

# Northwest Residential Ducts

*Market Baseline Evaluation Report, No. 1*  
*Executive Summary*

*prepared by*

**XENERGY Inc.**

*report #E99-020*

January 1999



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# **NORTHWEST RESIDENTIAL DUCTS BASELINE STUDY: VOLUME I**

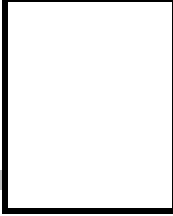
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## **ACKNOWLEDGEMENTS**

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We would like to acknowledge the assistance and cooperation of several individuals who made this study possible. Ben Bronfman of the Northwest Energy Efficiency Alliance provided management and technical oversight. Roger Spring, Evergreen Consulting Group, helped on many occasions to coordinate this evaluation activity with the Venture. We would like to thank the state Venture personnel for their timely help in providing information: Tom Hewes, Oregon Office of Energy; Michael Lubliner, Washington State University Cooperative Extension Energy Program; and Ken Eklund, Idaho Department of Water Resources. Ted Haskell (Oregon) was very helpful in providing important insights into how to identify duct problems, as were David Hales (Washington), Kevin Reese (Idaho), and David Baylon (Ecotope). In addition, we would like to thank the builders, contractors, and other industry representatives who took the time to provide their perspectives on the market for duct improvements.

## S.1 INTRODUCTION

This report presents baseline information and initial findings for the Northwest Energy Efficiency Alliance’s Residential Air-Distribution System Venture (Venture). For simplicity, we refer to air-distribution systems in this report as ducts or duct systems. Information and findings are based on interviews with key regional stakeholders, Venture documentation, and other studies and data. We conducted one survey of home owners in 10 of the Venture pilot project areas and another with a representative sample of home owners across the region (Oregon, Washington, Idaho, and western Montana).

## S.2 SUMMARY OF BASELINE INFORMATION

Baseline characteristics of three general types were documented: characteristics of the market, information on the market actors, and the status of duct improvement services. All information presented in this report focuses on the homes targeted by the Venture: owner-occupied homes with central ducted electric heating systems.

### S.2.1 *Characteristics of the Market*

The key participants in the current duct efficiency services market are the following:

- **home owners and buyers,**
- **home builders (including manufactured home producers),**
- **HVAC contractors, and**
- **weatherization contractors.**

Lenders and real estate agents, possibly through energy-efficiency loans (such as energy-efficient mortgages, or EEMs) and appraisals or rating systems (such as home energy rating systems, or HERS) that reflect energy efficiency, could become market participants if the market is transformed so that efficient ducts become an important home characteristic. In the manufactured housing market, home dealers have direct contact with buyers and they could become participants in a market for improved duct efficiency.

Four major segments of the housing market are addressed separately—

- **newer (built less than five years ago) and older site-built homes (totaling 69% of the market) and**

- **newer (built in 1992 and later) and older manufactured homes (totaling 31% of the market).**

Major relevant baseline characteristics of the new site-built home market include the following:

- **Where they exist, building codes establish minimum requirements for duct systems, but are limited primarily to insulation levels and lack detailed duct sealing requirements.**
- **Duct systems are installed in new site-built homes by HVAC subcontractors and are designed and constructed most often to just meet the code. Some contractors, however, are aware of improved practices and materials and use them in a small portion of their projects.**
- **The main barriers to improved duct practices in new homes are the builders' desire to cap costs, a perception by contractors that builders don't want to invest in duct improvements, and a perception by builders that buyers don't value the benefits of better duct systems.**
- **Buyers, most HVAC contractors, and most builders are not knowledgeable about how duct improvements can improve living conditions in a home, particularly in terms of health and safety.**

The new manufactured home market differs in some key ways—

- **Manufactured homes are produced in factories that build under a single national code that sets duct system specifications similar to those for site-built homes.**
- **In the Northwest, there is a 10-year history of energy-efficient manufactured home programs that have resulted in some programmatic improvements in manufactured home duct systems.**
- **Manufactured home dealers are a key source of information to buyers and, as a result of the region's manufactured home programs, manufactured home dealers have become better informed about energy efficiency.**

The existing homes market is considerably larger than the new homes market, and it is the primary market targeted by the Venture. In the existing homes market, several additional market characteristics are important—

- **Home owners have little understanding about how their duct system is affecting living conditions in their home or potential benefits of system improvements. With current levels of consumer awareness and understanding of the benefits of improved ducts systems, few home owners are willing to pay for system upgrades.**

- **Both HVAC contractors and weatherization contractors provide duct improvement services to existing homes.**
- **Retrofit duct improvements are likely to be part of a package of services. For example, HVAC contractors sometimes upgrade the duct system during furnace replacements.**
- **HVAC contractors, however, generally have little understanding or awareness of the range of benefits provided by duct improvements and lack the tools and information to communicate the benefits to home owners.**

### ***S.2.2 Market Actor Characteristics***

This study provides information on the following key market actors: home owners, site-built home builders, HVAC contractors, weatherization contractors, real estate agents, and lenders.

Key baseline characteristics of home owners include the following:

- **Most home owners are aware that duct systems can cause a range of problems, but few believe that their system suffers from such problems.**
- **A lack of understanding about the benefits of duct system improvements given the costs of such improvements appears to be a major barrier to increased consumer demand.**
- **Home owners indicate that reducing the initial cost and having a utility endorsement (to provide home owners assurances about the benefits of duct system improvements) are the two most effective ways to increase their willingness to obtain duct services.**
- **Home owners lack an adequate understanding of their home and duct system characteristics to provide accurate information about certain home characteristics related to their ducts.**
- **Home owners consider utilities to be the most credible source of duct information and consider information about the effects of ducts on utility bills to be the most useful type of information when considering duct system improvements.**

Key baseline findings about home builders are these:

- **Builders have little awareness about what effects duct systems have on energy use, comfort, health, or safety.**
- **Construction costs are the primary factor in builder decisionmaking about what types of equipment and materials to install in a new home. Consequently, builders usually select an HVAC contractor based on lowest bid and rarely consider an improved duct system to be worth the additional costs.**

- **Builders currently see little value in 3<sup>rd</sup> party certification of HVAC contractors.**

The primary baseline findings about HVAC contractors (who perform duct work in both new and existing homes) and weatherization contractors (who work on duct systems in existing homes) are the following:

- **Both HVAC and weatherization contractors are familiar with the possible links between ducts and energy use, comfort, health, and safety.**
- **Many contractors, however, lack an understanding of how to measure and improve duct performance.**
- **Over half the contractors we interviewed expressed an interest in duct system technical training, but a large minority said they had little or no interest in such training.**
- **Contractors generally believe that 3<sup>rd</sup> party certification, marketing tools, and marketing training would be valuable tools to improve duct system efficiency in both new and existing homes.**

Key baseline findings regarding real estate agents and lenders include the following:

- **Real estate agents and lenders have little awareness about ducts and their effects on energy use, comfort, health, or safety.**
- **A small minority of lenders and real estate agents are aware of HERS and EEMs.**
- **Real estate agents and lenders, however, rarely take energy efficiency into account in their services for the new and existing home markets.**

### ***S.2.3 Duct Improvement Services***

This study provides baseline information on home owner, contractor, and builder perceptions of current duct system efficiency levels, non-energy effects of improved duct systems, the cost of improved systems, and the potential market for duct improvement services.

Key baseline findings about current efficiency levels and measures in the market include these:

- **Almost 40% of home owners across the region say that their ducts are either uninsulated (17%) or they don't know (23%) if they're insulated.**
- **Most homes are built with standard duct systems (i.e., they just meet the basic requirements of building codes).**
- **Almost 40% of home owners in the Venture pilot areas believe that their duct system has been sealed or insulated since their home was built.**



Primary baseline findings regarding other duct impacts are these:

- **Nearly three fourths of home owners in the Venture pilot areas are aware that ducts can affect comfort. Over half the home owners are aware that ducts also can affect health and safety.**
- **Less than 10% of home owners across the region, however, believe that ducts have much effect on comfort, health, or safety in their home.**
- **About 22% of home owners report problems that could be a result of faulty ducts.**

The major baseline findings regarding the cost of improving ducts in new and existing homes are the following:

- **Most home owners do not know enough about duct improvements (sealing and insulating) to estimate how much they should cost or how much they are worth.**
- **There is a gap between what home owners are willing to pay for duct improvements (sealing and insulating) and the costs of these services. This gap is related to the lack of understanding that home owners have about the potential benefits of duct improvements.**
- **Builders estimate the cost of an improved duct system at between \$500 and \$2,000 in new homes, depending on the size of the home and the characteristics of the duct system.**

Major baseline findings about the market for improved duct systems are the following:

- **Because building codes lack stringent sealing requirements and may not be enforced uniformly, there is likely to be a significant potential for duct sealing improvements in most new homes.**
- **At this point in time, little definitive information is available about the potential for duct improvements in existing homes and how to select homes that could benefit from improvements.**
- **Using a methodology developed by the authors for this study, we estimate that of the existing homes targeted in the region (approximately 776,000 electrically heated homes with central, ducted heating systems) at least 10% are excellent candidates for duct improvements and about 53% are likely candidates.<sup>1</sup>**

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<sup>1</sup> We developed a technique that uses only survey data collected from home owners. This decision analysis model relies on assumptions about how likely a home would be to benefit from duct improvements based on characteristics of the home and the duct system. The estimates here are derived from the assumption that duct improvements would reduce space heating/cooling energy consumption, but other factors such as potential health or safety improvements could be reflected in the analysis. The methodology is discussed in detail in Section 3.

### **S.3 IMPLICATIONS FOR THE VENTURE**

Transformation of this market will depend on both home owner demand for duct system improvements and the awareness and motivations of market actors on the duct service and product supply side. Key implications for the Venture that are suggested by the baseline information for both demand- and supply-side actors include the following:

- **Successful transformation of this market will require a fundamental shift in consumer demand for improved duct systems, not just changes in the duct services supply side.**
- **The full range of benefits from improved ducts—energy, comfort, health, and safety—will have to be communicated to home owners and buyers, builders, and contractors to overcome existing market barriers.**
- **Means that reduce duct service cost impacts (e.g., combining duct service with other services or recognizing duct efficiency in energy-efficient loans) could have significant effects on the willingness of home owners and buyers to purchase duct system improvements.**
- **The favorable attitude that home buyers have toward their utility can be used to leverage their interest in and demand for duct improvements.**
- **Training on how to market improved duct systems (contractor-to-builder, contractor-to-owner, and builder-to-buyer) appears to be an essential need for transforming this market.**
- **Based on the views expressed by builders and contractors, steps may be required to increase interest in technical training and third-party certification of contractors.**