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HOOD RIVER CONSERVATION PROGRAM PROPOSAL

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November 19, 1982

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HOOD RIVER CONSERVATION PROGRAM

Abstract

Focus

The Hood River Conservation Program is a model effort designed to demonstrate and document the conservation potential of a limited geographic area over a short period of time. The results of the Program will provide information for long-range regional conservation planning and future modifications to model conservation standards included in the Regional Plan.

The 24-month study will identify reasonably achievable penetration levels through vigorous marketing of residential conservation services and measures. The measures offered represent a higher level of retrofit in the region than currently available through existing programs. These measures will be provided without direct expense to all qualified customers within the study area. The effectiveness of the Program and measures will be assessed through comprehensive evaluation. This evaluation program will address energy and capacity effects on end use as well as community electric requirements.

Background

The Pacific Northwest Electric Power Planning and Conservation Act established conservation as the keystone in regional power planning. Under terms of the Act, the Regional Council is to prepare a Regional Plan with model conservation standards and a 20-year power demand forecast.

Need

Unfortunately, much of the information prerequisite to the development of the conservation component of the Regional Plan does not exist or represents understandings based on untested assumptions or limited experience.

The proposed Hood River Conservation Program is designed to demonstrate and document the conservation potential within the residential sector through retrofit measures. By doing so, the Program will provide empirically derived informaton upon which objective long-range conservation planning and future modifications of the model conservation standards can be affirmatively based.

Objectives

Specifically, the Hood River Program is designed to achieve five major objectives: (1) to determine the impact of residential retrofit conservation measures on the transmission and distribution system, individual customer load characteristics, and kilowatt hour savings, (2) to determine the maximum reasonable penetration rate of the Program and levels of potentially cost-effective weatherization measures, (3) to determine the relative effectiveness of varied approaches to conservation marketing, (4) to assess the characteristics of community social interaction and impacts under maximum conservation program conditions, and (5) to determine the costs associated with the development and implementation of a maximum conservation effort.

Evaluation

Conservation program system effects and their relationship to end use variables will be an important Program focus. Distribution and transmission system changes will be monitored through the installation of appropriate metering devices, and correlated to Program end use information. The resulting data is expected to yield information useful in load management planning.

Social effects and consequences of the Hood River Conservation Program will be systematically observed and reported. Special survey and assessment instruments will be prepared, administered and evaluated by contractor specialists. These data will enable planners to anticipate probable human factors which may effect similar future conservation efforts.

Program costs will be systematically recorded and reported to ensure an accurate accounting of the financial requirements associated with such a conservation effort.

Measures and Incentives

Those measures and incentives selected for study go well beyond current Bonneville Power Administration conservation program offerings. They are measures and incentives which might reasonably be supported at a future time. As such, they are focused on long range rather than near term projected costs; they will assess the potential for residential dwelling conservation for a time when the region no longer enjoys a surplus and must again contemplate construction of new generation facilities.

Marketing and Communication

Marketing and communications are essential components of the Hood River Conservation Program. They serve both as a means for information dissemination and collection, and as a triggering mechanism for most key events. As such, a measure of marketing and communication success will be the degree to which the goal of total market penetration and maximum participation is achieved.

Participation

The Hood River Conservation Program is the collective product of a wide spectrum of agencies and organizations. Those most actively involved in planning include the Regional Council, Bonneville Power Administration, Pacific Northwest Utilities Conference Committee, Pacific Power & Light Company, the Natural Resources Defense Council, Northwest Public Power Association and the Hood River Electric Cooperative.

The Program design and management plan assumes continuing multi-sector participation throughout the two year life of the effort. A Contract Oversight Group composed of those agencies and organizations noted above, will exercise continuing scrutiny of the processes being utilized and the progress being achieved. An important although informal Community Committee will be established to ensure positive community relations and promote qualified customer involvement. Continuing liaison between the Bonneville Power Administration and the Pacific Power & Light Company will be maintained throughout the life of the Program.

Program management and administration will be the responsibility of the Pacific Power & Light Company, through its Energy & Conservation Services Department. A team of qualified personnel will be assigned to carry out the terms and intent of the Program as described in a negotiated agreement. These persons will be supported by the extensive professional and technical resources of PP&L and by contractors with knowledge in special areas necessary to the Program's success.

Location

The study will be centered in Hood River County and City, an area which by its geography, population density and mix, physical characteristics and economic structure is broadly representative of communities throughout the region.

Budget

The cost of the Hood River Conservation Program is estimated to be $20,765,358. This sum was derived as follows: Evaluation - $3,379,702; Marketing & Communications - $202,000; Measures and Incentives - $16,316,900; and Administration - $866,756.

Consequence

The Hood River Conservation Program potentially represents a timely and vital component in the region's power planning. When successfully completed, the Program results will provide valuable insight into conservation's ability to contribute to the region's future energy mix.

LEGISLATIVE BACKGROUND

> "Conservation is an integral part of the regional power program established in this legislation. This bill will result in the most comprehensive and aggressive electric power conservation program in the United States." Senator Henry M. Jackson, Statement of Introduction of S. 885, April 5, 1979.

Senator Jackson's comments reflect widespread expectations concerning what was to become the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act). Congress left no doubt as to its intent in regard to the crucial role conservation was to play in the implementation of the Regional Act and the future of the Pacific Northwest. To the extent practical (subject to cost-effectiveness standards set forth in the Act), future electric power needs in the region are to be met through conservation. The Bonneville Power Administration (Bonneville) is directed "to the maximum extent practicable" to make use of its authorities under the Act to acquire conservation and to implement conservation measures.

Crucial to the implementation of the conservation objectives of the Regional Act is the Regional Electric Power and Conservation Plan (Regional Plan), which is to be issued by the Regional Council prior to March, 1983. The Regional Plan is to include, among other things, model conservation standards and a 20-year demand forecast which projects the Region's electric power loads and resources. The model conservation standards are to be designed to produce power savings that are cost effective for the Region.

Determination of conservation potential in the Pacific Northwest is essential to the development of the Regional Plan. Absent such an understanding, resource planning consistent with the mandate of the Regional Act cannot be undertaken and the promise of the Regional Act cannot be fully realized. The Hood River Conservation Program is proposed in this context.

PROGRAM OBJECTIVES

The Hood River Conservation Program is primarily a research and development effort designed to implement a sequence of state-of-the-art data gathering activities. Although the Program was developed to be statistically valid in its research design, any a prior speculation on the accuracy of the evaluation results must be viewed with caution.

		REFERENCE
OBJECTIVE 1:	To determine the impact of conservation measures by -	Research component III.~~B~~, pp. ~~31-34~~. 24-30
	A. Evaluating the transmission and distribution effects of a comprehensive conservation effort.	
	B. Evaluating individual customer load characteristics.	Research component III.~~A~~, pp. ~~25-31~~. 24-30
	C. Evaluating actual versus estimated savings (KWH) from conventional heat loss methodologies.	Research components II.D, pp. ~~21-24~~; 20-24 II.A, pp. ~~6-11~~. 5-10
OBJECTIVE 2:	To determine the achievable penetration rate of the Program and levels of potentially cost-effective weatherization measures.	Research components II.B, pp. ~~11-15~~; 10-15 II.C, pp. ~~16-20~~ 15-20
OBJECTIVE 3:	To determine the effectiveness of rigorous conservation marketing.	~~Research component IV.B, pp. 37-42, and~~ Marketing and Communication Plan (Tab).
OBJECTIVE 4:	To determine the characteristics of community social interaction and impacts under aggressive conservation program conditions.	Research components IV.~~A~~, pp. ~~35-36~~, 30-32 ~~IV.B, pp. 37-42,~~ VII., pp. ~~52-54~~. 40-43
OBJECTIVE 5:	To determine the costs associated with the development and implementation of an aggressive conservation effort.	Research component V., pp. ~~43-45~~. 32-34

A summary of objectives, actions to be taken to achieve the objectives, and research products follow as "Summary of Objectives."

SUMMARY OF OBJECTIVES

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
OBJECTIVE 1: Determine the impact of conservation measures by:	1) Monitoring of all distribution feeders. 2) End-use submetering of 325 individual households on a single feeder. 3) Contractor hired to evaluate data.	1) Measures of load characteristics at the feeder level. 2) Assessment of the effects of wide-spread conservation treatment. 3) Measures of inter-feeder diversity and the impacts from a comprehensive conservation program.
A. Evaluating the distribution and transmission system effects of a comprehensive conservation effort.		
NOTE: Differences between feeders relating to the characteristics of the housing stock will be statistically controlled.		
B. Evaluating individual customer load characteristics.	1) Four-channel end-use metering of 325 households (space heat, water heat, total load and indoor temperature) before and after conservation treatment.	1) Measurement of residential load characteristics by major end use.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
	2) Samples will be drawn to ensure statistical validity. 3) Contractor will be hired to analyze the data.	2) Impact of conservation activities on residential load characteristics. 3) Measurement of demand diversity among residences and of contributions to aggregate feeder line load characteristics. 4) Impact of conservation program on aggregate feeder line load characteristics.

NOTE: Feeder line chosen for sub-metering will be selected to ensure the greatest generality and validity of results.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
C. Evaluating actual versus estimated KWH savings.	1) A data base will be developed combining customer consumption records, survey information, and detailed weather data. 2) Household audits will include the survey instrument from the BPA/PNUCC Northwest Regional 1983 Survey along with a heat loss calculation from an approved heat loss methodology. 3) Two communities chosen for similar economic and demographic characteristics, Grants Pass and Pendleton, Oregon, as well as a random sample of households in PP&L's PNW service territory, will act as comparison groups to Hood River.	1) Evaluation of "before" and "after" weatherization energy consumption accounting for weather, behavior and structural changes. 2) Reconciliation of estimated program savings from heat loss methodology versus actual savings derived from program evaluation. 3) Development and comparison of alternative weather adjustment techniques.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
	4) Consumption records, weather data, and survey data will be gathered for all comparison groups.	4) Energy savings contrasts of Hood River vs. comparison communities and PNW/PP&L random sample.
	5) A contractor, reviewed by a PNUCC advisory committee, will be hired to analyze the data.	5) Attempts to identify energy savings from individual conservation measures as well as from total conservation packages.

NOTE: The end-use monitoring data of the 325 customers will be used to supplement the billing records and survey data in the evaluation process.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
OBJECTIVE 2: To determine the achievable penetration rate of the Program and levels of potentially cost-effective weatherization measures.		
A. Program Penetration	1) A pre-program and post-program survey of Hood River and the three comparison groups will be implemented to 800 households in each area emphasizing customer attitudes towards energy conservation. 2) Tracking records will be kept on pre-existing structural characteristics and post-treatment changes. 3) Tracking records will be kept detailing implementation progress.	1) Measurement of Hood River Conservation Project penetration versus conservation activity in comparison groups. 2) Effects of selected community-specific influences on conservation activities of individual households. 3) Identification of customer barriers to the total treatment package.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
B. Penetration and Levels of Measures	1) Data will be derived from the aforementioned surveys, audits and measure implementation records. 2) Pre-existing and post-treatment levels of conservation measures will be identified.	1) Identification and measurement of the frequency with which physical and attitudinal barriers to the application of conservation measures are encountered. 2) Measurement of the effects of physical and attitudinal barriers to the application programmatic conservation measures. 3) Statistical description and measurement of structural barriers found to exist. 4) Description of how participants change over time.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
		4) Estimates of the effects on energy savings of incremental additions to the conservation treatment of households.
		5) Description and frequency of customer options for "beyond program" levels and measures (at cost to the customer).

NOTE: Special studies may be implemented to explore specific problem areas as they arise.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
OBJECTIVE 3: To determine the relative effectiveness of vigorous conservation marketing.	1) Implementation to occur in two phases: Phase I - general media approaches based on existing practices (e.g. general advertising, bill enclosures, general direct mail); Phase II - personal approaches where necessary to achieve participation (e.g. personal letter from serving electric utility manager, door-to-door visit, telephone call). 2) Contractors will be hired to assist in the development of the advertising and communications activities.	1) Measurement of the effectiveness of elements and sequences of elements in the communications package to achieve the earliest and highest level of customer participation. 2) Recommendations for future marketing and communication efforts, referenced to empirical findings.

NOTE: Results from the community assessment component of this project will be used to develop the marketing strategies. In addition, an independent marketing consultant will review marketing/communications component for potential effectiveness.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
OBJECTIVE 4: To determine the characteristics of community social interaction and impacts under aggressive conservation program conditions.	1) Consultant hired to write a non-quantitative story of the Hood River Conservation Project. 2) Consultant hired to identify the social and communication networks in the community through interviews, surveys, audits and interaction with established community organizations. 3) Tracking records kept on customer reactions (positive and negative) and on staff perceptions of the conservation project.	1) "The Hood River Story" - a narrative monograph on the history and experience of the conservation project and its impacts on the community. 2) A detailed narrative written in the form of a guide for utilities concerning the implementation of a community conservation campaign. 3) Identification of the formal and informal communication networks and power structures within the community.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
		4) Description of the positive and negative effects from the community perspective of a widescale conservation program. 5) A report on staff and community perceptions of the progress of the project over time. 6) A comparison of Hood River and BPA Regional Survey results.

NOTE: Items within this component may comprise a single document and may be incorporated into other evaluation reports.

OBJECTIVE	ACTIONS TAKEN TO ACHIEVE OBJECTIVES	RESEARCH PRODUCTS
OBJECTIVE 5: To determine the costs associated with the development and implementation of a maximum conservation effort.	1) All costs will be assigned, compiled, and summed by project staff.	1) A detailed assessment of how each cost item contributes to the project component with which it was associated and to the project as a whole.

MEASURES AND INCENTIVES

A. Relevant Objectives

In selecting the appropriate measure and incentive levels for the Program, the key objective is to facilitate the testing of the achievable level of penetration when the economic incentives are at the maximum permitted under the Regional Act. As such, the measures and incentives must go well beyond the current BPA program offering which is based, by necessity, on near term alternative costs and a business like approach which will minimize the costs to BPA customers.

The Hood River Conservation Program (HRCP), by contrast, is essentially an R & D effort which addresses the potential of residential dwelling conservation when the region is beyond the current surplus and is contemplating the construction of new electric plant. Because of the long planning time necessary for construction, information about the potential of such conservation is needed as soon as possible.

The measures selected for the HRCP must reasonably test those which are now being vigorously advocated before the Regional Council by such groups as N.R.D.C.[1] At the same time such measures and incentives must be limited to those to which could reasonably be expected to be supported at some point in time by an alternative cost analysis. If so set, the Program will yield essential information about the efficacy of additional steps BPA could take in residential weatherization.

B. Approach in Meeting Objectives

1) Full Cost Reimbursement Incentive

The Hood River Conservation Program provides full cost reimbursement as an appropriate customer incentive to test maximum market

[1]Natural Resources Defense Council

penetration of conservation services and measures. It is essential that the ability to pay not be a consideration in the consumer's decision to participate. Full cost reimbursement permits the Program to test the two fundamental barriers to penetration -- physical limitation and non-economic customer resistance.

Information does not currently exist on the degree to which retrofitting beyond the current typical levels is simply not possible or not achievable within reasonable economic constraints. These limitations may well be more important than those associated with the consumers economics and information about them is essential to market planning.

Pacific's experience with programs which provide free water heater wraps suggest that a portion of customers will not accept an in-person offer of a free conservation measure if it means intrusion into the dwelling. This problem may be intensified by measures which go beyond the current typical programs to triple glass, insulation levels in the ceiling and floor which will greatly reduce some previously useable space, and, in some cases, significant changes to heating systems and housing exteriors.

Full cost reimbursement for this Program should in no way impinge on BPA's flexibility in setting actual program incentive levels. Quite the contrary, by providing information on fundamental barriers to penetration, more realistic standards may be set to measure the comparative penetration of programs with more economical incentives.

2) Accelerated Cost Effectiveness

The H.R.C.P. will utilize the long run incremental cost (LRIC) levels for energy and capacity from the 1982 BPA rate case to establish an

upper bound for conservation measure spending levels on an individual, house by house basis.

The LRIC study looks beyond the current, near-term power surplus in the region and identifies those long-term resources that could provide baseload power to the region. The study is used extensively by BPA in formulating rate structures and allocating revenue requirements appropriately among various classes of service. BPA's revised Time-Differentied LRIC was released on 8-13-82 and was the final product of months of formal hearings, with broad input from all major BPA customer groups in the Region, and reflects many man-years of BPA Wholesale Rate Staff review and refinement.

Given the mandate of BPA under the Regional Act to acquire output from resources to meet the load requirements of the entire region, this study has emerged as perhaps the best available measure of long-run regional costs.

C. Cost Effectiveness Ceilings

Measures specified in Section D will be applied to each dwelling. However, no dwelling shall have a measure performed which raises the average cost per annual kwh saved for the dwelling above $1.15.

The method of utilizing the dwelling's average cost of savings for determining cost effectiveness was chosen in accordance with BPA's strong preference for consistency with its current program. The $1.15 ceiling represents BPA's LRIC using BPA transmission loss and PP&L distribution loss figures, capacity saving limited to that provided by a base load thermal plant, the "10% bonus" for conservation from the Regional Power Act, and the assumption of a 35 year life for the conservation

measures. The assumptions used in deriving the $1.15 were chosen as a compromise which would permit the installation of measures which go beyond current practice for most dwellings in Hood River.

It was recognized that there was an area of disagreement over the appropriate adjustments of the LRIC study for such factors as the actual level of capacity savings, the life of the measures, and several other factors. Page 5 shows a range of $.96 to $1.41 utilizing various assumptions for just the two factors mentioned. The BPA and PP&L staffs also undertook an analysis of the costs of retrofitting typical types of dwellings. Page 6 shows a sample of such calculations using the BPA heat loss methodology. It was generally agreed that any significant retrofit to homes built since 1978 and homes retrofitted to PP&L standards under the Company's weatherization programs were beyond that which BPA could foresee as ever being cost effective. Retrofitting most other dwellings with measures which go beyond current practice was possible within a ceiling of $1.15.

The use of the LRIC study for establishing cost effectiveness for the Hood River Conservation Program does not imply that such a procedure is desirable for current BPA programs. Clearly such a procedure is not economic in the face of a large regional power surplus. This application is appropriate only as part of an effort to assess cost effective conservation potential beyond the surplus period.

CONSERVATION SAVINGS BASED UPON BPA
TIME DIFFERENTIATED LONG RUN INCREMENTAL
COST ANALYSIS, TABLES 2 AND 3
REVISED FIGURES RELEASED 08-13-82

(1983 $)

		MILLS
CAPACITY COST		
$\frac{(\$51.60/KW)\ (1{,}000\ mills/\$)}{(.6957)^{*}\ X\ (8760\ hours)}$	=	8.47
Capacity Loss Adjustment		X 1.1612
$\frac{1}{1 - .1388} = 1.1612$		9.83
ENERGY COST		40.81
Energy Loss Adjustment		
$\frac{1}{1 - .0936} = 1.1033$		X 1.1033
		45.03
TOTAL ENERGY AND CAPACITY COST		54.86 mills

Total Value per annual KWH savings, reflecting 110% conservation preference and 3.82% annual real discount rate as used in BPA TDLRIC study

25 Year Life		
$1.1\ (PV^{25}_{3.82}\ .05486)$	=	$ .96
30 Year Life		
$1.1\ (PV^{30}_{3.82}\ .05486)$	=	$1.07
35 Year Life		
$1.1\ (PV^{35}_{3.82}\ .05486)$	=	$1.15

*plant factor

LRIC-BASED CONSERVATION SAVINGS
(ADJUSTING FOR CAPACITY SAVINGS)

CAPACITY COST

9.83 Mills (from page 1)

x CAPACITY LOAD FACTOR ADJUSTMENT

$$\text{(SPACE HEAT)}\ \frac{\text{PLANT CAPACITY FACTOR}}{\text{SYSTEM DIVERSIFIED LOAD FACTOR}} = \frac{.6957}{.31}$$

= 2.2442

Total Capacity Cost	= 22.06 Mills
Total Energy Cost	= 45.03 Mills
Total Energy and Capacity Cost	= 67.09 Mills

35 Year Life

$$1.1\ (PV\ {}^{35}_{3.82\%}\ .06709) = \$1.41$$

MEASURES AND LEVELS OF INSTALLATION

*Full cost reimbursement to be used as an appropriate customer incentive to test maximum market penetration of conventional conservation services and measures.

*Measures selected for implementation reflect cost effectiveness levels consistent with reasonable long term resource acquisition (35 years) during periods of expected shortage.

*Cost effectiveness will be calculated on a house-by-house basis. Preliminary analysis indicates that the following list of measures and levels should meet cost effectiveness criteria when considered in appropriate combinations:

Residential	Target Levels
1. Home energy audit	All residential customers.
2. Ceiling insulation and appropriate ventilation	R-49
3. Floor insulation	R-38
4. Wall insulation	R-11 to R-19
5. Cold and hot water pipe insulation	R-3
6. Dehumidifiers and air-to-air heat exchangers	As required.
7. Clock thermostats	Where applicable.
8. Duct insulation	Crawl space R-11 Attic R-30
9. Stock windows and thermal replacement sash and glazing	Triple Glazing
10. Storm doors, thermal doors and double glazed sliding doors	Where applicable
11. Caulking and weatherstripping	Where applicable
12. Outlet and switchplate gaskets	Where applicable
13. Heat pump conversion of existing electric furnace systems	Where appropriate conventional measures cannot be installed.
14. Electric water heater wraps	R-11
15. Hot water flow regulators	As required.

MANAGEMENT PLAN

Objectives Addressed

The management Plan describes the organizing and facilitating mechanisms of the Hood River Conservation Program (HRCP). The Plan outlines the assignment and relationship of management and administrative personnel, the auditing-weatherization-inspection process, the schedule of reports preparation and distribution, and the oversight and accountability components. As such, the management Plan is inherently related to all Program objectives.

Introduction

A broadly representative group of agencies, organizations and individuals will be involved in the Program. Such participation is designed to ensure that the HRCP is implemented in a manner which is consistent with agreed objectives, that there is full compliance with all contractual terms and agreements, and that appropriate communication and interaction occurs between those interested in Program progress and results.

Oversight

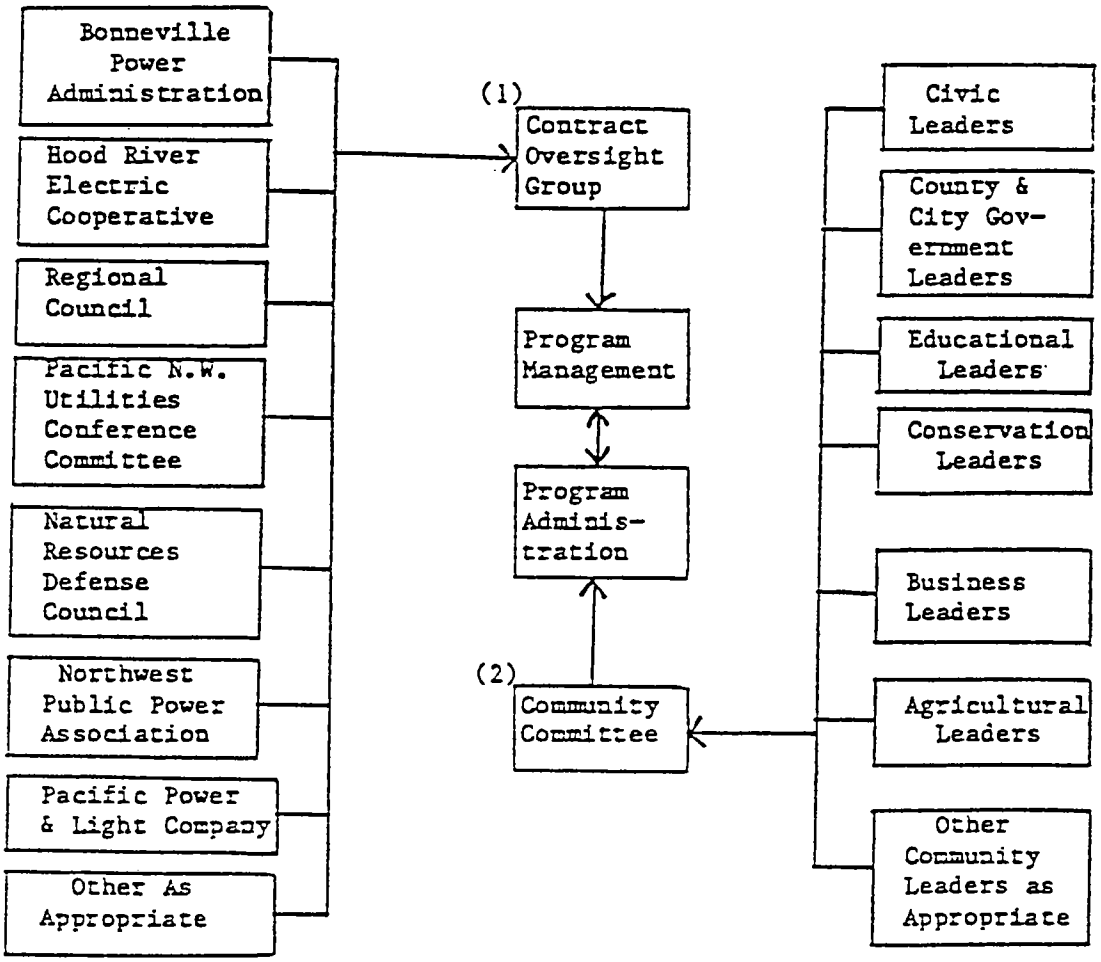
Continuing scrutiny of the HRCP will be provided by the Contract Oversight Group. This Group will include, but will not be restricted to, representatives from agencies and organizations instrumental in Program formation and contract supervision. As such, the Contract Oversight Group will include the Bonneville Power Administration, Pacific Northwest Utilities Conference Committee, Regional Council, Pacific Power & Light Company, Hood River Electric Cooperative, and the Natural Resources Defense Council.

The Contract Oversight Group will review Program progress, evaluate and distribute results, assist HRCP staff, and serve as liaison between the HRCP and the respective organizations and their constituents.

An informal Community Committee will be organized. This group will include citizen leaders and other interested persons from a cross section of the community. The Committee will provide such guidance and assistance as may from time to time be necessary to accomplish the Program's objectives.

The relationship of the Contract Oversight Group (1) and Community Committee (2) to the Program Management and Administration is presented graphically in Chart I: Program Oversight.

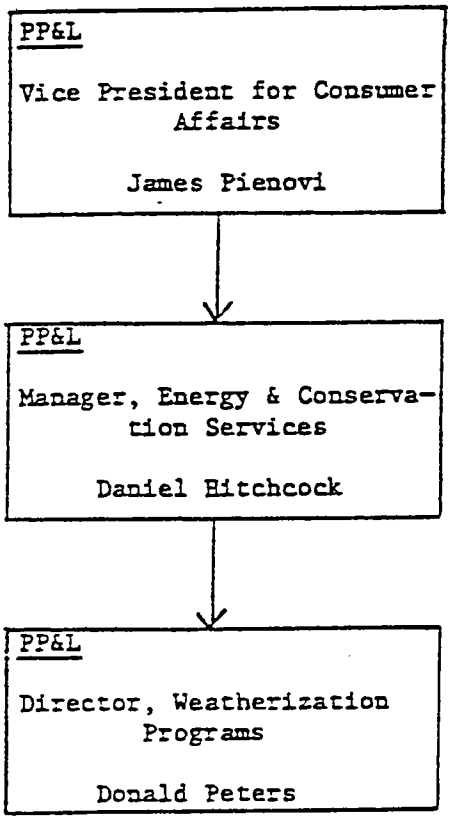
CHART I: Program Oversight



Management

The Hood River Conservation Program will be managed by the Pacific Power & Light Company through its Energy & Conservation Services Department (E&CS). As such, HRCP management responsibilities will conform to the existing corporate organization and structure, and can be graphically described as follows:

Chart II: Program Management



Management Responsibilities: Is responsible for all Consumer Affair Departments; implements corporate policy, will exercise executive authority over the Hood River Conservation Program.

Management Responsibilities: Is responsible for all Energy & Conservation Services Department functions; will exercise general management authority over the Hood River Conservation Program.

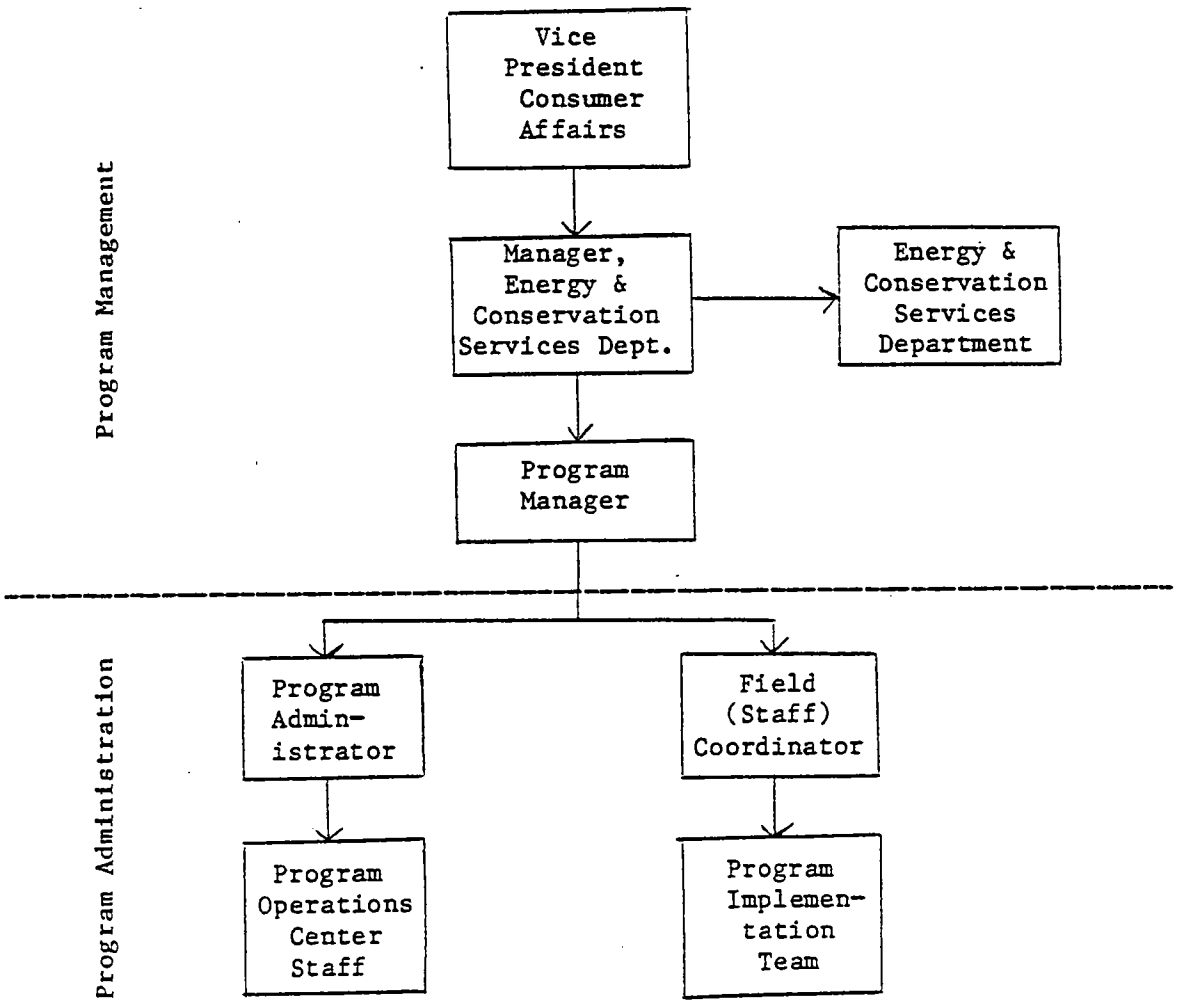
Management Responsibilities: Is responsible for the planning, implementation and evaluation of all Energy & Conservation Services Department weatherization programs activities; will serve as Manager for the Hood River Conservation Program.

Administration

The Hood River Conservation Program will be administered within

the context of the management structure and policies of the Pacific Power & Light Company. Specifically, HRCP administration will conform to standard procedures and practices of the Energy & Conservation Services Department. Principal administrative responsibilities will be assigned to John Jones, E&CS Department Special Projects and Education Services Administrator, and Jack Cooney, Field Coordinator. In addition, the extensive professional technical resources of the Energy & Conservation Services Department staff will be available to support the administrators as required.

Chart III: Program Organization/Management and Administration



Weatherization Management Process

The home auditing and weatherization process can be described as a series of discrete but sequentially related events. Each event or cluster of interrelated activities follows out of the preceding and succeeding completed component.

The cornerstone of the Hood River Conservation Program is the Home Energy Analysis (HEA). This key event is described below, as are the principal components which precede or follow as a direct consequence of the HEA.

Step One: PROGRAM INITIATION

The auditing-weatherization sequence will be initiated with general advertising using media forms which might be expected to reach most of the study area residents - local radio, newspapers and bulletins, and available community forums. The general advertising will have an informational focus, with the potential to control early Program enrollment.

The program of general advertising will be followed by a predetermined schedule of activities which selectively solicit qualified homeowner participation. The forms of invitation will include door-to-door contact, telephone calls, personal letters, and direct mail. The details of this process are described in the section entitled Marketing and Communication Plan.

Step Two: HOMEOWNER ACCEPTANCE

The qualified homeowner may elect to participate in the HRCP in three specific ways:

1. Program Operation Center Contact

   A qualified homeowner may enroll in the Program by visiting

or telephoning the Program Operation Center. Such an expression of interest will be registered on the master schedule by the Administrative Secretary by date and time.

2. Homeowner Initiated Mail and Telephone Responses

   There will be many opportunities for qualified homeowners to indicate their willingness to participate by mail and telephone. Most general newspaper advertising will contain telephone numbers and "clip out" enrollment forms, as will articles and published reports issued during the registration period. Enrollment forms will also be posted in prominent public locations and included in regular customer billings.

3. Homeowner Contact

   It can be anticipated that a major portion of those expressing a willingness to participate in the HRCP will do so as a direct consequence of personal contact. The contact will include door-to-door visits, telephone calls, personal letters and other direct mail invitations.

Step Three: PROGRAM STAFF CONFIRMATION

Following homeowner registration, an Implementation Team member will contact the prospective participant and reconfirm the commitment. Having done so, a date and time for a Home Energy Analysis (HEA) will be scheduled. During this contact the Implementation Team member may elect to answer questions of immediate homeowner concern and interest, as well as explain how the homeowner can assist the auditor in carrying out the HEA.

Following the confirming telephone contact a packet of material describing important Program characteristics and a reminder of the HEA date will be sent to the homeowner.

Step Four: HOME ENERGY ANALYSIS

Home energy analyses in the Hood River Conservation Program will be performed by selected members of the Energy & Conservation Department staff, or by properly trained and experienced contract personnel. The Pacific Power & Light Company, through its Energy & Conservation Services Department, has conducted approximately 53,000 HEAs since 1977.

During the HEA the energy consultant will examine the home and collect information on the existing insulation levels, appliance use and other data needed to complete the analysis. The energy consultant will use a portable terminal to enter the collected data into a computer through the customer's telephone. The audit results will then be analyzed and reported back verbally by the computer directly to the customer and the energy consultant. The resulting report will include estimated costs and anticipated savings. The homeowner will be given a copy of the report, and encouraged to implement recommended conservation and renewable resources measures. As an added benefit, residential electric water heating participants will receive a water heater blanket and installation.

Step Five: HOMEOWNER WEATHERIZATION APPROVAL

A weatherization plan including specific measures and products will be developed for the inspected residence based on the Home Energy Analysis. The measures selected for implementation will reflect cost effective levels consistent with reasonable long-term resource acquisition (35 years) during

periods of expected capacity storage. Cost effectiveness will be calculated on a house-by-house basis. Measures and levels expected to meet the cost effectiveness criteria are described in the section entitled Measures and Incentives.

The homeowner will be asked to review and approve the weatherization plan which will be implemented under the Program's full cost payment. When approved, the homeowner will have no further contractual obligation or role until the post-weatherization inspection.

Step Six: WEATHERIZATION

One or more general contractors will be employed to manage and carry out residential weatherization. These general contractors may elect to employ subcontractors to perform specific tasks. In all instances, an effort will be made to identify and employ local contractors with requisite skill and experience.

Contractor selection and training will be directed by the Program Manager. Contractor assignment and scheduling will be the responsibility of the Field Coordinator. Assistance will be provided by the Program Administrator as required.

All prospective weatherization contractors, general and subcontractors, will be evaluated by the Energy & Conservation Services Department staff. Only those who are sufficiently bonded and licensed and can exhibit evidence of a performance capacity at or above normally accepted industry standards will be certified to perform in the Hood River Conservation Program weatherization activities.

Step Seven: INSPECTION

There will be a post-installation inspection of each weatherization job. Inspections will be performed by the homeowner, Program inspectors, and on a random basis by a third party to certify quality control. The homeowner will be asked to confirm that the work has been performed and that it is acceptable. The inspectors will verify that the planned measures have been installed, that appropriate levels have been reached, and that the quality of work performed meets generally accepted industry standards.

Where performance criteria have been met and both the homeowner and inspector have approved the work, the inspector will submit a Notice of Project Completion to the Program Administrator, who will then authorize payment to the contractor.

Where the inspector finds a deficiency, the inspector will notify the Program Administrator and identify the incomplete or inadequate work and recommended steps for correction. The Program Administrator will prepare a Notice of Deficiency stating the problem(s) and recommendations of correction and deliver it to the appropriate contractor. When the appropriate corrective steps have been taken, the contractor will notify the Program Administrator and request a second inspection. The inspection process will be carried out as described above.

Where the record reveals a consistent pattern of deficient work being performed by a contractor, the Energy & Conservation Services staff will review the record and contractor certification. Such a review may result in: (1) no action, (2) a request for specific remedial steps on the part of the contractor, or (3) the removal of certification and the opportunity for further HRCP participation. Where remedial steps are required, the

contractor will be considered to be on probation, and a review of progress will be scheduled after an appropriate interval.

Process Summary

The weatherization management process can be summarized as follows:

Step One: PROGRAM INITIATION	General informational advertising designed to reach a broad spectrum of the community, followed by personal contact with all possible qualified homeowners.
Step Two: HOMEOWNER ACCEPTANCE	Three specific methods of homeowner registration: (1) At the Program Operations Center, (2) With a mail response, and (3) During a personal contact.
Step Three: STAFF CONFIRMATION	Homeowner commitment reconfirmed by staff member call to the prospective participant. Date scheduled for audit.
Step Four: HOME ENERGY ANALYSIS	Auditors conduct home energy analysis and prepare a weatherization plan including specific measures and products.
Step Five: HOMEOWNER APPROVES WEATHERIZATION PLAN	Auditor or Field Coordinator presents weatherization plan to homeowner and receives approval of original or modified work plan.
Step Six: WEATHERIZATION	Weatherization plan submitted to general contractor. General contractor or certified subcontractor performs authorized work.
Step Seven: INSPECTION	Post-installation inspection of work by the homeowner, Pacific Power, and by a third party if necessary. If work is approved contractor payment is authorized. If work is found to be deficient, a process of review and correction will be implemented.

A graphic description of the principal characteristics of the weatherization management process is presented in Chart IV: Summary/HRCP Weatherization Process.

Reporting

Reports will be systematically developed and distributed throughout the HRCP period. These include daily, weekly, monthly, quarterly and final reports. The principal objectives of these reports will be to: (1) ensure effective management and administrative controls, and (2) establish and maintain appropriate communications between participants and others interested in the Program's progress and outcomes.

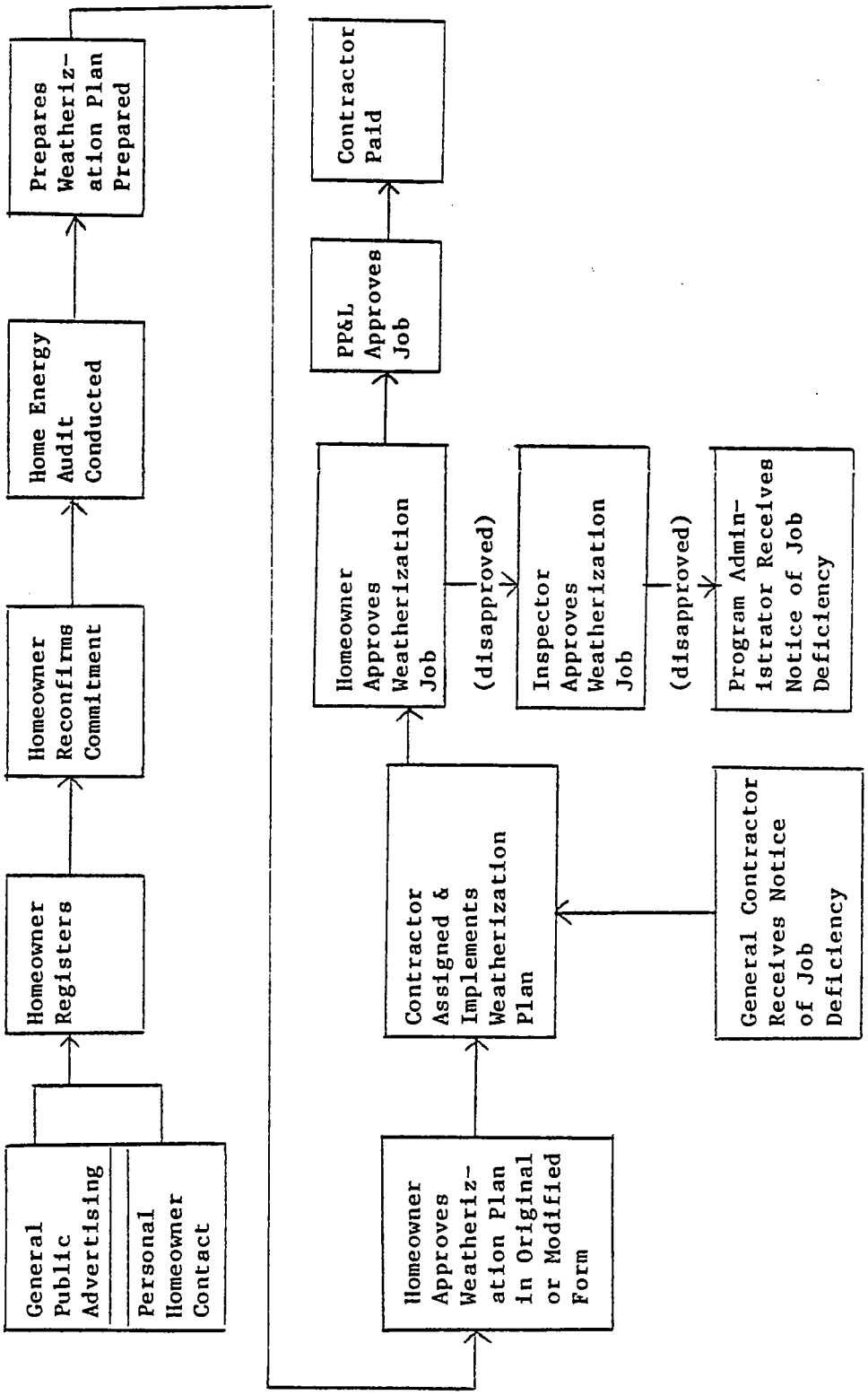
Daily and Weekly Reports

Reports will be prepared by the Program Administrator on a daily and weekly basis. These reports will focus on the degree of progress being achieved on scheduled work, the deployment of personnel, and the scheduling of support services. These are internal reports with limited internal distribution.

Monthly Reports

Cumulative data summaries and analyses will be prepared monthly by the Program Administrator. These reports will compare HRCP achievements with predetermined performance objectives, compare actual with projected costs, and present such other summarizing data as may be important or useful to Program managers and sponsors. Monthly reports will provide the basis for subsequent month planning, including establishing performance expectations, determining manpower, physical resource needs, and financial requirements. Monthly reports will be distributed to the Bonneville Power

CHART IV: SUMMARY/HRCP WEATHERIZATION PROCESS



Administration, Contract Oversight Group, participating utilities and other interested agencies and organizations.

Quarterly Reports

A quarterly report will be prepared at the end of each three-month Program interval. These reports will include comprehensive presentations and analyses of performance data for the period, and a cumulative presentation of all data since the Program's inception. Quarterly reports will compare projected and actual HRCP achievements, with emphasis on auditing-weatherization-inspection performance. Other areas of treatment may include community and political relations, Community Center operations and experience, and other topics of importance to Program success.

Quarterly reports will be distributed to the Bonneville Power Administration, Contract Oversight Group, participating utilities and other interested agencies and organizations.

Closing/Final Report

A final report will be prepared following the conclusion of the Program period. The target date of the concluding report must remain subject to sub-feeder and end use monitoring schedules, and to heating season sensitive data collection requirements. The final report, in appropriate form and quantity, will be delivered by the prime contractor to the Bonneville Power Administration on a mutually agreed date.

A summarizing Schedule of Principal Reports follows, as does an abbreviated timeline of reporting events in Chart V: HRCP Reports Timeline.

SCHEDULE OF PRINCIPAL ADMINISTRATIVE REPORTS

TYPE OF REPORT	ISSUE PERIOD	DESCRIPTION	USE(S)	DISTRIBUTION
Progress	Daily	Report of daily work completed with comparison to scheduled performance objectives for the day.	Work scheduling and personnel department for subsequent day.	Field Coordinator Program Administrator Administrative Secretary
Progress	Weekly	Audit-weatherization-inspection data for the week and cumulative total Program data. Comparison to scheduled performance objectives for the week.	Subsequent workweek schedule preparation and personnel deployment. Performance evaluation. Materials and equipment scheduling.	E&CS Dept. Manager Program Manager Field Coordinator Program Administrator Administrative Secretary
Summary & Analysis	Monthly	Audit-weatherization-inspection data for the month and cumulative total Program data. Analysis of data and comparison with scheduled performance objectives. Expense summary (BPA/PP&L).	Subsequent workmonth schedule preparation. Assessment of manpower requirements. Contractor scheduling. Financial monitoring.	Bonneville Power Administration Oversight Group PP&L Steering Committee Hood River Elec. Coop. Mgr. E&CS Dept. Mgr. Program Manager Field Coordinator Program Administrator Administrative Secretary
Summary & Analysis	Quarterly	Audit-weatherization-inspection data for the three-month period, plus cumulative total of previous work. Analysis of data and comparison with scheduled performance objectives for the quarter. Cumulative expense summary (BPA/PP&L).	Principal informational document for interested groups.	As in #3 above.
Summative	1 Year Report	Report of progress as of the end of Program year one.	Evaluation of Program progress; informational.	As in #3 above. Other as appropriate.
Final	At Completion	A case study including all process and content data, analysis and conclusions.	As per objectives.	Bonneville Power Administration

CHART V: HRCP REPORTS TIMELINE

EPORT	PROGRAM MONTH																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	*TBD
Daily (not charted)	(daily reports will be prepared throughout the Program period for internal use)																								
Monthly	x	x		x	x		x	x		x	x		x	x		x	x		x	x		x	x		
Quarterly			x			x			x						x			x			x				
12 Month												x													
Final																									x

* TBD - to be determined in negotiation.

ISSUES RELATING TO DATA QUALITY

Special emphasis will be placed on ensuring the integrity of the data collected throughout the HRCP. Contractors involved in the collection of specific information (i.e. survey of monitoring data) will be responsible for documented procedures used to edit and correct errors in the data. Program personnel involved in keypunching audit, weatherization, and inspection data into the tracking system will screen and return any incomplete data forms to the person(s) responsible for the data collection. All data input into the computer tracking system should be cross-checked by another data specialist at the HRCP office. This additional step is a relatively minor burden to ensure the accuracy of the data gathering process. In addition, frequent comparisons of individual customers data with consumption records will help identify errors. For example, electric space heat customers would be expected to experience a wider disparity between summer and winter monthly electric consumption than a non-electric heat customer. A large deviation from this premise by any single customer record would require closer scrutiny of the account.

PERSONNEL

The following persons will be involved in the Hood River Conservation Program management:

1. James Pienovi, Vice President, Consumer Affairs, PP&L

   Mr. Pienovi graduated from Portland State University with a Bachelor of Science degree in mathematics. He was employed by Pacific in 1968. He has held a series of increasingly responsible positions including Research Analyst, Contracts Administrator, Supervisor of Financial Reporting, Rate Department Manager, S. W. Division Staff Assistant, and Controller. Mr. Pienovi was appointed Vice President of Consumer Affairs in 1982.

2. Daniel Hitchcock, Manager, Energy & Conservation Services Department, PP&L

   Mr. Hitchcock graduated from Oregon State University with a Bachelor of Science degree and was employed by Pacific in 1966 as a Marketing Representative. He has worked in Yreka, California, and Medford, Oregon, as Manager of Customer and Technical Services where he supervised Energy Consultants doing residential and commercial audits and other conservation activities. In 1977 he joined the E&CS staff in Portland as Director of Program Planning.

3. Donald Peters, Director of Weatherization Services, Energy & Conservation Services Department, PP&L

   Mr. Peters has a degree from Oregon State University with a major in Business Administration and a minor in Science. He joined Pacific in 1968 and has worked in various conservation related positions, including residential and commercial/industrial audit experience. He also has done extensive work in training employees and the general public in the areas of residential, agricultural, commercial and industrial conservation. In 1980 he joined the E&CS staff as Director of Weatherization Services and is responsible for all weatherization programs.

The following persons will have specific administrative responsibilities for the Hood River Conservation Program:

4. John Jones, Special Projects and Educational Services Administrator, Energy & Conservation Services Department, PP&L

   Dr. Jones has a doctorate in education from the University of Oregon, with Bachelor of Science and Master of Science degrees in Political Science and History. Before joining Pacific in 1981 as Consumer Affairs Coordinator, he served for nine years as President of Energy & Man's Environment, a national energy education organization; was a university Director of Continuing and Professional Studies; Regional Administrator, Oregon State System of Higher Education, D.C.E.; and a Director of Secondary Education.

5. Jack Cooney, Field Coordinator, Energy & Conservation Services Department, PP&L

   Mr. Cooney was employed by Pacific in 1959. He has served 23 years as a marketing and conservation specialist in Tillamook, Corvallis, Cottage Grove, Walla Walla, Coos Bay, and Portland.

The management and administrative personnel noted above will be supported by the resources and talents of the Pacific Power & Light Company and, specifically, the professional-technical personnel of the Energy & Conservation Services Department. Those E&CS Department personnel who will be most directly involved in supporting the Hood River Conservation Program staff are:

6. Frank Rush, Director of Technical Services, E&CS, PP&L

   Mr. Rush worked as a license electrical contractor and general building contractor prior to joining Pacific in 1958. He has served in various staff, training and technical positions and as Manager of Energy & Conservation Services for the Portland District Office. He is currently a member of the State of Oregon Energy Conservation Board, the ASHRAE Energy Committee and has served on various state and national advisory committees for insulation, codes and building construction standards. He has been involved in the development and implementation of the Company's residential and commercial conservation programs.

7. Bill Kinard, Senior Technical Consultant, E&CS, PP&L

   Mr. Kinard graduated from Washington State University with a degree in Electrical Engineering and is a Professional Engineer registered in both Washington and Oregon. He has worked in various engineering,

management, marketing and conservation positions in the Company during the past 32 years. Currently, he provides support and training for E&CS staff and field personnel and assistance to the technical staff.

8. Shawn Oveson, Technical Consultant A, E&CS, PP&L

Mr. Oveson graduated from Westmar College, Iowa with a degree in Math and Physics and is a candidate for a Master of Science in Mechanical Engineering. He has eleven years of electrical, mechanical and HVAC engineering experience. Joining Pacific in 1976, Shawn was responsible for construction work and experimental design for TERA One, Pacific's solar research home. While working as a technical consultant in E&CS, he has participated in developing and conducting technical training programs on the Home Energy Analysis and Commercial/Industrial Energy Analysis. Currently, he is working on the development of a computerized commercial energy audit program.

9. Jim Haberman, Technical Consultant B, E&CS, PP&L

Mr. Haberman graduated from Oregon State University with a degree in Mechanical Engineering Technology and was employed by Marquess Engineering in Springfield, Oregon, a mechanical consulting firm. His responsibilities included planning, designing and balancing of building mechanical systems. Joining Pacific in 1978 as an Energy Consultant,he conducted both residential and commercial audits. In 1979, he joined the Technical staff and is primarily involved in training and research of the technical and commercial audit programs, as well as renewable resources. He has attended various technical seminars on active and passive systems.

10. John Montgomery, Technical Consultant B, E&CS, PP&L

Mr. Montgomery graduated from Washington State University with a degree in Industrial Technology and worked as Assistant Production Manager for a motor home manufacturing company. He has worked as a licensed general contractor specializing in remodeling and light commercial buildings. In 1978 he joined Pacific as an Energy Consultant in Sunnyside, Washington, with primary responsibility in residential energy audits. In 1979, he transferred to E&CS staff and assists with development and implementation of technical training programs for field personnel.

11. Mike Hartley, Product Specialist, E&CS, PP&L

A graduate of Southern Oregon College, with a degree in Math and Science and extensive work in electrical engineering, Mr. Hartley worked on the Titan I Missile Launcher System and with Pacific Northwest Bell as a Communications Consultant. Joining Pacific in 1975 as an Energy Consultant, he worked in Medford, Yakima and Sandpoint, Idaho, with both residential and commercial customers

doing energy audits. Since 1978, he has worked with Portland staff providing technical support in our conservation programs. He has been a technical consultant, and is currently responsible for all conservation products.

12. Bev Groshens, Senior Program Planning Coordinator, E&CS, PP&L

Mrs. Groshens graduated from Colorado State University with a degree in Home Economics Education. Prior to joining Pacific she was Home Service Director at Cheyenne Light Fuel & Power in Cheyenne, Wyoming. Joining Pacific in 1970 as a Marketing Representative in Medford, she has also worked as an Energy Consultant in several Oregon cities. In 1977 she joined the E&CS staff as a Program Planning Coordinator and has also served as Training Administrator. She is responsible for developing and implementing the training programs for approximately 200 energy consultants and supervisors.

13. Dennis Quinn, Weatherization Services Administrative Coordinator, E&CS, PP&L

Mr. Quinn has a degree in Business Administration with a double minor in Computer Science and Applied Mathematics and a Master in Business Administration from Oregon State University. He joined Pacific in 1977 as a Customer Office Representative and transferred to a position as an Energy Consultant in Medford in 1978 doing extensive work in residential audits and heat loss in Medford and Corvallis. In 1980 he joined the E&CS staff and has been involved in the coordination of the Residential Conservation Services program with lead agencies in Pacific's six-state service area. As a member of the RCS Advisory task force in these states, he has been working on the development and implementation of the RCS programs.

14. Sally LaBriere, Program Planning Coordinator, E&CS, PP&L

Mrs. LaBriere graduated from California State University at San Jose in 1972 and joined Pacific as an Energy Consultant in Springfield in 1973. Transferred to Lebanon in 1974, she has worked as an energy auditor for both residential and commercial customers. In 1979 she joined the E&CS staff and now plans and coordinates many of Pacific's conservation programs. She also works as a trainer during residential auditor training sessions.

15. Gary Smith, Programs Analyst, E&CS, PP&L

Gary Smith graduated from Oregon State University with a degree in Business Administration with special emphasis in computer science. Joining Pacific as an Energy Consultant in Roseburg in 1978, he has extensive experience in residential auditing. Transferred to E&CS staff in 1980, he is primarily responsible for monitoring the Company's computerized Home Energy Analysis program.

HOOD RIVER CONSERVATION PROGRAM

Summary: Principal Program Groups and Individuals

GROUP/INDIVIDUAL	MEMBER(S)	RESPONSIBILITIES
I. Program Oversight & Advisory		
A. Contract Oversight Group	1. Bonneville Power Administration 2. Pacific NW Utilities Conference Committee 3. Regional Council 4. National Resources Defense Council 5. Hood River Electric Coop. 6. Pacific Power & Light Company	The Contract Oversight Group reviews Program processes and progress; evaluates and distributes results, provides liaison between the Program and the respective participating groups and organizations. The Bonneville Power Administration will exercise specific contract review authority.
B. Community Advisory Committee	1. Government officals 2. Civic leaders 3. Clergy 4. Educators 5. Agricultural leaders 6. Environmental organizations 7. Interested citizens	The Community Advisory Committee will serve in an unofficial liaison and support capacity to the Program management and administration. The contactee will provide Program progress reports to the Committee on a regular basis.
II. Program Management & Administration		
A. Management		
1. Vice President for Consumer Affairs, PP&L	James Pienovi	Conduct of the Hood River Program will be under the direction of Energy & Conservation Services, one of PP&L's Consumer Affairs Departments. As such, Mr. Pienovi, V.P. Consumer Affairs, will exercise primary executive authority over the responsibility for conduct of the Program under terms of the contract and policies of the corporation.

GROUP/INDIVIDUAL	MEMBER(S)	RESPONSIBILITIES
A. Management (continued)		
2. Manager, Energy & Conservation Services Dept.	Daniel Hitchcock	Reports to the Vice President for Consumer Affairs. Is Manager of the PP&L department charged with conducting the Hood River Program. As such, Mr. Hitchcock will have general management responsibility for conduct of the Hood River Program.
3. Program Manager	Donald Peters, Director of Weatherization Services, PP&L	Reports to the Manager, Energy & Conservation Services Department, PP&L. The Program Manager is responsible for carrying out the Program as specified by the contract and corporate policy; . including general personnel direction, schedule maintenance, fiscal control and process and progress reporting.
B. Administration		
1. Project Administrator	John Jones, Special Projects and Educational Services Administrator, Energy & Conservation Services Dept., PP&L	Reports to the Program Manager. Is responsible for daily on-site direction of Program support activities; including community liaison, administrative, materials and equipment supply, Hood River-Portland communications, community conflict resolution, reporting, and supervision of the Program Operations Center and staff. The Program Administrator will support the Program Field Coordinator as required.

GROUP/INDIVIDUAL	MEMBER(S)	RESPONSIBILITIES
B. Administration (continued)		
2. Field Coordinator	Jack Cooney, Field Coordinator, Energy & Conservation Services Dept., PP&L	Reports to the Program Manager. Supervises the Program Implementation Team in their assigned auditing, weatherization, and inspection duties. Specific responsibilities include job scheduling, contractor liaison, personnel deployment and performance assessment. Prepares daily progress/status reports and coordinates scheduled summary updates with the Program Administrator.
3. Implementation Team	Members of the Energy & Conservation Services Department staff or qualified contractor auditors.	Reports to the Field Coordinator. Conducts home energy audits, prepares weatherization plans, and negotiates acceptable plan of work with homeowner.
4. Inspectors	Contractors with established skill and experience in assessing the quality and completeness of weatherization performance.	Reports to the Program Administrator. Responsible for determining whether a specified weatherization has been completed within the terms of an agreed plan.
C. Program Operations Center Staff		
1. Administrative Secretary	To be determined.	Reports to the Program Administrator. Supervises the Program Operations Center staff. Primary responsibilities include general public contact, communications routing, facility maintenance, records supervision, and support of the data input clerk.

GROUP/INDIVIDUAL	MEMBER(S)	RESPONSIBILITIES
C. Program Operations Center Staff (continued)		
2. Data Input Clerk	To be determined.	Reports to the Administrative Secretary. Operates computer equipment, including daily data input, maintenance of records, and other duties as assigned.
3. Clerk-typist	To be determined.	Reports to the Administrative Secretary. Performs such secretarial and clerical duties as are assigned. Supports the Data Input Clerk as required.

MARKETING AND COMMUNICATION PLAN

Objectives Addressed

This section addresses the following objectives:

Program Objective 2 - to determine the reasonable penetration rate of the Program and levels of potentially cost-effective weatherization measures.

Program Objective 3 - to determine the relative effectiveness of varied approaches to conservation marketing.

Program Objective 4 - to determine the characteristics of social interaction and impacts under aggressive conservation program conditions.

Overview

Marketing and communications associated with the Hood River Conservation Program (HRCP) address both internal audiences within the Hood River area and concerned audiences in the region and elsewhere.

For both audiences it is important that a marketing and communications program of the scale contemplated fit into a quickly understood framework. The basis of HRCP "understandability" centers on the fact that the entire effort is a research and development program. In marketing parlance, this overall framework would be called a "theme." It appears that the Hood River "theme" has legitimacy, credibility and acceptability for all audiences.

In accordance with the theme, citizens of this community will be asked to participate in a critical, cost conscious experiment in residential conservation; a "first" in the nation and the Northwest. It will be a thorough, coherent attempt to determine with as much clarity as

possible, what a typical Northwest community can achieve through a concentrated, collective conservation effort.

Structure

Marketing and communication activities are organized as two distinct components. Component One includes planning and development; Component Two includes those events associated with Program implementation and is organized into two levels - conventional, general media approaches, and innovative and personal contact approaches. A description of these interrelated levels is presented below.

Component One - Planning and Development

A. Community Assessment

A community assessment will be conducted to ensure a thorough understanding of the community structure, existing and potential issues, and possible impediments to Program success. The assessment will be designed and reviewed by a qualified third-party contractor-specialist. Proposals have been requested from three such organizations. The contractor selected will have demonstrated by experience and proposal quality a high probability of success.

The consultant-designed community assessment will provide useful management information and a forecast view of Program impacts. Answers will be sought to such questions as:

a. What is the formal and informal power structure? What community factions and consensus groups exist?

b. What are the potential negative social impacts of the Project?

c. What are the formal and informal communication networks?

d. What are the existing community and neighborhood groups.

e. What are the existing community organizations (i.e., VFW, Rotary, Grange, FFA).

f. Who are the influential groups and individuals?

g. What are the known community interests, concerns and ethical commitments?

h. What are the potential sources of political support and resistance?

i. What is the existing community problem resolution process?

j. What are the existing and most effective media sources?

B. Advertising

Advertising professionals have been employed to assist in preparing a marketing plan for the Hood River Program. A comprehensive plan is being developed for contacting, attracting and soliciting the participation and support of the 3,100 electric heat, and the 3,200 non-electric heat customers in the study area. A consulting firm will participate in implementation and provide such continuing assistance to the program's administrators as may be appropriate and necessary.

D. Community Program Center

A multipurpose Community Program Center will be established approximately two months prior to the initiation of implementation activities. Ideally, the Community Center will be a strategically located mid-town storefront with local ownership. Support staff will, to the

extent possible, be drawn from local manpower resources. Physically, the Center will be attractive, open and inviting. It will offer appropriate security and have sufficient space to efficiently accommodate anticipated staff, public and storage functions.

Component Two - Program Implementation

Marketing and communication in the implementation component is a direct extension of preparations and activities consummated during planning and development. The activities of Component Two, Levels I and II are designed to reveal best and/or most direct sequences of marketing-communication events for achieving earliest and highest levels of qualified customer participation.

Level I - general media approaches which employ known techniques such as advertising in newspapers and on radio, billing inserts, and direct mail solicitations.

Level II - selective personal approaches using innovative techniques for creating and regulating qualified customer interest and participation. Level II techniques will be employed where Level I efforts have not been adequate or where there is a need to selectively target specific groups. Personal approaches may include direct personal mail, telephone calls and door-to-door contact. Community involvement and innovative techniques may be employed to supplement scheduled Program activities.

As noted, the objectives of the marketing communications efforts are to generate the highest possible levels of Program participation through

varied approaches to conservation marketing. Participation rates must, however, be manageable and communications must be measurable. The need to manage and measure customer response requires closer examination of differing customer groups within Hood River.

Appeals will be addressed to three distinct groups:

1. Electric space heat/Electric water heater customers
2. Non-electric space heat/Electric water heater customers
3. Non-electric space heat/Non-electric water heater customers

There will be distinct differences in the level of benefits for which each category of customer is eligible. This disparity in benefits and resultant variation in response will be taken into account as broad based community support is sought.

Electric space heat customers are eligible for maximum benefits under the program. The challenge will not be to convince a majority of these customers to accept free weatherization. The problem rather, will be one of utilizing marketing and communication techniques to selectively control and direct a potentially volatile mass response in a manner that will avoid a large program request backlog with its attendant customer frustrations and negativism.

Conversely, non-electric space heat customers are expected to be much more difficult to motivate to participate in or to support the program, thus requiring higher levels of marketing activity.

Given such variations in reaction to program promotion, there exists a need for multiple strategies based on early identification of each customer by load type.

It is expected that the initial Program announcement and news coverage will more than adequately stimulate customer response to a level suitable for "KICK-OFF." Initiation of successive marketing efforts will reflect the multiple-strategy approach.

Electric Heat Strategy

The succession of selective marketing efforts for this group, at least initially, will be based on managing customer response rates and attitude in accordance with Program planning goals. Again, the central theme that "this is a two year R&D program under which no one will be overlooked" will play an important role.

When and if initial request volume from the electric-heat group begins to diminish, a shift from a selective "controlled response" strategy to a higher profile "promotional" strategy incorporating measurable mixes of Level I and II techniques will be employed.

Non-Electric Heat Strategy

Marketing efforts directed to this group will be targeted 1) to those with electric water heat, and 2) those with non-electric water heat. Motivation of these two sub-groups, especially the latter, is expected to require vigorous use of all justifiable measures as well as rigorous promotion. There are very real energy savings to be had in both cases, but attitudes toward the lesser benefits received relative to electric heat customers and therefore, their attitude relative to supporting the program will be dependant upon the non-electric strategy.

This group represents over half of the community and is expected to play a vital role in maximizing penetration through cooperative community commitment.

Measurement

It is important that assessment of marketing appeals be accomplished in compliance with Program Objective 3.

Simplistic tallies of customer response to specific mailers or the amount of foot or phone traffic through the Program Center on a given day is not sufficient. The information must provide more than a statement as to which mechanism the customer used to respond. The information must reflect the combination of circumstances which caused the customer to respond.

This type of measurement will be achieved through an addendum to the audit process. It will be in the form of a brief questionnaire conducted shortly after the customer's request, while it is still fresh in his mind.

Research Design

The research components associated with marketing and communication are presented in the research section. Specific objectives are identified below in relation to the research section and actions to be taken to achieve the objectives.

Objective	Focus Area	Research Section	Action Taken to Achieve Objective
2A	Program penetration	II.8, pp 10-15	Survey - pre-post of Hood River and two comparison communities, plus a random survey of northwest communities. Tracking records on pre-existing structural characteristics and post-treatment changes. Tracking implementation progress.
2B	Penetration and levels of measures	II.C., pp 15-20	Identify physical and attitudinal barriers. Measure effect of barriers on program measures. Statistical description of structural barriers. Estimated effects on energy savings on incremental addition of measures. Description of customer operations beyond program - at customer cost.
3	Effectiveness of varied approaches to conservation marketing.	IV. 30-32 IV. B. 39-42	Community Center Contractor-specialist planning: Level I - general media approaches Level II - personal approaches Customer questionnaire Narrative monographs (2) Descriptive "guidelines" paper Summary "perceptions" report

Objective	Focus Area	Research Section	Action Taken to Achieve Objective
4	Characteristics of community social interaction and impacts under maximum conservation program conditions.	VII. 40-43	Consultant to write non-quantitative report. Consultant to identify social and communication networks. Tracking records kept on customer reactions and staff perceptions. Correlation of customer response data to marketing activity and community event logs.

Timeline

The timing of the activities described in this section and the interrelationship of these activities to other Program events are of critical importance. A timeline of some key events associated with marketing and/or communication is described below.

TIMELINE: MARKETING AND COMMUNICATIONS

PROJECT ACTIVITY	PLANNING & DEVELOPMENT / IMPLEMENTATION PROJECT MONTH 9 8 7 6 5 4 3 2 1 0* 1 2 3 4 5 6 7 8 24
I. Project Operations Center	
1. Identify Options	
2. Negotiate Contract	
3. Preparation of Center Facility	
4. Install and test Communications and Data Processing Equipment	
5. Open Center to public	
II. Marketing and Communications	
1. Retain Consultants	
2. Design Community Assessment	
3. Conduct Community Assessment	
4. Assessment follow-up	
5. Assign Adversiting Firm	
6. Design materials and Develop Implementation Strategy	
7. Produce Materials	
8. Initiate Marketing Activity (Program Kick-Off)	
III. Community Liaison	
1. Identify Community Leaders	
2. Form Liaison Group	
3. Conduct Periodic Meetings	

*Tenatively March 1, 1983

STUDY AREA

The study area was selected from alternative sites on the basis of general research criteria and logistical advantages. The principle selection standard was the ability of the study area to represent other communities of the Pacific Northwest. The following selection criteria were employed in judging potential sites:

1. The area is geographically delimited and definable.
2. There is a range of construction vintages, from new construction to pre-1945.
3. There is a diversified economy which is influenced by general economic conditions neither significantly more nor significantly less than other areas of the region.
4. The population is heterogeneous. That is, it includes a disparate mix of ages, sexes and occupational involvement.
5. There are no unusual energy conservation programs or activities.
6. There are representative residential, commercial and industrial sectors.
7. The area is served by both publicly-owned and investor-owned electric utilities.
8. There is a representative range of income levels and household sizes present.
9. The area is comprised of a representative mix of urban, suburban and rural zones.

10. There is at least one community in the area with a population of at least 200 but not more than 25,000 population.
11. The area is sufficiently near Pacific Power & Light Company corporate headquarters to permit administrative access and technical support.

When these criteria were applied to the Pacific Power & Light Company service area, Hood River, Oregon (county and city) met the criteria, while also meeting important logistical requirements. Further, the Hood River Electric Cooperative service area adjoins that of Pacific Power and is appropriately and easily included within the parameters of the Program.

The recommended study area includes most of the 536 square miles of Hood River County, and has a population of approximately 15,065. It lies along the northern edge of Oregon, bounded on the north by the Columbia River and located approximately 45 miles east of metropolitan Portland.

The study area is served by Pacific Power and Hood River Electric Cooperative. Pacific serves 5,093 customers: 4,046 residential, 760 commercial-industrial and 287 irrigation. Hood River Electric Cooperative serves 2,631 customers: 2,226 residential, 187 commercial-industrial and 218 irrigation.

Hood River County lies in a climatic transition zone between the marine influence of western Oregon and the semi-arid climate of eastern Oregon. It is characterized by four distinct seasons and an annual rainfall of 28.47 inches. Average January temperatures are 33.1° F; July 67.5° F. There is an average of 5,145 heating degree days and 193 cooling

degree days, with winter design temperatures of 12° and summer of 89° (based on 97.5 percent of occurrence).

Hood River County is typical of the region in its scattered, largely rural population with small but easily identified community concentrations. It mirrors, in its cultural and political attitudes, the character of the region's people. The economy reflects a cross section of industry and employment typical of the Pacific Northwest. Its geographic location with both marine and arid climatic influences, distinct seasons, and temperature diversity provides clear reference points to other sections of the region.

The historical and social basis of Hood River reflects that of the region. The first non-native settlers were principally of English, Finnish, German, and Japanese decent. The first land claim was recorded in the vicinity of the present city of Hood River in 1854. Hood River County was established on June 23, 1908, with the town of Hood River selected as the seat of county administration.

The major sources of revenue in the study area are agriculture, timber, lumber and recreation. Agricultural potential has been increasing as compared to other primary industry, lumber and lumber products. The Hood River Valley produces fruit of exceptional quality and is recognized as a world leader in pear production. The fruit production area is approximately 10 miles wide, extending southward 25 miles from the Columbia River to the slopes of Mt. Hood.

The lumber industry has been experiencing a period of adjustment with several small mills closing. While logging and sawmilling have long been a substantial part of the Hood River economy, the trend is toward fewer but larger mills.

Outdoor recreation is an important economic supplement. The study area's proximity to the metropolitan Portland area provides a regular source of revenue and cultural interaction. Popular activities include boating, camping, hunting, fishing, hiking and skiing.

COMPARISON COMMUNITIES

Two study areas were selected as comparison communities for the Hood River Program. The selection criteria are based on considerations of population, location, economy, and climate.

For purposes of evaluation, it was essential to maintain rate experience in the comparison communities identical to that of Hood River. For this reason the State of Oregon was examined first. Each of the 28 counties in Pacific Power's Oregon electric service area were considered. Sites which did not meet the established criteria were eliminated. As a consequence of this process, two comparison areas were selected: (1) Grants Pass, Oregon and surrounding Pacific service areas in Josephine County, and (2) Pendleton and surrounding Pacific service areas in Umatilla County. A discussion of selection criteria is presented below.

1. Population

   A. The area is semi-rural with at least one community population over 200 and none over 25,000.

   B. The population within the county and within Pacific Power's service territory is large enough to sample.

   C. Customer population characteristics are "like" Hood River based on per customer annual kilowatt hours and electric end use proportions.

Grants Pass, with a population of 15,050 (1980), is the largest city within Josephine County; Pendleton, with a population of 14,656 (1980), is the largest city in Umatilla County. Pacific Power serves 23,000 residential customers in Josephine County and 16,000 residential customers in Umatilla County.

2. Location

A. No physical proximity to either Hood River or Portland.

B. Limited or no reliance within the comparison community on Hood River or Portland news media. Presence of a local news source.

C. Absence of significant recent or on-going community conservation programs near or within the community.

These criteria both avoid reaction to the Program and maintain relatively pure comparisons representative of the Northwest experience. Both communities selected are physically isolated from the Hood River Program and other active community conservation campaigns conducted by Bonneville Power Administration or Pacific Power. Grants Pass and Pendleton are major community concentrations within their counties each having a principle local news source. The East Oregonian newspaper is published each week day and Saturday in Pendleton as is the Daily Courier in Grants Pass.

3. Economy

A diversified economy influenced by general economic conditions neither significantly more nor significantly less than other areas of the region.

The economies of Josephine and Umatilla counties are diversified and relatively stable. The major industries are lumbering, tourism,

and agriculture in Josephine County; and agriculture, lumbering, food processing, and manufacturing for Umatilla County. Percent dependence of total manufacturing income on lumber and/or paper products is 68.5 for Josephine County, and less than 60 for both Umatilla and Hood River counties. Unemployment rates from the State of Oregon Employment Division, August 1982, are 13.0% for Josephine County, 10.5% for Umatilla County, and 16.4% for Hood River. The state of Oregon seasonally adjusted unemployment rate for this date is 10.8%.

4. Climate

The communities selected represent two distinct climates found within the region. Both are referenced in the climatic transition zone in which Hood River is located. Josephine County, located in southwestern Oregon, has a temperature climate with mild, wet winters and hot, dry summers. The average annual rainfall is 28 inches, average January temperature 39.3°F; average July 71.2°F. Umatilla County, situated in northeastern Oregon, has a temperature, semi-arid climate with an average annual rainfall of 12 inches; average January temperature of 32°F; average July temperature of 73.5°F.

These and other principle comparison characteristics are summarized in Chart One: Comparison Communities below:

CHART ONE: COMPARISON COMMUNITIES

Characteristics	Hood River	Grants Pass	Pendleton
Kwh/Customer/Yr.	12,600	13,000	12,000
Space Heat Saturation	54%	57%	48%
January Temperature	33°	39°	32°
July Temperature	68°	71°	74°
Service Area Population	15,900	56,500	59,200
PP&L Residential Customers	4,161	23,298	16,092
% Lumber	<60%	<70%	<60%
Unemployment (August '82)	14.4%	13%	10.5%

EVALUATION

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(I) Objectives: Questions to be Answered in the Hood River Conservation Program Evaluation

Evaluation objectives are listed in this overview, and detailed in the appropriate sections of the evaluation plan. Evaluation tasks are classed under three major objectives: Energy Savings, Capacity/Diversity Effects, and Process Evaluation (includes assessment of program implementation). Other evaluation objectives, such as analysis of penetrations and physical/behavioral barriers to implementation of measures are considered as aspects of the major objectives.

(A) The Energy Savings Impact

One of the major objectives of the evaluation plan is to permit accurate assessment of the energy (kWh) savings impact of the conservation Program. This objective includes consideration of overall impact, impact of measures, and to the extent possible of levels of measures. In addition, physical barriers will be assessed. Evaluation questions under this objective are as follows:

(1) What overall energy (kWh) savings can be achieved by implementing a reasonably high standard of conservation measures in a community in a program in which ability to pay is not a barrier to acceptance of weatherization, along with an intensive community campaign?

(2) What penetration can be achieved by the Program?

(3) What penetration can be achieved for specific measures?

(4) What savings can be estimated for specific measures? How do estimated (audit) savings and actual savings compare? What are the quantitative and qualitative effects of these comparisons

in relation to the question of comparison of current heat loss methodologies?

(5) What levels of measures are actually attainable? What tentative estimates can be developed regarding energy savings due to levels of measures?

(6) What are the physical/behavorial barriers to implementation of a reasonably high standard of conservation measures? What is the relative frequency of specific barriers to specific measures? Are there dwelling characteristics that correlate highly with these barriers, which might serve as readily available indicators for use in planning?

(B) Feeder Study: Capacity and Diversity Effects

A second major objective of the evaluation is to assess the capacity (kW) effects of the Program. The primary vehicle for this assessment will be a feeder study, although plans also call for feeder-level monitoring of several community feeders. There are two principal evaluation questions under this objective:

(1) What are the capacity (kW) effects obtained from implementation of a reasonably high standard of conservation measures in a community in a program in which ability to pay is not á barrier, along with an intensive community campaign?

(2) What are the capacity (kW) and diversity effects on a primarily residential feeder obtained by implementing a reasonably high standard of conservation measures with high residential penetration?

(C) Evaluation of Program Implementation

The third major objective is focused on the Program as a process. Evaluation questions in this area concern Program implementation and evaluation of communications media and techniques. Evaluation of communications media and techniques is discussed earlier in the proposal. The principle evaluation question under Program implementation is:

What can be learned about the process of Program implementation and potential constraints induced by the magnitude of an intensive conservation campaign?

(1) What are the Program goals of the Hood River Conservation Program, as planned and defined? In which respects did Program implementation support planned goals? In which respects did the actual delivery of Program services differ from delivery as planned? What events or factors emerged in the course of the Program which introduced changes in the ways the program was implemented and perceived? Did the Program generate any unanticipated consequences? What aspects of the Program were responsible for unanticipated developments? Which aspects of the Program were essential (and which probably irrelevant) in attaining the achieved degree of success in accomplishing program goals? What can be learned about how similar programs might be implemented in the future?

(2) Did the size and intensity of the Program generate any institutional constraints? Was supply of required material bottlenecked due to the size or timing of demand? Was Program timing and generation of expectations keyed to the

ability to deliver services? If not, what were the consequences? Was quality of construction affected by the number of homes being weatherized during a given period of time? Was quality control of inspection efforts affected by the size of the workload?

(D) General Issues

It is intended that much of the evaluation of the Hood River Community Conservation Program will be completed by independent contractors to be selected before and during the Program. In particular, the design and conduct of the Program's two attitudinal surveys, the community assessment, and the analysis of all data will be performed by parties not otherwise affiliated with the Program or with the Program's sponsors.

This expectation imposes a number of parameters for the discussion of evaluation issues to follow. In general, it suggests that research issues and research designs should be clearly identified but that specific decisions relating to the selection of analytical techniques and variable selection should be addressed only generally in anticipation of input from contractors. This pattern -- the emphasis of design issues over those associated with variable selection and analytical method -- is present throughout the presentation of evaluation issues.

One element of the flexibility being retained for contractors lies in the identification of units of analysis to be employed in the various analytical components. In general, analyses will address behaviors associated with the community and with elements of the community's housing stock, irrespective of turnover among inhabitants associated with each during the course of the time period being studied. It is reasonable,

however, to anticipate that deviations from this focus will be implemented as deemed appropriate by the contractor and members of the appropriate Program oversight committee. It is realistic, for example, to anticipate that some analytical attention will turn to residences which evidenced stable occupancy during the Program period. Similarly, it is realistic to expect variations in the time frames over which behaviors are observed in order, for example, to capture possible effects of additions to the area's housing stock. In general, however, residences -- including single family, multi-family, and mobile home units -- will comprise the Program's primary focus in analytical work: resident-specific sources of variation will in general constitute an area of secondary interest.

(II) Energy Savings Impact of the Hood River Conservation Program

Accurate assessment of the overall energy savings (kWh) impact of the Hood River Conservation Program is a major evaluation objective. In addition, questions of Program penetration, penetration of measures (and physical barriers to implementation), and comparison of heat loss methodologies will be outlined in this section of the evaluation plan.

(A) Overall Energy Savings Due to Program

The key question is: "What overall energy (kWh) savings can be achieved by implementing a reasonably high standard of conservation measures in a community in a Program in which ability to pay is not a barrier to acceptance of weatherization, along with an intensive community campaign?" The evaluation design, analytic approach, and sample design proposed for reaching an answer to this question are detailed below, along with a listing of principal variables to be used in the analysis and a specification of research products.

(1) Evaluation Design

The assessment of overall savings will be carried out using a modified multiple time-series research design (Campbell & Stanley, Pp. 55-57). The analysis groups specified in the design (Figure 1) include a Hood River group, two comparison communities, and a random sample of residential customers from throughout the Pacific Power service area.

Figure 1
Energy Savings Multiple Time-Series Design

Analysis Group	1977	1978	1979	1980	1981	1982	1983	1984
Hood River, Early Treatment.	0	0	0	0	0	0	X	0
Hood River, Late Treatment..	0	0	0	0	0	0	0	X
Comparison Community #1.....	0	0	0	0	0	0	0	0
Comparison Community #2.....	0	0	0	0	0	0	0	0
PNW/PP&L Random Sample.....	0	0	0	0	0	0	0	0

NOTE: Observations are indicated by the symbol "0," while "X" indicates Hood River Conservation Program weatherization.

Use of comparison groups will provide protection against unusual events which might distort estimation of savings due to the Hood River Conservation Program. For example, an oil embargo, an energy shortage, or an increase in international tensions leading to some sort of federally stimulated mobilization or energy conservation campaign would affect analysis groups more-or-less equally. Additional effects of the Hood River Conservation Program could be separated from those due to the emergence of such national or regional events. Also, the use of time-series measurement (use of kWh data from each of several years) permits control for any

gradual cumulative changes across the analysis groups. Loss of observations (for example, by deaths and moves out of the community) may be expected to be about the same across groups.

The possibility that savings estimates might be biased by some unknown difference between people in Hood River and other places is made unlikely by using three comparison groups: two communities judgmentally selected to be "like" Hood River (both of these in Oregon to keep rate experience equal), and a random sample of PP&L's customers in the BPA region. The use of a second comparison community is designed to provide some insurance against the possibility that comparison with a single community might fail if some singular event occurred within the single comparison community during the course of the Program (a local conservation mobilization, some unexpected political development, etc.). Similarly, the random sample of PP&L's customers in the BPA region will permit comparisons to reveal the generalizability of results. Finally, those elements of the Hood River community not treated in a given year of the Program can provide a basis of comparison for residences which are treated.

Measurement processes are not likely to influence results in a biased fashion since the basic measurement of energy (kWh) is routine and generally unnoticed, and the relevant surveys ("pre-test" and "follow-after"--see section VII) will be applied equally in Hood River and the comparison groups. The Hood River community will, in addition, receive other surveys ("audit" and "market"--see section VII), but these can be considered indistinguishable from the community campaign in customer perception. The possibility of statistical regression bias between Hood River and comparison groups is virtually ruled out by the use of three comparison groups

with no weatherization related selection criteria. The time-series design will permit investigation of regression bias as a precaution against misinterpretation.

An additional virtue of the multiple time-series design is that it provides sufficient blocking of rate induced conservation effects. First, the two comparison communities will undergo identical rates and rate changes as Hood River. Second, applicable rate and rate change data collected for Hood River Electric Cooperative, the two comparison communities, and residences within the PNW/PP&L random sample, will permit supplementary analysis and statistical control of rate effects, if necessary.

(2) Approach to Analysis of Overall Energy Savings

Fundamentally, the problem is to address differences in mean consumption (kWh) per dwelling unit in two sorts of comparison: "after" vs. "before" weatherization within the Hood River community and "treatment group" (Hood River) vs. "comparison group" (Comparison Community #1, Comparison Community #2, PNW/PP&L Random Sample). Within this basic approach, several types of comparisons are required to show the degree of similarity across analysis groups and to derive an indication of the trend over time within each analysis group. As a practical matter, however, total annual residential consumption is affected by weather during the winter heating season, so energy consumption (kWh) will be weather-adjusted at the dwelling unit level using a billing cycle degree day approach or other suitable technique. The analytic technique to be employed is a generalized multiple regression/correlation approach with a hierarchical model for unique partitioning of variance. Within this approach, both

analysis group and weatherization will be introduced as nominally scaled research factors and group means will be compared in an analysis of variance sence with a protected t-test (Cohen & Cohen, Pp. 171-211).

(3) Sample Design

The sample design for analysis of overall energy savings will provide a basis for two levels of detail in the comparisons described above. At the most basic level, the sample for these comparisons will include all members of the analysis groups (all households in Hood River Community #1, all households in Comparison Community #1, every dwelling unit in the PNW/PP&L Random Sample, etc.). For more detailed comparisons, in which more variables are taken into account, the sample will be limited to those households included in the "pre-test" or "follow-after" surveys; these households will have been randomly selected. (see Section VII). Additionally, random-based samples of customers with similar load configurations may be developed for analyses. It is expected that differences between Hood River and other analysis groups (effect sizes) will be larger for energy measures (kWh) than is usually the case due to the high standard of measures and community comparison.

(4) Variables Employed and Data Sources

Energy consumption (kWh), the key variable in the analysis, will be obtained from accounting records of the two utilities serving Hood River. At least five years of such billing record data is currently available from billing records for PP&L customers in Hood River, Comparison Community #1, Comparison Community #2, and the PNW/PP&L Random Sample. Additional years of energy data will be collected from billing records during the course of the Program and Program evaluation. Other variables to be included in the analysis will be collected from surveys (see Section VII).

(5) Research Products

Several contrasts will be performed in addition to the main contrast of Hood River with the other analysis groups.

1. Energy savings: Hood River vs. other groups.
   a. Hood River vs. Comparison Community #1.
   b. Hood River vs. Comparison Community #2.
   c. Hood River vs. PNW/PP&L Random Sample.

2. Energy savings: Stability of comparison groups.
   a. Comparison Community #1 vs. #2.
   b. Comparison Community #1 vs. PNW/PP&L Random Sample.
   c. Comparison Community #2 vs. PNW/PP&L Random Sample.

3. Survey comparisons: Attitudes and characteristics.
   a. Hood River vs. Comparison Community #1.
   b. Hood River vs. Comparison Community #2.
   c. Hood River vs. PNW/PP&L Random Sample.
   d. Comparison Community #1 vs. #2.
   e. Comparison Community #1 vs. PNW/PP&L Random Sample.
   f. Comparison Community #2 vs. PNW/PP&L Random Sample.

(B) Penetration of Program

(1) Evaluation Design

An important component of the Hood River Program lies in assessing the degree to which an aggressive residential conservation program will be accepted by members of a community when ability to pay is removed as a barrier to Program participation and when the Program is complemented by an

active marketing and communication campaign. This phase of the Program separates this study from other work in the field by complementing usual savings/household findings with others relating to the proportion of the housing stock which can reasonably be treated.

This phase of the Program will employ a form of the non-equivalent control group design (Campbell and Stanley, 47-50), which permits comparison of experience in the experimental group with those of other groups not exposed to treatment. As shown in Figure 2, this design parallels those of other phases of the Program evaluation in that events in Hood River are compared to events in two comparison communities and to a random sample of PP&L customers from throughout the Company's service area. With influences arising out of other sources statistically controlled, this design permits the estimation of effects associated with the differences between the Hood River Program and those available to the comparison groups.

Figure 2

Program Penetration Non-Equivalent Control Group Design

Analysis Group	1983-4		1984-5
Hood River	(0)	X	0
Comparison Community #1	0		0
Comparison Community #2	0		0
PNW/PP&L Random Sample	0		0

NOTE: 0 = Observation, X = Treatment

This particular application of the non-equivalent control group design differs in its application from most others, including those described elsewhere for other evaluation components of this Program. This difference

centers on the use of the initial observation in Hood River. Since the experimental treatment -- the Hood River Conservation Program -- is substantially different from other conservation programs availed to these households in the past, the evaluation of this Program's penetration is most accurately envisioned as involving only the treatment and post-treatment observations to take place in that locale. This part of the evaluation comprises the (X . . . 0) component of the design noted above: it is not pertinent for this particular purpose to conduct a pre-treatment observation. It is, however, appropriate to observe the community prior to introduction and implementation of the Program in order to assess Hood River's pre-Program comparability to the three comparison groups: this assessment of pre-Program comparability is important to comparisons based on post-Program observations. As a consequence of these factors, the initial Hood River observations primarily serve a cross-sectional role, and only indirectly contribute to longitudinal comparisons. This quality of the design is graphically indicated in the figure through the notation (0) for pre-Program observations in Hood River. Pre- and post-treatment observations among the three comparison groups will permit measurement of the conservation activities which occur among members of those groups.

(2) Approach to Analysis of Program Penetration

The analytical work undertaken in support of this evaluation issue differs from most others in the Program in that the Program-eligible housing stock in each community constitutes the unit of analysis: in most other evaluation areas, the object of attention is the individual household. The major consequence of this difference -- to be discussed shortly -- lies in the variables to be used. Analytical techniques, however, can be similar to those employed elsewhere. While conservation treatment

constitutes the measure of principal interest, it is reasonable to anticipate that a number of influences other than Program availabilities will influence penetration rates. For this reason, analytical techniques based on analysis of covariance are planned. These permit the statistical control of other determinants and so allow the assessment of net program effects on the adoption of conservation measures.

As a complementary analysis, Program dynamics will be considered in support of the issue of penetration. Of interest are changes in application response rates through the course of the Program as well as variations in participant characteristics over time. The unit of analysis changes from the Program-eligible housing stock to the Program participant. Multi-variate correlation methods will be used to determine the influence of the participant's demographic or behavioral characteristics on the time of application to participate.

(3) Sample Design

Three of the four groups to be analyzed will have been selected through purposive methods. The criteria which led to the selection of Hood River as a test site were specified earlier in this document. As discussed in the "Study Area" section, the selection of the two comparison communities is similarly based on a number of criteria which address their comparability with Hood River, including the provision of electrical service by Pacific Power and Light Company. PP&L service is suggested to simplify data collection, since PP&L consumption records are efficiently maintained and readily available to the Program.

Members of the PNW/PP&L Random Sample, however, will be selected through probability sampling techniques from PP&L's customer accounting

records. While the exact size of this sample of customers remains to be determined, it must be of sufficient scale to permit an accurate description of the population it represents in the Program: accordingly, it is currently envisioned that this group will number approximately 800, and will include customers with and without electric space and water heating.

(4) Variables to be Employed and Data Sources

While most other analytical work undertaken in the Program focuses on individual households and so employ variables representing household characteristics, this analytical component will address the community and will employ variables descriptive of the locale. As a result, household characteristics will be described in terms of saturation rates and other summary measures. Variables to be employed in these analyses will include characteristics of the housing stock (to be obtained from surveys and from energy audits), of occupants (taken from surveys), and of the community as a whole. Among the last group of measures will be such variables as unemployment rates (taken from sources issued by the State of Oregon) and weather (from NOAA records). The focal variable for this Program phase -- conservation status -- will be obtained from one of two sources. In Hood River, eligible households and participants will be identified through Program records. Conservation status in the comparison groups will be determined through PP&L's conservation program records and through Program surveys.

(5) Research Products

This component of the Program evaluation will yield the following kinds of information.

1. Measures of Hood River Conservation Program penetration.

2. Measures of conservation activity among members of the comparison groups.
3. Measures of net differences in conservation activity associated with the Hood River Conservation Program.
4. Measures of the effects of selected community-specific influences on conservation activities of residents.
5. Measures of Program participation changes over time.

(C) Penetration of Measures

(1) Evaluation Design

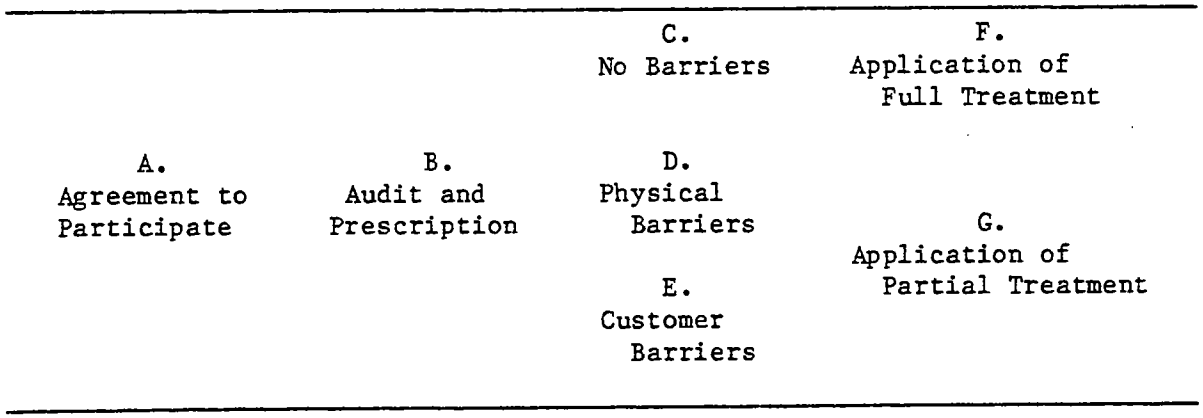
An issue which is parallel to the penetration of the Program among eligible households in the community is the penetration of individual conservation measures among participating households. It is probable that some households participating in the study will not be treated with conservation measures targeted under Program specifications, whether due to the structural characteristics of the residence or to the preferences or attitudes of residents. This will result in limitations on the extent to which treatments may be applied in spite of the occupants' fundamental willingness to participate in the Program. Moreover, these barriers to the implementation of various measures could well impose significant limitations on the degree to which a conservation Program offering a specified package of measures can reach the energy and capacity savings which would accompany universal application of measures. This evaluation area addresses this issue by specifically identifying the levels of measures actually implemented in participating households. In addition, this series of evaluations will address two other, closely related issues: first, the nature

and effects of barriers which impede application of the total package and, second, the statistical analysis of the effects on household energy savings of different treatment levels as imposed on the Program by these barriers.

This evaluation component analyzes activities within the processes designated as "treatment" throughout the remainder of the evaluation description. In recognizing that Program participation and the installation of full treatment measures are not perfectly correlated, it suggests sources of variation within the treatment process. Figure 3, graphically depicts the nature of this process.

Figure 3

Treatment Penetration Flow Diagram



As shown in the diagram, three possibilities arise at or after the time of the audit. If no barriers are recognized, the prescription and application of full treatment can proceed. A second alternative entails the existence of physical barriers to the installation of all Program measures: this situation would lead to the application of a set of measures of less than programmatic intensity. Finally, members of the household may object on some grounds to some or all measures: again, this

situation would lead to the application of a treatment other than that called for by the Program. Since Program-induced effects on consumption and demand are likely to be reflective of the levels of measures actually installed in residences, it is reasonable to anticipate that these variations in treatment would be accompanied by variations in effectiveness.

The evaluation process supporting this series of questions is primarily one of analysis. Where most other evaluation components necessarily entail data gathering strategies which in turn necessitate design specifications, this series of analyses bear no such requirement. Instead, the evaluation focus is primarily one of modeling the incidence and barriers to the various measures, based solely on empirical observations as evidenced among Program participants.

As suggested in the Figure 3, structural and customer barriers to the application of specific measures will likely become known after the initial agreement to participate in the Program and before the actual installation of the treatment. Accordingly, barriers and their effects on the Program's application can be documented by the Program representative to whom the barrier first becomes apparent.

As noted above, anticipated barriers are of two types. Structural barriers are characteristics of the residence which preclude the installation of a specific measure or else permit its application to a degree less than that specified by the Program. An example would be the inability to install R-49 ceiling insulation because of a roof line which physically permits only R-30. The recording of this parameter and its effect on the treatment of the residence would constitute a data point for this evaluation phase. Aggregated, these data for all households would suggest the degree to which specified Program practices could not be met, the reasons

why they could not, and the effects of the barriers on the Program. Customer barriers represent a similar case: Reticence to cover elaborate windows or ornate doors with storm fixtures would be examples. However, while these impediments may lead to less than specified treatments in some cases, it is also reasonable to anticipate that customer actions may lead to greater levels of treatment to other residences than are specified in the Program. In either case, such departures from specifications would lead to inclusion as a point of observation.

Residences evidencing both types of barriers will contribute variance to the programmatic treatment levels applied to the community's residences. Additional variance will be contributed through the levels of conservation treatments applied to residences before the Program and "beyond Program" levels or measures implemented at the option of (and cost to) residents. As pre-treatment conditions will be physically measured as part of the audit procedure and post-treatment levels similarly assessed through quality control audits, precise measures of Program-related treatment levels will be available.

(2) Approach to Analysis of Penetration of Measures

Together, these three types of data -- relating to physical barriers, to customer barriers, and to variations in treatment levels -- comprise the basis for analytical work addressing three focal questions. The quantification of effects imposed on the Program by physical barriers entails a series of frequencies documenting the incidence of each such impediment encountered during the course of the Program: summed and related to the total number of residences eligible for Program treatment, these data can also provide the basis for producing saturation estimates. Similarly,

customer barriers may be aggregated as a measure of the degree to which this class of influence affected the Program.

The consequences on consumption savings of differences in treatment levels will be addressed through the application of correlational and structure search techniques, or the equivalent.

(3) Sample Design

Whether through the characteristics of residences as ramified through structural barriers or pre-existing conservation measures, or through the expressed preferences of householders, households will self-select into the various groups addressed by these evaluational analyses. As no data currently exist which can be used to estimate the extent to which treatment variation will be encountered, it is not possible to specify the precision with which estimates may be developed. All residences will, however, be electrically heated in keeping with eligibility requirements for treatment under the Program.

(4) Variables to be Employed and Data Sources

The variables to be employed in these analyses are fewer in number than those of most other evaluation components. As suggested above, structural barriers will be documented by the energy auditors who inspect residences prior to treatment or by quality control inspectors who audit to ensure compliance: these same people will document through inspection the effects of the various barriers on the Program's weatherization package. Similarly, customer barriers and their effects on the treatment package will be documented by Program auditors and inspectors. Where conservation measures have been applied to a residence prior to the Program, auditors and inspectors will physically measure pre-existing and post-treatment levels, respectively, and Program-related treatments will be represented by

the differences between these values. Finally, electrical consumption will be obtained from the files of the electric utility serving each customer.

(5) Research Products

Information which will be developed through these analyses will include the following.

1. Identification and measures of frequency with which physical barriers to the application of the total treatment package are encountered.
2. Measures of the effects of physical barriers on the application of programmatic conservation measures.
3. Identification of pre-existing levels of conservation measures.
4. Description and frequency of customer options for "beyond Program" levels and measures (at cost to customer).
5. Identification and measures of frequency with which customer barriers to the application of the total treatment package are encountered.
6. Measures of the effects of customer barriers on the application of programmatic conservation measures.
7. Descriptive statistics of residences in which various types of structural barriers are found to exist.
8. Estimates of the effects on energy savings of incremental additions to the conservation treatment of households.

(D) Comparison of Heat Loss Methodologies

(1) Evaluation Design

Critical decisions and assertions regarding the effectiveness of conservation measures rest upon the reliability and accuracy of the heat loss

methods used in their evaluation. Controversy over the assumptions, structure, and use of various methods has resulted in the promotion of several models. The Hood River Conservation Program provides an ideal opportunity to gather sufficient data from a sample of structures to compare the most popular of these models. Additionally, it provides opportunities to refer to the substantial base of consumer, structure, and community observations to understand and explain errors in the results of these models due to behavioral and other influences.

This evaluation objective, like others in this Program, will utilize information from two sources; namely, the basic energy audits performed on all structures, and data from a sample of structures that will be extensively monitored and audited. This latter sample will consist of all of the 325 structures sampled for the distribution feeder study. This will make available to this analysis the hourly load and temperature data collected for feeder study purposes. It will also make available structure-specific data on consumer characteristics, utilities, and behaviors that will facilitate explanation of observed deviations of results from those expected.

(2) Approach to Comparison of Heat Loss Methodologies

Analysis of the alternative models are naturally divided into two types: building simulations and post hoc analyses of results. Sufficient data will be collected to permit building simulations using alternate modeling techniques. The alternate models will be compared based on the match between the observed and expected simulation results. To the extent that there are differences between the observed and the expected results or the different simulations post hoc analyses of these differences will be

necessary. Although we are unable to specify these analyses in advance, we have anticipated the need for such analyses in our data collection Program as indicated in the section on variables and data sources.

(3) Sample Design

Two data collection vehicles are planned to support this analysis. The first is a census of all Program participants in the form of a detailed energy audit. This audit will encompass all of the variables generally required in the BPA audit program as well as selected consumer characteristics questions specific to this Program. A sample of these structures will be selected for more extensive monitoring and auditing. This sample will be identical to that selected for the distribution feeder study.

(4) Variables Employed and Data Sources

Data for these analyses will come primarily from building audit forms and special studies of a sample of 325 structures. The building audit forms will be used to audit all participants' structures. These forms will include at least all of the information presently collected on BPA audit forms plus some additional consumer characteristics data added specifically for this Program. It is desired that certain additional data be collected at each site to facilitate subsequent analyses of solar retrofit suitability such as solar orientation as determined by a pathfinder study, roof angles, and perhaps photos of each structure.

The samples of 325 structures is expected to include the audit data as well as the on-site recording of the following:

* Total electric load (subhourly).

* Space heating system electric load (subhourly).

* Water heating system electric load (subhourly).
* Internal structure temperature (subhourly).
* Water temperature at kitchen faucet (before and after water heater conservation).
* Test of space heater thermostat calibration and sensitivity.
* Blower door test.

This data will permit a variety of building simulations and heat-loss model evaluations. It may, however, be insufficient to satisfy certain questions of marginal interest such as how much energy is used to humidify/dehumidify homes, what impact does weatherization have on humidity in a structure, how much energy does the structure use under vacant but normal heating conditions, and so on. These additional analyses would require additional instrumentation, monitoring, and recording including, multiple thermometers in the heated space, thermometers in the buffer spaces (attic, crawl space, etc.), sub metering of humidity and humidifiers/dehumidifiers, and tests of vacant houses during the heating season with the heating system in normal operating modes.

In addition to these site-specific data collection activities, local climate data will be collected using subhourly recording intervals comparable to those used for load recording, including temperature (wet and dry bulb), wind speed and direction, and solar insolation. These micro climate stations would be used to supplement similar data available locally from NOAA and along the survey sampled distribution feeder.

(5) Research Products

Post hoc analyses of this data will result in a number of research products that cannot be determined in advance. The following products are representative of those that are expected:

1. Comparisons of building simulations with each other using standard inputs and alternative models.
2. Comparison of alternate building simulations with observed behavior using standard inputs and alternate models.
3. Evaluation of output of alternate building simulations from alternate models with standard inputs that vary from sparse to extensive.
4. Development and comparison of alternate weather adjustment techniques (from correlation of HVAC System use to temperature data).

(III) Feeder Study of Capacity and Diversity Effects

This phase of the Program evaluation entails two components, each designed to assess the impacts of the Hood River Program on selected load characteristics. In the first, a sample of households served by a single feeder will be end-use monitored while the feeder itself will be load monitored as well: this phase of the evaluation will address capacity and diversity effects, and is denoted in subsequent discussion as the "intra-feeder evaluation." As a secondary component, several feeder lines serving the study area will be monitored in order to develop preliminary estimates of Program effects on aggregated load characteristics after residences in areas served by the various feeders are treated under the Program: this component will be referred to as the "inter-feeder evaluation" in subsequent discussion.

(A) Evaluation Design

The assessment of capacity and diversity effects will each draw from a one-group, pretest-posttest design (Campbell and Stanley, 7-12), as reflected in Figure 4.

Figure 4

Intra-Feeder Evaluation
of Capacity and Diversity Effects
One-Group Pretest-Posttest Design

Analysis Group	1983-4		1984-5
Space and Water Heat Customers	0	X	0

NOTE: 0 = Observation, X = Treatment

Three sets of observations will be employed in these analyses. First, a sample of households with electric space and water heat will be end-use monitored before and after the auditing, treatment, and quality control inspection of their residences. Second, the feeder line itself will be monitored throughout the period of end use monitoring noted above. Finally, several of the feeders in the area will be monitored during the same time frame.

Load metering will develop hourly demand data for all three sets of observations for the duration of the Program. As individual residences and the feeders will not have been monitored prior to the inception of the Program, no historical data will be available.

A third focus of this evaluation component lies in estimating the effects of the Program on aggregated load characteristics as monitored on the feeder serving the area. While requiring data of the type which will

be collected through the design depicted in Figure 4, this phase of the task will be essentially empirical, and consists of statistical estimation of the strengths of association between programmtic effects on the loads of individual households and those of the feeder serving them. General relationships between variables are shown in Figure 5.

Figure 5

End-Use/Feeder Load Relationships

Changes in Water Heating Loads	B_1	
Changes in Space Heating Loads	B_2	Changes in Feeder Loads
Changes in Other End Use Loads	B_3	

This figure depicts changes in feeder loads as resulting from changes in the loads associated with the various end uses it serves. As an outgrowth of this causal relationship, changes in feeder loads may be modeled in part as functions of programmatically-induced changes in water and space heating loads in the service area: B_i, then, represents the effects of household-specific variation on feeder variation. This body of analyses focuses on estimating the values of B_i.

(B) Approach to Capacity and Diversity Effects Analysis

Analysis of the intra-feeder diversity effects of the Program will incorporate the load data of the electric space and water heating sample. At issue in this assessment is the degree to which the coincidence of individual electrical demands among these customers is altered through their participation in the Program. The pre- and post-treatment end-use

metering in place on these customers' residences will additionally permit identification of how individual end uses contribute to any changes which are identified. Analyses will focus on the comparisons of load characteristics before and after the treatment of eligible residences. It is expected that all monitored loads among the treated households will decrease; moreover, it is anticipated that space and water heating loads will reflect greater Program-related variation than will the total load of the group.

The evaluation of intra-feeder capacity savings will employ the same general approach, but will focus on a different dependent variable. While the evaluation of diversity effects addressed program-related effects on the coincidence of customer energy use, the assessment of capacity effects addresses Program-induced changes in the rate at which electrical energy is used by individual customers or groups of customers.

Analysis of the intra-feeder diversity effects of the Program will incorporate the load data from the feeders. The essential question addresses the identification of differences in selected load characteristics associated with the Hood River Conservation Program: included among these characteristics are the level and timing of loads as they relate to the differences in attributes of the various feeder lines and the areas they serve.

This analytical approach is not without weaknesses. The body of customers served by each feeder are likely to be different from those served by other feeders. Differences in urban/rural mix and commercial and industrial uses, for example, undoubtedly distinguish the various feeder-defined areas. Additionally, the tendency for socioeconomic differences to be ramified in patterns of residential location suggests that treatment

effects will vary by feeder. To a great extent, however, these influences may be statistically controlled. These issues notwithstanding, it is felt that the findings of these analyses will be valuable, both for their contributions to an overall understanding of treatment effects and for the insights they will provide into determinants of aggregated load sensitivities to conservation treatment.

Analysis of the third evaluation issue -- the contributions of changes in end-use loads to changes in feeder loads -- is well-suited to multivariate correlational techniques by virtue of their abilities to identify treatment effects while statistically controlling for the effects of other quantifiable influences. As in other bodies of analysis, control variables will represent selected characteristics of the residences and householders observed through the metering of loads.

(3) Sample Design

The sampling scheme for the intra-feeder evaluation involves a two-stage process in which the feeder is first identified, followed by the selection of customers for monitoring.

The feeder will be selected in accordance with a number of criteria. While it is unlikely that a "typical" feeder exists, it is nonetheless pertinent to select one which is optimally consistent with criteria relating to types and number of customers served, length, urban/rural mix, and age and rate of growth in served housing stock. In addition, the operational characteristics of the line, including load size and associated dimensions, and constancy of configuration are important.

Customers to be monitored will be selected through random-based techniques applied to populations of customers with electric space and

water heat. The sample size to be achieved with space and water heating customers should be sufficient to ensure 90 percent confidence and 10 percent precision with respect to changes in consumption associated with the program's conservation treatments: a sample size of approximately 325 space and water heating customers is planned.

The sample design for the intra-feeder evaluation area is straightforward. Twelve feeder lines serve the Program area -- seven in the PP&L service area and five in that of HREC -- several of these will be monitored for load throughout the duration of the Program. Selection will be dependent on an engineering analysis to determine the feasibility of load monitoring.

(4) Variables Employed and Sources

The principal variables to be addressed in this evaluation relate to load characteristics, including level, timing, duration, and coincidence. These values will be operationalized through load recordings of the feeder lines and the sample of customers' residences.

Measures to be treated as statistical controls relate to such influences as weather and the characteristics of customers, their residences, and their inventories of electrical appliances. These measures will be obtained from surveys as well as through the audits and post-treatment inspections of treated households. Additional measures for the intra-feeder evaluation include the mix of commercial and industrial customers taken from utility records and the urban/rural nature of the service area.

(5) Research Products

The outputs of this series of evaluation steps will include the following:

1. Measures of residential load shapes, including those for electric space heat and electric water heat, other end uses as a group, and total.
2. Measures of end-use-specific contributions to aggregate load as measured on feeder lines.
3. Measures of diversity among customers with electric space and water heat.
4. Measures of programmatic effects on household load shapes.
5. Measures of programmatic effects on feeder load characteristics.
6. Effect of treatment on aggregated load shape as represented by feeders.
7. Measures of load characteristics at feeder level including level, duration, timing.
8. Measures of inter-feeder diversity.
9. Effect of treatment on inter-feeder diversity.

(IV) Assessment of Program Implementation

The assessment of Program implementation is the story of what was planned as the Hood River Conservation Program, and of how plans were implemented, modified, and subsequently carried out. In part, the question addressed in process evaluation is "whether...(the)...program was implemented according to its stated guidelines" (Bernstein & Freeman, P. 18). Additionally, the process evaluation is the story of the Program, a narrative rooted in Program experience to be of value in understanding the Program and designed to be useful to other utilities considering community approaches to conservation.

(1) Evaluation Design

Process evaluation is designed as a case study, primarily qualitative in nature, to be based on historical records, the community assessment, interviews, the experience of Program personnel and management.

(2) Analytic Approach to Assessment of Program Implementation

The analytic approach will involve application of case study methods. Primarily, this will involve analysis and synthesis of available records of Program progress, obstacles, and emergent developments which impinged upon the course of the project. Quantitative results from other phases of the evaluation plan will be qualitatively assessed and integrated into the Program story.

(3) Sample Design

All survey material (see section VII) will be available for use in the process evaluation, and will be drawn on selectively. In addition, a separate time-series sample of community perceptions and knowledge of the Program and a supplementary sample of interviews with project personnel over time is proposed. The community perception survey will be a systematic random sample mail or phone survey of a small number or residences every two months for the duration of the Program. The Program personnel survey will be designed as a systematic sample of time intervals covering various personnel levels.

(4) Variables and Data Sources

All Program records will be available. Attitudinal information will be drawn from surveys (see section VII), the community assessment, and other observations and experience.

(5) Research Products

Research Products from the assessment of Program implementation include the following:

(a) "The Hood River Story"--a narrative monograph on the history and experience of the conservation campaign in Hood River.

(b) "The Community Conservation Campaign"--a narrative monograph written in the form of a guide for utilities in implementation of a community approach to conservation.

(c) "Conservation Constraints"--brief paper describing negative and positive effects stemming from the size and intensity of the Program in Hood River. This paper may be incorporated in document a or b.

(d) "Report on Staff and Community Perceptions"--brief summary report derived from staff interviews and community interviews over time, tracking changes in perceptions. This paper may be incorporated in document a or b.

(V) Synthesis of Results and Final Report

Preceding discussion in the evaluation section has been oriented to developing information and findings relating to specific issues, each of which contributes a piece of the overall evaluation of the Program. While each of these components serves a necessary function in the overall assessment of the Program, the pieces do not form a whole until they are brought together and assessed as a group. The synthesis of results and final Program report will perform these functions for the Hood River Conservation Program. A number of functions are subsumed under this general class of activity.

One major function to be served in the synthesis process lies in the consolidation of programmatic effects. A necessary consequence of a well-developed evaluation scheme of this type is the incompatability of findings as developed by each of the individual evaluations addressing different classes of outcomes. A review of the discussion which preceded will disclose that while a number of outputs will be framed in terms of KWH, others will address KW and still others will entail references to numbers of residences and penetration rates. It remains to tie these references into a cohesive body of Program findings, and this task will be undertaken through the synthesis of results and the final Program report.

A similar process is necessary in aggregating the resources which will be necessary to undertake and complete the Program. This phase of the evaluation will entail the compilation, assignment, and summing of resource costs, and additionally the critical assessment of how each cost item contributes to the Program component with which it was associated and the Program as a whole.

A critical component in the assessment of Program effects and resource requirements relates to the process evaluation of the Program. Among other products, the process evaluation will address how the Program's progress was affected by influences associated with the group implementing the Hood River Conservation Program, the community into which the Program was introduced, and the interaction of these two bodies. This is a highly important component in the larger evaluation process. Because the Program will entail the intensive communication of conservation and Program-related information to individual and organizational members of the community, it is reasonable to anticipate that it will command greater attention than have other conservation programs available to the consuming public. As a

result, the alignment of community organizations behind or against the effort can bear strongly on its outcome. Similarly, tasks completed well or poorly will likely become widely known as the Program unfolds. In these instances and in others like them, the ultimate success of the study may well be affected by conditions which are only indirectly associated with the Program itself. For these reasons, the synthesis and reporting of the Program's evaluation will necessarily be conditioned by the nature of the processes which surround its implementation and conduct.

The structure of the final report remains to be negotiated, but it is possible to outline its contents with respect to Program evaluation. In general, it is reasonable to expect that it will be comprised of three broad sections. First, the processes and results of the individual evaluation components will be reported: included in these descriptions will be the sources and processes through which data were obtained, descriptions and results of evaluation analyses, and findings. Second, the report will address the process and results of drawing findings together in support of conclusions arising out of the Program: this phase of the report will encompass the considerations outlined above. Finally, the report will address implications of the Program for other applications: important components of this part of the report include not only the identification of which implications are suitable for use in other spheres of activity and consideration, but also those which are not.

(VI) Definitions of Variables to be Used in Analysis

The exact specification of variables to employ in the various analytical applications will remain unaddressed until a later point in the Program's development. Nonetheless, the discussions of evaluation procedures

which preceded identified a number of measures and types of variables which would likely be employed. This discussion draws these measures into a single location and identifies them in terms of general definition and likely source. Two classes of variables will be addressed; those planned for use in the evaluations of Program effects, and those to be employed in the process evaluation of the Hood River Conservation Program. Each of these will be discussed individually in the text which follows:

(A) Program Effect Evaluations

Variables and types of measures identified in association with the various evaluations of programmatic effects include the following.

Effect Evaluation Variables and Planned Sources

Variable	Source
Treatment Levels	Auditors' measurements, quality control inspectors' measurements
Treatment Condition	Hood River Conservation Program records
Consumpton	Utility billing records
Load Characteristics: Customers	End-use load monitoring of a sample of customers with electrical space and water heat
Load Characteristics: Feeder	Load monitoring of feeder lines
Customer Barriers, Effects	Energy consultants and quality control inspectors
Physical Barriers, Effects	Energy consultants and quality control inspectors

Effect Evaluation Variables and Planned Sources (Cont'd)

Variable	Source
Demographic Measures	Surveys
Weather	NOAA records
Indoor Temperature	Monitoring of inside temperature of residences in end-use monitoring sample

Each of these measures is further discussed in the following text.

(1) Treatment Levels. Treatment levels represent the conservation measures actually applied to a residence during the course of the Program. Treatments will be of three general types; weatherization, water heater wraps, and heat pump space heater installations. Water heater wraps and heat pump installations will be dichotomous measures, reflecting whether or not either measure is applied to a residence through the project. Weatherization measures may reflect differences of degree: for this reason, three component indexes are relevant for each treatment measure in the weatherization package. The first involves weatherization measures found in the home and measured by the energy consultant at the time of the structure's audit for Program treatment. The second index represents the treatment levels found and measured to be in place after treatment of the home under the Program. A third index, derived ffom the difference between pre- and post-treatment measurements, represents the treatment levels actually attributable to the Program.

(2) Treatment Condition. This variable is a dichotomous measure reflecting the presence or absence of Program-related conservation treatments in a household or, alternatively, in aggregations of households

served by a feeder. These data will be maintained on a current basis in project files.

(3) Consumption. Measured in KWH, electrical consumption represents the quantity of electricity used by households during selected time frames. Consumption data will be drawn from the customer accounting records of participating uitlities for months comprising the Program period. Additionally, historical consumption data as available will be used to augment that developed during the course of the Program.

(4) Load Characteristics: Customers. Measured in KW and documented in one-hour time frames, individual customer loads will be monitored among a sample of customers served by a selected feeder. The sample of electrical space and water heating customers will be monitored with four-channel recording equipment: space heating, water heating and total loads will be recorded along with indoor temperature. Load characteristics of individual residences to be documented are three in number: the magnitude of peak load (mesured in KW), the duration of peak load (measured in hours and reflected in load shapes), and peak load timing (reflecting the time of peak demand). In addition, the degree of concurrence of demand peaks among individual customers -- diversity -- will be assessed.

(5) Load Characteristics: Feeders. Since they transmit the current used by aggregations of individual customers, feeder lines and substations present opportunities to monitor the temporal distribution of customers' uses of electricity, the rates at which electricity is used, and the amounts of energy actually consumed. Measured in KW or in a multiple thereof, the loads of several feeders and substations serving the Program area will be monitored with load recording equipment throughout the dura-

tion of the Program. Specific characteristics of interest will include the magnitude of peak demand, its timing, and its duration.

(6) Customer Barriers, Effects. It is anticipated that various aspects of the measures included in the Program's conservation package may lead certain customers to resist application of the full Program to their residences, or to contribute to treatment cost and exceed the measures specified by the Program. These cases will be documented by Program auditors and quality control personnel as they become known, as will the nature of the customer barrier and its effect on the conservation measures installed in the residence.

(7) Physical Barriers, Effects. To be chronicled at the time of the audit and/or at the time of post-treatment quality control inspection, physical barriers represent characteristics of the residence itself which preclude in part or in total the application of a weatherization measure. Physical barriers will be documented in terms of the characteristic actually precluding full treatment application and the degree to which the weatherization measure was affected.

(8) Demographic Variables. Demographic measures to be used in Program analyses have yet to be selected but will likely include number of residents and selected measures of socioeconomic status. These values will be obtained through surveys of households.

(9) Weather. Focusing primarily on temperature, hourly weather data will be obtained from a local weather monitoring station installed as part of the Program.

(10) Indoor Temperature. Important as a variable through its direct linkage to occupant behaviors, indoor temperature will be documented

through temperature probes placed in the residence and linked to load recording equipment installed as a part of end-use metering. Resulting data will provide hourly measures of residential temperatures.

(B) Process Evaluations

Variables to be used in assessment of Program implementation and in evaluation of communications media and techniques include the following:

Process Evaluation Variables and Planned Sources

Variable	Source
Treatment Levels	Auditors' measurement, quality control inspectors' measurements.
Demographic Variables	Surveys.
Historical Data	Program records, community assessment, interviews, experience of Program management and personnel.
Community Perceptions	Community perception survey (see section VII).
Conservation Constraints	Program records, program management information system reports, experience of Program management and personnel, contractor and/or subcontractor interviews, quality control inspectors' reports.
Planned Implementation	Program documents, proposal, records of planning sessions, BPA guidelines, contract, interviews with Program management.
Actual Implementation	Experience and observation (see Historical Data, Community Perceptions, Conservation Constraints, above).
Communications Package	The communications package will be developed by a marketing/communications consultant, and subsequently a possibly modified version of the recommended package will be adopted by Program management.

Process Evaluation Variables and Planned Sources (Continued)

Variable	Source
Communications Elements	Conservation package.
Consumer Initiated Response	Customer request for audit, possibly stimulated by elements in the communications package, prior to auditor contact.
Customer Auditor Response	Customer decision to participate in audit, taken in response to auditor contact.
Success	Success will be defined as (1) customer initiated response of request for audit, (2) customer auditor response of request for audit, (3) customer participation in Program weatherization following audit. Each definition of this criterion variable will be employed in parts of the analysis. Derived from customer contact records, auditor reports, Program weatherization records.
Sequence	Particular sequences of communications elements may be defined as elements, if recommended by marketing/communications consultant and/or adopted by Program management.
Attitudinal Measures	Surveys
Reason-analysis Variables	Marketing Surveys
Dwelling Characteristics	Surveys and audit records.

(VII) Outline of Surveys in the Evaluation Plan

Six separate surveys will be employed in the Program evaluation. First, a "pre-test" survey will be used to develop baseline attitudinal

measures before or in the initial stages of Program implementation. Second, an audit survey will be administered to all people who accept the weatherization audit. This survey will be extended by addition of a supplementary set of questions selected as key items from BPA's planned 1983 Pacific Northwest Regional Survey. Third, market surveys will record customer perceptions and attitudes related to reasons for participating or not participating in the audit and weatherization elements of the Hood River Community Conservation Program. Finally, a "follow-after" survey will be administered to register shifts in conservation attitudes and perceptions during the time the program is operative in Hood River. In addition, two supplementary surveys are planned. The first will be a time series sampling of community perceptions, and the second will involve interviews with Program management and staff. Each survey sample will be designed to accomplish information objectives at defined levels of statistical significance and statistical power at minimum cost (Cohen, 1977).

Pre-test Survey

The pre-test survey will be a short (4-5 page) mail survey administered to a sample of the Hood River community as well as to the two comparison communities and to the PNW/PP&L Random Sample. The focus of the survey will be on conservation attitudes and it is designed to produce a pre-Program baseline for the Hood River community. Administration of the same survey in comparison communities will (in conjunction with data from the follow-after survey) permit measurement of changes in attitudes as well as document the emergence of a conservation ethic, and reported behaviors. The PNW/PP&L Random Sample will demonstrate the representativeness of individuals in the Hood River community and the comparison communities

(Grants Pass, Pendleton) with respect to PP&L's customers in the BPA region.

Audit Survey

The audit survey will consist of standard questions required for performance of a residential audit as well as key items selected from the BPA planned 1983 Pacific Northwest Regional Survey. This survey will demonstrate how audited residences (and residents) in Hood River fit into the representative profile developed by the regional survey. Data will provide an inventory of appliances, use patterns, and dwelling characteristics. Information will be used in savings analysis, process evaluation, and costing.

The audit survey will have two components. First, a survey record for each audited residence (a near census sample of auditable residences, rather than a statistical probability sample), and second abbreviated surveys of other homes by feeder for use in the inter-feeder analysis (see Section III.B.3).

Follow-after Survey

The follow-after survey parallels the pre-test baseline, with perhaps a few additional questions. It will be administered in Hood River, the two comparison communities, and the PNW/PP&L Random Sample. The comparison groups will be used to factor out trends that may occur during the course of the Hood River Community Conservation Program in terms of conservation ethic and shifts in attitudes regarding conservation.

Community Perception Survey

The community perception survey will be used in the assessment of Program implementation (see Section IV.A.3) and also in the evaluation of

communications media and techniques. This survey will be conducted by phone every two months for the duration of the Program and administered to small random samples of residences in Hood River. The survey will consist of a small number of questions (approximately 7-15) to track the trend of community perceptions of the Program.

Staff Survey

A brief staff survey will be developed and administered in a time segment sample to Program staff and management. The management component of the survey will be accomplished by means of interviews at various stages in the Program. The staff component will consist of a short series of questions on perceived efficacy, perception of customer response, and attitudes, to be filled out by the staff member without an interviewer present. The staff component may be supplemented by some interview data for the assessment of Program implementation.

(VIII) Timing of Evaluation Activities

The temporal relationships between components of the Program's evaluation plan are reflected in Figure 6 presented on the next page, and will be briefly described in the text which follows. It is appropriate to note that this discussion will generally address the ordering of evaluation activities rather than their specific placement in time. This approach is recommended both by the fact that the Program is still in evolution toward its final configuration, and because most evaluation activities will be continuously pursued throughout the entirety of portions of the Program period. While the Program is planned for implementation during Spring 1984, it is possible that intervening events may impose an earlier or later starting time. In light of this possibility, the schedule discussed in

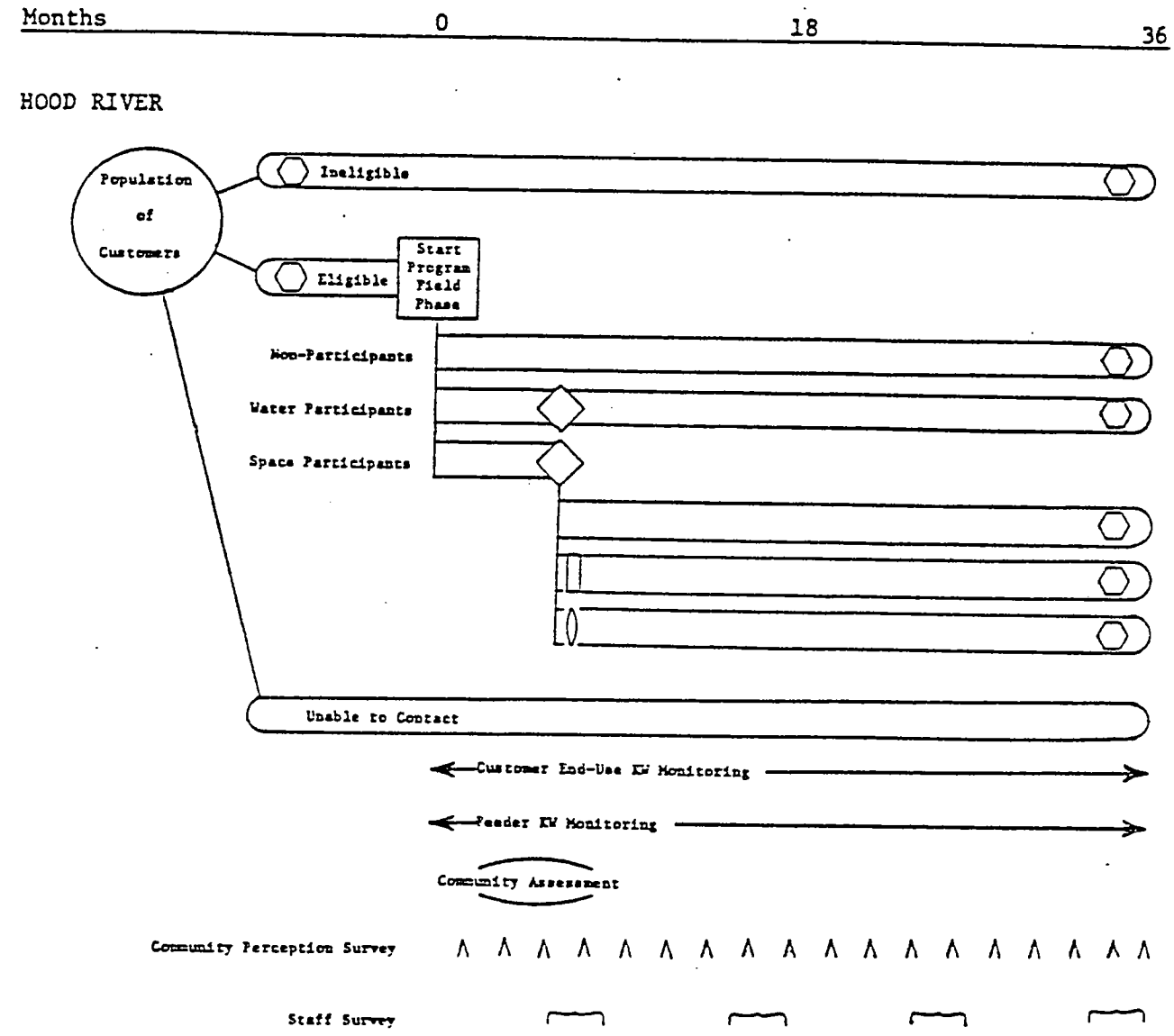
this section is structured in terms of months from the initiation of Program field work.

Two sorts of data to be employed in the study will actually be collected prior to the implementation of field work. First, electrical consumption of Hood River residential customers and those included in the comparison groups will include data reflecting the period from 1977 through the end of the Program. Second, the first of two attitudinal surveys to be circulated to random samples of all residential customers in Hood River, the two comparison communities (Pendleton and Grants Pass, Oregon), and the random sample of PP&L's other customers will precede the Program's actual entry into the study area. By preceding the initiation of field work and accompanying publicity, it is hoped that Program-related influences on the responses of Hood River customers can be minimized.

For the body of customers who are ineligible for treatment under the Program by virtue of using energy sources other than electricity for water and space heating, three remaining Program-related events will take place. First, all will be eligible to have residences audited for energy efficiency: this is not related to the evaluation and is not noted in Figure 6. Second, electrical consumption will be monitored, as noted above. Finally, a sub-set of ineligible customers will be selected in the random sample of all local customers for both waves of the attitudinal survey.

Hood River customers who are eligible for direct treatment under the Program by virtue of electrical water and/or space heating will fall into one of three groups: those electing not to participate, those with electrical water heat but without electric space heat who choose to participate, and those with electric space heat and possibly electric water heat

Figure 6
Evaluation Activities:
Temporal Relationships



who opt to be treated under the Program. It is expected that each group will be represented in the initial attitudinal survey, but that their experiences will differ in the period after the Program's field phases are initiated in Month 0.

Those choosing not to participate in the Program will not again be approached for Program-related activity until the second attitudinal survey, to be conducted late in the Program period. The electrical consumption of these customers will, however, be monitored throughout the duration of the study.

Similarly, Program participants with electric water heating but not space heating will have their water heaters wrapped in conjunction with the audit, at which time residents will be requested to complete an audit survey. These customers will not again be directly approached until a sample of customers is selected and contacted with the second attitudinal survey. Again, electrical consumption will be monitored throughout the Program period.

Finally, participants with electric space heat will have their structures treated through the Program. At the time of the audit customers will be requested to complete an audit survey, and a sample will be contacted at the end of the Program period and asked to respond to the second attitudinal survey. Electrical consumption will be recorded throughout the period of the study. It is anticipated that these customers will be of three types: (1) those whose structures will be brought up to full weatherization standards under the Program, (2) those whose residences will impose structural barriers to the installation of full measures, and (3) those for which occupant resistance will preclude the application of full measures.

Finally, it is anticipated that a sub-set of customers will simply not be available for contact in conjunction with the study. While the electrical consumption of these residences will be monitored throughout the Program, no other information will be available.

Five other types of activity will take place in Hood River during the course of the study. First, the end-use load monitoring of a sample of space heating customers will commence as soon as practicable and will conclude at the end of the Program's field work. Similarly, the load monitoring of a sample of feeder lines will begin as early as possible and will continue through the end of the study period. Third, the process evaluation of the community's social and organizational dynamics will be conducted early in the Program period, while community perception surveys will be conducted bi-monthly and staff surveys completed periodically through the course of the Program.

As discussed in earlier sections of this document, three other sets of customers will be observed through the course of the study as comparison groups. These include customers in Pendleton and Grants Pass, Oregon, and a random sample of PP&L customers from throughout the remainder of the Company's service area. In all cases, random samples of customers will be asked to respond to attitudinal surveys at the same time that Hood River customers are similarly approached, and electrical consumption will be monitored throughout the duration of the Program.

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BUDGET SUMMARY

I.	Evaluation	$ 3,379,702	
II.	Marketing and Communications	202,000	
III.	Measures and Incentives	16,316,900	
IV.	Administration	866,756	
	Total Estimated Project Cost		$20,765,358
	Total Estimated Reimbursement - Short-term Conservation Contract		4,601,300
	Total Estimated Project Costs		$16,164,058

BUDGET

I.	EVALUATION		
	A. Consumption Data Acquisition, Processing, and Analysis	$ 45,000	
	B. Feeder, End Use, and Total Use Load Data Acquisition, Processing, and Analysis	2,822,035	
	C. Survey Data Acquisition, Processing, and Analysis	65,000	
	D. Process Evaluation	26,000	
	1. Implementation 12,000		
	2. Communications Media and Technology 14,000		
	E. Data Analysis Computer System	396,667	
	F. Synthesis and Report	25,000	
	G. Total Evaluation		$3,379,702

II. MARKETING AND COMMUNICATIONS

A.	Survey Data Acquisition, Processing, and Analysis		$ 65,000	
	1. Community Survey	36,000		
	2. Audit Survey, Treated Residences	4,500		
	3. Audit Survey, Untreated Residences	10,000		
	4. Marketing Survey	12,000		
	5. Community Perception Telephone Surveys	1,300		
	6. Staff Survey	1,200		
B.	Advertising		55,000	
C.	Community Relations		14,000	
D.	Materials Development Productions and Distribution		68,000	
	Total Marketing and Communication			$ 202,000

III. MEASURES AND INCENTIVES *

A.	Residential Weatherization	13,383,600	
B.	Residential Audits/Inspections	769,000	
C.	Residential Water Heater Wraps	540,300	
D.	Residential Mitigation	1,240,000	
E.	Commercial Audits	384,000	
	Total Measures and Incentives		$16,316,900

* see attached detail breakdown

HOOD RIVER PROJECT COSTS
MEASURES AND INCENTIVES

	Hood River Project (Number)x($) = Total	
Residential Weatherization		
Ceiling Insulation		
R-11 to R-49	(2861)(850) = $2,431,800	
R-38 to R-49	(239)(250) = 59,800	
Floor Insulation		
R-0 to R-38	(2861)(1350) = $3,862,400	
R-19 to R4-39	(239)(945) = 225,900	
Glass		
Single to Triple	(1426)(1600) = $2,281,600	
Double to Triple	(1674)(1000) = 1,674,000	
Wall Insulation		
R-0 to R-11	(1042)(1000) = $1,042,000	
R-0 to R-11 + siding	(130)(2350) = 305,500	
R-0 to R-11 + siding + sheathing	(130)(2350) = 370,000	
Caulking & Weatherstripping	(3100)(35) = $ 108,500	
Duct Insulation	(961)(200) = $ 192,200	
Outlet Gaskets Installed	(3100)(10) = $ 31,000	
Dehumidifiers	(775)(200) = $ 155,000	
Heat Pump Conversion	(200)(2500) = $ 500,000	
Timed Thermostats	(760)(90) = $ 68,400	
House Doctoring	(125)(600) = $ 75,000	
		$13,383,600
Residential Audits/Inspections	(3100)(160) = $ 496,000	
Electric Heat	(3100)(160) = $ 496,000	
Non-Electric Heat	(3100)(80) = 248,000	
Miscellaneous Audit Equipment	(1)(25000) = 25,000	
		769,000
Residential Water Heater		
Water Heater Wrap	(5751)(32) = $ 184,000	
Shower Head Restrictors	(5324)(15) = 79,900	
Insulated Pipe Wrap	(4606)(60) = 276,400	
		540,300
Residential Mitigation		
Air-to-Air Heat Exchanger	(1550)(800) = $1,240,000	1,240,000
Commercial Audits	(768)(500) = $ 384,000	384,000
		$16,316,900

IV. ADMINISTRATION

A. Salaries	$ 560,636*	
B. Travel & Accommodations	87,120*	
C. Office Expenses	219,000*	
Total Administration		$ 866,756

* see attached detail breakdown

ADMINISTRATIVE COSTS

Salaries	Annual Salary	Labor Loading (45.2%)	% of Time On Project	Total
James Pienovi			2	
Dan Hitchcock			7	
Don Peters			25	
John Jones			50	
Jack Cooney			100	
Subtotal	$114,200	$ 51,618		$165,818
E&CS Staff	34,000	15,400	100	49,400
Admin. Secretary	16,500	7,500	100	24,000
Computer Clerk	16,800	7,600	100	24,400
General Clerk	11,500	5,200	100	16,700
Subtotal	193,000	87,318		$280,318
x 2 years	x 2	x 2		x 2
TOTAL	$386,000	$174,636		$560,636

ADMINISTRATIVE COSTS

Travel & Accommodations (Annual)

	Meals	Lodging	Travel	Total
James Pienovi	$ 500	$ 400	$ 800	$ 1,700
Dan Hitchcock	900	600	1,000	2,500
Don Peters	1,450	2,150	1,400	5,000
John Jones	2,580	3,900	2,280	8,760
Jack Cooney	4,700	7,200	4,400	16,300
E&CS Staff	2,800	4,400	2,100	9,300
Subtotal	$12,930	$18,650	$11,980	$43,560
x 2 years	x 2	x 2	x 2	x 2
TOTAL	$25,860	$37,300	$23,960	$87,120

Rich Mazzucchi
ENGINEERING

Jess (CS->)
PROJ. MGR.

Tom Sechler

Tony Olsen
STATISTICS
SOCIAL SCIENCE MANAGER

RnSaid

↳ load data 23 million items
- spacial analysis -

↳ Submetering of other cities comparison study

"managed communication"

wood and change in wood use habits after insulation

↳ location (Don)
diary (?)

Adelem Kindios

↳ Wind Prospector

4614

"intrusion effect"

ADMINISTRATIVE COSTS

Office Expenses

Item	Monthly Cost	Annual Cost	Total
Rent (office & warehouse)	$ 2,000	$ 24,000	$ 48,000
Utilities (electric, water, etc.)	300	3,600	7,200
Telephone	2,500	30,000	60,000
Postage	300	3,600	7,200
Printing	200	2,400	4,800
Equipment lease (files, tables, chairs, desks, copy machine)	3,300	39,600	79,200
Office supplies	400	4,800	9,600
Other	125	1,500	3,000
TOTAL	$ 9,125	$109,500	$219,000