STATEWIDE MANUFACTURED HOUSING MARKET CHARACTERIZATION FINAL REPORT

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August 12, 1999

California State-Level Market Assessment and Evaluation Study
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STATEWIDE MANUFACTURED HOUSINGMARKET CHARACTERIZATION

FINAL REPORT

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Statewide Manufactured Housing Market Characterization

EXECUTIVE SUMMARY

Highlights of the characterization of the manufactured homes market in California are presented in this Executive Summary. The overall goal of this project is to characterize the manufactured homes market to assist the California utilities and the California Board for Energy Efficiency in developing an effective program for new manufactured housing. There are three stages to this market characterization, culminating in strategic recommendations for developing a manufactured housing program:

- Characterization of the baseline market structure including market, actors, technologies, and barriers
- Assessment of high-potential interventions among key market actors
- Identifying the intended market effects and indicators that will measure progress toward those effects.

The overall approach to this market characterization study was founded on identifying and tracking the links between all elements of the targeted market and public and private sector interventions.

Both secondary and primary data were used to characterize the manufactured housing market. Extensive use was made of the large body of literature documenting the work done with manufactured homes in the Pacific Northwest. Past and potential updates of the nationwide HUD code and the design of EPA's ENERGYSTAR® Manufactured Homes Program were also investigated. Primary data were collected from each major group of market actors, ranging from manufacturers to end users and "enabling" market actors. Sample frames are described in detail in Chapter 1.

Information gathered in the primary and secondary data collection phases was used to address the key issues of market size and structure, market barriers, and potential interventions, as described below.

THE MANUFACTURED HOMES MARKET IN CALIFORNIA

The market for manufactured housing is unique in that manufactured housing construction is regulated by the U.S. Department of Housing and Urban Development (HUD) code, formally known as the Federal Manufactured Home Construction and Safety Standards. Local jurisdictions can establish neither tighter nor looser construction requirements; thus, any local program to increase energy efficiency through construction changes must be voluntary.

While both the building envelope and all energy-using equipment in the home determine energy usage, energy efficiency in manufactured homes is usually defined primarily by the

overall coefficient of heat transmission, or U-value, for the home's envelope. This is the key feature of the HUD standards

California Market Trends

After declining throughout the early 1990s, the California market for manufactured homes has been rising for the past several years. It currently represents about 6 percent of new housing starts in the state, with some 7,000 homes expected to be sited in 1999.

The cost of a manufactured home in California ranged from $16,600 to $177,000 in 1998, averaging $56,500 — almost 50 percent more than the $40,000 average cost nationwide. One of the reasons for the high value of California manufactured homes is the high percentage of multi-section homes (i.e., double- and triple-wide) with single-wide homes accounting for less than 7 percent of the California market in 1998.

Significant numbers of manufactured homes are sold in most parts of the state, including areas representing most of the 16 California Energy Commission (CEC) climate zones. As with site-built homes these diverse climates (and associated heating/cooling requirements) complicate efforts to determine the most cost-effective energy efficiency measures for the state as a whole.

California Market ¾ Value Flow

At the retail level, the California manufactured housing market is valued at some $370 million. California's seven manufacturers sell virtually all of their homes through a network of dealers, where buyers usually order a home built to their specifications, although they can purchase homes off the dealer's lot. The dealer places the order with the manufacturer and, usually within a month, the home is constructed. After being built in the factory, the home must be properly installed at the site, a function that is usually arranged by the dealer and performed by specialized contractors — although some dealers have their own set-up crews. Despite being "mobile," only about 5 percent of homes are ever moved after being sited the first time.

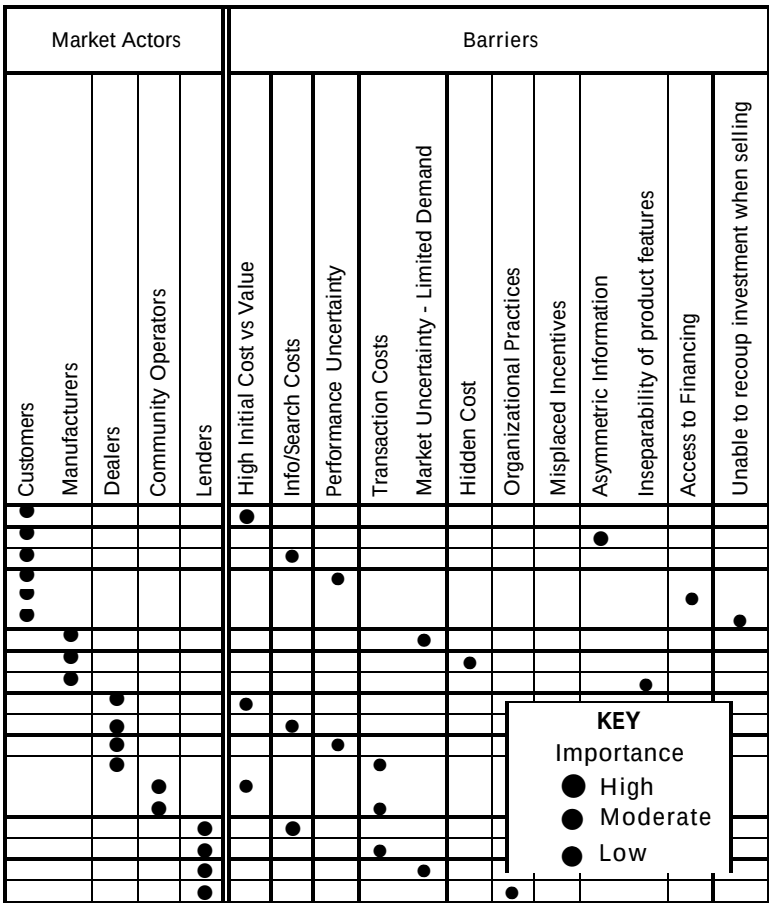
Manufactured homes are either sited on the buyer's own property or on lots in a manufactured home community or development. Homes may also be purchased from the developers of these communities, who often set up model homes just as a conventional developer would.

Most manufactured homes are financed through personal property loans; homes that are permanently attached to a foundation can be financed with a mortgage. Financing is often arranged by dealers through a finance company with which they have a business relationship.

MARKET BARRIERS

In this section, the barriers to energy efficiency in manufactured homes reported by each group of surveyed market actors are briefly summarized. Levels of perceived barriers are presented in Exhibit 1 according to the percentage of survey respondents who reported each barrier as not at all important, moderately important, or very important.

Exhibit 1
Perceived Barriers



Because the programs fielded in the Pacific Northwest (PNW) range from initial R&D efforts to demonstration projects to full-scale resource acquisition programs and back to a more modest market transformation approach, it was felt that considerable insight could be obtained regarding potential program designs for California. PNW findings are cited when appropriate, to provide context for the survey results.

Customer Barriers

Customers were able to identify some rather significant barriers to buying an energy efficient manufactured home. These results were verified with dealers' perceptions of barriers faced by their customers.

The highest rated barrier was ***high initial cost vs. value***. Customers say that energy efficient manufactured homes cost too much. This finding is consistent with the PNW results where

the added cost for energy efficiency has been identified consistently as the major barrier to greater efficiency in new manufactured homes. This issue is probably even more important with manufactured than site-built housing because buyers seek manufactured housing because of its lower first cost and monthly housing payments. Buyers also tend to have lower incomes so any added costs are a more significant burden.

Asymmetric information and ***information search cost*** were also identified as important barriers based on survey responses. Customers and dealers agree that the information on energy efficient benefits for customers is incomplete, unreliable and hard to find. Moreover, manufactured home buyers are often unaware that energy saving opportunities exist.

A barrier cited or perceived as less important by customers is ***lack of access to financing***. These customers simply say that they would be unable to finance the extra cost of energy efficient features. As reported in the lender characterization section of this report, lenders typically charge higher interest rates for manufactured homes when compared to site built homes. This was also found to be a barrier in the PNW experience, in that standard lending terms for manufactured homes, especially those financed as personal property, aggravate the effects of higher first cost.

Another barrier related to the issue of high first cost is a kind of hidden cost faced by customers, who are afraid that ***they will be unable to recoup their investment in energy efficiency when they try to sell their house***. This is also consistent with the PNW experience, in which little consistency was found in the treatment of energy-efficiency measures in appraisals of used homes and this was a type of hidden cost faced by buyers.

Lastly, some customers have doubts about energy savings from energy efficient manufactured homes — a clear indication of a ***performance uncertainty*** barrier. Since customers see very little information related to energy efficient homes in general, it would make sense that they might doubt a certain home's performance when it comes to saving them money on utility bills. This is a prime reason for a utility backed information program.

Manufacturer Barriers

As a group, California manufacturers reported few barriers to the production of energy efficient manufactured homes. In part this is because several of the surveyed plants already produce homes that are significantly above the HUD code for Zone 2.

The only barrier that was perceived as moderately important was limited customer demand, a form of ***market uncertainty***. Less important barriers for manufacturers include an inseparability of product features barrier in the form of ***buyer concerns about window area*** of energy efficient manufactured homes. ***Difficulties in siting and installation*** of manufactured homes were cited as a barrier not so much to energy efficiency specifically, but to the proper functioning of the manufactured home overall.

In comparing the barriers reported here with those encountered in the Pacific Northwest, it is worth noting how many of the more ***technical barriers*** manufacturers faced in the past have

been overcome. Concerns regarding the feasibility of building within height limits, using 2x6 framing, and the need to redesign floors, for example, have all essentially disappeared. In addition, PNW manufacturer worries about ***the need to maintain larger, more diverse parts and supplies inventories*** also appear to have been overcome.

Since most of the California manufacturers either ship to or compete with the PNW market, it appears that this lack of barriers among the interviewed manufacturers can be interpreted as a long-term market effect of the PNW programs.

Dealer Barriers

In general, manufactured home dealers do not see many significant barriers to selling energy efficient homes. Dealers believe that the homes that they sell are sufficiently energy efficient and that additional measures, such as added insulation or higher SEER central air conditioners, are not required. The only somewhat significant barriers to energy efficiency are high initial cost and an overall lack of knowledge and understanding by the customers.

High initial cost vs. value is seen by dealers as their main barrier to selling higher efficiency homes. This result is consistent with PNW's program experiences, where the added cost for energy efficiency has been consistently identified as the major barrier to greater efficiency in new manufactured homes.

Information and search costs is also seen as a moderately important barrier. Dealers state that information on energy efficient manufactured homes is hard to find and understand. Since no manufactured home program currently exists in California, the dealers have little or no material to present to their customers about energy efficiency. This result is consistent with findings in the PNW that consumers did not have adequate information about the benefits of increased energy efficiency to evaluate the economic impacts properly. In addition, manufactured home buyers typically lacked much awareness of energy saving opportunities.

Two additional barriers received low importance ratings from the dealers. These were ***transactions costs*** and ***performance uncertainty***.

Community Operator Barriers

Manufactured home community operators do not appear to play a major role in the market for energy efficient manufactured homes except to the extent that they act as dealers. In general, manufactured home operators do not see many significant barriers to selling energy efficient homes. All surveyed operators stated that the homes they sell are already energy efficient, especially when compared to homes that were manufactured 10-20 years ago and may still be in their park.

When respondents were asked to think about hurdles to selling even more energy efficient homes, the only barriers reported by surveyed operators were ***high initial cost*** and ***transaction cost.***

Lender Barriers

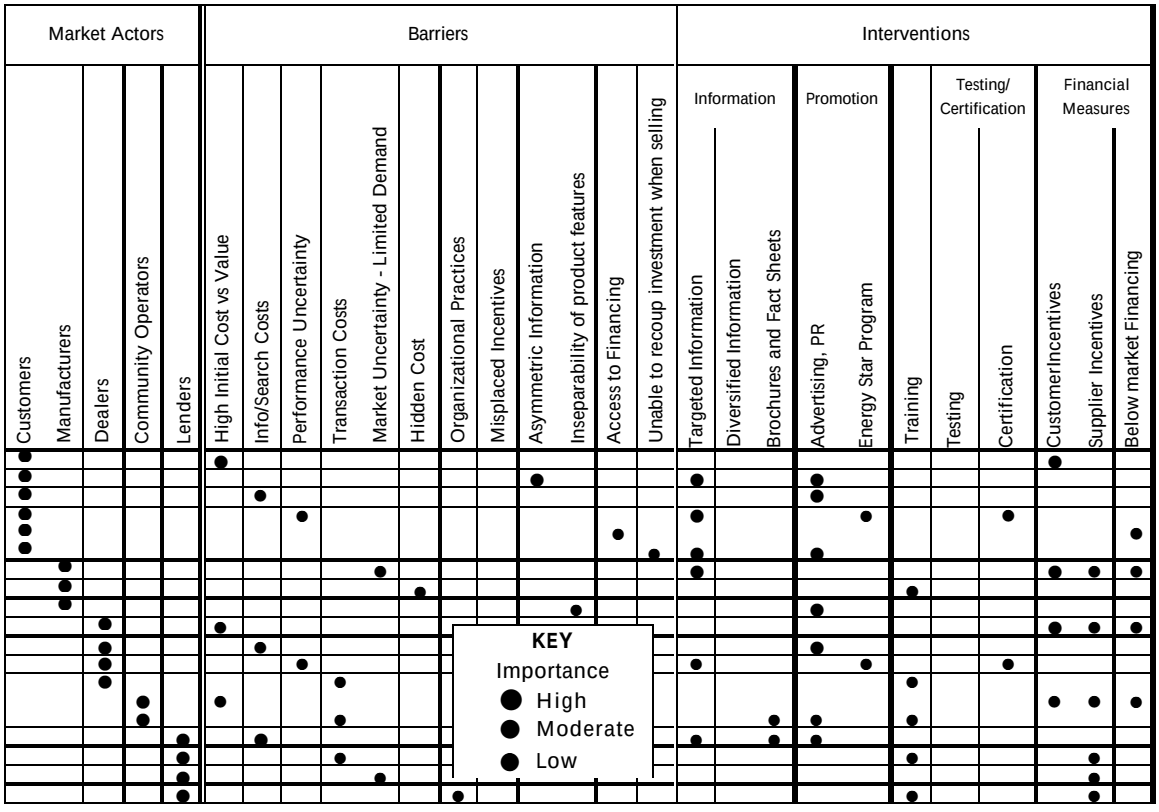
Information and search cost was rated as a highly important barrier among surveyed lenders. All surveyed lenders claimed that they do not know enough about energy efficient financing, with five lenders citing that they were not aware of energy efficient financing. In addition, all lenders think that dealers and customers are not aware that energy efficient financing is available for efficient manufactured homes.

Three additional barriers received low importance ratings from surveyed lenders. These were ***transactions costs, market uncertainty,*** and ***organizational practices.***

MARKET INTERVENTIONS

In this section, the interventions to energy efficiency in manufactured homes reported by each group of surveyed market actors are discussed. Levels of effective interventions are presented in Exhibit 2 according to the percentage of respondents who reported each intervention as not at all effective, moderately effective, or very effective.

Exhibit 2
Perceptions of Intervention Effectiveness



While the review of program experience in the Pacific Northwest provided valuable insights into the interventions that were considered in the manufactured home market, we did not include those findings in the survey-based results presented in the exhibit. PNW findings are cited, however, when appropriate to provide context for the survey results.

Customer Interventions

The intervention that was perceived to be effective in overcoming the high initial cost vs. value barrier was customer ***incentives***. Incentives targeted to home buyers would offset a portion of the up front cost of energy efficiency upgrades.

In the late 1980's and early 1990's, financial incentives were an essential component of the PNW programs. Substantial incentives ($1,500 to $4,000 per home) targeted throughout the supply chain or at consumers have been investigated and instituted in the PNW. Because first cost traditionally has been such an important consideration in this market, any program in California would have to examine the various financial incentive options carefully and likely would need to include the most cost-effective ones, at least to jump-start a program.

Interventions that were perceived to be effective to overcoming the barriers of asymmetric information, information/search costs and the fear of not being able to recoup the investment when selling include:

- ***Advertising and PR*** to increase awareness of energy efficiency financing

- ***Targeted information*** to educate customers about the possible benefits of energy efficient upgrades.

Extensive marketing and promotion have been another key component of the PNW regional programs from the beginning. There is a consensus in the PNW that the success of the programs has been driven by consumer awareness of the Super Good Cents (SGC) label, increased understanding of energy-efficiency, and the influence of marketing on consumer demand. This industry is very responsive to consumer demand and, when consumer demand for energy efficiency has increased, the industry has demonstrated that it will respond with products that meet consumer needs; the key in the PNW was motivating increased consumer demand. There is no reason to think that this would be any less important in California and marketing and promotion would be essential program elements.

Interventions perceived to be effective to overcome the performance uncertainty barrier include:

- ***Targeted information*** to home buyers, dealers, and lenders to keep them informed about what is available and some estimates of savings from energy efficient measures

- **Certification** from utilities and/or ***EPA's ENERGYSTAR® Program*** could give some verification and support to possible benefits and claimed savings.

The use of energy-efficient home labeling has been a very successful strategy in the PNW. The SGC label has become well recognized by dealers and buyers, and marketing materials have been designed to incorporate the label. Efforts are underway to determine how best to incorporate the national ENERGYSTAR® label. Development of a brand name and label would benefit a California program. Either the Good Cents or ENERGYSTAR® labels could be considered, or another label consistent with existing California programs might be examined.

An intervention that was perceived to be effective in overcoming limited access to financing is ***below market financing***. A number of improved lending options for high-efficiency manufactured homes have been explored during the course of the PNW programs. Since the first regional programs were started, the availability of energy-efficient mortgages or loans has increased and some lenders have improved their lending terms for efficient manufactured homes.

A California program could benefit from working with the lending and appraisal industries to provide advantages to buyers who purchase efficient manufactured homes. There is evidence that the lending market in California is becoming more competitive and this might be an opportune time to work with the lending industry to develop such a program.

Manufacturer Interventions

Interventions that were perceived to be effective in overcoming limited customer demand for energy efficient homes include:

- ***Targeted information*** aimed at increasing customer awareness of the benefits of energy efficient upgrades
- ***Customer and supplier incentives*** that would assist in bringing down the initial cost of energy efficient upgrades
- ***Below market financing*** that would enable customers to finance the additional cost of energy efficiency upgrades.

Difficulties in the siting and installation of energy efficient manufactured homes lead to the barrier of hidden cost. This barrier could be overcome through proper ***training*** of installation contractors.

The barrier of inseparability of product features could be overcome through ***advertising and PR***. This would allow customers that might be concerned about the window area of high efficiency manufactured homes to learn about options such as low-e argon filled windows.

Dealer Interventions

Interventions that were perceived to be effective in overcoming the high initial cost vs. value barrier are directed at home buyers, dealers, and lenders. These include:

- ***Incentives*** targeted to home buyers and dealers that would offset a portion of the up front cost of energy efficiency upgrades

- ***Below market financing*** that would enable customers to finance the additional cost of energy efficiency upgrades.

An intervention that was perceived to be effective to overcome the barrier of information/search costs is ***advertising and PR*** to increase awareness of energy efficiency financing.

Interventions perceived to be effective to overcome performance uncertainty barriers include:

- ***Targeted information*** to home buyers, dealers, and lenders to keep them informed about what is available and some estimates of savings from energy efficient measures

- **Certification** from utilities and/or ***EPA's ENERGYSTAR® Program*** could give some verification and support to possible benefits and claimed savings.

An intervention that was perceived to be effective in overcoming transaction costs is ***training*** for dealers on how to effectively communicate the benefits of owning an energy efficient manufactured home. Training and education were key components of the strategies implemented in the PNW. These efforts were directed at the key market actors to increase their understanding and awareness of energy efficiency and to make sure that efficiency upgrades were implemented most effectively. Manufacturer and dealer training and education would probably be essential in California, and could draw upon the materials and approaches implemented in the PNW.

Community Operator Interventions

Interventions that were perceived to be effective to overcome the barrier of high initial cost vs. value are ***incentives*** for customers and dealers and ***below market financing***.

Interventions that were perceived to be effective in overcoming transaction costs are targeted to both sellers and buyers of manufactured homes. These include:

- ***Training*** for operators and dealers to inform them of benefits from energy efficient manufactured homes

- ***Brochures and fact sheets*** for operators and dealers to show to potential home buyers during the sales process to help explain the benefits of energy efficient manufactured home more easily

- ***Advertising and PR*** to educate manufactured home buyers on available energy efficient measures and their associated benefits.

Lender Interventions

Interventions that were perceived to be effective to overcome the barrier of information / search costs are directed at lenders, dealers, and home buyers. These include:

- ***Targeted information*** targeted to lenders, dealers, and home buyers and ***advertising and PR*** to increase awareness of energy efficiency financing

- ***Brochures and fact sheets*** that lenders and dealers can use to explain energy efficient financing to their customers.

Interventions that were perceived to be effective in overcoming transaction costs are ***training*** for lenders and dealers on how to effectively process the paperwork for energy efficient financing, and ***incentives*** to lenders and dealers for writing energy efficient financing.

Interventions that were perceived to be effective in overcoming the market uncertainty barrier are ***incentives*** to lenders and dealers for writing energy efficient financing.

Interventions that were perceived to be effective in overcoming the organizational practices barrier are ***training*** for lenders and dealers on how the qualification process works and the loan-to-income ratios required for energy efficient financing, and ***incentives*** to lenders and dealers for writing energy efficient financing.

Packages of Interventions

As is evident from the results achieved in the Pacific Northwest, a combination of interventions targeted to multiple groups of market actors must be implemented if a program is to achieve the desired market effects. The individual interventions described above should therefore be seen as components of an integrated program that simultaneously emphasizes the benefits and addresses the needs of all the key players.

PNW Design and Implementation Strategies

There have been a number of program design and implementation strategies that have been essential to the success of PNW programs and that could prove useful during program design in California. Some of the key strategies are summarized below.

- The manufactured housing industry felt that a sequential, incremental approach was important to program success. Industry members noted that it would be essential to provide some certainty about the program so the industry could plan its investments accordingly. They wanted a program designed to be a multi-year effort that could be fine-tuned based upon what was learned in preceding years.

- An important feature of the regional program was the proactive involvement of the industry in program design and implementation. From the beginning, manufacturers were brought into the design and implementation effort and much of the program's

success was due to this cooperative approach. Manufacturers, in fact, initially proposed the guidelines for the Manufactured Housing Acquisition Program (MAP).

  - Furthermore, universal participation by manufacturers was important because it prevented non-participants from undercutting participants.
  - A weak link in early efforts, however, was a failure to involve dealers adequately in the program.

- Centralization of program administration was important to the industry to increase certainty and minimize administrative burdens. The high level of trust and understanding that was developed between implementers and the industry was important to program success.

- Flexibility in the programs was important to permit adaptation to changing conditions. For example, the programs were able to adapt to changing efficiency measure costs and the recognition of the importance of including dealers in the program. Recently, tracking and monitoring information for the Northwest Energy Efficiency Alliance's Super Good Cents program suggests that industry consolidation and vertical integration are occurring and may necessitate further program changes.

- Another important program element was tracking of efficient home sales. The PNW program consistently instituted means to track the production and sales of efficient homes to verify program effects, identify problems, and allow program fine-tuning. The existing industry tracking infrastructure provides a good starting point for such a tracking system.

- Inclusion of other measures, such as more efficient lighting, water heating, and appliances, has been investigated in the PNW. Such changes could be conducted in cooperation with the national ENERGYSTAR® program or other programs specific to California.

An important element in any program should be a ***planned exit strategy***. The failure to have one in place when MAP ended created initial industry consternation and disrupted the cooperative spirit that had been developed over several years. Manufacturers and dealers are likely to be more willing participants if they can plan with some certainty.

One long-term strategy in the PNW has been ***working to upgrade the HUD code***. This strategy was proposed in the late-1980s and again after the initial SGC program was implemented. Ultimately, MAP had an effect on the efficiency levels required by the 1994 HUD code by providing evidence that very efficient homes could be built and sold. In California, it could be useful to work with HUD to determine what opportunities exist to influence future code upgrades.

Finally, a strategy that represented more of the "stick" than the "carrot" was the ***establishment of electric utility hook-up fees for manufactured homes that did not meet specified high-efficiency levels.*** Understandably, the manufactured housing industry

opposed this approach. Where it was implemented in the region, the requirement was established for *all housing types* so that it did not single out manufactured homes. California utilities could explore the legal, policy, and program implications of pursuing this option.

MARKET EFFECTS INDICATORS

While the ultimate indicator of effectiveness of any intervention is the adoption of efficient solutions as standard practice, different interventions would be expected to have their primary effects at different stages of the awareness-adoption process. A preliminary set of possible market effects indicators was developed based on information from the Pacific Northwest programs. These market effects indicators are discussed in detail in Chapter 7 and are summarized below.

- Awareness/knowledge — Potential indicators of ***energy-efficiency awareness and knowledge*** can be identified, measured, and tracked for the key market actors.

- Interest — ***Interest*** in energy efficiency is probably most important as a market effects indicator for consumers, but is also important for other market actors

- Expressed intent to use and promote energy efficiency — The ***intent*** to produce, market, and purchase energy-efficient manufactured homes provides important indicators of market effects for all market actors.

- Observed usage and promotion of energy efficiency —In addition to ***usage***, measures of the extent of ***promotion of increased energy efficiency and purchase by consumers*** provide solid indicators of market effects.

- Regular and repeated usage and promotion of energy efficiency — Finally, longer-term market effects can be tracked through measures of ***regular and repeated promotions and purchases of energy-efficient homes*** for major market actors. Long-term market effects may also be evident in the actions of "enabling" market actors and both upstream and downstream suppliers.

In Chapter 7, both the stage of awareness-adoption being tracked and the specific data elements used to measure their status are presented. Also shown are the "baseline" data for these data elements and the data source that would need to be used to gather updated information in the future. As programs are developed for the manufactured homes market, additional indicators may become available to track the level of interest and participation in the program among manufacturers, dealers, and customers.

MANUFACTURED HOMES MARKET CHARACTERIZATION STUDY

1. INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION

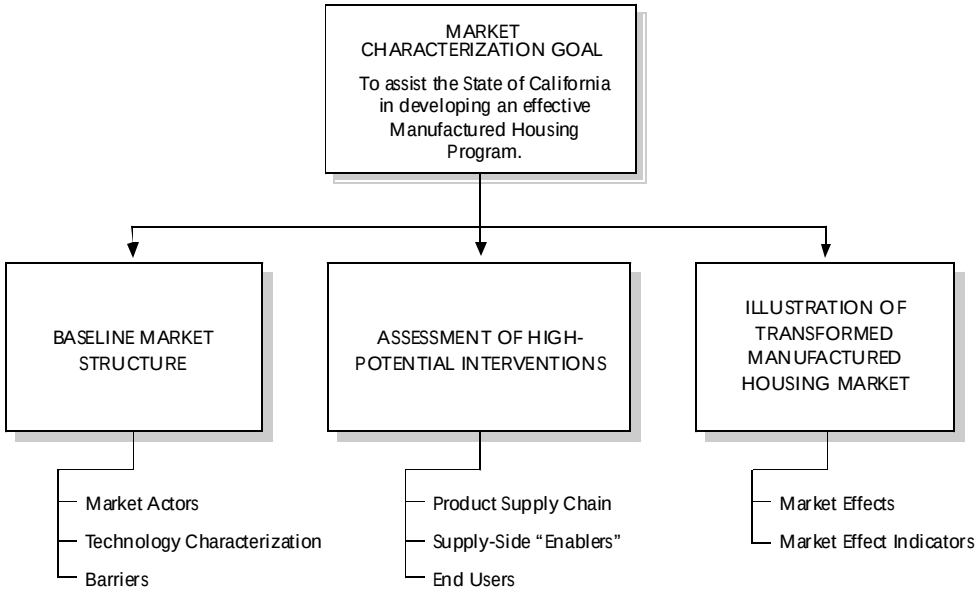
Results of the characterization of the manufactured homes market in California are presented in this report. The overall goal of this project is to characterize the manufactured homes market to assist the California utilities and the California Board for Energy Efficiency in developing an effective program for new manufactured housing. As illustrated in Exhibit 1-1, there are three stages to this market characterization, culminating in strategic recommendations for developing a manufactured housing program:

- Characterization of the baseline market structure including market, actors, technologies, and barriers

- Assessment of high-potential interventions among key market actors, including supply side "enabling" market actors as well as end users and those directly involved in the supply chain

- Illustration of the transformed manufactured housing market, including identifying the intended market effects and indicators that will measure progress toward those effects.

Exhibit 1-1
Statewide Manufactured Housing Market Characterization Goals and Objectives



This report is designed to provide the statewide RNC working group with the results of both the review of secondary data and the primary data collection activities. The remainder of this report is organized as follows:

- In the balance of this chapter, study methods and data sources are discussed.

- Chapter 2 provides an overview of the overall manufactured housing market and the specific characteristics of the market in California — in terms of market size, current and high-potential technologies, and the roles of various market actors.

- The third chapter explores the 15-year history of manufactured homes programs in the Northwest. This region is chosen for extensive review not only for its long history with such programs, but also because of the spectacular apparent success and subsequent setbacks experienced with those programs.

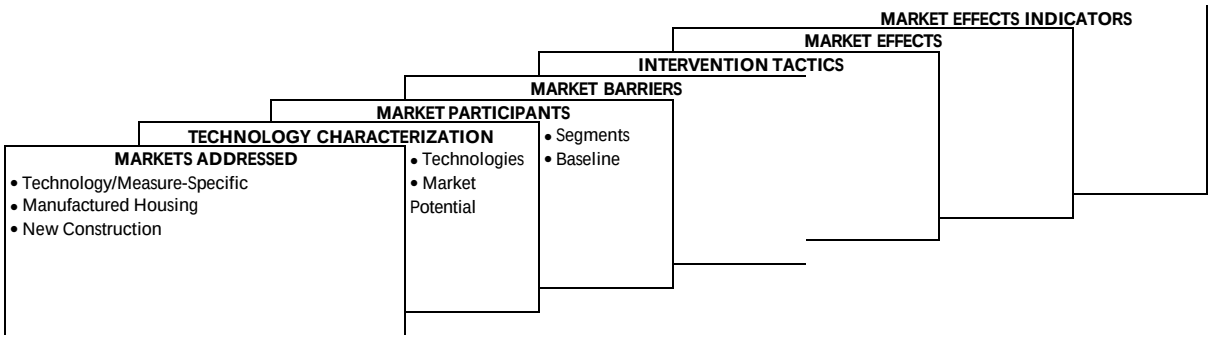
- In Chapter 4, results regarding barriers to energy efficiency encountered by various market actors are discussed, while Chapter 5 presents information on potential market interventions that could be used to overcome barriers and market effects indicators that can be used to track progress toward a transformed market.

- Conclusions regarding the current state of the market and recommendations for potential program designs are presented in Chapter 6.

- Extensive supporting data are presented in the appendices, along with the data collection instruments used for both supply-side and customer surveys.

1.2 STUDY APPROACH AND METHODS

Exhibit 1-2
Elements of Market Characterization



Our overall approach to the market characterization study was founded on establishing and tracking the links between all elements of the targeted market and public and private sector interventions. The process used for this study is illustrated in Exhibit 1-2, and proceeded as follows.

- Initially, the roles, actions, motivations and relationships of all market actors are described as they exist today (the market baseline). As part of this step, we identified the current market size, and the technical and economic potential for energy efficient applications.

- The barriers to the development of the self-sustaining market were then analyzed and linked to each market actor, as perceived by the market actors themselves, their upstream and downstream trading partners, "enabling" market actors, and end users.

- Market interventions that address the above market barriers are then identified and evaluated for their potential to overcome specific barriers.

- Finally, indicators of market effects are developed that will track the effectiveness of interventions in overcoming barriers as programs are developed and implemented. In addition, the "vision" for the future is described, both in terms of the offered by various energy efficient technologies and in terms of the new structure that supports energy efficiency in a mature, "self-sustaining" marketplace.

1.3 DATA SOURCES

Both secondary and primary data were used to characterize the manufactured housing market.

1.3.1 Secondary Data

A review of secondary data sources was an important element of the study. In this project, we took particular advantage of the large body of literature documenting the work done with manufactured homes in the Pacific Northwest. We also investigated past and potential updates of the nationwide HUD code and the design of EPA's ENERGYSTAR® Manufactured Homes Program. Some of the more relevant data sources that were included in our review are presented in Appendix A.

Exhibit 1-3
Manufactured Housing Study Sample Frame

	Climate Zone				
	1	2	3	4	Total
Customers	30	30	30	30	120
Manufacturers	7				7
Component Suppliers	5				5
Dealers					
Large	5	5	5	5	20
Medium	5	5	5	5	20
Land-Lease Communities/Developers					
Land-Lease	5				5
Developers	5				5
Lenders/Appraisers	10				10
Inspectors	4				4
Trade Assocs and Orgs	10				10
Total	na	na	na	na	206

1.3.2 Primary Data

Primary data were collected from each major group of market actors, ranging from manufacturers to end users and "enabling" market actors. Sample frames are presented in Exhibit 1-3 and discussed below. For the customer and dealer samples, we distributed the sample across four broad climate zones created by mapping each of the 16 California Energy Commission (CEC) climate zones according to the number of heating degree days (high >1500; low <1500) and cooling degree days (high >600; low<600). Of the four resulting climate zones, Zone 2 (the low heating, high cooling zone) had no manufactured home

parks, according to Dun & Bradstreet data. The samples were therefore spread across the remain three zones, defined as those with low heating and cooling (zone 1 above); high heating and low cooling (zone 3); and high heating and high cooling (zone 4).

Several aspects of the data collection effort are worth noting. First, as explained in the research plan, we attempted to contact all of the California manufacturers. We were able to complete interviews with managers representing 6 of the 7 manufacturers and seven of the 10 plants. In all, these manufacturers produced more than 7,200 of the 9,000 manufactured homes built in California in 1998.

Second, since the California utilities do not identify manufactured homes in the customer information systems, it was necessary to obtain a customer sample from other sources. Evidently the California Department of Housing and Community Development, which handles manufactured home titling, will not make the names of manufactured home buyers available. As a result, we were unable to obtain a sample consisting exclusively of recent home buyers.

One vendor, Metroscan, did offer data that included a "mobile home" descriptor for most (but not all) counties and that also identified the number of years that the current owner had owned the home. The Metroscan data did not, however, identify, whether the home had been purchased new or used. We nevertheless used this sample as the most likely to include relatively recent manufactured home buyers.

Our initial effort to use only home owners who had purchased new homes in the past several years yielded very few qualifying respondents, and even fewer who were willing to complete the survey. We were told by one manufactured home park operator that their largely elderly residents were frequently warned by the police to be extremely suspicious of unsolicited phone calls, which may help explain the low response rate.

To expand the sample, we next selected addresses from the same street as previous qualified but unwilling respondents. We also contacted a number of manufactured home park operators and, if the park was relatively new, asked them to provide us with a list of residents. While none were willing to do so, several gave us information on street names, which we then looked up on CD-ROM. We used the same approach with manufactured home communities cited on the web sites of the California Manufactured Housing Institute or of individual manufacturers. Unfortunately, most of the newer communities were not yet listed on the CD-ROM.

Ultimately, it was decided to interview both recent home buyers and those who had purchased their homes more than three years ago, on the assumption that past buyers would have purchase criteria and perceptions similar to those of more recent buyers. Results of the customer survey are presented in the appendix, broken down by the year of purchase and whether the home had been purchased new or used.

In summary, several features of the customer data collection are worth noting: 1) not all of the respondents had recently purchased manufactured homes, 2) because we relied on

manufactured home communities to identify some of our sample, owners who live on private lots outside of a manufactured home community are probably under-represented.

Information gathered in the primary data collection phase was used to address the key issues of market size and structure, market barriers, and potential interventions. Data collection instruments are included in the Appendices.

2. THE MANUFACTURED HOMES MARKET IN CALIFORNIA

2.1 OVERVIEW

The market for manufactured housing is unique in that manufactured housing construction is regulated by the U.S. Department of Housing and Urban Development, which sets and enforces a detailed code. The national Department of Housing and Urban Development (HUD) code, formally known as the Federal Manufactured Home Construction and Safety Standards, is a preemptive code. In effect since June 1976, it covers the construction requirements for all transportable manufactured homes of at least 320 square feet built on a permanent chassis. Local jurisdictions can establish neither tighter nor looser construction requirements; thus, any local program to increase energy efficiency through construction changes must be voluntary.

The HUD-code energy standards are based on an overall envelope U-value (excluding air infiltration), which varies for the three HUD thermal zones in the U.S. California is all in Zone 2, which means the required U-value is 0.096. The code permits higher U-values if the home is equipped with more efficient heating/cooling equipment. The code includes ventilation specifications. The thermal requirements were upgraded once, effective October 25, 1994.

Because of the reporting requirements of the HUD code, manufactured housing is one of the better documented markets in the country, with characteristics of each HUD-code home built required to be documented by the manufacturer and collected by HUD. Information derived from HUD data is cited where relevant throughout this report.

2.2 CALIFORNIA MARKET SIZE

After declining throughout the early 1990s, the California market for manufactured homes has been rising for the past several years. It currently represents about 6 percent of new housing starts in the state. According to HUD data supplied by the Manufactured Housing Institute (MHI), sales of manufactured housing in California peaked at 10,800 in 1989, then declined steadily through 1995. Since 1996, however, the market has been picking up, with Bob West, President of the California Manufactured Housing Institute (CMHI,) expecting 7,000 homes to be sited in 1999.

According to CMHI, one factor in the growth of the market is the inability of the construction rate for site-built housing (105,000 homes per year) to keep up with demand, which is estimated at some 250,000 single family homes annually. The California manufactured housing industry, on the other hand, has ample capacity and is a net exporter of manufactured homes; of the 9,089 homes constructed in the state in 1998, 6,673 were sited in California.

While the size and cost of manufactured homes sold have increased nationwide, they remain significantly higher in California than elsewhere. The cost of a manufactured home in

California ranged from $16,600 to $177,000 in 1998, averaging $56,500 — almost 50 percent more than the $40,000 average cost nationwide.

One of the reasons for the high value of California manufactured homes is the high percentage of multi-section homes (i.e., double- and triple-wide), with single-wide homes accounting for less than 7 percent of the California market in 1998. According to CMHI, California manufactured homes range in size from 700 to more than 3,000 square feet, and often include amenities such as vaulted ceilings, bay windows, jacuzzis, and upgraded kitchens. In the past several years, the industry has begun to build and install two-story homes, which will probably make manufactured homes even more similar to site-built homes in size and cost.

2.3 GEOGRAPHIC DISTRIBUTION

As shown in Exhibit 2-1, significant numbers of manufactured homes are sold in most parts of the state. While information on the final site where a home is installed is unavailable, relatively detailed data are filed regarding the number of homes shipped by dealers in each county. These data show that in 1997, the largest volume of sales (13.8 percent) went through dealers in Orange County[i].

Exhibit 2-1
Manufactured Homes Sales and Communities
(by CEC Climate Zone)

CEC Climate Zone	Major City in Zone	Number of Homes Sold*	%	Number of Parks**	%
1	Eureka	73	2.2	0	
2	Santa Rosa	189	5.8	109	4.4
3	Oakland	365	11.1	243	9.8
4	San Jose	42	1.3	99	4.0
5	San Luis Obispo	8	0.2	102	4.1
6	Long Beach	46	1.4	174	7.0
7	San Diego	135	4.1	311	12.5
8	Santa Ana	563	17.2	159	6.4
9	Los Angeles	182	5.6	328	13.2
10	San Bernardino	204	6.2	262	10.5
11	Roseville	387	11.8	46	1.9
12	Sacramento	463	14.1	194	7.8
13	Fresno	265	8.1	157	6.3
14	Hesperia*	210	6.4	301	12.1
15	Palm Springs	36	1.1	0	-
16	S. Lake Tahoe	107	3.3	0	-
Totals		3275	-	2485	-

* Sales are based on data reported to the California Department of Housing and Community Development for the first 9 months of 1997

**The location of manufactured home communities was taken from D&B data, as provided by iMarket, Inc.'s MarketPlace CD, June 1999

Note that manufactured homes are located in areas representing most of the 16 California Energy Commission (CEC) climate zones. As with site-built homes these diverse climates (and associated heating/cooling requirements) complicate efforts to determine the most cost-effective energy efficiency measures for the state as a whole. Despite this diversity in climate, the HUD code treats California (and other states) as a single climate zone. California is in HUD Zone 2, which also covers Arizona, New Mexico, Kansas, Oklahoma, Missouri, Arkansas, Kentucky, Tennessee, and North Carolina.

The geographic dispersion of manufactured home sales within California tends to contradict stereotypes regarding where manufactured homes are sold and sited. For example, because of the scarcity and high price of site-built homes, areas such as Silicon Valley are said by CMHI to offer major opportunities for manufactured homes. Opportunities are also being created through urban infill and redevelopment projects, where manufactured homes can be used to provide affordable housing that can be relatively easily and quickly constructed. And,

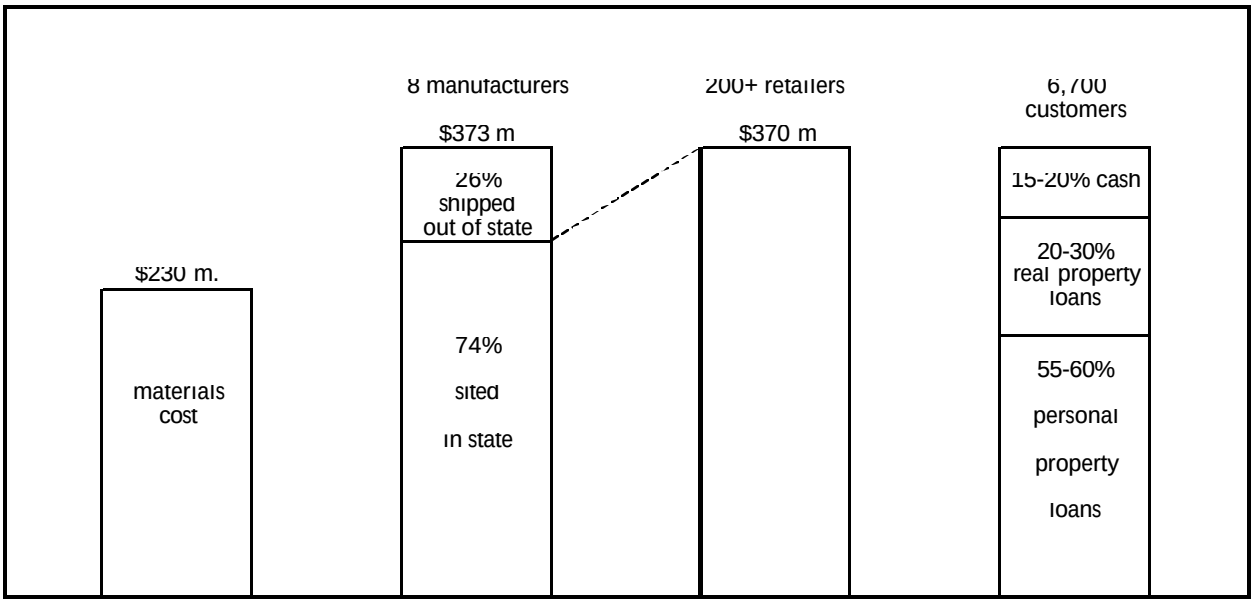
at the higher end of the market, several upscale manufactured home communities are being developed In Newport Beach with two-story homes in excess of 2,500 square feet.

While the broad geographic dispersion of manufactured homes may complicate setting program standards, it also suggests that there will be market segments where clear opportunities for energy efficiency exist.

2.4 CALIFORNIA MARKET — VALUE FLOW

At the retail level, the California manufactured housing market is valued at some $370 million[ii]. The various market actors and the value they add at each stage of the production process are illustrated in Exhibit 2-2.

Exhibit 2-2
California Manufactured Home Market Value Flow



Sources: Retail value of manufacturer output based on CA manufactured home production, siting, and average value of manufactured homes, from the California Manufactured Housing Institute.
Ratio of material cost to retail value and wholesale price, retail mark-up from 1992 study:
Baylon, D. and Davis, B. Cost-Effectiveness of the Manufactured Housing Acquisition Program (MAP), Ecotope, January 1993.
Financing percentages estimated from 1997 CA data and previous studies in the Northwest

Based on margins reported for manufacturers, distributors, and dealers in surveys in the Pacific Northwest,[iii] the *ex factory* value of manufactured home production in California was approximately $373 million in 1998, of which 26 percent was sold in neighboring states. To generate this output, California manufacturers purchased approximately $230 million in parts and materials.[iv]

There are no wholesalers in this market; manufacturers sell virtually all of their homes through a network of dealers. Nationally, there is a trend to greater manufacturer ownership

of dealers, but only one of the six manufacturers interviewed reported having a significant number of "factory outlets."

Buyers usually order a home built to their specifications, but they can purchase homes off the dealer's lot. If the home has to be manufactured, the dealer places the order with the manufacturer and, usually within a month, the home is constructed.

After being built in the factory, the home must be properly installed at the site, a function that is usually arranged by the dealer and performed by specialized contractors — although some dealers have their own set-up crews.

Despite being "mobile," only about 5 percent of homes are ever moved after being sited the first time. Manufactured homes are either sited on the buyer's own property or on lots in a manufactured home community or development. Homes may also be purchased from the developers of these communities, who often set up model homes just as a conventional developer would.

Because manufactured homes represent the only affordable avenue to home ownership for many buyers, financing is a critical component of the market. Most manufactured homes are financed through personal property loans; homes that are permanently attached to a foundation can be financed with a mortgage. Financing is often arranged by dealers through a finance company with which they have a business relationship.

2.5 TECHNOLOGY CHARACTERIZATION

In this section, the determinants of energy usage and energy efficiency in manufactured homes are discussed. While both the building envelope and all energy-using equipment in the home determine energy usage, energy efficiency in manufactured homes is usually defined primarily by the overall coefficient of heat transmission, or U-value, for the home's envelope. The following discussion focuses on the building envelope (insulation and windows) and mechanical systems, in that order.

2.5.1 Envelope

The HUD code requirement for Zone 2, which includes all of California, is an overall envelope U-value of 0.096. By comparison, the Pacific Northwest is in the more heating-intensive Zone 3 (overall envelope U-value of 0.079), while the southernmost states are in Zone 1 (overall envelope U-value of 0.116).

Within California, about two-thirds of all manufactured homes are built "just to code." While the formula gives manufacturers considerable leeway in how they attain the code's requirements, a good indication of current standard practice is provided by the characteristics of homes built by three manufacturers who report building 80 - 90 percent of their homes just to code.

Exhibit 2-3
California Manufacturer Typical Insulation Levels and Window Characteristics

	Manufacturer #1	Manufacturer #2	Manufacturer #3	Best Offered
Roof / Ceiling R-value	R-22	R-21	R-22	R-40
Wall R-value	R-15	R-14	R-11	R-22
Floor R-value	R-11	R-19	R-22	R-33
Windows	Gas-filled dual-pane vinyl	Dual-pane vinyl	Dual-pane vinyl	Dual-pane, gas-filled, low-e vinyl

As shown in Exhibit 2-3, insulation levels as well as and window characteristics help determine the overall U-value. What is somewhat surprising is the extent to which dual-pane vinyl windows are now standard practice for all California manufactured homes, including those manufacturers who describe themselves as serving the lower end of the market.

For both insulation levels and windows, more energy efficient options are readily available from most manufacturers, and one indication of the technical potential in the market is the most efficient technology offered for each of the above, shown in the last column.

Manufacturers generally do not have any idea of the amount of energy a customer will save on their utility bill from going to the highest available efficiency. Not surprisingly, they point out that savings will depend almost entirely on where the home is sited.

One indication of potential efficiency gains is provided by the "Zone 3" package offered by Manufacturer 1 in the above table. By raising the ceiling, wall, and floor insulation R-levels to 33, 22, and 19, respectively, this manufacturer builds a home that complies with the Zone 3 HUD code requirement; that is, the coefficient of heat transmission is reduced by 18 percent. The added cost of this package is about $2,000.

2.5.2 Mechanical Systems

In addition to these envelope characteristics, the other primary determinant of energy efficiency is the mechanical systems.

Most California manufactured homes leave the factory with a gas or propane furnace installed. While few manufacturers were able to provide the efficiency rating of the installed furnaces, a leading supplier of furnaces states that the typical furnace is 80-82 percent AFUE, depending on size, a range that was confirmed by one home manufacturer.

This same supplier has just started selling a 90 percent AFUE unit. The incremental cost to the contractor from the manufacturers will be about $300 for the 90 percent unit. To date, none have been sold in California. Moreover, the supplier says that there are significant additional costs (and potential problems) associated with the high efficiency unit. "You can't

really go above 82 percent in furnaces without condensation problems and higher costs for drains, etc."

Cooling equipment is not installed at the factory, but is put into the home after it is installed on its permanent site. The California representative of one of the largest equipment suppliers states that 10 SEER ACs represent about 75 percent of the market, with about 25 percent of customers choosing a 12 SEER model and "a miniscule percentage" going as high as 14 SEER. Incremental cost to contractors for the 12 SEER unit are only about $200.

2.6 CALIFORNIA MARKET ACTORS

Each group of market actors is discussed below based on secondary data and survey results regarding market actor characteristics, practices, and perceptions.

2.6.1 Manufactured Home Buyers

2.6.1.1 Overview

Manufactured home buyers represent about 6 percent of the California new housing market. In all, more than 1.1 million Californians live in some 590,000 manufactured homes, with about 8 percent of the stock of existing homes changing each year. Many buyers see manufactured homes as an affordable alternative that gives them access to the benefits of home ownership.

Based on survey results, the average manufactured home owner appears to be retired with relatively substantial income. The majority (almost 60 percent) of manufactured home owners are age 65 or older, and almost 75 percent are 55 and older. Sixty-five percent of these homeowners report average yearly incomes in excess of $30,000 per year. Almost 40 percent have yearly incomes greater than $50,000.

Only 6 percent of the surveyed customers reported living in single-wide homes. Almost 70 percent live in double-wide and 25 percent live in triple-wide homes — findings that are consistent with percentages reported by manufacturers and dealers.

2.6.1.2 Purchase Criteria

Of 121 surveyed manufactured home owners, approximately 50 percent purchased their homes in 1996 or later. Almost 40 percent purchased newly constructed homes. Climate Zone 3 (characterized by relatively high heating requirements and low cooling requirements) had the highest percentage of new homes purchased.

A surprisingly large percentage (45 percent) of the surveyed homeowners indicated their homes were bought using cash, presumably from the proceeds of a previous home sale. The remainder were either purchased using a mortgage loan (41 percent) or a personal property loan (9 percent). As noted previously, dealers reported a much higher proportion of purchases financed. Furthermore, as discussed in Section 2.6.5.2 below, about two-thirds of loans offered by surveyed lenders are personal property loans.

Customers were asked what their most important purchase criteria would be if they were currently in the market for a new manufactured home. The highest rated factors were amount of home for the money, energy efficiency, and warranty. For the most part, dealer perceptions of customers' purchase criteria agreed with the customers' rankings, except upgraded appliances, which customers rated very important and dealers rated not at all important.[v]

2.6.1.3 Standard Equipment

The majority (69 percent) of homes are heated with gas furnaces, with the remaining heated with electric furnaces (14 percent) and heat pumps (9 percent). The majority (62 percent) of homes are cooled with central air conditioners, with the remaining cooled with heat pumps (7 percent) and room air conditioners (3 percent). Twelve percent of the customers have no cooling systems. The majority (79 percent) of homes have gas water heating, with the remaining having electric water heaters (17 percent) and propane water heaters (3 percent).

2.6.1.4 Energy Efficiency Upgrades

Seventy-three percent of customers were not provided with literature on optional energy efficiency upgrades available in manufactured homes. Of those that were provided with literature, 15 percent received it from the dealer, 5 percent from their utility, and 4 percent from the manufacturer.

Only 18 percent of customers said that the dealer who sold the home discussed energy efficiency options. Approximately 25 percent of the customers paid extra for energy efficiency upgrade packages, usually including double paned windows and added insulation.

2.6.2 Manufacturers

2.6.2.1 Manufacturer Size and Output

Most of the manufacturers in California are part of large corporations that are active nationwide, reflecting a trend to consolidation within the industry. Nominally, California has seven companies (shown in Exhibit 2-3) building manufactured homes in ten plants. Silvercrest/Western Homes has, however, been purchased by Champion, and other mergers/acquisitions are said to be possible.

An industry expert notes that the trend to consolidation may limit consumer choice by driving out smaller manufacturers who formerly served niche markets with special product offerings (including, potentially, energy efficient models). In addition, he says, retailers owned by national manufacturers may be less responsive to (or knowledgeable about) the needs of customers in a single region or state.

The manufacturers counter that their increasing involvement at the retail level is necessary to give them better control over the quality of installations — which have been a persistent concern to manufacturers. Not only must manufacturers deal with callbacks on problems caused by poor installation, siting-related problems tend to undermine the hard-won gains in customer satisfaction that manufacturers have achieved. Of the seven manufacturers interviewed, only two sell through their own retailing network.

Exhibit 2-4
California Manufacturers

Manufacturer	Location(s)	Percent of CA Market
Fleetwood	Riverside	35-40
Silvercrest/Western Homes	Woodland, Corona	15-20
Skyline	Hemet, Woodland	10-15
Champion	Lindsay	10-15
Golden WestHomes/Oakwood	Perris	<10
Hallmark Southwest	Loma Linda	<10
Karsten	Sacramento	<10

Not all California manufacturers are large. At least two of the manufacturers interviewed are small, independent operations who produce fewer than 500 homes a year and view themselves as niche marketers, generally at the higher end of the market.

2.6.2.2 In-State Sales

California manufacturers sell from 40 to 95 percent of their production within the state; on average, the 7 surveyed plants site 69 percent of their production in California (as noted in Section 2.2 above, HUD data show 74 percent being sold in the state). Most of the remainder is shipped to neighboring states. High transport costs generally make more extensive shipment impractical, although one manufacturer said his plant has shipped homes as far as Colorado. John Jennings, Project Coordinator for the Northwest Energy Efficiency Alliance's (NEEA's) Super Good Cents (SGC) Manufactured Home program, noted that at least one plant in Northern California supplies SGC-qualifying energy efficient homes to the Pacific Northwest. There may also be some shipments of SGC homes from Oregon to California.

Several Arizona-based manufacturers (notably Cavco and Clayton) are said to be active in the California market, and have joined the CMHI. The 1997 data do not mention these firms, however.

2.6.2.3 Product Characteristics and Prices

About 75 percent of the manufactured homes built in California are produced to meet specific customer orders; the other 25 percent are built to meet dealer orders for on-the-lot inventory. Actually producing a home takes only about a week; finding a slot on the production line, however, takes longer, and extends the turnaround time for a typical order to about a month, with three manufacturers reporting that it takes longer than a month.

Even more than nationally, multi-section homes dominate the market, accounting for over 96 percent of the manufactured homes produced in California. Manufacturers note that single-section homes are usually sold only to replace an old home in an established community, where it may be impossible to site a double-wide.

The few single-section homes sold average about 800 square feet in size, and cost an average of about $35,000. Multi-section homes average 1,475 square feet, but range in size up to

3,000 square feet. Prices for multi-section homes show a correspondingly wide range, averaging $65,000, but ranging up to the hundreds of thousands. Several manufacturers commented on the generally more upscale character of the California market, which is reflected in both the size and cost of the typical California manufactured home.

Most of the manufacturers interviewed described themselves as building for the mid-range segment of the market. Only a single manufacturer described his plant as catering to the lower end of the market, but that plant produces 1,500 homes a year.

2.6.2.4 Energy Using Equipment and Energy Efficiency Options

Most plant managers report considerable authority in making decision regarding the level of energy efficiency — in several cases because the plant *is* corporate headquarters. The interviewed manufacturers said that anywhere from 10 to 100 percent of their production exceeds the minimum HUD code requirements for energy efficiency in Zone 2. Manufacturers who are building above the HUD code usually see energy efficiency as something their customers already demand and are willing to pay for. Several mentioned energy efficiency as something that buyers associate with a higher quality home.

Five of the seven manufacturers offer special energy efficiency upgrade packages. In one case, the upgrade package is simply the HUD code qualifying model for neighboring Zone 3; in another it is marketed as a "desert package." In all cases, the energy efficiency upgrades consist primarily of added insulation; an average of R-37 in the ceiling, R-20 for the walls, and R-27 in the floor. While most manufacturers install dual-pane vinyl windows as standard equipment, a few offer low-e or argon-filled windows as part of the upgrade. High-efficiency furnaces were not mentioned as part of the upgrade packages, and none of the manufacturers install air conditioners at the factory.

The average energy efficiency upgrade package adds $1,440 to the cost of a multi-section house; one manufacturer who offers the same package for single-wide homes says it adds about $500 to the cost. Only a single respondent would estimate how much these packages would save on utility bills (he said 10-15 percent). On average, about 21 percent of homes are sold with an energy efficiency upgrade package.

As noted above, almost all manufacturers have dual-pane vinyl windows as standard. Several of the higher end manufacturers also offer low-e, argon filled windows as standard.

2.6.3 Dealers

According to Dun & Bradstreet data, there are more than 400 dealers selling new and used manufactured homes in California, though fewer than 100 dealers account for most new home sales. The most recent Department of Housing and Community Development data available show that nine dealers (with up to ten sites each) accounted for one-third of all manufactured homes sold in California from January to October of 1997.

Exhibit 2-5
Leading California Retailers
(as of 1997)

Dealer Name	Main Location	Percent of CA Market
Advantage Homes	Sunnyvale	6.8
Visalia Trailer Sales	Visalia	4.3
Madison MH Sales	Manteca	4.1
D&D Mobile Homes	Vacaville	3.9
Cousin Gary's	Redding	3.4
Santiago Homes	Garden Grove	3.4
Golden Sun	Stanton	3.3
5 Star MH Sales	Stanton	3.1
D&D Mobile Homes	Red Bluff	3.1

* Based on October 1997 year-to-date sales data

2.6.3.1 Volume and Price

Survey results indicate that, on average, the larger dealers sell over 110 new homes per year. The medium sized dealers sell an average of 65 new homes per year. Climate zone does not have a significant effect on sales numbers. These dealerships have been selling manufactured homes for an average of 17 years. Dealerships average 7.7 full time equivalent employees at individual sites.

The most common methods used to generate new business are TV, radio, and print advertising. Dealers also report new business through referrals from customers and, to a lesser extent, from direct mailings. A growing trend mentioned by several dealers is advertising over the internet. Many dealers and communities now have web sites.

Based on the average retail price of a California manufactured home, 1998 new home sales topped $370 million. Dealers report that the average price range for a new home is $43,000 to $130,000, with the typical home selling for $65,000. There is no significant difference in price across climate zones. Approximately 95 percent of the manufactured homes recently sold are double or triple-wide.

Manufactured home dealers comprise both independents with multiple lines and, increasingly, dealerships who are controlled by a manufacturer or its parent company. Eight of the 40 surveyed dealers sell only one manufacturer's homes. Some dealers may sell homes as part of a land/home package in manufactured home developments, using model homes just as a conventional developer would. Almost 60 percent of surveyed dealers sell homes in developments as part of land/home packages.

2.6.3.2 Dealer Services

As the only link between buyers and manufacturers, dealers play a critical role in the manufactured housing market. Manufacturers, park operators, and lenders all identified dealers as the focal point of the market, and all emphasized that dealer involvement is critical

to the success of any program that hopes to transform the market. Dealers provide all the services customers need to take possession of their home: from custom ordering, to financing, to installation.

Almost 90 percent of homes sold by dealers are ordered direct from the factory based on individual customer orders. The remaining are models that are kept on the lot. The typical time to receive a manufactured home from the manufacturer is 4 to 7 weeks.

Seventy-five percent of surveyed dealers offer financing to their customers, with most offering both personal property loans and real estate (mortgage) loans. Personal property loans are virtually always financed over 30 years, customers typically put an average of 12 percent down, and pay an interest rate of 10.7 percent. Real estate loans are also financed over 30 years, with customers typically putting an average of 12 percent down, but paying a lower interest rate of 8.6 percent. Most of these loans are funded by either a local bank or a nation-wide bank.

The growing concentration in the industry is reflected in the retail function as well, as manufacturers become more vertically integrated in an effort to gain greater control in the market. A key driver behind this push for control has been the retailer's handling (often through subcontractors) of siting and set-up, which gives manufacturers no control over installation, even though home owners typically go back to the manufacturer for any problems resulting from improper set-up. All 40 of the surveyed dealers provide installation services, with approximately half using their own staff and the remaining using subcontractors.

While installation contractors have to be licensed by the state, their licensing is outside the manufactured home regulatory infrastructure. One manufacturer, Fleetwood, has reportedly dealt with the control issue by certifying its installers.

2.6.3.3 Energy Efficient Features

According to dealers, the majority of homes come from the factory with efficient features. The typical home is shipped with R-23 insulation in the ceilings, R-14 in the walls, and R-15 in the floors. Virtually 100 percent of homes shipped by surveyed dealers have dual pane, vinyl frame windows. Almost all homes are heated with natural gas furnaces. For homes with central air conditioning (CAC), the typical SEER rating is 10. The most common alternate to CAC is the installation of an evaporative (or swamp) cooler.

About three-quarters of the surveyed dealers offer energy efficiency upgrade packages to their customers, with the most popular upgrade being added insulation in the ceiling, walls, and floor. Additionally, dealers estimate that approximately 13 percent of customers will upgrade the efficiency of their CAC from 10 SEER to 12 SEER. The average upgrade package adds just over $2,000 dollars to the overall final sales price of a home. Dealers report that one in five new homes sold have energy efficiency upgrade packages.

2.6.4 Community Operators

2.6.4.1 Role of Communities

Traditionally, manufactured homes were sited in land-lease communities (or parks), where the resident owns the home but leases the home site from the park's management. More than 80 percent of California's existing manufactured housing stock is sited in 5,500 such communities[vi]. This is consistent with the finding that 85 percent of manufactured homes among surveyed communities are land-lease rather than owned lots.

While most of California's 590,000 existing manufactured homes are in land-lease communities, new manufactured homes are increasingly sited on individual lots or in developments as part of a land/home package. Today, most buyers are siting their manufactured homes on private property, with over 60 percent of new homes sited on lots in urban, suburban, or rural neighborhoods, according to CMHI.

Many of these homes are being built in manufactured home subdivisions, a concept that was pioneered in California, and, according to CMHI's Bob West, accounts for about 85 percent of new home sitings in Northern California. A Southern California example of such a subdivision boast 3,000 square foot homes on two-acre lots, offering amenities that are claimed to be comparable to site-built homes at a 30-40 percent lower price.

Siting on owned lots has been encouraged in California by the passage of legislation several years ago to allow manufactured homes to be sited on any residential lot (provided local development standards are met). The state has also made it illegal for local jurisdictions to adopt other covenants or restrictions to forbid the siting of a manufactured homes. This latter trend is being accelerated by "infill" — the use of manufactured homes as a moderate-cost means of filling in vacant space within already incorporated areas.[vii]

The growing popularity of land/home packages and single-site occupancy means more manufactured homes will be financed with more favorable real estate loans — which should increase the opportunity for cost-effective energy efficiency upgrades at the time of purchase.

2.6.4.2 Community Characteristics

On average, manufactured home operators have 821 homes sited in their communities overall. These include respondents who operate multiple communities. For the six respondents who operate a single community, the number of homes in each community ranged from 40-163, with an average of 116 homes. For the six respondents who operate multiple communities, the number of homes in their communities overall ranged from 270-5,000, with an average of 1,525 homes.

About 95 percent of the homes in the surveyed communities are multi-section. On average, the cost for homes sited in the 12 surveyed communities ranges from $60,000 to $93,000, with a typical cost of $75,000.

Over 90 percent of the manufactured homes in the surveyed communities use natural gas for heating and cooking. According to surveyed operators, residents of manufactured homes in their communities pay an average of $90 per month for their gas and electric utility bills.

CMHI estimates state that as many as 400,000 existing manufactured homes pre-date the June 1976 HUD code, and many of these units are starting to be junked or recycled. Surveyed communities have been in operation for an average of 24 years, with about 60 percent who have been in operation prior to 1976.

Half of the surveyed manufactured home operators have communities that are still under development. It is expected that many of these communities will be complete in the next 2 years.

2.6.4.3 Communities as Dealers

Two-thirds of the 12 surveyed manufactured home community operators also sell homes. These homes are primarily sold within their communities — only one of these eight community operators sells homes sited in other communities. All eight of these community operators have model homes at the development, but none reported that they sell homes offering any special energy efficiency upgrade packages.

Surveyed operators said the majority of their customers are first-time manufactured home buyers. Accordingly, they stated that it is important for the manufactured homes they offer to have the look and feel of a site-built home. Communities of surveyed operators are either targeted to lower-income customers who have a more difficult time affording site built housing or to customers 55 and older who are scaling down from their previous site-built home.

The vast majority of the homes sold by these communities are ordered directly from the factory, with Silvercrest and Fleetwood as the most prevalent brands sold. Surveyed operators cited that it typically takes 1-2 months to receive a manufactured home from the manufacturer.

One operator who leases lots only reported that their parent company is looking into having all community managers obtain real estate licenses so that they can also sell homes. In communities who lease lots only, homes are either purchased new from the dealer (51 percent) or purchased used from a previous owner (28 percent). Only 1 percent are purchased used from the dealer while none are existing homes moved from other sites.

2.6.4.4 Financing

Only three of the 12 surveyed operators offer financing to their customers. Two of these three operators offer only personal property loans while the other offers only real estate loans. An average of 45 percent of customers in these communities use the financing offered by the community. Customers who do not finance through the community typically finance through banks, lenders, and dealers, or pay cash.

2.6.4.5 Installation and Maintenance

Ten of the 12 surveyed communities provide installation services for homes sited in their communities. The majority of these communities use subcontractors to provide installation services, and have the installations inspected by local building inspectors. None of the

surveyed operators reported any major challenges to siting and installation or any energy efficiency considerations that are affected by installation practices.

Most of the surveyed operators reported no operations and maintenance-related concerns for manufactured home owners in their communities. Operators indicated that the level of maintenance needed for manufactured homes built in the last 5-10 years is comparable to the level of maintenance needed for site-built homes.

2.6.5 Lenders

The sample of lenders for the survey was selected from a listing of financial institutions known to specialize in financing for manufactured homes. Results, therefore, are not representative of the entire lending industry.

2.6.5.1 Lender Characteristics

Most manufactured homes are financed by a relatively small number of financial institutions specializing in manufactured homes, who often work closely with dealers. On average, surveyed lenders write about 1,200 loans per year for manufactured homes, 77 percent of which are originated through a dealer.

2.6.5.2 Types of Financing

Manufactured homes are financed using both personal property loans and real estate mortgages. All surveyed manufactured home lenders offer both personal property loans and real estate mortgages. About two-thirds of loans offered by surveyed lenders are personal property loans. This is consistent with the 1997 data from the Department of Housing and Community Services, which indicate that approximately 60 percent of manufactured homes sold that year were financed with personal property loans. The following ten lenders accounted for over 90 percent of these loans.

- Green Tree
- Ford Housing Finance
- Ford Consumer Financing
- Belgravia
- Bank America Housing
- CIT Group
- Independent National
- Deutsche Financial
- Oakwood
- Chase Manhattan.

Personal property loans typically have less favorable interest rate terms than do real estate mortgages. The average interest rate for personal property loans offered by surveyed lenders is 11.7 percent, compared to 9.1 percent for their real estate mortgages. Down payments, loan lengths, and qualification ratios, on the other hand, are comparable between personal property loans and real estate mortgages.

- On average, personal property loans offered by surveyed lenders include a 7.5 percent down payment, a 27.5 year loan length, and a qualification ratio of 39 percent.

- The average real estate mortgage offered by surveyed lenders includes a 12.5 percent down payment, a 30 year loan length, and a qualification ratio of 38 percent.

Conventional real estate mortgages can be used for manufactured homes when they are permanently attached to a foundation on owned land, making them eligible for insurance under government-backed programs offered by FHA, VA, and FmHA. Further, the Federal National Mortgage Association and Federal Home Loan Mortgage Corporation will buy loans backed by manufactured home real estate on the secondary market.

2.6.5.3 Role of Energy Efficiency

When qualifying buyers, none of the surveyed lenders take into consideration reduced energy bills for energy efficient manufactured homes. Although five of the 10 surveyed lenders reported that they are familiar with energy efficient financing, none have written energy efficient mortgages or loans. Further, none of the surveyed lenders have even discussed energy efficient financing with their customers. All of the surveyed lenders, however, reported that they have an interest in offering energy efficient financing.

No surveyed lenders thought that customers are aware that energy efficient financing is available for efficient manufactured homes. Most lenders think that home buyers consider energy efficiency to be moderately important. All surveyed lenders also believe that dealers are not aware of energy efficient financing, but think that dealers would encourage energy efficient financing if they knew about the options available.

3. MANUFACTURED HOUSING EXPERIENCE FROM THE PACIFIC NORTHWEST

3.1 INTRODUCTION

In this chapter, the Pacific Northwest's (PNW's) experience with energy-efficient manufactured homes is profiled, drawing upon data and information compiled over more than a decade of programs targeted to this market. Findings and lessons learned are summarized to take maximum advantage of this prior experience as a starting point for characterizing the market in California and to provide insight into the effectiveness of market interventions.

Secondary data and information reviewed for this market characterization background include an extensive list of prior studies of the PNW programs, supplemented by the firsthand knowledge of the authors and other experts familiar with the programs, as detailed in end notes to this chapter. The remainder of this chapter is organized as follows:

- An overview is presented summarizing the rationale for the PNW programs and the series of projects and programs that were conducted.
- Next, information about the PNW market and its evolution throughout the programs is presented. This discussion includes the market actors and structure, special features of the market, and the role of energy efficiency.
- The energy-efficiency technologies addressed by the programs — including estimates of their market potential in the PNW — are then discussed.
- Next, barriers to energy-efficiency improvements for each market actor group are described, based on the experiences associated with the PNW programs.
- Market interventions that were implemented are then discussed. The PNW programs employed a wide range of interventions involving all key market actors, thereby providing an expansive testbed of approaches and outcomes from which important lessons can be drawn for California.
- Next, market effects indicators are discussed. Most PNW programs were implemented before a market transformation paradigm was fully developed, so market effects were not always a program goal. Nevertheless, insights can be extracted from the extensive body of data available on the programs.

Throughout this chapter, we emphasize the lessons learned that are most relevant to the California market and program intervention opportunities.

3.2 HISTORY OF PACIFIC NORTHWEST PROGRAMS

The history of PNW's manufactured housing programs is presented in this section to provide background information that will be useful in designing and implementing California's

manufactured housing program. Early research and demonstration projects are discussed initially. Next, the region's large-scale energy efficiency programs are described, emphasizing the Manufactured Housing Acquisition Program (MAP). The section ends with a discussion of the transition to the Super Good Cents venture.

The PNW programs were based on an overall objective of making fundamental changes in the manufactured housing market, within the special conditions of this market, that would lead to significant long-term energy-efficiency improvements in new manufactured homes. Exhibit 2-1 provides a timeline overview of this history.

3.2.1 Early R&D Projects

The PNW programs were initiated under the auspices of the Bonneville Power Administration (BPA) as a result of the policy and program actions of the Northwest Power Planning Council (NPPC).[viii] In 1980, the Northwest Power Act established the NPPC and required it to develop a 20-year electrical power plan and a program to improve the conditions for fish and wildlife. The NPPC's first and subsequent plans emphasized energy conservation and the key role of BPA in achieving regional goals.

In its 1986 plan, the NPPC estimated a technical potential of 90 MW for electric space heating energy savings in new manufactured homes based on building homes to the NPPCís proposed Model Conservation Standards (MCS) over a 20-year period. Estimates were based on regional cost-effectiveness with a typical insulation package of R-38 in ceilings, R-29 to R-31 in walls, and R-29 to R-30 in floors, and U-0.4 windows. Current construction practice was typically R-11 insulation in the building envelope.

BPA initiated investigations into manufactured home energy-efficiency opportunities in 1984. Because the inventory of manufactured homes was substantial and significant opportunities for efficiency improvements were anticipated, BPA's first study assessed potential energy savings in existing manufactured homes. The initial study showed that cost-effective retrofit opportunities existed for the most poorly insulated homes, but that costs were prohibitive for homes with modest insulation levels.[ix] Consequently, most of BPA's subsequent efforts targeted new manufactured homes.

Exhibit 3-1
Timeline of Manufactured Home Activities in the Pacific Northwest

1976	First HUD code goes into effect
1977	
1978	
1979	
1980	Northwest Power Act passed: conservation goal established
1981	
1982	
1983	
1984	BPA conducts first study of energy-efficiency MH retrofit; First efficient MH regional market assessment
1985	Two efficient MH pilot projects: 5 homes and 34 homes: BPA studies including MHs in SGC program
1986	NPPC recommends regional efficient MH program; BPA studies infiltration/indoor air quality in MHs;
	Study of MH design approval process
1987	BPA conducts 150 MH RCDP (87-89); Study of current practice in MH market
1988	Comprehensive study of efficient MH cost-effectiveness
1989	MHs added to existing SGC program (89-92)
1990	MH manufacturers suggest MAP concept
1991	Cost-effectiveness of RCDP MHs; SGC MH process evaluation
1992	MAP begins: phases in from Apr to Oct; Lending/appraisal study
1993	BPA sponsors study of MH non-heating loads; Efficient MH lighting study
1994	MAP fuel choice effects studied; PacifiCorp studies efficient MH lending program;
	MAP cost-effectiveness study; HUD energy code upgraded: Oct '94;
	MH consumer behavior/economics study; MAP incentive reduced based on new HUD code;
	IOUs sponsor MAP evaluation
1995	Study of initial lessons from MAP; Updated MH market study;
	BPA sponsors MAP evaluations/cost-effectiveness studies; MAP terminated: Aug 95;
	Northwest Energy Efficient Manufactured Home marketing/certification program starts
1996	Dealer/consumer focus groups
1997	Alliance agrees to fund SGC MH program: Jun 97
1998	
1999	Alliance SGC MH progress report

BPA conducted a second pilot project with Silvercrest Industries, which constructed 34 homes to the MCS for the Tulalip Indian Tribe. Preliminary cost-effectiveness analyses from this and the five-home pilot projects were presented by BPA and showed that the cost-effectiveness of these initial homes was questionable because of the high incremental cost of these pilot homes.[x]

In the late-1980s, BPA focused on developing a better understanding of the market and opportunities for promoting energy efficiency, while accumulating and analyzing extensive manufactured home performance data. Major research studies are summarized below.

- BPA sponsored a broad study of the manufactured housing market, opportunities for energy-efficiency improvements, and characteristics of a viable energy-efficiency

marketing program.xi This study drew upon existing survey data, both national and regional, and new surveys conducted for the study. It also discussed several efficient MH programs that had been implemented.

- A study documenting current construction practice and the market was conducted. The study used manufacturer interviews and data from 154 "compliance certificates" for homes produced by regional plants.xii The study showed that the average manufactured home was about 20 percent more efficient than required by the HUD code in effect at the time (June 1976 version).

- Detailed energy consumption analyses were conducted for the two sets of pilot project MCS homes (39 total), 594 weatherized homes, and 10 current practice homes.xiii The study assessed the cost-effectiveness of a wide range of efficiency upgrades and showed that several measures were cost-effective in both new and existing manufactured homes.

- The air infiltration performance of manufactured homes was investigated and tests showed that manufactured homes generally were constructed tighter than typical site-built homes, which increased their thermal performance, but raised questions about indoor air quality.xiv Infiltration rates were even lower in energy-efficient homes and ventilation systems appeared to fail to operate or be installed properly in many cases, thus aggravating potential problems.xv

- A study was conducted of the role of Design Approval Primary Inspection Agencies (DAPIAs) that perform the design review of HUD-code homes to determine their potential role in improving energy efficiency.xvi The study showed that the DAPIAs would have to be involved in approving any new designs, but there appeared to be no major stumbling blocks.

The major demonstration project in the late 1980's was conducted as part of BPA's residential construction and demonstration project. Before the demonstration project, the possibility of including manufactured homes in BPA's consumer rebate Super Good Cents (SGC) program was investigated based on the existing program for site-built homes and information about manufactured home buyers. Although a strategy for implementing the program was proposed,[xvii] it was decided to follow a different approach.

A large-scale energy-efficient manufactured homes demonstration project was conducted between 1987 and 1989. Manufactured homes were included in Cycle II of BPA's Residential Construction and Demonstration Project (RCDP). BPA developed the project design in consultation with the manufactured housing industry.

Under this project, eight factories built 150 homes to the SGC specifications and BPA provided incentives to manufacturers ($2,000 to $3,000), to dealers ($250-$500), and consumers ($300).[xviii] Cost and energy performance data were collected and analyzed, as was information from manufacturer interviews. Significant findings included the following:

- Manufacturer markups on individual material costs varied, but averaged around 1.8; dealers marked up incremental costs another 30 percent.

- Energy savings were estimated to be between 3,500 and 6,500 kWh/year. Levelized costs associated with energy efficiency were about 3¢/kWh or less.[xix,xx,xxi,xxii,xxiii,xxiv]

- Regarding major non-heating loads, average air-conditioning consumption was estimated to be 1,500 kWh/year, and average annual electric water heating consumption was estimated to be 1,000 kWh/person.[xxv]

The NPPC subsequently conducted a study of efficiency options for manufactured homes based on the research and demonstration projects conducted by BPA.[xxvi] The study determined the insulation levels required for each of the three MCS climate zones and showed that the requirements could be met without too much difficulty in all but the coldest zone.

3.2.2 Super Good Cents Program

After the region completed its RD&D program, the first steps were taken to conduct large-scale energy efficiency programs. Based on the results of the RCDP, which showed the technical feasibility of building manufactured homes to the MCS and developed an inspection and certification process, and an increased understanding of the manufactured housing market and industry, in 1989 BPA decided to include manufactured homes in its existing SGC program, originally designed for site-built homes.[xxvii]

The SGC program included marketing, the provision of informational materials, certification, labeling, and inspections. The initial marketing campaign was added on to the existing campaign for site-built homes. Total incentives were set at between $2,000 and $3,000 for each SGC home, depending on the MCS climate zone for which it was built. The incentives went to the buyers and some utilities also provided dealer incentives. In-plant and on-site inspections were conducted to verify compliance with the SGC specifications.[xxviii]

All manufacturers eventually participated in the SGC program. One major reason was that utilities indicated that they would probably institute additional hook-up fees of about $2,000 for new homes, including manufactured homes, if they were not built to SGC requirements.[xxix] Over time, dealers also influenced manufacturers to participate because they found that their buyers were asking about the availability of SGC homes.[xxx]

Despite substantial incentives, the penetration of SGC manufactured homes was disappointingly slow to increase. In the first two years of the program, only about 830 certified homes were built. By the third year of the program, however, sales accelerated and reached about 30 percent of the manufactured housing market.[xxxi,xxxii]

A process evaluation of the program conducted in its second year, revealed many important insights into what was and was not working well in the program.[xxxiii] Several positive program features were identified.

- The manufacturers were able to meet the demanding technical specifications and no significant retooling was required.

- The incentive was well received by most parties and was a significant factor in increasing consumer demand for energy efficiency.

- The third-party inspection procedures were a key factor in enhancing credibility and confidence in the quality and performance of the homes.

- The technical assistance provided by the states was very helpful to the industry.

- SGC homes were relatively easy to sell. Furthermore, one-fourth of the dealers felt that selling SGC homes gave them a competitive advantage.

- The program benefited from prior SGC program experiences.

Areas for improvement were also identified. First, the implementation process was found to be fairly complex and involve many parties, which led to communications and coordination problems. In addition, promotion and marketing were not planned and coordinated well enough and were not targeted enough to manufactured housing (as distinct from site-built housing). Promotional materials were often too technical, too vague, or not eye-catching, and should have emphasized the benefits of energy efficiency rather than the rebate (marketing materials addressed short-term price concerns more than long-term benefits). Other findings of the process evaluation included:

- Reaching all 200 dealers systematically and consistently with training and information was a difficult challenge.

- SGC homes were not displayed by all dealers to familiarize buyers with them.

- Lending and appraisal practices only rarely took energy efficiency into account.

- Glazing limitations interfered with sales of SGC manufactured homes.

- SGC requirements increase the labor and materials required to design, construct, and set up a home.

Although there were signs that the program was starting to make inroads into the market, the NPPC, BPA, and other regional actors believed that more dramatic steps were required to influence the market significantly and rapidly. Actions taken by the NPPC and utilities to promote increased energy efficiency in manufactured homes included working with HUD to advocate a tighter national standard and having some utilities institute hook-up fees of as much as $2,000 for *all* new homes, including manufactured homes, that did not the regional MCS requirements.[xxxiv]

3.2.3 Manufactured Housing Acquisition Program

In 1990, a small group of regional manufactured home producers surfaced an alternative idea that became the Manufactured Housing Acquisition Program (MAP).[xxxv] A committee was created, made up of NPPC staff, manufacturers, utilities, and BPA, to develop a program design. Guiding principles for MAP included the following:

- All manufacturers would have to participate to prevent some plants from "building against" the specifications.

- All utilities had to participate to assure the industry that MAP homes could be sited and recognized anywhere in the region.

- Home specifications had to be uniform across the region to avoid the risk of building homes that wouldn't qualify where they were sited eventually; the approach agreed to was that all homes meet the most stringent MCS climate zone requirements.

- No restriction should apply to the amount of glazing area allowed as long as more efficient windows were installed.

The ultimate issue was the level of incentive that would be paid. A decision was reached that payments would be made directly to manufacturers for each MAP home. Previous analyses showed that, because of the wholesale and dealer markups, a payment to manufacturers would have a larger effect on consumer price than a rebate paid directly to buyers. Cost and energy savings analyses were conducted, based on the extensive data available from the preceding programs, to help establish an appropriate incentive level.

In the end, the incentive level was negotiated between the two industries — manufactured housing producers and utilities. An amount of $2,500 per home was agreed upon. To allay manufacturer concerns about timely payment of incentives, BPA agreed to centralize incentive payments and handle the tracking and paperwork. Regional IOUs agreed to reimburse BPA the incentive amount for homes sited in their territories.

Because of its brand recognition, the SGC label was applied to MAP homes and was used in marketing. In addition, the SGC specifications were fine-tuned to remedy problems and take into account the details agreed to by the utilities and producers. As a result of this effort, thermal performance was improved by 20 percent over the prior requirements at no additional cost.[xxxvi]

A policy of 100 percent inspection was adopted to ensure compliance with construction and siting requirements. State staff (e.g., the Oregon Office of Energy) took responsibility for in-plant inspections and utilities indicated that they would conduct on-site inspections.

The program kicked off in April 1992, with manufacturers signing 4-year contracts with BPA to build all their electrically heated homes to MAP specifications. A penetration rate of 100 percent of electrically heated manufactured homes (representing over 90 percent of all manufactured homes sited in the region) was achieved. In the course of the program, over 65,000 SGC homes were built under MAP.

3.2.3.1 MAP — Program Modifications

As market conditions changes, MAP was refined to reflect those changes, including a change in the HUD code. After a public process required by federal legislation, HUD developed and adopted a new energy standard that tightened the thermal requirements in manufactured

homes across the country. The efficiency levels adopted were justified, in part, based on the experience gained through the MAP.

The code, which became effective on October 25, 1994, had new requirements in the PNW that were about 30 percent tighter than the prior code.[xxxvii] In response to the new HUD code, the MAP incentive payment was reduced to $1,500 to adjust for a more efficient baseline that resulted from the new HUD requirements.

At about that same time, PacifiCorp, an IOU in the PNW, investigated an alternative to the MAP design: certification of qualified lenders, improved terms offered by certified lenders, a $500 incentive to home buyers, and promotion of certified lenders to buyers. This approach would have reduced direct utility costs, and analysis showed that it would have provided affordability to buyers equivalent to the $1,500 MAP incentive.[xxxviii] The program was never implemented.

A case study of MAP noted that production of program homes during the first two years (30,000) exceeded original projections by 25 percent.[xxxix] The study also noted that two Oregon IOUs stated their intention to terminate their role in the program early because of the higher than expected expenditure rate.

Some observers raised questions about whether MAP's targeting of electrically heated homes had affected the market share of other heating fuels. A study for BPA concluded that the share of electric heat in new manufactured homes had been above 90 percent for several years and that MAP had probably caused a one-time increase of 6 percent in the share, which was well within the variation that had been observed in the market.[xl]

3.2.3.2 Results of Research Studies

Several studies were conducted to assess the operation and impacts of the program. Three separate program impact evaluations were conducted — all of which provided different estimates of impacts and cost-effectiveness.

- The first impact evaluation study released noted two important market transformation effects: increased efficiency of gas-heated manufactured homes and the adoption of a more stringent HUD code than would have been adopted otherwise.xli The study found, however, that energy savings were substantially lower than the original projections.

- The study released next estimated energy savings much closer to the original projections, nearly three times higher than the first study.xlii This study also presented data that showed that more than one fourth of MAP homes did not have their cross-over ducts installed as required by the program specifications.

- The final impact evaluation study estimated energy savings that were between the two preceding studies.xliii It showed that, based on these savings estimates, the program met the required cost-effectiveness tests.

Additional studies were conducted that may provide information useful in designing and implementing a California program.

- An initial cost-effectiveness study was conducted early in MAP, based on program measure cost data and energy simulations.xliv

- Another study for BPA addressed fundamental consumer behavior and economic factors involved in manufactured home purchases. It addressed price sensitivity, discount rates, and tenure in new manufactured homes.xlv

- A study was conducted based on interviews with MAP home owners and owners of standard manufactured homes constructed just prior to the start of MAP. The study provided updated information on the market and buyer reactions to the MAP.xlvi

- The influence of lending and appraisal practices for energy-efficient manufactured homes was examined in another study. Lending and appraisal practices for manufactured homes, in general, were documented and specific issues such as interest rates, valuation of efficiency measures, barriers, and the treatment of energy efficiency in the lending process were studied.xlvii

- Two research projects were conducted on the use of alternative building materials in energy-efficient manufactured homes. One addressed the use of structural insulated panels (SIPs) and the other identified sustainable building materials that could be used in manufactured homes.xlviii,xlix

- A study was conducted to identify the potential for energy-efficient lighting in new manufactured homes.l

3.2.4 Post-MAP Activities

MAP ended in August 1995, over 6 months before originally planned, and a non-incentive program was crafted to take its place.[li] Because the production of manufactured homes accelerated during MAP, the utility incentives were paid out faster than anticipated. Under increasing budget pressure, the utilities sought to terminate the program before its planned 4-year life.

There was no exit strategy planned early in MAP and, when it became clear that the program would probably have to end prematurely, the utilities began working with the manufactured housing industry to establish a follow-on program. Despite the utilities' efforts, the early program termination jeopardized the good relationship that had been developed with the industry.

When MAP ended, program designers and the industry worked to structure suitable programs that were based on intensive marketing, training, technical assistance, and other strategies identified in the earlier regional programs, but that excluded large rebates. A new program — Northwest Energy Efficient Manufactured Home (NEEM) — was designed and implemented. BPA and other utilities provided funding to state energy offices, and home

producers contributed $30 per home toward inspection costs. This program was expanded to cover both electrically *and* gas heated homes.

In the meantime, a new regional body — the Northwest Energy Efficiency Alliance (Alliance) — responsible for implementing energy-efficiency market transformation programs was created, and several state organizations and BPA banded together to request Alliance funding to establish a Super Good Cents Manufactured Housing Venture. In June 1997, the Alliance agreed to fund the proposed Super Good Cents venture.[lii]

The primary partners in the venture are BPA and state agencies in Washington, Idaho, and Montana. Because of a higher production rate, Oregon's Energy Office was able to implement its own program funded by the $30/home fee from in-state plants and was not supported financially by the venture. Major highlights of the first year of this program are presented below.

- All manufacturers were contacted and briefed on the new marketing campaign. Point-of-sale and other advertising materials were developed with the Comfort You Can Count On theme. Television advertising of SGC homes was conducted in conjunction with the industry's Northwest Pride marketing program, the SGC program was marketed at home shows, and a program website was created.

- Statewide manufactured home installation and installer training programs were in place in Idaho, Oregon, and Washington. Permits and inspections are now required in all three states.

- A retailer training and certification program was designed and implemented. Top sales people were recognized through a Super Good Cents Hall of Fame.

- In-plant home inspection continued, as well as technical assistance by state agency staff.

Monitoring and preliminary evaluation have suggested that significant changes may be required for the venture to achieve its goals. One need may be to reduce program costs and possibly obtain some support from retailers. Another possible approach is to align the program with EPA's ENERGYSTAR® program.

Industry consolidation, the entry of new manufacturers, and vertical integration were significant market changes that occurred during this venture. Price competition appeared to be an increasing trend. The marketing effort was beginning to impact the retail level and the erosion of the SGC market appeared to be slowing late in 1998.

The characteristics of the manufactured housing market, with special emphasis on the market in the PNW, and the relevance of these characteristics to the California market, are discussed next.

3.3 PACIFIC NORTHWEST MANUFACTURED HOUSING MARKET OVERVIEW

As described in the overview of the California market, the manufactured housing market is strongly influenced by federal codes and standards. Unlike California, which falls under

HUD Zone 2 (overall envelope U-value of 0.096), the Pacific Northwest is in the more heating-intensive Zone 3 (overall envelope U-value of 0.079).

The manufactured housing market characteristics that are especially relevant in the Pacific Northwest are presented on the following pages. Similarities and differences between the Pacific Northwest and California are noted throughout the discussion.

3.3.1 Market Size and Composition

In 1980, 8 percent of single-family detached homes in the PNW were manufactured homes.[liii] The share has increased steadily, with manufactured homes representing over 30 percent of new single-family homes sold in the region. In California, the share is between 5 percent and 10 percent.[liv]

In most parts of the country, including California, industry sales declined during the early 1980's, but have risen considerably since the late 1980's. Throughout the country, the market share of multi-section manufactured homes has increased steadily in the past decade. In the PNW and California, about 90 percent of new homes are multi-section, and nationally the figure is about 60 percent.[lv] The floor area of single-section homes in the PNW has averaged around 900 sq. ft. and for multi-section homes it has averaged about 1,500 sq. ft. for several years.

Most manufactured homes are sited in rural areas, and over 85 percent of manufactured homes are owner-occupied. The PNW market, similar to California and the rest of the country, can be segmented into low-end, mid-range, and high-end homes based primarily on price and features. Nationally, the median price is about $40,000. In the PNW, it is about $50,000 and in California it is about $60,000.[lvi] The average price in the PNW increased by about 40 percent between 1986 and 1996.[lvii]

3.3.2 Cost Structure and Materials

The ratio between material cost and retail cost is about 2.2 in the PNW and California.[lviii] Manufacturers are able to negotiate prices from suppliers that are lower than list prices. Wholesale cost is about 60 percent more than material cost, and retail cost (including taxes) is about 35 percent more than wholesale cost.

In the PNW, the dominant heating system in recent years — over 90 percent of new homes — has been central electric furnaces. In fact, manufactured homes in the PNW comprise between 40 percent and 50 percent of new electrically heated homes. Wood heating is used commonly in between 20 percent and 30 percent of the new homes.[lix]

Homes almost always come equipped with cooking appliances, refrigerators, water heaters, and heating equipment. Clothes washers and dryers are usually offered as options. In 1995, about 80 percent of newer homes had dishwashers, virtually all had clothes washers and dryers, and 30 percent had computer equipment.[lx]

In the mid-1980's, virtually all homes were equipped with aluminum frame windows. In large part due to MAP and SGC, vinyl frame windows had become the norm in the PNW by the late-1990s.

3.3.3 Characteristics of PNW Market Actors

The key actors in this market are buyers, dealers/retailers, manufacturers, and lenders. Other important actors include component and material suppliers, set-up crews, and inspectors and regulators.

In almost all cases, buyers purchase their new home from a dealer who handles one or more home brands. Usually the buyer orders a home built to their specifications, but buyers can purchase homes off the dealer's lot. Despite being "mobile," only about 5 percent of homes are ever moved after being sited the first time.

The dealer usually arranges financing for the buyer with a finance company with which they have a business relationship. If the home has to be manufactured, the dealer places the order with the manufacturer and usually within a month the home is constructed. The dealer usually arranges for the home to be delivered and set up at the buyer's site. Some dealers have their own set-up crews and others contract with outside crews.

The home buyer takes delivery of the home and any required local inspections are conducted. If a heat pump or central air-conditioner is purchased with the home, the home buyer usually arranges for a contractor to install the required equipment. If there are any problems with the home, the buyer usually contacts the dealer or manufacturer to resolve them.

Information relevant to manufactured housing program design and implementation for each market actor is presented in the remainder of this section.

3.3.3.1 Manufactured Home Buyers

Historically, manufactured home buyers were primarily young families and the elderly. Recent data suggest that the age distribution is more uniform. However, buyers still see "affordability" as the primary advantage manufactured homes have over other housing options. Affordability is usually considered in terms of whether the buyer can afford the monthly housing expenses.[lxi]

Based on information from 1987, consumers ranked the most important factors in their choice of a home to be layout, price, innovative design/features, size, external features, energy efficiency, service, customization, and brand name.[lxii] In 1995, a different survey found that buyers rated purchase price as the most important consideration, followed by quality, heating/cooling costs, and maintenance costs.[lxiii] Consumer data from 1992 showed that 40 percent considered lower heating/cooling bills to be an advantage of manufactured homes.[lxiv]

Based on national data, the price elasticity of demand for manufactured housing (-0.7) is very similar to values typical for other types of housing, contrary to previous estimates (2.4). Based on PNW home owner survey data, a discount rate of approximately 20 percent and a simple payback of about 5 years apply to the purchase of manufactured home energy-efficiency options. Across all buyers of new manufactured homes, the average stay in their home is at least 15 years.[lxv]

3.3.3.2 Manufacturers

PNW plants typically produce from 250 to 1,750 floors (there are two floors in a double-section home) per year and employee between 50 and 300 people. Historically, most plants have been relatively autonomous, even if part of a large corporation. Major decisions, however, usually require corporate approval.

Manufacturers tend to take a wait-and-see attitude, and are relatively resistant to change; however, when something is introduced that works, most manufacturers adopt the innovation quickly. Some plants are innovators and are willing to try a new product or process to get a jump on their competition. Smaller plants are more likely to adopt innovations, although they may require more outside technical assistance. Within many plants, there are often innovation champions who can pursue an innovation.

Manufacturers believe that although buyers value energy efficiency they typically are not willing to trade it off for aesthetic features. Manufacturers believe that dealers are the critical link for understanding buyer needs and pushing new products.

3.3.3.3 Dealers

About 90 percent of new homes are purchased through a dealer.[lxvi] Dealers are attuned to buyer needs, and perceive quality and comfort to be critical selling points.[lxvii]

3.3.3.4 Lenders

Key findings about lenders and the lending and appraisal process are available from a study conducted by Sandahl et al. (1992). The study notes that, historically, most homes were financed as personal property, but there is a trend toward real estate loans or mortgages for homes with permanent foundations on the owner's lot (40 percent of homes in 1992). Most financing is through conventional instruments; financing through government-backed lending programs occurs only about one fourth as often (6 percent) as it does for site-built homes.

Lending is arranged through the dealer (indirect loans) about 85 percent of the time and directly with a lender (direct loans) about 15 percent of the time. About 30 percent of manufactured homes are purchased with cash.

Manufactured home loan terms, especially personal property loans, are less favorable for manufactured homes than site-built homes. Typically, interest rates are 2 percent to 3 percent higher for manufactured homes and loan lengths average about 13 years, compared with 29 years for site-built homes.

Competition has been pushing lending terms for home/land purchases closer to terms for site-built homes. In addition, there is little evidence that delinquency or foreclosure rates are higher than for site-built home loans and would justify the less favorable lending terms for manufactured homes.

Most lenders use the total debt to income ratio (35 percent to 45 percent) to determine whether buyers are qualified. Typically, lenders have not taken utility bills or energy

efficiency into account. During MAP and the SGC program, some lenders started reflecting energy savings in their qualification ratios.

Appraisals of new homes are based on the dealer invoice so the costs of energy-efficiency measures are included. Appraisals of existing homes have been based on comparables or at least six available value guides. In existing homes, energy-efficiency measures were not treated consistently historically. At least one value guide developed a specific value for the SGC home package and appraisers usually assigned a value from $1,000 to $5,000 to SGC.

3.3.4 Overall Industry Trends

Several important trends have been occurring in the market.

- Zoning barriers to siting manufactured homes have been declining over time, making it feasible to site the homes in more locations.

- Manufactured home developments, a concept developed in California, have become more common. The owner either buys or obtains a long-term lease on the land, qualifying the property for a real estate loan.

- In the 1990's, industry consolidation and vertical integration were becoming more common in the PNW, and the perception was that this was occurring nationwide.[lxviii]

Energy efficiency trends in the PNW are discussed next.

3.4 ENERGY EFFICIENCY IN THE PACIFIC NORTHWEST

In the 1980's, increases in manufactured home energy efficiency in the Pacific Northwest did not keep pace with the advances in the efficiency of site-built homes through regional efficiency programs and energy codes. Most homes were built to levels only somewhat higher than the HUD code required, and increased gradually between 1976 and 1987[lxix]. In wasn't until the large-scale regional programs were implemented that significant upgrades were made.

Under the regional efficiency programs in the late-1980's, manufacturers began to offer additional efficiency measures and innovative applications. Vinyl-frame windows and floor insulation installed between the floor joists were used under the RCDP.[lxx] The incremental cost of vinyl-frame windows was about twice as much as the incremental cost of comparably efficient aluminum-frame windows, but cost reductions appeared to be likely.[lxxi]

Designing and constructing homes to meet the SGC requirements was not difficult in the two milder MCS climate zones. Production time increased some, but not significantly. Overall, costs increased about $2,200 at the wholesale level.[lxxii] Other features raising energy efficiency included:

- The specifications required additional caulking and better sealing between the units of multi-section homes.

- The insulation on crossover ducts between units of multi-section homes was increased from R-4 to R-11 and this appeared to be a very cost-effective measure.

- Using floor "cut-in" insulation (batts cut to fit between floor joists) increased thermal performance substantially. Blown-in ceiling insulation initially appeared to be considerably more cost-effective than fiberglass insulation.[lxxiii]

- The use of energy-efficient lighting was examined and potential savings were estimated to be 400 kWh/year for each new home. Levelized cost was estimated to be about $.05/kWh.[lxxiv]

The programs had other transformation-oriented effects on the PNW market. By the time MAP was underway, some efficiency measure prices had declined.[lxxv] The price of ceiling batt insulation had fallen and material sizing had been modified to make the batts fit so that they were more effective; batt insulation cost and performance were comparable to blow-in insulation. Vinyl-frame window prices had also fallen considerably as much of the window industry shifted to using vinyl frames. Overall, the costs of meeting the specifications were estimated to have declined by about 20 percent, in part as a result of the programs.

The efficiency requirements that were first established based on the MCS were very similar to the most recent requirements under the Alliance's SGC program; however, they have been fine-tuned over time to take advantage of improved designs and technologies, feedback from the industry, and price changes.

- The specifications require basically the maximum feasible insulation levels in all envelope components that can be achieved without using unconventional technologies. Typical ceiling insulation levels are R-38 to R-49 (depending on whether the ceiling is vaulted or not). Wall insulation levels of R-21 are achieved with 6" walls and higher density batts. R-33 floor insulation is typical, with special installation to ensure that internal ducts are within the insulation and the entire cavity is well insulated. Crossover ducts are well sealed and insulated; this is estimated to cut duct losses in half. All penetrations and openings are well sealed. And windows typically have a U-value of 0.38.[lxxvi]

- Technically, thermal performance equivalent to the SGC specifications could be achieved in essentially 100 percent of the new manufactured homes with either electric or gas heating.

In addition to having had effects on prices, the programs also provided useful insights about potential energy-efficiency marketing issues. It was found that buyers tended to associate efficiency with high quality,[lxxvii] but that limitations on window area were an impediment to sales of efficient homes.[lxxviii]

Manufacturers believed that buyers were interested in energy efficiency and would pay more for improved performance, but they needed solid evidence of the energy savings.[lxxix] Furthermore, dealer and buyer focus groups conducted at the end of MAP (in 1996) showed that several important changes had occurred in the market regarding energy efficiency.[lxxx]

- SGC features had become the standard for several manufacturers.

- Buyers had become very aware of SGC homes and expected new manufactured homes to be built to SGC specifications. Although they were sold on the idea of SGC homes, few dealers or consumers had a good understanding of the amount such homes would save on utility bills.

- Buyers and dealers associated energy efficiency with higher home quality.

- Dealers opposed manufacturer attempts to produce non-SGC homes because they felt that the image of their products would suffer.

- The amount that SGC features added to retail home prices varied widely — from $500 to $2,500 — depending on home size, price range, the standard efficiency level, and markups.

3.5 MARKET BARRIERS

A number of barriers have been identified through Pacific Northwest studies and programs. The comprehensive regional experience has provided an excellent understanding of these barriers, which are dominated by first cost issues for both consumers and suppliers.

Exhibit 3-2
Pacific Northwest Barriers

Market Actors			Barriers												
Customers	Manufacturers	Dealers	High Initial Cost vs Value	Info/Search Costs	Performance Uncertainty	Transaction Costs	Market Uncertainty	Hidden Cost *	Organizational Practices	Misplaced Incentives	Asymmetric Information **	Inseparability of product features	Access to Financing	Unable to recoup investment when selling
●			X											
●				X										
●												X		
●													X	
●														X
	●					X								
	●						X							
	●							X						
	●								X					
	●									X				
	●										X			
		●					X							
		●							X					
		●								X				
		●									X			

* Hidden costs identified for manufacturers included technical/construction barriers and aesthetics and customer preferences.

** Consolidation and vertical integration has led to the asymmetric information barrier, since new market entrants have no experience or familiarity with energy efficiency programs already in place.

3.5.1 Customer Barriers

Added cost for efficiency improvements has been identified consistently as the major barrier to greater efficiency in new manufactured homes. When stakeholders were asked about barriers to efficiency improvements in the earliest regional studies, the most frequently cited barrier was reduced home affordability because of higher first costs.[lxxxi]

This issue is probably even more important with manufactured than site-built housing because buyers seek manufactured housing because of its lower first cost and monthly housing payments. Buyers also tend to have lower incomes so any added costs are a more significant burden.

Information from dealer and manufacturer surveys conducted in the PNW suggested that to some extent higher efficiency levels were associated primarily with higher price homes with additional amenities. Consequently, there was at least a partial ***inseparability-of-features*** barrier.

To manufacturers and dealers, higher first cost translates into ***concerns about decreased sales and market uncertainties***. Conventional wisdom and research prior to the PNW programs had supported the belief that manufactured home buyer demand was especially sensitive to higher costs. A recent empirical study, however, showed that the price elasticity of demand for manufactured homes was essentially the same as it was for site-built homes.[lxxxii] This study also suggested that loan interest rates could be a significant factor in determining demand.

Access to financing is a barrier in that standard lending terms for manufactured homes, especially those financed as personal property, aggravate the effects of higher first cost.

- Higher interest rates and shorter loan terms have made manufactured home monthly housing payments considerably higher than payments for the same loan amount on a site-built home. There is little justification in terms of the usual risk factors for these less favorable terms.

- Lending competition has lessened the lending term differences for manufactured homes on the owner's lot, but a significant differential continues to exist for homes financed as personal property.

- Affordability has been defined by buyers according to their ability to qualify for a home loan. This test was institutionalized in the market in loan/income qualifying ratios, which usually did not take the benefits of reduced utility bills into account in the qualification process. Energy-efficient loans and mortgages that would take the effects of energy efficiency into account had been even less available for manufactured homes than site-built homes.

A related cost issue is ***whether an owner will recover the added costs of a more energy-efficient home at resal***e. In the early stages of the PNW programs, there was little consistency in the treatment of energy-efficiency measures in appraisals of used homes and this was a type of hidden cost faced by buyers. There is also the possibility that a home buyer will not live in the home long enough to pay back added costs for the efficiency investment through reduced utility bills. Conventional wisdom and past studies suggested that buyers of new manufactured homes lived in them for seven (7) years or less and this might not be long enough to save enough on their energy bills to recover their higher up-front costs. A recent empirical study found, however, that the average tenure in a new manufactured home was closer to 15 years.[lxxxiii]

Another way of defining the issue of higher first cost is ***that consumers do not have adequate information*** about the benefits of increased energy efficiency to evaluate the economic impacts properly. In fact, most stakeholders recognized that this was the real issue, and this recognition was responsible for the PNW's extensive demonstration, data collection, and

independent data analyses to assess energy savings and cost-effectiveness of efficient manufactured homes.

- In the early days of the regional programs, planners acknowledged that manufactured homes were different enough from site-built homes that findings and programs for site-built homes could not be applied directly to manufactured housing. All stakeholders had to be presented with actual data and results for manufactured homes verifying their energy savings. The support of manufacturers was contingent on the availability of data directly relevant to manufactured homes, while dealers needed reliable, objective, and easy-to-understand and communicate information about the expected energy savings of efficient homes.

- In addition, manufactured home buyers typically lacked much awareness of energy saving opportunities. This situation was aggravated by the fact that a large proportion of purchasers were first-time buyers.

Ultimately, buyers had to be convinced that the value of energy savings they would receive would more than offset the added cost of the energy-efficient measures they were considering.

3.5.2 Supply-Side Barriers

A number of supply-side barriers faced by manufacturers and dealers were also found to play a significant role in the market. In the early stages of regional programs, several ***technical or construction barriers*** were identified that could limit the application of energy-efficient measures.

- First, because manufactured homes have to be transported, they must be designed within certain height limits, which are based on the clearance limits on highways. Consequently, roofs could not be designed to be higher to permit more insulation to be installed.lxxxiv Unconventional techniques were identified for constructing roofs with higher insulation levels, but they added to costs. A related issue was excessive compression of ceiling insulation that occurred at the roof heel. Higher heel height designs have become available to alleviate this problem.

- Similarly, manufacturers were concerned about limits on the amount of insulation that could be installed in walls.lxxxv Making walls significantly thicker would reduce floor area because width limitations also apply to manufactured homes. Increasing wall thickness from 4 inches to 6 inches was not considered to be a major technical hurdle, but it added significant costs. Since the 1980s, 6-inch walls have become standard for many manufacturers because of consumer demand and this has allowed installing insulation up to about R-22 using conventional designs.

- Manufacturers were also concerned that highly insulated homes would be very heavy and require additional axles and structural support.lxxxvi Once again, however, consumer demand has led to production of heavier and larger units, so the transportation issue had to be addressed anyway.

- Manufacturers were also concerned that putting more than R-19 insulation in floors might require substantial floor redesign.[lxxxvii] Innovative solutions have been found, however, to install as much as R-30 floor insulation in homes in the PNW.

- Potential condensation problems were another barrier that manufacturers foresaw.[lxxxviii] Condensation had been a recurrent problem that plagued the industry for years. The industry feared that tightening homes up to save energy would aggravate potential problems with moisture. As a consequence, proper ventilation became a cornerstone of the regional programs.

Another potential construction barrier involved ***aesthetics and consumer preferences***. Throughout the programs, limitations on glazing area to achieve prescribed efficiency levels were a concern because customers usually preferred more glazing, and dealers said that restricting the amount of glazing would hurt marketability and sales.[lxxxix] This issue was resolved largely through the use of much more efficient windows.

Manufacturers had several ***other production process concerns*** that constituted potential barriers. One is related to the geographic coverage of efficiency standards. The manufactured housing industry is structured to build homes in a factory that can be shipped to wide geographic areas. Furthermore, manufacturers have no control over where the home is sited. Any requirements that varied within relatively small geographic areas would interfere with the process used by the industry, ultimately leading to higher consumer costs and major industry disruptions. Consequently, efficiency requirements that were not uniform over a large region were considered to be very undesirable.

Higher efficiency requirements could also disrupt the production process and increase costs through another mechanism — increased supply inventories. The less the diversity of materials that have to be stocked in a factory, the less the inventory costs are and the better control the manufacturers have over the production process.[xc] Similarly, requirements for unusual materials or components could lead to problems with availability. Manufactures also raised this as a potential obstacle.[xci]

An overall barrier on the supply side of this market was the ***organizational practices*** of manufacturers and dealers, that is, their inherent reluctance to change their practices. The building industries traditionally have been resistant to change, and manufactured housing producers were no different. Supply-side actors had developed their products, delivery mechanisms, and markets, and were skeptical of any changes that were initiated from the outside.

A unique problem of ***split incentives*** existed in this industry. The set-up crews that installed the manufactured homes were often independent contractors who had no ties to manufacturers and frequently few commitments to dealers. Nevertheless, the job they did setting up homes could affect the homes' performance substantially. Manufacturers expressed concerns that home installer practices could reduce the performance of efficient homes that they produced and, ultimately, the manufacturer would be held responsible by the consumer.[xcii]

Another potential barrier identified by both dealers and manufacturers was the ***cost of stocking energy-efficient homes on the dealer's lot***. Both groups felt that it was important to have efficient homes on the lot to promote their sales, but the dealer would have to absorb the cost of inventorying a home that might be sold in relatively small quantities.[xciii]

One final potential barrier has been identified only recently and is related to an apparent industry trend. The ***consolidation and vertical integration*** that has occurred in the industry in recent years may pose some obstacles because it means that new players, often from other parts of the country, are entering the PNW market.[xciv]

These new market entrants may have no experience or familiarity with the steps that have been taken in this region to improve energy efficiency, so their awareness must be built up from the beginning. Some also bring a strategy of competing primarily on price, so they are unlikely to readily accept the need and rationale for increased energy efficiency. In fact, they may use price-cutting as a strategy to capture market share, thereby encouraging established manufacturers also to emphasize initial cost rather than energy efficiency.

3.6 MARKET INTERVENTIONS

Interventions that were used in the PNW to address these barriers are discussed in this section. The discussion addresses interventions by category, and also identifies lessons learned that might be applicable in California.

Exhibit 3-3
Pacific Northwest Interventions

Market Actors			Barriers												Interventions													
															Information			Promotion						Testing/ Certifi-cation		Financial Measures		
Customers	Manufacturers	Dealers	High Initial Cost vs Value	Info/Search Costs	Performance Uncertainty	Transaction Costs	Market Uncertainty	Hidden Cost *	Organizational Practices	Misplaced Incentives	Asymmetric Information **	Inseparability of product features	Access to Financing	Unable to recoup investment when selling	Targeted Information	Diversified Information	Brochures and Fact Sheets	Advertising, PR	Energy Star Program	Technical Assistance	Design Assistance	Training	Testing	Certification	Customer Incentives	Supplier Incentives	Below market Financing
●			x																						x		x
●				x													x	x									
●												x						x									
●													x														x
●														x	x			x									
	●					x																x					
	●						x								x		x				x				x	x	x
	●							x												x		x					
	●								x												x	x					
	●									x															x	x	
	●										x				x		x	x									
		●					x								x		x				x				x	x	x
		●							x												x	x					
		●								x															x	x	
		●									x				x		x	x									

* Hidden costs identified for manufacturers included technical/construction barriers and aesthetics and customer preferences.

** Consolidation and vertical integration has led to the asymmetric information barrier, since new market entrants have no experience or familiarity with energy efficiency programs already in place.

3.6.1 Market Interventions — Research

From the earliest stages of the PNW activities, implementers recognized that it was important to develop empirical evidence about the technical feasibility, cost, and performance of various efficiency upgrades. Although these activities were not strictly interventions in the market, they were essential to both determine what efficiency improvements were feasible and demonstrate to all stakeholders the costs and benefits of contemplated upgrades. Moreover, this information meant that the actual interventions implemented were built on a solid research base that was supplemented throughout the program with updated data and information. Stakeholders believed that this information was critical to maximize the effectiveness of the interventions.

At the very beginning of the regional programs, manufacturers noted that it would be important to have solid data on the performance of energy-efficiency upgrades to convince the market of the benefits.[xcv] They, and other industry members and consumers, indicated that it was important to have information available from trusted, third parties on the performance of energy-efficient manufactured homes.[xcvi]

Industry stakeholders believed that there were potential conflicts between increased energy efficiency and marketability of their homes and this needed to be addressed by comprehensive research.[xcvii] Timely analyses were frequently demonstrated to be very beneficial, e.g., when they showed that insulation and vinyl-frame window prices had fallen after the initial regional efforts. These data were useful in future program revisions and materials.[xcviii]

After the initial decision to focus BPA efforts on new manufactured homes, a first step was two pilot projects that resulted in the construction of 39 high-efficiency new homes built to regional MCS requirements. These pilot projects showed that constructing homes with much higher insulation levels was technically feasible and the homes performed well, but the cost-effectiveness was questionable given the upgrade costs and the state of manufacturer experience with efficiency measures.

There has been very little research done on manufactured housing energy-efficiency opportunities in California, and a base of information about costs and benefits would probably be essential for a statewide program.

- The research conducted in the PNW would be helpful to build upon in California, but the PNW program has emphasized space heating issues, whereas a program in California would have to take space cooling into account. Consequently, new research would be required.

- The PNW findings about retrofit options — which probably would apply in California — showed that cost-effective retrofit opportunities were limited because of the high costs of implementing upgrades and the limitations inherent in the construction of older manufactured homes (such as small roof cavities). However, it was shown that upgrades of older, less-insulated homes were cost-effective if the remaining life of the home were long enough.xcix

The ***development and dissemination of market and cost-benefit information*** became a cornerstone of the PNW programs. A concerted effort was made to disseminate the findings from the regional research projects. It would be useful to integrate information dissemination into a manufactured housing program in California to ensure that all stakeholders had timely access to the latest research findings.

- The initial SGC study recommended providing manufacturers and dealers with detailed market information to help reduce risks associated with the construction and stocking of efficient homes.c

- A frequent theme advocated by industry was the generation and dissemination of simple consumer information stressing the benefits of efficient homes and providing third-party data on energy and dollar savings.ci

3.6.2 Market Interventions — Marketing and Promotion

Extensive marketing and promotion have been another key component of the regional programs from the beginning. There is a consensus in the PNW that the success of the

programs has been driven by consumer awareness of the SGC label, increased understanding of energy-efficiency, and the influence of marketing on consumer demand. This industry is very responsive to consumer demand and, when consumer demand for energy efficiency has increased, the industry has demonstrated that it will respond with products that meet consumer needs; the key in the PNW was motivating increased consumer demand. There is no reason to think that this would be any less important in California and marketing and promotion would be essential program elements.

Specific marketing and promotion interventions used in the PNW and their effects are discussed below.

- The initial study of SGC recommended implementing co-op advertising with dealers. From the beginning, manufacturers were not convinced that promotion and certification would be effective, however, unless they were coupled with other mechanisms.cii

- The promotion and information dissemination employed in MAP were very successful — 90 percent of MAP home buyers said that they had received literature on energy-efficiency features. MAP home owners were also more satisfied with their home's energy efficiency than buyers of standard homes and were twice as likely (40 percent) to say that their energy bills were lower than expected.ciii

- Dealers in focus groups held in 1996 praised the marketing approaches used in MAP and the SGC program.civ Almost all buyers in parallel focus groups indicated that they knew about SGC before visiting a dealer and expected their home to be built to the specifications. Buyers and dealers noted that BPA's credibility and objectivity had a very positive effect on their perceptions. Television ads had a lasting effect on buyer perceptions, and buyers associated home quality with energy efficiency. Both dealers and consumers wanted more, simple to understand materials about the utility bill savings of SGC homes. Dealers and consumers also felt that displays such as cutaways showing the level of insulation in SGC homes were very useful.

- Since MAP, regional program implementers have worked jointly with PNW industry associations through Northwest Pride to incorporate promotions about SGC homes in regional television advertising. Efficiency program implementers have funded the production cost of SGC ads and the industry has paid for the air time. This campaign has been very effective.

- Industry stakeholders have commented for several years that to achieve lasting effects the marketing message must stress the diverse long-term benefits of owning an energy-efficient home. Industry members believe that fundamental changes won't occur if an incentive is used and the marketing message emphasizes the incentive. The industry also has stressed the need for a common theme and marketing coordination. The Alliance's current Comfort You Can Count On ad campaign addresses these issues.cv The industry also argued that it was important to promote manufactured housing separately from site-built housing and not as an afterthought, but marketing should focus on energy-efficient manufactured housing, not manufactured housing as a housing type.cvi

- The Alliance's SGC program has included a point-of-sale ad campaign with collateral under a common theme. A "Hall of Fame" for the top SGC sales people was established. Manufacturers were briefed on the marketing campaign. Marketing occurred at home shows and the television ad campaign developed in conjunction with the industry continued under Northwest Pride.[cvii] Another important element of point-of-sale marketing was the placement of energy-efficient homes on dealer lots; manufacturers and dealers have maintained that this was important for selling SGC homes to buyers. About half the dealers have stocked SGC homes under the Alliance's program.[cviii]

- Involving material and component suppliers (e.g., insulation suppliers and high-efficiency heating/cooling equipment producers) in the promotion of energy-efficient manufactured homes has been considered in the PNW. Because suppliers of efficient products can benefit financially from energy-efficiency programs, such programs can be in their interest. BPA initiated a dialogue with suppliers to involve them in co-funding and implementing marketing campaigns and found that several were receptive and willing to commit funding.

3.6.3 Market Interventions — Financial Incentives

In the late 1980's and early 1990's, financial incentives were an essential component of the PNW programs. Incentives targeted throughout the supply chain or at consumers have been investigated and instituted in the PNW. Because first cost traditionally has been such an important consideration in this market, any program in California would have to examine the various financial incentive options carefully and likely would need to include the most cost-effective ones, at least to jump-start a program.

The first study that explored including manufactured homes in the SGC program recommended providing dealers with a rebate or purchase allowance for stocking SGC homes on their lots. It also recommended offering consumers rebates or other financial incentives to purchase SGC homes. Another option proposed was reduced electric rates for high-efficiency manufactured homes.

Initially, manufacturers felt that financial incentives should be provided to buyers rather than to dealers or manufacturers. They mentioned consumer rebates, improved lending terms, and lower electric rates as preferred consumer financial incentive options. Several manufacturers noted that they were concerned that rebates to supply-side participants might not reach consumers.[cix]

Consumer rebates were implemented initially in the RCDP. In subsequent programs, dealer incentives and manufacturer rebates (in MAP) were used. In all cases where rebates were implemented, they were relatively large (from $1,500 to $4,000).

Although manufacturers felt that giving rebates to consumers had the advantage of making the rebate clearly visible to buyers and ensuring that the buyer received the full rebate, there was evidence that an incentive to the manufacturer translated into a larger price reduction at the retail level than a direct rebate to consumers. Consequently, the utility investment was leveraged and had a higher financial impact than a consumer rebate.

There have been misgivings about negative effects of large rebates in that rebates became institutionalized and both consumers and suppliers came to depend on them.[cx] This was consistent with repeated manufacturer observations that the market could not be changed fundamentally unless the benefits of energy efficiency, rather than the availability of rebates, were stressed. A smaller consumer rebate ($500) was proposed at one time, in conjunction with a lender program offering better lending terms, but never implemented.[cxi] This approach deserves further investigation and consideration.

3.6.4 Market Interventions — Labeling

The use of ***energy-efficient home labeling*** has been a very successful strategy in the PNW. The SGC label has become well recognized by dealers and buyers, and marketing materials have been designed to incorporate the label. Efforts are underway to determine how best to incorporate the national ENERGYSTAR® label. Development of a brand name and label would benefit a California program. Either the Good Cents or ENERGYSTAR® labels could be considered, or another label consistent with existing California programs might be examined.

3.6.5 Market Interventions — Training/Education

Training and education were key components of the strategies implemented in the PNW. These efforts were directed at the key market actors to increase their understanding and awareness of energy efficiency and to make sure that efficiency upgrades were implemented most effectively. Manufacturer and dealer training and education would probably be essential in California, and could draw upon the materials and approaches implemented in the PNW.

Initial proposals for training and education for dealers and manufacturers originated in the early study of the feasibility of including manufactured homes in the regional site-built SGC program.[cxii]

Early in the regional efforts, manufacturers felt that dealers, in particular, needed education and training about energy efficiency.[cxiii] This became a key element of subsequent programs and continues under the Alliance's SGC program.[cxiv] A related recommendation that emerged from the initial SGC program was the need to centralize and coordinate training.[cxv]

3.6.6 Market Interventions — Financing Options

A number of improved lending options for high-efficiency manufactured homes have been explored during the course of the PNW programs. Since the first regional programs were started, the availability of energy-efficient mortgages or loans has increased and some lenders have improved their lending terms for efficient manufactured homes.

A California program could benefit from working with the lending and appraisal industries to provide advantages to buyers who purchase efficient manufactured homes. There is evidence that the lending market in California is becoming more competitive and this might be an opportune time to work with the lending industry to develop such a program.

Specific experiences with financing in the PNW include the following.

- The initial study of SGC manufactured homes recommended encouraging lenders to increase the debt-to-income ratio required for efficient manufactured homes. It also recommended encouraging insurance companies to reduce the premiums on SGC homes.

- During the initial SGC program, recommendations were made to modify lending terms, including the qualification ratio, for efficient manufactured homes.cxvi A study of lending and appraisal practices demonstrated the benefits of including energy bills in determining the qualification ratio and showed that affordability would be improved by a more efficient home. It also recommended offering lower interest rates and stretching the qualification ratio.cxvii

- Over time, energy-efficient loan and mortgage terms and a qualification ratio stretch have become more available to manufactured home buyers in the PNW; however, they do not appear to be widespread. The SGC package has been recognized in appraiser value guides.

- One innovative approach proposed certifying and promoting those lenders who offered improved lending terms to buyers of efficient manufactured homes (along with a modest consumer rebate from utilities). Lenders would have been required to institute lending terms that provided the same affordability as a $1,500 consumer rebate.cxviii This program was not implemented.

  - A recent development in the Pacific Northwest is a low-interest loan program that Idaho has developed for SGC (electrically heated) and Natural Choice (gas heated) manufactured homes, which are combined under the Northwest Energy-Efficient Manufactured Home (NEEM) program. According to Ken Eklund of the Idaho Department of Water Resources (IDWR), the lending program provides a 4 percent interest rate loan for 5 years of $1,500 for multi-section homes and $1,000 for single-sections towards the cost of a program qualifying home.

  - The loans apply to homes sold both as real and personal property. The loan approach was structured so that it would not interfere with their security interest in homes. Lenders view the loan as a contribution to the down payment — which sometimes means that the buyer can get a better interest rate on their primary loan. Because the dealer has to contribute a 10 percent reserve as security against default on the loan, they have an interest in assuring the loan quality. So far, the credit risk of participants is generally quite good.

  - To date, 40 loans have originated under the program for a total of $60,000. Despite this relatively modest number, it appears that the existence of the program has increased sales of program homes because participating retailers must mention the lending program (and consequently the NEEM program) to buyers, even though the buyer may not elect to take the special loan.

  - Among the other PNW states, Oregon is pursuing development of a similar program; Washington is not at this time. Eklund estimates that it would cost about $10 million to set up a regional lending program to cover all manufactured homes.

3.6.7 Market Interventions — Inspection and Certification

Inspection and certification of energy-efficient manufactured homes was another key component that became institutionalized in the PNW regional programs. In-plant inspection, on-site inspection, and certification would probably be essential in a California program. The option of self-certification and Production Inspection Primary Inspection Agency (IPIA) in-plant inspection could be explored in California.

The first regional study on SGC manufactured housing options proposed that IPIAs conduct the in-plant inspections as part of the regular HUD-code inspection process and that utilities conduct on-site inspections.[cxix] The study also proposed allowing manufacturers to self-certify compliance of their homes.

- Using IPIAs to conduct in-plant inspections was not implemented across the region because of the reluctance of IPIAs to add to their workload and the possibility of diluting the standard HUD-code inspection process. State energy office staff typically assumed this role.

- Self-certification also was not implemented, primarily because of restrictions imposed by the organization that had the rights to the Good Cents label.

Throughout the regional programs, in-plant and on-site inspections became critical elements. The current Alliance SGC program continues these activities.[cxx]

The regional programs emphasized implementing the programs on a voluntary basis and giving the manufacturers maximum flexibility in meeting design requirements. As in the PNW, any program implemented in California would have to be designed to be consistent with the preemptive scope of the HUD code. The industry in California would probably be most willing to participate in a program that provided reasonable flexibility for meeting design specifications.

- The initial study of the possibility of including manufactured homes in the SGC program emphasized the importance of providing manufacturers maximum flexibility to meet the requirements. Manufacturers expressed concerns early in the programs that they be allowed flexibility to meet efficiency specifications. This was consistent with the performance requirements of the HUD code.cxxi

- The HUD code precluded local jurisdictions from setting requirements that differed from the code, so all program design and construction specifications applied only to program participants and program participation was voluntary.

3.6.8 Market Interventions — Technical Assistance

Over the course of the regional programs, technical assistance and timely resolution of technical issues, including those related to home set-up, have been essential to maintain manufacturer involvement. It is likely that these steps would be important in a California program as well, and that solutions to technical problems in the PNW could provide a solid

information base for California's efforts. Specific aspects of the PNW experience include the following.

The first SGC study recommended providing manufacturers with production planning assistance, and manufacturers themselves have stressed the importance of having technical assistance available to them for designing and constructing efficient manufactured homes.[cxxii]

- Potential condensation problems in efficient manufactured homes were an initial industry concern and they were addressed through specific ventilation requirements that evolved over several years.cxxiii

- The unique characteristics of manufactured homes and a lack of experience with some high-efficiency measures made it very important to provide expert technical assistance to the industry on an on-going basis. The Alliance's program continues to offer technical assistance to manufacturers and consumers.cxxiv

Manufacturers have been concerned since the beginning of the regional programs that improper home set up could undermine the efficiency improvements and that ***specific set-up requirements were necessary***. This is likely to be a concern in California as well and should receive thorough attention in conjunction with the industry.

- From the first stages of the regional program, manufacturers expressed concerns about the potential negative effects of improper home installations.cxxv In the early regional programs, dealers and set-up crews were not involved actively and this was a serious omission in MAP because of their critical role in set up.

- A government, utility, and industry effort led to Washington legislation requiring a training program and the presence of at least one certified set up crew member on every home installation.cxxvi Most states in the region have now adopted training and certification programs for installers.

3.6.9 Market Interventions — Design and Implementation Strategies

There have been a number of program design and implementation strategies that have been essential to the success of PNW programs and that could prove useful during program design in California.

- The industry felt that a sequential, incremental approach was important to program success. Industry members noted that it would be essential to keep paperwork to a minimum and provide some certainty about the program so the industry could plan its investments accordingly. They wanted a program designed to be a multi-year effort that could be fine-tuned based upon what was learned in preceding years.cxxvii

- Having different construction requirements in different geographic areas was an industry concern in the early program stages because manufacturers were not always sure where their homes would be sited, and it was a burden on them to have to meet multiple specifications. The industry also wanted the program to cover enough of their market that they could justify the investments required.

- Universal participation by manufacturers during MAP was important because it prevented non-participants from undercutting participants.

- Centralization of program administration was important to the industry to increase certainty and minimize administrative burdens. A high level of trust and understanding developed between implementers and the industry and this was important to program success.cxxviii

- An important feature of the regional program has been the proactive involvement of the industry in program design and implementation. From the beginning, manufacturers were brought into the design and implementation effort and much of the program's success was due to this cooperative approach. Manufacturers, in fact, initially proposed the guidelines for MAP. A weak link in early efforts, however, was a failure to involve dealers adequately in the program.cxxix

- The first evaluation of the SGC manufactured home program recommended program design elements including good coordination and communication among all parties involved in implementing the program; a single climate zone specification; a limited number of implementing parties; and certainty about the program life.cxxx

- Another important program element was tracking of efficient home sales.cxxxi The PNW program has consistently instituted means to track the production and sales of efficient homes to verify program effects, identify problems, and allow program fine-tuning. The existing industry tracking infrastructure provides a good starting point for such a tracking system.

- Flexibility in the programs was important to permit adaptation to changing conditions. For example, the programs were able to adapt to changing efficiency measure costs and the recognition of the importance of including dealers in the program. Recently, tracking and monitoring information for the Alliance's SGC program suggests that industry consolidation and vertical integration are occurring and may necessitate program changes.cxxxii

- Inclusion of other measures, such as more efficient lighting, water heating, and appliances, has been investigated in the PNW. Such changes could be conducted in cooperation with the national EnergyStar® program or other programs specific to California.

An important element in any program should be a planned exit strategy. The failure to have one in place when MAP ended created initial industry consternation and disrupted the cooperative spirit that had been developed over several years. Manufacturers and dealers are likely to be more willing participants if they can plan with some certainty.

One long-term strategy in the PNW has been ***working to upgrade the HUD code***. This strategy was proposed in the late-1980s and again after the initial SGC program was implemented.[cxxxiii] Ultimately, MAP had an effect on the efficiency levels required by the 1994 HUD code by providing evidence that very efficient homes could be built and sold. In

California, it could be useful to work with HUD to determine what opportunities exist to influence future code upgrades.

Finally, a strategy that represented more of the "stick" than the "carrot" was the ***establishment of electric utility hook-up fees for manufactured homes that did not meet specified high-efficiency levels.*** Understandably, the manufactured housing industry opposed this approach. Where it was implemented in the region, the requirement was established for *all housing types* so that it did not single out manufactured homes.[cxxxiv] California utilities could explore the legal, policy, and program implications of pursuing this option.

3.7 MARKET EFFECTS INDICATORS

A preliminary set of possible market effects indicators was developed based on information from the Pacific Northwest programs. These market effects indicators are summarized in five categories:

- awareness/knowledge
- interest
- expressed intent to use and promote energy efficiency
- observed usage and promotion of energy efficiency
- regular and repeated usage and promotion of energy efficiency.

3.7.1 Market Effects Indicators — Awareness/knowledge

Potential indicators of ***energy-efficiency awareness and knowledge*** can be identified, measured, and tracked for the key market actors.

- Initially, it would be important to determine the awareness and knowledge of manufacturers and dealers because of their key role in any efficiency program. Their familiarity with energy-efficiency upgrades in California and awareness of what measures have been implemented in other regions could be identified and tracked.

- Consumer awareness and knowledge also would be an important indicator; awareness and knowledge about what energy-efficient options exist as well as their potential benefits and costs would be useful metrics.

- The awareness and knowledge of other market actors would be secondary, but important, indicators. Other actors that could provide valuable indicators include lenders, set-up crews, and product and material suppliers.

3.7.2 Market Effects Indicators — Interest

Interest in energy efficiency is probably most important as a market effects indicator for consumers. As consumers become better informed and educated about the benefits of energy-efficient manufactured homes, their level of interest is likely to rise. They may indicate an increasing willingness to pay more for energy efficiency or purchase energy efficiency in place of other amenities.

Dealer interest in energy efficiency is likely to be spurred by consumer interest, while manufacturer interest is likely to be in response to changes in the products ordered through dealers. However, both dealers and manufacturers can be proactive in the market and an increasing interest level could be the result of an effective program.

Increasing lender interest in energy efficiency could also be a useful indicator of market effects, particularly if lenders see an advantage in making energy-efficient loans.

3.7.3 Market Effects Indicators — Intent

The ***intent*** to produce, market, and purchase energy-efficient manufactured homes provides important indicators of market effects for all market actors.

- Although consumers often overstate their intentions to purchase energy-efficient products, their expressed intent can be a useful indicator to track market changes. Potential manufactured home buyers can provide information about what energy-efficiency features they are seeking and their purchase intentions, as well as how much they would be willing to pay and how important they view energy efficiency compared with other characteristics.

- Dealers can provide information about their intentions to promote energy-efficient manufactured homes. Specifically, they can indicate what types of marketing they have done and what they plan to do in the future in terms of advertising and promoting efficiency to customers.

- Manufacturers can provide information about whether they anticipate increasing the energy efficiency of certain types of homes, what types of measures and equipment they expect to use, what additional information they plan to collect, and what R&D they anticipate conducting.

- Lenders can indicate whether they expect to write any or more energy-efficient loans or mortgages for manufactured homes. They can also provide information on the types of lending terms they expect to offer for efficient manufactured homes.

3.7.4 Market Effects Indicators — Usage and Promotion of Energy Efficiency

Measures of the extent of ***promotion of increased energy efficiency and purchase by consumers*** provide solid indicators of market effects.

- The efficiency of homes bought by consumers provides a direct metric of market effects. If homes are sold through a labeling program, then the penetration of these homes could be used as a direct indicator. The efficiency of non-program homes could also be tracked since there has been evidence in the Northwest that even non-program homes have become more efficient.

- The extent and types of dealer promotional activities provide a good indicator of market effects. Point-of-purchase materials and sales person mentions of energy efficiency are two useful indicators. The extent of dealer advertising of efficient homes

in print materials and through radio and television advertisements are other important indicators. The presence of efficient homes on dealer lots is another critical indicator.

- Manufacturers can promote efficiency features to their dealers, but there is likely to be less evidence of this.

- Product and material supplier promotions of efficiency also could be important indicators.

- Lender implementation and promotion of favorable lending terms for efficient homes could be monitored as another critical indicator.

- Another important indicator of market effects is changed installation practices by set-up crews. The development and implementation of set-up specifications for efficient homes would be another indicator of changes in the market.

Finally, longer term market effects can be tracked through measures of ***regular and repeated promotions and purchases of energy-efficient homes*** for major market actors.

- For consumers, important indicators of long-term market effects include the satisfaction of buyers with energy-efficient homes, the frequency with which they inform other consumers about energy efficiency, and long-term increases in market penetration.

- The routine marketing of standard energy-efficiency packages, an increasing prevalence of efficient homes on dealer lots, increased understanding and awareness of energy-efficiency options and benefits, and increased marketing of energy efficiency would indicate adoption by the retailers of standard practices to promote efficient homes.

- Manufacturer adoption of energy-efficient packages as a standard offering in their product line, increased purchases of efficiency products and materials, and increased production of efficient homes would provide useful indicators to track long-term effects. Another indicator would be increased manufacturer awareness and understanding of the benefits of energy efficiency.

Long-term market effects may also be evident in the actions of "enabling" market actors and both upstream and downstream suppliers.

- Increased sales of insulation and efficient equipment and appliances would provide another indicator of established market effects.

- Lender development and adoption of favorable lending terms and energy-efficient loans and mortgages would be an indicator of long-term effects on lending practices.

- Establishment of appropriate installation practices for efficient homes and the development of training and certification programs for set-up crews would be indicators of long-term market effects.

- Adoption of tighter HUD thermal requirements would be an indicator of a significant market effect. Allowance of special requirements for more extreme climate zones would be an alternative indicator.

4. OTHER PROGRAMS

While the greatest amount of program activity has taken place in the Pacific Northwest, there have been other initiatives elsewhere in the country. Several of these are discussed below.

4.1 MANUFACTURED HOUSING RESEARCH ALLIANCE

The Manufactured Housing Research Alliance (MHRA) has as its focus the application of technology to improve energy efficiency as well as other aspects of manufactured home design and construction. Originally formed as the Southeast Manufactured Housing Alliance, the organization earlier this year joined forces with the Manufactured Housing Institute (MHI), which will now become the primary underwriter of MHRA operations. Although it was originally created specifically to improving energy efficiency, MHRA has expanded its scope to include other building technologies. Specific initiatives now under way include studying the feasibility of shifting to steel framing, improving the thermal performance of roofs, and developing a manual of recommended ducting practices.

On the energy efficiency front, MHRA has developed a series of state-specific cooling equipment sizing charts for HUD Zone 1. (Sizing charts for Zones 2 and 3 are expected by the end of the summer.) In a sample chart for the state of Georgia, sizing guidelines are provided for a half dozen separate geographic regions within the state, and are tailored to the size of the home and the percentage of glazed area.

Two sets of sizing recommendations are provided: one set assumes that the manufactured home is built just to HUD code; the other set is for homes that are built to the specifications of the "Alliance Energy Package," which includes minimum requirements for insulation (R-11 walls and either R-30 ceiling / R-19 floor or R-28 ceiling / R-22 floor), exterior duct work (R-6.5 duct wrap or equivalent), windows and doors (storm or insulated), and heat pump (10+ SEER; 6.8+ HSPF). In the sizing chart for Georgia, the Alliance package makes possible downsizing of up to 1 ton, although a half ton difference is more common. Notes to the sizing chart indicate that "in many cases, the use of low-e windows instead of clear glass will allow a reduction of ½ ton of cooling capacity."

Emanuel Levy, Executive Director of MHRA says that the Alliance Energy Package was not developed with a specific cost-effectiveness requirement. Instead, these standards represent what are, in MHRA's view, realistic and attainable levels of energy efficiency for manufactured homes. Levy also says that significant savings can be achieved from proper sizing alone, noting that units are almost always oversized by at least one half ton, and commonly by a ton or more.

4.2 EPA — ENERGYSTAR® MANUFACTURED HOMES

EPA's ENERGYSTAR® Manufactured Homes program is still in its early stages. To date, only a single manufacturer, Palm Harbor, has had any of its plants certified, and they have built a modest number of ENERGYSTAR® certified manufactured homes at their Florida factory and a handful at their plant in Oregon.

According to Subrato Chandra of the Florida Solar Energy Center (FSEC), the ENERGYSTAR® manufactured homes are not that different, especially when compared to other higher end homes. The main differences are higher SEER AC and — most important — the requirement that ducts be sealed using mastic rather than tape. This is, in fact, a significant requirement in that it requires installation contractors to change the way they site manufactured homes.

The ENERGYSTAR® Manufactured Homes Program Director, Sam Rashkin, notes that EPA convened a national industry group in April 1999 to consider ways to structure a program. The industry wanted to make the program as compatible as possible with the existing HUD approval (IPIA and DAPIA) process. EPA agreed to develop the requirements in terms of a total U-value, which is how the HUD code is defined. The target for ENERGYSTAR® is the same as for site-built homes — 30 percent better than the Model Energy Code level.

Under this plan, a manufacturer's ENERGYSTAR® design would be approved by the DAPIA (the independent contractor that inspects designs for conformance with the HUD code), but it would also have to be approved by EPA.

Manufacturers will have to implement a quality assurance (QA) process, using either the IPIA (the independent contractor that conducts in-plant inspections) or another certified 3rd party. The QA provider reviews the plant to make sure it meets program requirements. EPA provides ENERGYSTAR® certificates for all homes built under the program. The QA provider tests from 2-5 percent of the homes after they're set up (they can test more if necessary). The plant will pay either a labeling fee for each ENERGYSTAR® home or a lump sum to cover the testing costs.

Palm Harbor has been producing ENERGYSTAR® manufactured homes for some time, but not under the current process. It has now signed on to use the agreed upon approach. Sam Rashkin indicated that EPA tested a randomly chosen ENERGYSTAR® home by Palm Harbor and found that its infiltration rate was only a third of the level allowed by ENERGYSTAR® and duct leakage was half the allowed amount. He was very impressed with how tight manufactured homes are and the quality control that can be implemented.

Both Champion and Fuqua have indicated they will sign up for the program. Discussions are underway with Fleetwood also. Rashkin feels that even though manufacturers have concerns about the added costs for testing under ENERGYSTAR®, the homes could be sold as higher quality and could help avoid potential liability problems.

He mentioned that EPA has an RFP out, through the Manufactured Housing Research Alliance, to develop ENERGYSTAR® packages throughout the country. He was unsure what the schedule was or how many packages might be developed for California. He expected that two or three climate zones would probably cover the state adequately.

The program for manufactured homes is not linked to ENERGYSTAR® appliances or windows in any direct way, although the ENERGYSTAR® web site encourages manufactured home builders to become partners in the ENERGYSTAR® appliance program. Using these products might make it easier to meet the home requirements, but there is concern that there might be some confusion among buyers if different components had the ENERGYSTAR® label, but the home wasn't ENERGYSTAR®.

Rashkin mentioned that MidAmerican utility is starting a program to provide buyers an incentive of $0.65/square foot for ENERGYSTAR® manufactured homes. The utility already does this for site-built ENERGYSTAR® homes. He is very interested in following what happens in California.

ENERGYSTAR® has also made some headway in the Pacific Northwest. John Jennings and Ken Eklund of the Northwest Energy Efficiency Alliance (the Alliance) both stated that there had been concerns that on the one hand SGC homes would not qualify because they are heated by electric resistance furnaces, and that on the other hand the insulation requirements for ENERGYSTAR® homes would be below those for SGC.

The Idaho Department of Water Resources, an Alliance member, has been working with EPA and has reached agreement on co-branding NEEM homes (comprising both electrically heated Super Good Cents homes and gas-heated Natural Choice homes) with ENERGYSTAR®. This took over 18 months to negotiate.

Under the agreement, all NEEM homes west of the Cascade Mountains will qualify as ENERGYSTAR®, regardless of their heating system. East of the Cascades, gas heated program homes will all qualify and Super Good Cents homes with heat pumps will qualify. There is still some regional concern that heat pumps will not be a good option in colder areas, and that air conditioning is not a reasonable requirement where cooling loads are low.

If EPA provides funding, the region will promote ENERGYSTAR®. EPA has agreed that manufactured homes can be randomly inspected to verify compliance with ENERGYSTAR®. This policy diverges from the requirement for inspection/testing of every site-built ENERGYSTAR® home, and may reflect the 100 percent inspection already in place for Super Good Cents and Natural Choice.

EPA is also working on developing a prescriptive approach for meeting ENERGYSTAR®. IDWR and the Alliance are recommending that the NEEM requirements be adopted in the northern tier of the U.S. (HUD zone 3). EPA will next develop prescriptive requirements for hot/humid climates. Probable equipment requirements for California would be a heating efficiency of 80 percent AFUE and cooling SEER of 12.

4.3 INDIVIDUAL UTILITIES

In addition to the above national and regional efforts, several individual utilities have their own programs to promote greater energy efficiency in manufactured homes.

4.3.1 Santee Cooper

In South Carolina, Santee Cooper promotes manufactured homes built to Good Cents standard, citing energy costs “up to 26 percent “ lower than a conventional manufactured home, based both on lower consumption and a lower “Good Cents” rate offered by the utility. To qualify, homes must be all electric and have the following characteristics:

- R-30 ceilings, R-12 walls, and R-19 floors
- insulated glass or storm windows

- weather stripped exterior doors
- ducts outside of conditioned spaces that are mechanically fastened and sealed and have a minimum of two inches of R-6.5 duct wrap insulation or equivalent
- heat pumps that meet site-built requirements (i.e., 10 SEER+).

The example provided by the utility uses an incremental cost of $1,500 for a Good Cents home instead of a $50,000 "standard" manufactured home. This would add about $25 a month to the monthly mortgage payment, but would reduce the average monthly utility bill from $88 to $60 — for a net saving of $13 per month.

4.3.2 South Alabama Electric Cooperative

South Alabama Electric also uses the Good Cents label for manufactured homes, and will provide a $300 cash incentive to buyers of qualified manufactured homes. To qualify, homes must meet the following requirements:

- a properly sized heat pump
- attic insulation of R-28 (conventional ceiling) or R-21 (vaulted ceiling)
- wall insulation of R-11
- floor insulation of R-19
- insulated or storm windows and doors
- skirting or underpinning.

Manufactured homes are also eligible for a rebate of $50-120 per ton on heat pumps, depending on the SEER level installed.

4.3.3 TVA

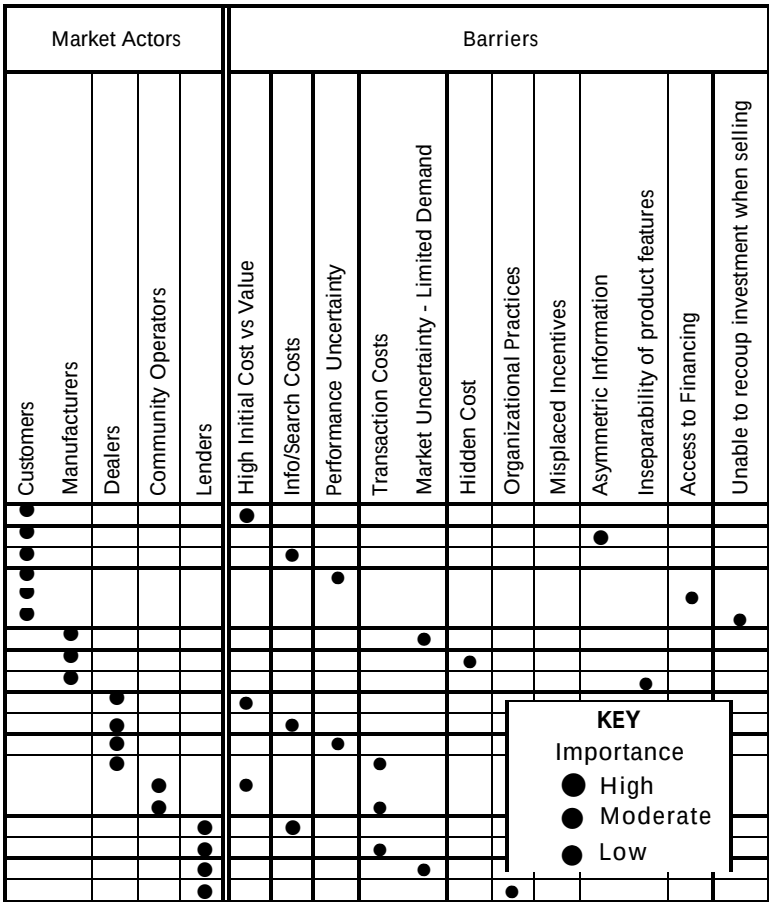
TVA's web site provides information on Energy Right Manufactured Homes along with Energy Right site-built homes. Requirements for Energy Right manufactured homes are fairly vague: insulated windows are cited as examples of energy efficient design, as are insulation levels of R-28 for ceiling, R-11 for walls, and R-22 for floor. No other program elements are cited or explained.

5. MARKET BARRIERS

In this chapter, the barriers to energy efficiency in manufactured homes reported by each group of surveyed market actors are discussed. In all data collection efforts, respondents were first asked an open-ended question asking them to identify hurdles they face when manufacturing, selling, or buying energy efficient manufactured homes. Any of these unprompted responses were given a "very important" rating.

Respondents were then asked to rate the importance of each of a list of barriers identified as potentially important based on review of other studies, discussions with knowledgeable industry observers or participants, and the researchers' judgment. Levels of perceived barriers are presented in Exhibit 5-1 according to the percentage of respondents who reported each barrier as not at all important, moderately important, or very important.[cxxxv]

Exhibit 5-1
Perceived Barriers



While the review of program experience in the Pacific Northwest provided valuable insights into the barriers that operate in the manufactured home market, we did not include those findings in the survey-based results presented in the exhibit. PNW findings are cited, however, when appropriate to provide context for the survey results.

5.1 CUSTOMER BARRIERS

Customers were able to identify some rather significant barriers to buying an energy efficient manufactured home. These results were verified with dealers' perceptions of barriers faced by their customers.

The highest rated barrier was ***high initial cost vs. value***. Customers say that energy efficient manufactured homes cost too much. Approximately half of the customers stated that this is a very important factor that would discourage the possible purchase of an energy efficient home. Buyers of manufactured homes typically have limited or fixed incomes that restrict the amount of additional money that could be spent on upgrades.

This finding is consistent with the PNW results where the added cost for energy efficiency has been identified consistently as the major barrier to greater efficiency in new manufactured homes. When stakeholders were asked about barriers to efficiency improvements in the earliest regional studies, the most frequently cited barrier was reduced home affordability because of higher first costs.

This issue is probably even more important with manufactured than site-built housing because buyers seek manufactured housing because of its lower first cost and monthly housing payments. Buyers also tend to have lower incomes so any added costs are a more significant burden.

Asymmetric information and ***information search cost*** were also identified as important barriers based on survey responses. Customers and dealers agree that the information on energy efficient benefits for customers is incomplete, unreliable and hard to find. Moreover, manufactured home buyers are often unaware that energy saving opportunities exist.

A less important barrier cited by customers is ***lack of access to financing***. These customers simply say that they would be unable to finance the extra cost of energy efficient features. As reported in the lender characterization section of this report, lenders typically charge higher interest rates for manufactured homes when compared to site built homes.

This was also found to be a barrier in the PNW experience, in that standard lending terms for manufactured homes, especially those financed as personal property, aggravate the effects of higher first cost. Affordability has been defined by buyers according to their ability to qualify for a home loan. This test was institutionalized in the market in loan/income qualifying ratios, which usually do not take the benefits of reduced utility bills into account in the qualification process. Energy-efficient loans and mortgages that would take the effects of energy efficiency into account have been even less available for manufactured homes than site-built homes.

Another barrier related to the issue of high first cost is a kind of hidden cost faced by customers, who are afraid that ***they will be unable to recoup their investment in energy efficiency when they try to sell their house***.

This is also consistent with the PNW report, which found little consistency in the treatment of energy-efficiency measures in appraisals of used homes and this was a type of hidden cost faced by buyers. There is also the possibility that a home buyer will not live in the home long enough to pay back added costs for the efficiency investment through reduced utility bills.

Lastly, some customers have doubts about energy savings from energy efficient manufactured homes — a clear indication of a ***performance uncertainty*** barrier. Since customers see very little information related to energy efficient homes in general, it would make sense that they might doubt a certain home's performance when it comes to saving them money on utility bills. This is a prime reason for a utility backed information program.

5.2 MANUFACTURER BARRIERS

As a group, California manufacturers reported few barriers to the production of energy efficient manufactured homes. In part this is because several of the surveyed plants already produce homes that are significantly above the HUD code for Zone 2.

The only barrier that was perceived as moderately important was limited customer demand, a form of ***market uncertainty***, which was cited as very important by three manufacturers. Three of the higher-end manufacturers, however, considered this not at all important.

Less important barriers for manufacturers include an inseparability of product features barrier in the form of ***buyer concerns about window area*** of energy efficient manufactured homes. Respondents reported this more as a barrier that had been a problem in the past, when it was necessary to limit window areas to maintain a higher overall U-value for the home envelope; with the availability of low-e, argon-filled vinyl windows this has become much less of a concern.

Difficulties in siting and installation of manufactured homes were cited as a barrier not so much to energy efficiency specifically, but to the proper functioning of the manufactured home overall. A more energy efficient design may, however, increase the need for careful installation, since crossover ducts must be connected, properly sealed, and insulated.

In comparing the barriers reported here with those encountered in the Pacific Northwest, it is worth noting how many of the more ***technical barriers*** manufacturers faced in the past have been overcome. Concerns regarding the feasibility of building within height limits, using 2x6 framing, and the need to redesign floors, for example, have all essentially disappeared.

PNW manufacturer worries about ***the need to maintain larger, more diverse parts and supplies inventories*** also appear to have been overcome: all of the manufacturers interviewed have just a single production line, and none appears to have any problems building models with a variety of characteristics on that single production line.

Since most of the California manufacturers either ship to or compete with the PNW market, it appears that this lack of barriers among the interviewed manufacturers can be interpreted as a long-term market effect of the PNW programs.

5.3 DEALER BARRIERS

In general, manufactured home dealers do not see many significant barriers to selling energy efficient homes. Dealers believe that the homes that they sell are sufficiently energy efficient and that additional measures, such as added insulation or higher SEER central air conditioners, are not required. Dealer comments regarding the energy efficiency of the manufactured homes they sell included:

- "Our homes already exceed HUD code requirements for insulation and windows, so we consider them to be very energy efficient."
- "The homes we sell are more efficient than a standard home."
- "Further improvement to the efficiency of our houses are not required or even necessary."

The only somewhat significant barriers to energy efficiency are high initial cost and an overall lack of knowledge and understanding by the customers.

High initial cost vs. value is seen by dealers as their main barrier to selling higher efficiency homes. When asked about energy efficient manufactured homes costing too much, almost half of the dealers thought this was a very important barrier. While dealers estimate that customers would be willing to pay an average of about $1,500 extra for a more energy efficient home that would reduce utility bills by 20 percent, one-third believe that this amount is less than the added cost they would have to pay to achieve that savings.

This result is consistent with PNW's program experiences, where the added cost for energy efficiency has been consistently identified as the major barrier to greater efficiency in new manufactured homes. When stakeholders were asked about barriers to efficiency improvements in the earliest regional studies, the most frequently cited barrier was reduced home affordability because of higher first costs.[cxxxvi]

Information and search costs is also seen as a moderately important barrier. Dealers state that information on energy efficient manufactured homes is hard to find and understand. Since no manufactured home program currently exists in California, the dealers have little or no material to present to their customers about energy efficiency.

This result is consistent with findings in the PNW that consumers did not have adequate information about the benefits of increased energy efficiency to evaluate the economic impacts properly. In addition, manufactured home buyers typically lacked much awareness of energy saving opportunities.

Two additional barriers received low importance ratings from the dealers. These were ***transactions costs*** and ***performance uncertainty***. Transaction costs were identified because some dealers mentioned that they find it difficult to explain the benefits of energy efficiency to

their customers. Several dealers also stated that many of their customers express doubts about energy savings from energy efficient manufactured homes. In other words, they are uncertain of the performance of an upgraded efficiency home.

5.4 COMMUNITY OPERATOR BARRIERS

Manufactured home community operators do not appear to play a major role in the market for energy efficient manufactured homes except to the extent that they act as dealers. In general, manufactured home operators do not see many significant barriers to selling energy efficient homes. All surveyed operators stated that the homes they sell are already energy efficient, especially when compared to homes that were manufactured 10-20 years ago and may still be in their park. Comments regarding the energy efficiency of the manufactured homes included:

- "Changes in HUD guidelines have made all new manufactured homes energy efficient. In fact, the new requirements for manufactured homes are so air tight that manufacturers have had to start adding air vents."

- "Today's manufactured homes are better insulated compared to older ones, so they are much more energy efficient."

- "Manufactured homes are already energy efficient."

- "New manufactured homes are much more energy efficient than the old ones."

When respondents were asked to think about hurdles to selling even more energy efficient homes, the only barriers reported by surveyed operators were high initial cost and transaction cost.

High initial cost vs. value was cited by operators as a moderately important barrier to selling energy efficient manufactured homes. Comments regarding the barrier of high initial cost included:

- "The biggest hurdle is that we are selling to customers who have a hard time with debt service and coming up with a down payment, so energy efficiency is not an issue with our customers because of the added costs."

- "Our customers have high school education or less and incomes of $25,000 or less. They, therefore, are not as educated about energy efficiency and do not have the resources to spend on energy efficient measures."

- "It is hard to sell energy efficiency to customers who are just getting by and can barely afford a manufactured home."

As noted in the section on dealer barriers, above, these results are consistent with program experiences in the PNW, where the added cost for energy efficiency has been consistently identified as the major barrier to greater efficiency in new manufactured homes.

As illustrated by the above comments from surveyed operators, this issue is probably even more important with manufactured than site-built housing, since many buyers seek manufactured housing precisely because of its lower first cost and monthly housing payments. Buyers also tend to have lower incomes, so any added initial costs are a more significant burden.

Transaction cost was seen as a less important barrier, receiving a low overall importance rating among surveyed operators. Six of the 12 surveyed operators mentioned that it was difficult to explain the benefits of energy efficiency to their customers, citing lack of information on energy efficient features of manufactured homes and lack of customer awareness of energy efficient features available. Comments regarding the barrier of transaction cost included:

- "Our main hurdle is that customers do not know enough about energy efficiency."
- "Estimates on the savings from energy efficient measures would be helpful in promoting energy efficient manufactured homes."
- "We would like more information and literature on energy efficiency to give to our customers."

This result, too, is consist with finding in the PNW that consumers lacked awareness of energy saving opportunities and did not have adequate information about the benefits of increased energy efficiency.

As reported earlier in Chapter 2, surveyed operators cited that the majority of their customers are first-time manufactured home buyers. This may also be a contributing factor to the transaction cost barrier.

5.5 LENDER BARRIERS

Information and search cost was rated as a highly important barrier among surveyed lenders. All surveyed lenders claimed that they do not know enough about energy efficient financing, with five lenders citing that they were not aware of energy efficient financing. In addition, all lenders think that dealers and customers are not aware that energy efficient financing is available for efficient manufactured homes. Comments regarding the barrier of information and search cost included:

- "We would promote energy efficient financing but our company, as well as dealers, need more information on the options available."
- "We would like more information on energy efficient financing. We do not know enough about them."
- "Lenders and dealers would be interested in energy efficient financing, but we need information and education on the options available."

Three additional barriers received low importance ratings from surveyed lenders. These were ***transactions costs, market uncertainty,*** and ***organizational practices.***

- Transaction costs were identified because some lenders thought that the paperwork necessary for processing energy efficient financing would be more complicated than for a standard loan.

- Because several lenders said that they might have difficulty reselling energy efficient loans and mortgages, market uncertainty was classified as a barrier.

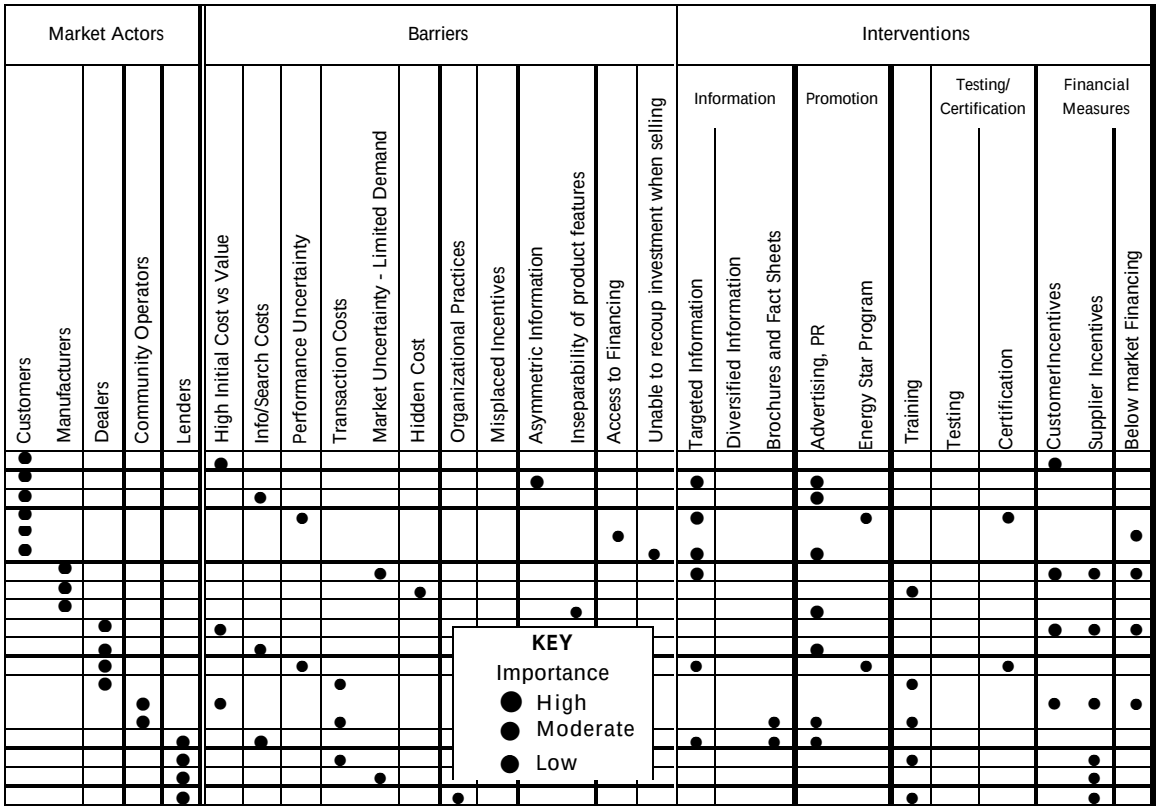
- Organizational practices were identified because some lenders believe that they need to exceed established loan-to-income ratios in order to provide energy efficient financing.

6. MARKET INTERVENTIONS

In this chapter, the interventions to energy efficiency in manufactured homes reported by each group of surveyed market actors are discussed. In all data collection efforts, respondents were first asked an open-ended question asking them to identify the types of interventions that might be effective in overcoming the hurdles they face when manufacturing, selling, or buying energy efficient manufactured homes. Any of these unprompted responses were given a "very important" rating.

Respondents were then asked to rate the effectiveness of each of a list of interventions identified as potentially effective based on review of other studies, discussions with knowledgeable industry observers or participants, and the researchers' judgment. Levels of effective interventions are presented in Exhibit 6-1 according to the percentage of respondents who reported each intervention as not at all effective, moderately effective, or very effective.[cxxxvii]

Exhibit 6-1
Perceptions of Intervention Effectiveness



While the review of program experience in the Pacific Northwest provided valuable insights into the interventions that were considered in the manufactured home market, we did not include those findings in the survey-based results presented in the exhibit. PNW findings are cited, however, when appropriate to provide context for the survey results.

6.1 CUSTOMER INTERVENTIONS

The intervention that was perceived to be effective in overcoming the high initial cost vs. value barrier was customer ***incentives***. Incentives targeted to home buyers would offset a portion of the up front cost of energy efficiency upgrades.

In the late 1980's and early 1990's, financial incentives were an essential component of the PNW programs. Incentives targeted throughout the supply chain or at consumers have been investigated and instituted in the PNW. Because first cost traditionally has been such an important consideration in this market, any program in California would have to examine the various financial incentive options carefully and likely would need to include the most cost-effective ones, at least to jump-start a program.

Interventions that were perceived to be effective to overcoming the barriers of asymmetric information, information/search costs and the fear of not being able to recoup the investment when selling include:

- Advertising and PR to increase awareness of energy efficiency financing
- Targeted information to educate customers about the possible benefits of energy efficient upgrades.

Extensive marketing and promotion have been another key component of the PNW regional programs from the beginning. There is a consensus in the PNW that the success of the programs has been driven by consumer awareness of the Super Good Cents label, increased understanding of energy-efficiency, and the influence of marketing on consumer demand. This industry is very responsive to consumer demand and, when consumer demand for energy efficiency has increased, the industry has demonstrated that it will respond with products that meet consumer needs; the key in the PNW was motivating increased consumer demand. There is no reason to think that this would be any less important in California and marketing and promotion would be essential program elements.

Interventions perceived to be effective to overcome the performance uncertainty barrier include:

- Targeted information to home buyers, dealers, and lenders to keep them informed about what is available and some estimates of savings from energy efficient measures
- Certification from utilities and/or EPA's EnergyStar® Program could give some verification and support to possible benefits and claimed savings.

The use of energy-efficient home labeling has been a very successful strategy in the PNW. The SGC label has become well recognized by dealers and buyers, and marketing materials have been designed to incorporate the label. Efforts are underway to determine how best to

incorporate the national ENERGYSTAR® label. Development of a brand name and label would benefit a California program. Either the Good Cents or ENERGYSTAR® labels could be considered, or another label consistent with existing California programs might be examined.

An intervention that was perceived to be effective in overcoming limited access to financing is ***below market financing***.

A number of improved lending options for high-efficiency manufactured homes have been explored during the course of the PNW programs. Since the first regional programs were started, the availability of energy-efficient mortgages or loans has increased and some lenders have improved their lending terms for efficient manufactured homes.

A California program could benefit from working with the lending and appraisal industries to provide advantages to buyers who purchase efficient manufactured homes. There is evidence that the lending market in California is becoming more competitive and this might be an opportune time to work with the lending industry to develop such a program.

6.2 MANUFACTURER INTERVENTIONS

Interventions that were perceived to be effective in overcoming limited customer demand for energy efficient homes include:

- Targeted information aimed at increasing customer awareness of the benefits of energy efficient upgrades
- Customer and supplier incentives that would assist in bringing down the initial cost of energy efficient upgrades
- Below market financing that would enable customers to finance the additional cost of energy efficiency upgrades.

Difficulties in the siting and installation of energy efficient manufactured homes lead to the barrier of hidden cost. This barrier could be overcome through proper ***training*** of installation contractors.

The barrier of inseparability of product features could be overcome through ***advertising and PR***. This would allow customers that might be concerned about the window area of high efficiency manufactured homes to learn about options such as low-e argon filled windows.

6.3 DEALER INTERVENTIONS

Interventions that were perceived to be effective in overcoming the high initial cost vs. value barrier are directed at home buyers, dealers, and lenders. These include:

- Incentives targeted to home buyers and dealers that would offset a portion of the up front cost of energy efficiency upgrades
- Below market financing that would enable customers to finance the additional cost of energy efficiency upgrades.

An intervention that was perceived to be effective to overcome the barrier of information/search costs is ***advertising and PR*** to increase awareness of energy efficiency financing.

Interventions perceived to be effective to overcome performance uncertainty barriers include:

- Targeted information to home buyers, dealers, and lenders to keep them informed about what is available and some estimates of savings from energy efficient measures

- Certification from utilities and/or EPA's EnergyStar® Program could give some verification and support to possible benefits and claimed savings.

An intervention that was perceived to be effective in overcoming transaction costs is ***training*** for dealers on how to effectively communicate the benefits of owning an energy efficient manufactured home.

Training and education were key components of the strategies implemented in the PNW. These efforts were directed at the key market actors to increase their understanding and awareness of energy efficiency and to make sure that efficiency upgrades were implemented most effectively. Manufacturer and dealer training and education would probably be essential in California, and could draw upon the materials and approaches implemented in the PNW.

6.4 COMMUNITY OPERATOR INTERVENTIONS

Interventions that were perceived to be effective to overcome the barrier of high initial cost vs. value are ***incentives*** for customers and dealers and ***below market financing***.

Interventions that were perceived to be effective in overcoming transaction costs are targeted to both sellers and buyers of manufactured homes. These include:

- Training for operators and dealers to inform them of benefits from energy efficient manufactured homes

- Brochures and fact sheets for operators and dealers to show to potential home buyers during the sales process to help explain the benefits of energy efficient manufactured home more easily

- Advertising and PR to educate manufactured home buyers on available energy efficient measures and their associated benefits.

6.5 LENDER INTERVENTIONS

Interventions that were perceived to be effective to overcome the barrier of information/search costs are directed at lenders, dealers, and home buyers. These include:

- Targeted information targeted to lenders, dealers, and home buyers and advertising and PR to increase awareness of energy efficiency financing

- Brochures and fact sheets that lenders and dealers can use to explain energy efficient financing to their customers.

Interventions that were perceived to be effective in overcoming transaction costs are ***training*** for lenders and dealers on how to effectively process the paperwork for energy efficient financing, and ***incentives*** to lenders and dealers for writing energy efficient financing.

Interventions that were perceived to be effective in overcoming the market uncertainty barrier are ***incentives*** to lenders and dealers for writing energy efficient financing.

Interventions that were perceived to be effective in overcoming the organizational practices barrier are ***training*** for lenders and dealers on how the qualification process works and the loan-to-income ratios required for energy efficient financing, and ***incentives*** to lenders and dealers for writing energy efficient financing.

6.6 PACKAGES OF INTERVENTIONS

As is evident from the results achieved in the Pacific Northwest, a combination of interventions targeted to multiple groups of market actors must be implemented if a program is to achieve the desired market effects. The individual interventions described above should therefore be seen as components of an integrated program that simultaneously emphasizes the benefits and addresses the needs of all the key players.

7. MARKET EFFECTS INDICATORS

While the ultimate indicator of effectiveness of any intervention is the adoption of efficient solutions as standard practice, different interventions would be expected to have their primary effects at different stages of the awareness-adoption process.

- awareness/knowledge
- interest
- expressed intent to use and promote energy efficiency
- observed usage and promotion of energy efficiency
- regular and repeated usage and promotion of energy efficiency.

To determine the extent to which market interventions have their desired effects, a set of market effects indicators was developed to track changes in the perceptions and actions of each group of market actors in these different stages.

In Exhibit 7-1, both the stage of awareness-adoption being tracked and the specific data elements used to measure their status are presented. Also shown are the "baseline" data for these data elements and the data source that would need to be used to gather updated information in the future. As programs are developed for the manufactured homes market, additional indicators may become available to track the level of interest and participation in the program among manufacturers, dealers, and customers.

Exhibit 7-1
Market Effects Indicators

Data Sources	Market Effects Indicator	Measurement	Current Status*
Customer Survey	Knowledge/Awareness	Provided with EE literature	41 of 121
	Interest	Discuss EE with sales person	20 of 121
		Customer brought up EE 1st	6 of 20
	Intent	EE list as important factor when purch	17 of 120
	Regular Usage	Pay extra for EE upgrades	29 of 121
Manufacturer Survey	Knowledge/Awareness	Aware of Energy Star	1 of 7
		Estimate of savings from EE	1 of 7
	Interest	Request information on EE programs	None
	Intent	Offer EE Package	5 of 7
	Usage	Most efficient measures offered and number who report offering them	
		Ceiling R-38	6 of 7
		Wall R-19	7 of 7
		Floor R-22	7 of 7
		Vinyl, low-e, argon filled windows	6 of 7
		AFUE 80 furnace	1 of 6
	Regular Usage	Percent of homes just at code	Average of 44%
Dealer Survey	Knowledge/Awareness	% with knowledge of SEER ratings	30 of 40
		Estimate $ extra for EE Manuf Home	27 of 40
		Estimate of savings from EE	17 of 40
	Interest	Customer ask EE in all/most sales	23 of 40
		Dealer bring up EE in all/most sales	36 of 40
	Intent	Offer EE Package	28 of 40
	Usage	Most efficient measures offered and number who report offering them	
		Ceiling R-38	13 of 40
		Wall R-19	22 of 40
		Floor R-22	11 of 40
		Vinyl, low-e, argon filled windows	Average of 13%
		AFUE 80 furnace	14 of 40
	Regular Usage	Percent EE sold	Average of 21%
Operator Survey	Knowledge/Awareness	Discuss EE options in all situations	6 of 8
	Interest	No. of very important barriers	0 of 10
	Intent	Offer EE Package	0 of 8
	Usage	Most efficient measures offered and number who report offering them	
		Ceiling R-38	1 of 8
		Wall R-19	3 of 8
		Floor R-22	0 of 8
		Vinyl, low-e, argon filled windows	0 of 8
		AFUE 80 furnace	4 of 8
Lender Survey	Knowledge/Awareness	Familiar w/EE loans	5 of 10
	Interest	No. of very important barriers	2 of 8
	Intent	Discuss EE loans	0 of 10
	Usage	Offer EE loans	0 of 10
	Regular Usage	Percent of loans that are EE loans	Average of 0%

* Source: Surveys conducted for this study.

ENDNOTES

[i] A private company used to compile and publish manufactured home titling information collected by the California Department of Housing & Community Development. The HCD has for several years has a significant backlog in processing such information, and the company publishing the data went out of business. October 1977 data were provided to us by CMHI, which is currently working to reestablish a process whereby the information is made available.

[ii] From CMHI data, 6,673 homes sited at an average cost of $56,500, without land.

[iii] Baylon, D. and Davis, B. *Cost-Effectiveness of the Manufactured Housing Acquisition Program (MAP)*, Ecotope, January 1993.

[iv] Ibid.

[v] These results can be seen in appendix tables C-2 and F-2.

[vi] CMHI Outlook '99, www.cmhi.org

[vii] CMHI Newsletter, *Resource*, Fall 1998

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[cxxxv] Barriers rated as very important by at least 2/3 of respondents were classified as High. Barriers rated as very important by at least 1/3, but less than 2/3 of respondents were classified as Moderate. Barriers rated as not at all important by at least 1/2 of respondents were not considered barriers. All other barriers were classified as Low (I.e., barriers rated as very important by less than 1/3 of respondents and rated as not at all important by less than 1/2 of respondents.

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