effort currently under way at the

Company. These elements should be included in any external communication. In addition, to the extent any of Ontario Hydro's traditional (or new) competitors and/or intervenors are included in the design and/or conduct of the project, this information should be emphasized.

13. Recommended Field Support Plan

Field Office

The field office should be situated in a central location in the community. Site selection should be sensitive to local community perceptions. For example, the office should not be ostentatious, and working hours should be in accord with community customs. The field office should be staffed sufficiently to provide quick service to walk-ins. Care should be taken in job descriptions to provide flexibility to move between tasks to provide excellent customer service.[34]

Trade Allies

Project staff will discover that certain suppliers can act as influential "trade allies." Staff should seek these suppliers out and ensure their continued support. Often this can be accomplished by regular visits and/or by notifying them in advance when timing of delivery or production will be critical.

Staff

Staff should be selected for the project based in part on interest and willingness to "go the extra mile" for the customer in a working environment that offers considerably more autonomy and scope than similar positions in normal operations, but in which the work climate is goal oriented and intense. Staff also should be able to identify with and relate well to the social and political environment of small communities.

Initial staffing of the field office should be planned so that employees who bid for project positions know in advance their status with the corporation, should they perform well, when the project approaches completion. If expansion to other communities comes about as planned, staff developed in the NCCP are likely to become the core staff for carrying out expansion. If expansion does not come about, staff should be assured in

[34] All field positions will require knowledge and work activity beyond the usual scope defined for similar positions in a less intense situation. Staff will be expected to show considerable initiative and autonomy within guidelines set, and redefined as necessary, by the project leader.

advance of their continued employment with the corporation.

We recommend staffing as follows:

Field Office

1. project leader (regular staff)
2. residential field coordinator/technical (regular staff)
3. commercial sector and small industrial sector field coordinator/technical (regular staff)
4. administrative assistant/field office (regular staff)
5. general clerk/field office (temporary staff)
6. tracking system analyst/field office (to interface with contractors and to maintain the project data base/tracking system in the field; regular staff)
7. data entry clerk/field office (two positions; temporary staff)
8. senior inspector/field office (regular staff)
9. inspector/field office (2-3, depending on contractor production; temporary staff)

(Note: auditor and inspection roles would be assigned to the same personnel)

Head Office

1. deputy project leader/head office (regular staff)
2. analyst/head office (regular staff)
3. secretary/clerical (regular staff)
4. student intern (temporary staff)
5. student intern (temporary staff)

Consultants

Consultant roles should include:

1. conduct an ongoing process evaluation
2. provide turnkey data base/tracking system
3. provide support for implementation, as required

4. conduct impact evaluation
5. provide marketing analysis and support
6. provide contractor and staff training

Additional details regarding the field support plan are contained in Appendix II.

14. Training and Development

Ontario Hydro staff reporting to the project leader should be taught the specifics of the project's objectives and be introduced to each others jobs. They will need to be flexible to cover for each other when necessary. They should also try out all forms and equipment before using them with applicants. Inspectors should be trained in material and installation specifications. They should also be taught how to use any unfamiliar equipment.

General and/or performance contractors and contractor staff should be certified by an appropriate authority as having received training in conservation retrofit practices. Auditors will need to share a common set of operational definitions and outlook. This can be accomplished in part through start-up training using a variation of Sheltair's "House as a System" seminar, and through reliance on NECA technical reference documentation and training modules. Continuing technical update meetings will allow contractors and staff to identify problem areas and to increase effectiveness. A goal in this effort should be to bring together auditors, contractors, inspectors and other staff as a common team, even though job responsibilities will require some differences in emphasis and outlook. Possibly some community participation can be invited, if the project leader determines this would aid the project.

Training will be planned and developed over the winter of 1990-1991.

15. Tracking and Monitoring System

A basic key to the success of the NCCP is a detailed and accurate tracking system, *personal computer based and centred on a relational data base*. The system should be designed to provide rapid feedback to the NCCP project leader for management and exceptions reporting, and also to support project evaluation.

Participation, barriers records,[35] a complete list of measures installed and inspection results should be included in the data base. Contractor payment authorization should be made conditional on tracking system reports. As savings results are generated, they should be coordinated with the tracking data base.

The computerized tracking system will permit monthly internal documentation of progress against goals. The system will be defined as a data base and report generator with the capability of recording individual measures within structures and linking records to billing data. The data base should be maintained for the composite life of the typical measure package for each program. As savings results are generated, they should be coordinated with the tracking data base. The data base also should incorporate updates from the customer accounting system.

Specifications

The tracking and monitoring system must include provisions (sets of modules) for residential and commercial applications. These may be developed sequentially, with the residential portion of the system being the top priority. Information is to be stored in a single relational data base. The data base should be designed to support multiple reporting

[35] **Barriers documentation**--Records will be kept of measures not installed so that it will be possible to develop increasingly more firm estimates of remaining energy savings to tap. This will provide documentation of physical barriers to installation of specific measures, as well as customer decisions to avoid certain installations intended within the objectives of specific programs. This information will provide an empirical basis for refining estimates of technical potential (theoretical conservation supply curves) and achievable potential (program supply curves). Patterns of relative frequency in the rejection of measures also will support ongoing efforts to optimize service and provide the project leader with a tool with which to compare auditors and contractors. The information also will be useful for cost-recovery and performance assessments within the regulatory context, since it will allow documentation of success in controlling "cream-skimming."

applications, not all of which will be known when the system is completed. The system should therefore be structured to be flexible, so that end users can modify and add reports and modules into the relational data base. A procedure should be established for adding new data, and a users guide should be produced.

Customer data should be stored independently from structure data so that changes in building ownership can be entered and retained. The residential portion of the system should be structured to provide for multifamily and single-family dwellings classifications. Existing Ontario Hydro classifications can serve as the beginning list of variables and categories of variables to be incorporated into the data base design. The detailed evaluation plans will list additional variables. In particular, the SIC codes, building square footage, structure vintage and related information should be stored.

Program information should be stored separately from participant data. Program information should include measures[36] and technologies (with these cross-classified into sets of defined "technology groups"), contractor and manufacturer lists, and any relevant contract provisions applying to all measures or to specific measures (warranty period and expiration date, etc.).

Compatible contractor data bases should be defined for all program contractors (and development and use of these data bases should be a condition for work with the program). The goal should be paperless transfer of information from contractors to Ontario Hydro, with encouragement to contractors to use the system to back up inventory and advance purchase of materials.[37]

Contractor work should be recorded by structure. The data should include type, quantity and operating conditions of equipment that is replaced (or that might be replaced in the future as program definitions change). Data on replacement equipment (or services

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[36] Provision should be made for exact catalog descriptions of measures and materials installed.

[37] Because many efficiency efforts are gearing up at once across Canada, suppliers are increasing their production of energy-efficiency materials and equipment to meet increasing demand. Severe bottlenecks in delivery of new materials and equipment can be expected, and the data base system is expected to ease this problem for the NCCP and its future expansion, if contractors will use the system to handle inventory and ordering.

rendered) should be tagged by item, manufacturer, catalog number and catalog, number of units and operating conditions.

Barrier data should include both customer barriers and physical barriers. Upon completion of work, the contractor will transfer information on measures installed and barriers.

The system should be able to generate inspection requests based on contractor completions. As contractor bills are received, the system should call for validation against completions. Discrepancies should be flagged by the system. The system should be able to show status on each account, listing by job and structure billing, inspection results, call-backs required and closed jobs.

As contractors' invoices are received, the service performed needs to be checked against the invoiced amount. The system needs to support such cross-checking in addition to producing notifications of discrepancies when found.

The system needs to be able to provide energy savings calculations on a total project basis. In addition, due to its relational structure, the system should be able to produce savings estimates by building, participant, manufacturer, equipment or measure.

The system also should be easy to operate. It should be menu driven, and it should allow interaction with reporting and analytic software.

One of the first assignments for the consultant selected to provide this system will be to develop a data flow diagram illustrating the above requirements.

16. Transferability and Leverage

This is a practical pilot project oriented toward developing experience and laying groundwork necessary to transfer the community-based performance contracting approach to other northern communities. As a saturation marketing technique, the NCCP may provide one of the most successful marketing and promotional approaches to accomplish demand-side results in small communities. It is recommended that the corporation plan project expansion into four to 12 communities on a geographical area basis (in which smaller communities might be grouped into projects) in the 1994-1995 time frame.

Every phase of this project should be viewed, at least in part, as a model and an experiment, from which the lessons learned can be transferred to other communities. Particular attention should be paid to strengthening the infrastructure needed for contractor delivery of conservation and supply logistics for materials. Every encounter with the diverse aspects of the community should be recorded and reviewed. The project leader should keep a log that can be used as a basis for development of a project report on transferability. The process evaluation also should address the transferability and leverage objective. In this way, a draft operational plan for transferability and leverage can be produced this fall, and updated four months following the close of project installation operations. The plan would be produced at the direction of the project leader, and oriented to developing an optimal leverage approach, based on project experience.

Appendix I: Proposed Energy Conservation Measures