

# Affordable Home Builder Demand for Green and Certified Wood Products

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## Abstract

Annual new housing starts in the United States decreased dramatically between 2005 and 2012. Consequently, products that are heavily tied to new housing starts, such as flooring, cabinetry, and moulding produced from Appalachian hardwoods, have suffered a corresponding decrease in demand. There may be opportunities to increase demand for these products, however, as demand in the green building sector increases. The present study evaluated the demand for certified wood products (CWPs) and green-labeled wood products in the central Appalachian affordable housing sector in 2011. The study also identified price premiums that affordable home builders were willing to pay for CWPs and green-labeled wood products. Results indicated that 50 percent of affordable housing respondents were planning future CWP purchases. Results also indicated that 62 percent of affordable housing respondents followed some type of green building standard. Additionally, more than 70 percent of affordable housing respondents suggested a willingness to pay an additional percentage for CWPs and local wood products. The use of CWPs was found to result from a combination of builder and homeowner preference. Last, of the housing builders who looked to purchase CWPs locally in 2011, only 17 percent were not able to locate the materials for purchase. The low percentage of unsuccessful procurement suggests CWPs are well distributed in areas near affordable housing projects in central Appalachia.

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According to 2010 National Association of Home Builder (NAHB) estimates, residential construction in the United States employs approximately 3.4 million people per year (Siniavskaia 2012). In terms of predicted lumber usage, softwoods account for 26.9 billion board feet (bf) and hardwood lumber for 6.5 billion bf (Howard and McKeever 2012). The large gap between softwood and hardwood usage can be explained by the relative uses of the two groups. Softwood lumber is used more in structural applications, such as framing and supporting members, while hardwood lumber is used more in aesthetic applications, such as flooring, cabinetry, and moulding (Forest Products Laboratory 2000).

Current hardwood markets for Appalachian producers consist of both national and international sales. The recent economic downturn and decrease in new housing starts in the United States has limited utilization of wood products, consequently lowering employment rates in this industry. For example, there was an 8 percent drop in forest industry employment as a percentage of total manufacturing employment between 2005 and 2010 in West Virginia alone (Woodall et al. 2011). However, it is currently unknown how reduced employment in hardwood-producing states has impacted the availability of wood products in the Appalachian region.

Rising interest over environmental issues has resulted in an increased focus on using sustainable (i.e., “green”) materials in building construction (Ortiz et al. 2009). Since 2005, green building has retained a relatively consistent market share of total single-family residential building in the United States. The stability of this market share can be partially attributed to a sales increase of US\$11 billion between 2005 and 2011 for green building, relative to the dramatic decrease of US\$217 billion for all single-family residential sales for the same period. Also, there is a projected increase for new green home construction and home renovations from 2011 to 2016 from 17 percent to

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Forest Prod. J. 63(1/2):4–11.

doi:10.13073/FPJ-D-12-00120

between 29 and 38 percent (McGraw-Hill 2012). This increase in popularity of green construction projects presents an opportunity for wood products to gain significant market share in the green economy. To take full advantage of these opportunities, however, more research is needed to evaluate consumer demand for wood products labeled as sustainable in niche markets, such as the affordable housing (AH) sector of residential building. According to the US Department of Housing and Urban Development (USHUD 2013), housing costs should account for no more than 30 percent of a household's total income to be considered affordable. As of February 2012, the USHUD estimates that 12 million renters and homeowners allocate 50 percent or more of their household incomes to housing costs (USHUD 2013). Of the 45 million working households in the United States in 2010, 10.6 million (24%) face a severe housing cost burden (Williams 2012). Therefore, the AH sector represents a large portion of the housing industry and provides both local and regional opportunities for expanding the use of wood products that have yet to be fully explored.

In addition to providing suitable living conditions for people with financial difficulties, AH provides positive impacts for both local job creation and economic growth. For example, when a new, 100-unit AH apartment complex is built, 80 new construction jobs are created, 42 local jobs are supported by local spending during construction, and 32 local jobs (ongoing) are supported by occupant spending postconstruction (NAHB 2010). To further categorize the jobs created and later maintained by the influx of AH developments; approximately 70 percent are directly tied to the construction industry during development, approximately 30 percent of jobs in wholesale and retail trade are supported by the spending of locally earned wages, and approximately 32 percent of wholesale and retail trade jobs are supported by occupants postconstruction.

Identifying demand for certified wood products (CWPs) has been a popular focus in recent studies. Anderson and Hansen (2004a) showed that undergraduate respondents preferred products accompanied by environmental certification when prices were kept consistent between certified and noncertified products. Similarly, Anderson and Hansen (2004b) also found that plywood consumers preferred Forest Stewardship Council (FSC)-certified products to uncertified products when prices were equal. A 2 percent increase in price to FSC-certified products, however, negated the environmental preference. In western Canada, survey respondents indicated interest in future purchases of value-added CWPs as long as the quality and variety were equal to the competing noncertified products (Kozak et al. 2004). Vlosky et al. (2009) found that according to survey respondents, manufacturer sales of CWPs doubled between 2002 (10%) and 2008 (21%). Additionally, results from a distributor-focused survey have shown that CWPs are accepted by most retailers and that 69 percent of the respondents expect future sales volumes of CWPs to increase (Perera et al. 2008). To our knowledge, however, no study has focused on identifying demand for and availability of CWPs for use in AH projects, especially in the central Appalachian region. Therefore, the present research was undertaken to help identify existing and potential markets for wood-based products, both certified as sustainable and noncertified, in AH markets.

To expand the use of Appalachian wood-based products in affordable building, it is important to understand both current building practices and material specifications. By collaborating with industry professionals, potential niches can be identified for renewable, sustainable materials, such as wood-based products, in building construction and renovation. Information obtained as a result of this research may help Appalachian wood product producers further understand their local marketplace and guide them in marketing decisions aimed at increasing the use of their products. Additionally, the information obtained through the present study is intended to assist Appalachian hardwood product producers in meeting consumer demand for wood-based products.

The goal of this project was to assess the current and future demand for and local availability of CWPs and green-labeled wood products that are used in AH construction within the central Appalachian region. A secondary goal was to identify preferential differences between builders who attribute a small portion of their business to AH construction and builders who attribute the majority of their business to AH construction (i.e., Federation of Appalachian Housing Enterprises [FAHE]). Specific objectives were to evaluate the demand for CWPs and green-labeled wood products in the central Appalachian AH sector as well as additional price percentages that AH builders are willing to pay for CWPs and green-labeled wood products.

## Methods

To reach a diverse and unbiased sampling group, a list of approximately 2,800 builders in the central Appalachian region was compiled from the NAHB, state home builder lists, county and city code departments, and building associations. These builders were identified through direct contact via telephone conversations and e-mail correspondence as well as research of online databases. The target area included all or a portion of the following states: Virginia, Kentucky, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and West Virginia. Builders were assembled into a database, and a random sample of prospective respondents was generated from the full data table. The sample included 700 of the initial 2,794 general builders as potential respondents of a formal mail survey. This sample of 700 builders was chosen to be representative of the target population as well as to lower project costs. This survey was developed to elicit responses related to business activity conducted during the calendar year of 2011.

Initial surveys were sent to the selected mailing addresses. In the event a survey was returned due to insufficient ( $n = 2$ ) or incorrect ( $n = 39$ ) address information, personal correspondence in the form of phone calls and e-mails was employed to obtain updated information. These actions resulted in the addition of updated contact information for three businesses.

Given the FAHE is primarily focused on AH construction, all 50 members were chosen, in addition to the 700 general builders, to take part in the same survey. FAHE builders were cross-referenced with the 700 randomly chosen builders to ensure no duplications in the sampled populations. The data collected from these respondents were combined with general builder respondent data. Inclusion of the FAHE helped the study gain a broader perspective of builders who specialize in the AH sector. Additionally,

surveying the FAHE members allowed comparison between builders who are specifically focused on AH (i.e., FAHE members) and general builders who may only attribute a portion of their business to AH projects. Comparison between these two groups of builders could indicate preferential differences in the use of wood products. Obtaining contact information for subcontracting companies of FAHE members was pursued but relatively unsuccessful. Therefore, FAHE members were asked to distribute the surveys to their subcontracted builders in the event they did not perform the construction themselves.

Surveys were designed and distributed according to suggestions of the Tailored Design Method (Dillman 2000). A notification to potential respondents was distributed followed by the actual survey for both the general builders and the FAHE members. After a 3-week period, follow-up correspondence accompanied by a second questionnaire was sent to general builders to encourage survey response from nonrespondents. Also after a 3-week period, follow-up correspondence was sent to FAHE members to encourage additional survey response. A second questionnaire was not sent to FAHE members, however, because this group was redistributing the surveys to their builders on our behalf and did not require additional surveys. Lastly, an appreciation letter and token of appreciation were distributed to all who did respond.

The response rate for completed surveys received was calculated by dividing the total number of completed surveys by the number of contacted units less the ineligible units and the refusals:

$$rr = \frac{cs}{cu - iu - rf}$$

where  $rr$  is the response rate,  $cs$  is the number of completed surveys,  $cu$  is the number of contacted units,  $iu$  is the number of ineligible units, and  $rf$  is the number of refusals.

The survey contained 23 multiple-choice questions that were designed to alleviate confusion and minimize the respondent's commitment and completion time. Questions were designed using information discussed with various stakeholders who assist builders within the Appalachian region with finding CWPs and to reflect our research interests. Response selections were a combination of closed-ended and partially closed-ended (i.e., including "other" and space for open-ended response), unordered categories. These surveys were peer-tested to assure these attributes and to minimize uncertainties and grammatical errors. The peer group for this survey consisted of experienced colleagues at other land grant institutions that routinely survey the wood products industry. Constructs used in the questionnaire included demographics, product purchasing preferences, competition factors (Wagner and Hansen 2004), and willingness to pay (Ozanne and Vlosky 1997). Types of questions asked included company demographics (i.e., number of employees, revenue, and percentage of business from AH construction), current and future demands for CWPs, factors that influence the use of CWPs, use of green building standards, and pricing of local wood products and CWPs. To further investigate the relationship among builder characteristics and their product consumption relationships,  $\chi^2$  tests of independence were performed. These tests were used to examine the relationship between observed and expected data (Dowdy et al. 2004).

When categorical response counts are low or expected counts are less than five, combining adjacent categories has been suggested as one method to increase frequency counts for more robust analysis (Linacre 2002, Dowdy et al. 2004, Robichaud et al. 2012). Therefore, due to the relatively low number of categorical responses, data from both AH and non-AH builders were grouped into two "number of employees" groups (1 to 5 and  $\geq 6$ ). Similarly, respondent data were also divided into groups by willingness to pay an additional amount for CWPs and also for locally sourced wood products (0% more and  $\geq 1\%$  more). Separating the data into these groups resulted in a sufficient number of responses to perform a  $\chi^2$  test to determine if 2011 business characteristics as given by survey respondents, such as number of employees or amount of revenue, were factors indicative of the willingness to pay additional percentages for CWPs and local wood materials. However, Fisher's exact test was used in the few instances when predicted cell sizes were fewer than five responses.

All survey respondents were initially segregated by whether or not they participated in AH projects in 2011. Because this group was the main focus of the present study, many of the results are based on their responses. In some instances, however, both groups of respondents (AH and non-AH builders) were combined to reflect the perceptions of builders in the central Appalachian region.

## Results and Discussion

### Response rate

*General builders.*—For the 700 surveys sent throughout the central Appalachian region to general builders, 60 completed surveys were received, and 41 were returned as nondeliverable. Three returned surveys were omitted from the sample set due to lack of questions answered ( $n = 1$ ) or inconsistency in answering ( $n = 2$ ; i.e., answering questions related to AH while previously answering there was an absence of involvement with AH). Therefore, the adjusted response rate calculated for general builders was 9.1 percent. Further analysis of the 60 received surveys from the general builder group indicated that 10 (16.7%) of the respondents were involved in AH construction in 2011.

*FAHE members.*—Five surveys were sent to each of the 50 FAHE members. Completed surveys were received from 12 different FAHE members, one per member, and resulted in a response rate of 24 percent. For the purpose of calculating response rate for this group, the total number of contacted units used was 50. As expected, all 12 FAHE member respondents indicated they were involved in AH construction in 2011. The number of subcontractors that had been employed by the FAHE members in 2011 was unknown. FAHE members were asked to distribute additional surveys to their subcontracted builders. FAHE members were not asked or responsible for implementing Dillman's method to ensure maximum survey response. Direct contact with this potential group of subcontracted companies might have resulted in a higher response rate, as second mailings and follow-up correspondence could have influenced potential respondents to complete the survey. A total number of 22 subcontractor survey respondents ( $\sim 31\%$  of all survey respondents) indicated they were involved in AH projects in 2011.

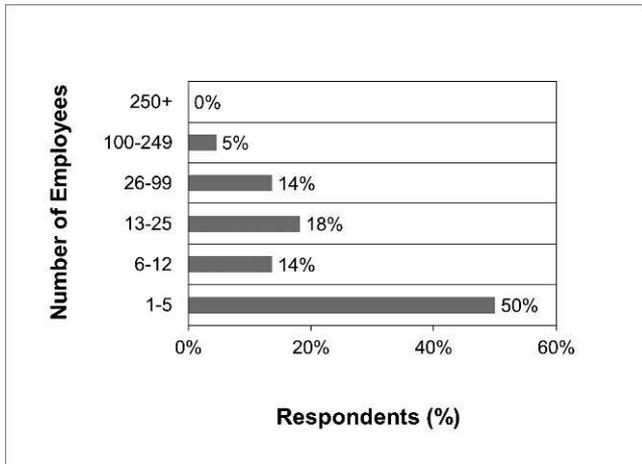


Figure 1.—Number of employees reported by affordable housing respondents.

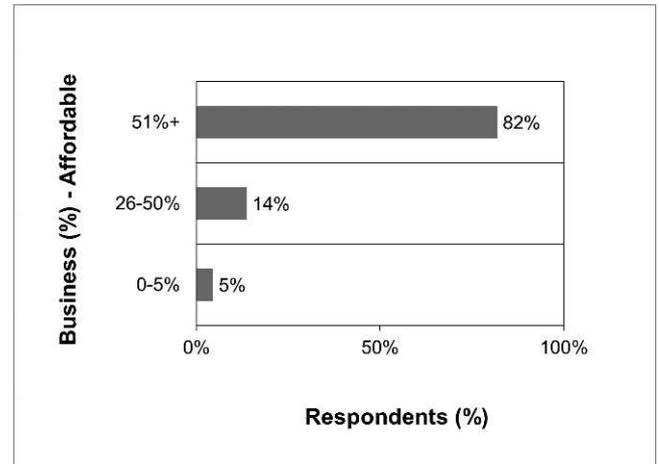


Figure 3.—Percentage of affordable housing business reported by affordable housing builders survey participants.

### Survey responses

Results from demographic analysis indicate that 50 percent of the AH respondents employed an average of one to five people in 2011 (Fig. 1). Additionally, 27, 18, and 27 percent of the AH respondents indicated that their total revenue for 2011 was between US\$100,000 and US\$500,000, between US\$500,000 and US\$1,000,000, and between US\$1,000,000 and US\$5,000,000, respectively (Fig. 2). Of the AH respondents, 82 percent reported that more than 50 percent of their total 2011 construction business was attributed to AH projects (Fig. 3). According to AH respondents, only 14 percent specifically sought out CWPs for building construction projects (Fig. 4). However, 50 percent planned to use CWPs in the future (Fig. 5). The use of CWPs has been anticipated in other studies (Vlosky et al. 2009), in which 97 percent of respondents indicated continuing the sales of CWPs in the future. Additionally, results from a study conducted by Perera et al. (2008) show that 69 percent of survey respondents predicted some degree of increase in CWP sales volume over the 5 years following the study. An interesting change in response from 18 to 45 percent was noted for the AH respondents who answered “I don’t know” in relation to current and future CWP

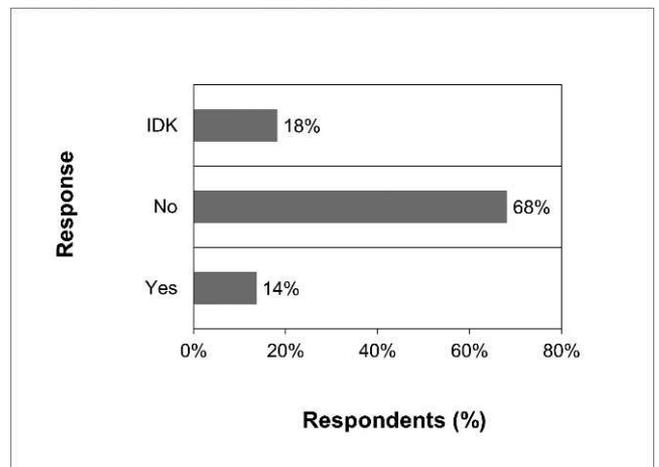


Figure 4.—Percentage of affordable housing builder respondents who specifically looked to purchase certified wood products.

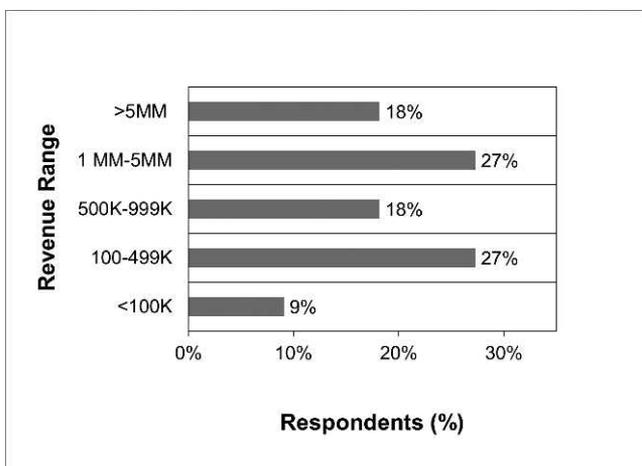


Figure 2.—Total revenue reported by affordable housing respondents.

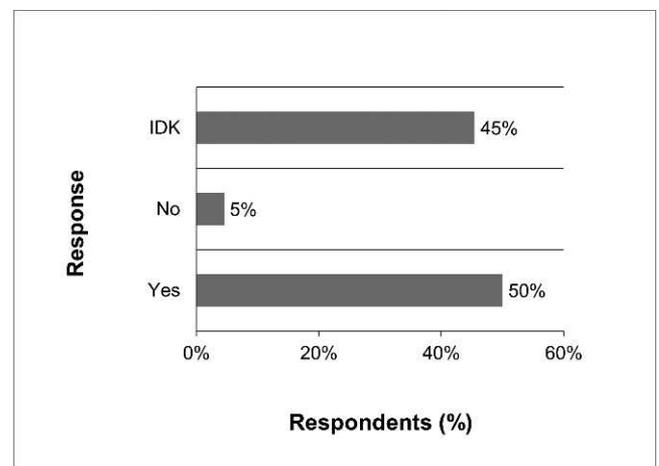


Figure 5.—Affordable housing builder respondents who plan to use certified wood products in the future.

purchasing, respectively. This difference in past and future CWP purchasing may have resulted from clients requiring the use of CWPs in past projects instead of CWPs being the builder's own initiative. In many green building standards, the use of CWPs can help accumulate points needed to achieve certification. Annual increases of compliance with green building technologies between 2005 and 2010 have been seen by AH builders (Hlady and Wells 2010) as a way to maximize their success rate when applying for government funding, such as Low Income Housing Tax Credits.

When indicating factors influencing whether or not to purchase CWPs, respondents were asked to select all factors that applied. In addition to 14 predetermined choices, the option to choose "other" and provide individual responses was made available. AH respondents indicated that the top seven, as determined by percentage of respondents per category, influential factors regarding the purchase CWPs were environmental benefits, building programs mandating CWPs, customers requesting CWPs, cost of CWPs being too high, customers not requesting CWPs, cost of CWPs being appropriate, and increased quality of CWPs (Table 1). The most popular reason AH respondents chose to use CWPs was the environmental benefits of the materials. This response indicates that the distribution of environmental information concerning CWPs has reached and affected the opinions of AH builders. Results such as these are not uncommon given the overall customer understanding of CWPs has increased (Ozanne and Vlosky 2003). Additionally, given environmental benefits are of importance, wood product manufacturers should emphasize environmental marketing to increase their potential market share with these customers. Likewise, because 23 percent of the respondents indicated a lack of experience or knowledge of CWPs, there may be an opportunity to better inform AH builders about the attributes of and benefits from using CWPs in construction projects.

Sixty-two percent of AH respondents reported following some type of green building program in 2011. Of the 13 respondents who followed a green building program, 5 indicated particular programs that were followed. In three of these instances, builders followed more than one green building program. The green building programs that were used by these survey respondents were Green Advantage (two respondents), Building Performance Institute (two respondents), Energy Star (two respondents), State Housing Finance Agency's "Green" Requirements (one respondent), and Healthy Home (one respondent). Interestingly, no respondent indicated the use of the predetermined choices on the survey; instead, respondents opted to select the "other" category and write in the green building program(s) they followed. Choices provided in the survey with reference to the type of green building program used in 2011 were National Green Building Program, NAHB; Leadership in Energy and Environmental Design, US Green Building Council; Green Globes, Green Building Initiative; EarthCraft; and Enterprise Green Communities. Although these programs are widely used and well known, the AH respondents appeared to be following other programs that may not have the publicity of the larger programs specifically listed in the survey. These results may indicate that AH builders have specific motivations toward the use of green building standards. Perhaps funding agency preference, personal experience, or cost may be a factor.

Table 1.—Factors related to affordable housing builders purchasing certified wood products (CWPs).

Influence	Response (%)
Environmental benefit	64
Building programs mandate CWPs	36
Customers request CWPs	36
Cost of CWPs too high	32
Customers do not request CWPs	32
Cost of CWPs is appropriate	27
Increased quality of CWPs	27

Of the 62 percent of AH respondents who used a green building standard, 26 percent followed a green building program because it was required by their client (Fig. 6). A majority of the AH clients represented in this survey population were not specifying their house to be built to any green building program. However, AH builders were still following green building standards even though the client was not requesting this component. These results suggest that builders may have been able, to some degree, to convince their clients about the benefits from using a green building standard.

Cumulatively, 77 percent of AH builder respondents indicated a willingness to pay some additional cost for CWPs (Fig. 7). These results agree with previous surveys that indicated customers may be willing to pay an additional amount for CWPs. Ozanne et al. (1999) found that 75 percent of consumer respondents indicated a willingness to pay more for CWPs. Aguilar and Vlosky (2007) found that an average of 62 and 66 percent of respondents were willing to pay an additional amount for various CWP items in 1995 and 2005, respectively. Although survey respondents in the present study indicated a willingness to pay higher prices for both certified and local wood products, actual buying behaviors could be different. Previous research (Anderson and Hansen 2004a, 2004b) has shown that consumer buying behavior shifts toward purchasing non-CWPs when the price of comparable CWPs are higher. Consumer willingness to pay more for CWPs could inspire more raw material manufactures, such as sawmills, to start or increase their participation in certification of wood and wood fiber.

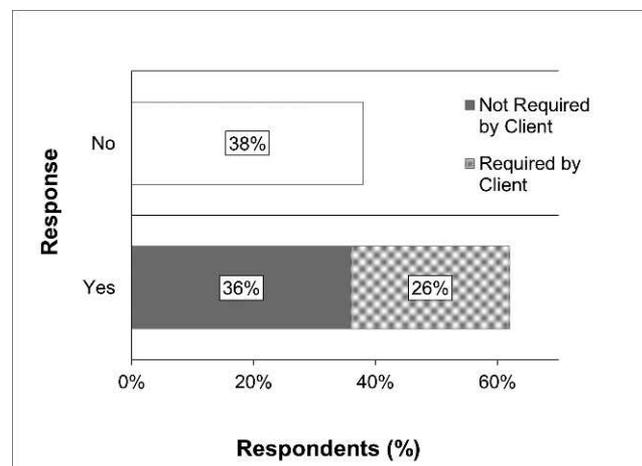


Figure 6.—Percentage of affordable housing builder respondents who followed a green building program.

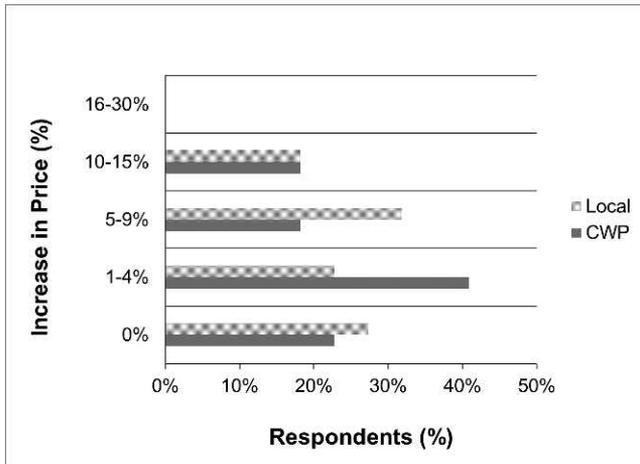


Figure 7.—Willingness of affordable housing builder respondents to pay more for local and certified wood products (CWPs).

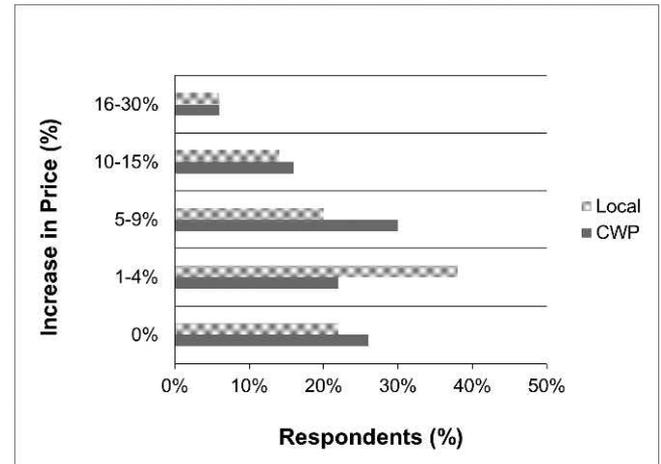


Figure 8.—Willingness of nonaffordable housing builder respondents to pay more for local and certified wood products (CWPs).

However, factors such as market size and cost of entry would need to be individually addressed by businesses to properly assess the associated costs and benefits. To increase manufacturer participation in certification programs, however, would require a portion of the increased revenue from the sales of CWPs to go directly to the manufacturer through willingness for a supplier to pay more for CWPs. Survey results suggest there may be opportunities within the AH sector for wood products producers to offset their product certification costs through price increases and also the potential increased revenue.

Similar results were found for AH respondents who indicated that they would be willing to pay more for locally sourced materials. Specifically, 73 percent of AH builder respondents indicated a willingness to pay some additional cost for locally sourced materials (Fig. 7). From the results, it appears there is interest in locally sourced materials, and AH builders would likely pay more for them. Survey results received from non-AH builders were also analyzed to determine their willingness to pay additional prices for local materials and CWPs. Of non-AH builder respondents, 74 and 78 percent indicated a willingness to pay an additional cost for CWPs and local materials, respectively (Fig. 8). Both AH and non-AH builders appeared to have a similar willingness to pay more for CWPs and local materials. In terms of CWPs, the survey results indicated that AH builders (77%) were more likely to pay a higher price for CWPs compared with non-AH builders (74%). In terms of local materials, the survey results indicated that non-AH builders (78%) were more likely to pay a higher price for local materials compared with AH builders (73%). Going one step further, a potential market for local wood product and/or CWP producers to target is construction businesses with yearly revenue under US\$500,000. Survey results indicate that businesses in this demographic are more likely to pay an additional price for local wood products and/or CWPs. However, further investigation into factors such as potential market size and cost of entry would need to be addressed to fully assess if the benefits outweigh the costs for individual businesses.

To further determine if CWPs were available to builders locally, respondents were asked if they were looking to buy

any CWPs that could not be found locally. Results indicated that 17 percent of all survey respondents were looking to purchase CWPs locally but found these products were not available. Of the respondents who could not find CWPs locally, the top five CWPs that were in demand were framing lumber (75%), oriented strandboard (75%), plywood (58%), pressure-treated lumber (58%), and doors (58%). These results indicate that the majority of builders who wanted to use CWPs could find them locally. Also, the size of the company, in terms of both number of employees and amount of revenue, had some effect on the ability to find CWPs locally. For example, 20 percent of respondents from companies with five or fewer employees were unable to find CWPs in their local markets, while only 11 percent of respondents from companies with six or more employees were unable to find CWPs in their local markets. Additionally, 26 percent of respondents from companies with less than US\$500,000 in pretax revenue for 2011 were unable to find CWPs in their local markets, while only 10 percent of respondents from companies with revenue higher than US\$500,000 were unable to find CWPs in their local markets. These results suggest that larger companies have greater access to locally available CWPs. However, there remains a portion of local demand that is not currently being met. Based on the results, there appears to be some market opportunities for local retailers. Specifically, there is a demand for locally available lumber and structural panels that have been certified to a sustainable forestry practice standard.

To better represent the building industry, respondents of both AH and non-AH builders were combined and analyzed to determine how they learned about new building products. Results indicated that builders were most likely to learn about new building products through local retailers (75%) and Web sites (72%; Table 2). Builders were least likely to hear about new building products through professional societies (47%) and advertisements (40%). While advertisements were last, many of the other listed sources likely used some type of advertisement in introducing new products. It was apparent, however, that Web sites and local retailers are an important market channel for introducing and promoting new wood products. This suggests that wood product companies should emphasize

Table 2.—Product marketing channels based on affordable housing (AH) and non-AH builder respondents.

Learning source	Response (%)
Local retailers	75
Web sites	72
Magazines	69
Trade shows	54
Professional societies	47
Advertisements	40

their Internet presence and their personal contact and relationships with local retailers when developing a marketing strategy for new products.

*Impact of company size and revenue.*—Survey results indicate that the size of the company, in terms of number of employees, had no statistically significant relationship ( $\chi^2 = 0.3692$ ,  $P = 0.5434$ ) on whether or not the company was willing to pay an additional percentage for CWPs. Similarly, the same analysis for locally sourced wood products showed no statistically significant relationship (Fisher's exact test,  $P = 0.0625$ ) between the company size, in terms of number of employees. These results indicate that of the survey respondents, the number of company employees may not be a significant factor in determining the willingness to pay an additional amount for locally sourced wood products. However, a relationship did exist between the revenue a company receives and whether or not that company is willing to pay additional amounts for both CWPs and locally sourced wood products. When analyzed by willingness to pay more for CWPs, there was a statistically significant relationship ( $\chi^2 = 9.9890$ ,  $P = 0.0016$ ) that indicated survey respondents with revenues less than US\$500,000 in 2011 were more likely to pay additional amounts for CWPs. Similarly, when analyzed by willingness to pay more for locally sourced wood products, there was a statistically significant relationship ( $\chi^2 = 8.8874$ ,  $P = 0.0029$ ) that suggested survey respondents with revenues less than US\$500,000 in 2011 may be more likely to pay additional amounts for locally sourced wood products.

*Affordable housing builders: FAHE versus general.*—A Fisher's exact test was used to determine if responses from FAHE builders varied greatly from other AH builders. Specifically of interest was whether or not general builders shared some of the same perceptions and experiences of those tied solely to the AH sector. Particular comparisons between FAHE and non-FAHE AH respondents were analyzed for the following scenarios: revenue, looking to purchase CWPs, plan to purchase CWPs in the future, following a green building program, client requirement to follow a green building program, and willingness to pay more for CWPs as well as locally sourced products. Results suggested that FAHE builders showed a statistically significant higher tendency ( $P = 0.045$ ) to follow a green building program because of the client's request compared with general AH builders. This difference could be the result of FAHE's indication to implement more green building programs in their construction (Survis 2012). The remainder of the results, however, indicated that there was no statistically significant difference between respondents who were FAHE builders and general builders involved in AH construction in 2011.

## Summary and Conclusions

The present research focused on local and CWP demand in the AH sector within central Appalachia. Specifically, the study looked at the attributes related to green building and perceptions and to use of local and CWP materials. While the number of AH builders is small in relation to all builders, our survey population was representative of those in the central Appalachian region. The addition of information from non-AH builders allowed a larger comparison of the local availability and market potential of CWPs in Appalachia.

The major conclusion was that AH builders tended to favor the use of CWPs. In general, results indicated that in 2011, 50 percent of AH respondents planned on purchasing CWPs in the future. Also, 74 and 77 percent of all non-AH builder and AH builder respondents, respectively, were willing to pay more for CWPs. Furthermore, 73 and 78 percent of all AH builder and non-AH builder respondents, respectively, were willing to pay more for locally sourced materials, indicating a possible niche market for wood products manufacturers. However, only the respondents with annual company revenues of less than US\$500,000 showed a statistically significant relationship toward paying additional amounts for CWPs and local wood products. Manufacturers may also gain local market share by providing CWPs, because 17 percent of all survey respondents were unable to purchase CWPs locally.

The results of the present study also indicated that wood product manufacturers should focus on environmental marketing to improve the demand of CWPs. This result is similar to findings of Kozak et al. (2004), who reported an increased interest in CWPs after potential customers were informed of the environmental benefits related to using this type of product. Also, when introducing new products, results suggest that wood product manufacturers should focus their efforts on Internet marketing and providing information to local retailers. Papadopoulos et al. (2010) also found the Internet to be a highly effective means by which to promote CWPs. It appears that the use of CWPs and green building standards is gaining more attention in the AH sector. With increased interest in energy efficiency, it is expected that in the future, builders will construct more homes that meet one or more of the green building standards. An increase in green building construction could position the wood products industry for significant growth by providing the only current environmentally certified structural building material (Bowyer 2008).

The present research indicated that non-AH builders in the central Appalachian region also showed interest in CWPs and locally sourced wood products. Future work should look more closely at non-AH builders and their preferences regarding use of CWPs, use of green building standards, and current and future purchasing decisions for different types of wood products.

## Acknowledgments

This report resulted from a collaborative effort between Rural Action and the FAHE, West Virginia University Division of Forestry and Natural Resources, and the Appalachian Hardwood Center. Funding for this research was provided by the Ford Foundation through RUPRI Center for Rural Entrepreneurship (Wealth Creation in Rural Communities) and Rural Action. The primary

function of the funding is to improve economic development in rural Appalachian regions.

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