

Increasing the Demand for Deconstruction in Hennepin County

Everything Including the Kitchen Sink



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Executive Summary

Hennepin County would like to encourage recycling and reuse, and reduce the amount of waste going into landfills. One source of this waste is from Construction and Demolition (C&D). One way to reduce waste is to encourage the “deconstruction” of properties that would otherwise be simply demolished and landfilled. Deconstruction is the “disassembly of structures for the purpose of reusing components and building materials.” (Kibert, Chini, and Languell 2001, 182). Demolition refers to the mechanical removal of a structure, resulting in debris hauled to a landfill. Currently most structures are demolished. In practice, however, the choice is not always binary; some techniques lie in between the two.

Deconstruction is labor intensive, so it typically costs much more than demolition. Costs can be mitigated by saving money on landfill tipping fees, since items are diverted for reuse. For property owners, federal tax deductions can reduce costs. Hennepin County contracts with a local nonprofit (Better Futures Minnesota) for deconstruction, and would like the practice to become more widespread. Hennepin County’s Environment and Energy Department engaged a student team from the University of Minnesota’s Humphrey School of Public Affairs to perform a study to determine how the use of deconstruction might be increased.

The student team established three research questions: (1) What is the process for building deconstruction in Hennepin County? (2) How do Better Futures Minnesota’s deconstruction methods and costs compare with other deconstruction companies? (3) Are the current policies and incentives in Hennepin County well aligned to spur deconstruction? The student team used quantitative and qualitative analysis to research these questions and to come up with findings and recommendations.

Based on the results of this study, the team provides the following recommendations:

(1) Build on current progress in policies and practice. This includes proposing a diversion and reuse ordinance to the County Board as planned, and implementing the recommendations of the “FOTH” study (“Construction and Demolition Diversion Capacity Study” 2015), as well as exploring partnerships with other local governments, and conducting a market feasibility analysis for deconstruction and materials reuse.

(2) Engage deconstruction stakeholders in a “dialog to action” conference and create a deconstruction task force or working group.

(3) Encourage any deconstruction provider operating in Hennepin County to follow successful practices. This includes educating on deconstruction, evaluating the county’s investment; and telling the full story on sustainability.

Introduction

This paper is the result of a partnership between Hennepin County and the Humphrey School of Public Affairs at the University of Minnesota. The Hennepin County Environment and Energy Department (referred to hereafter as HCEE) seeks to encourage recycling and reuse, and reduce the amount of waste going into landfills. One source of this is Construction and Demolition (C&D) waste, which could be mitigated somewhat if more properties were “deconstructed” rather than simply demolished.

HCEE staff sought out the Humphrey School to see if graduate students would be interested in working on a project to look at deconstruction practices and think about how they could be implemented more widely.

The team met with HCEE staff multiple times, and also met with The Network for Better Futures Minnesota (referred to hereafter as BFM), a local nonprofit organization that currently does deconstruction work and has a contract with Hennepin County. The team researched deconstruction practices around the country to learn what practices were more successful in other locations and how those practices might work in Hennepin County. Research included scholarly sources, data retrieval, and direct interviews with experts in other states via both telephone interviews and email.

The paper is divided into several sections:

First, the reader will be presented with the opportunity for Hennepin County to reduce waste through greater use of deconstruction practices.

Next, there is an overview of the difference between deconstruction and demolition, and why this is not always a simple binary choice but instead exists on a spectrum.

Then, the costs of the various choices are discussed, as are practices in other locations. The logistics of deconstruction are examined, as well as public incentives and mandates.

We then outline the research questions that were developed in response to the needs of the client, and the methodology that was used to investigate each question.

Finally, the findings from the research are explored, and several recommendations are put forth as a result of an analysis of the findings and how they can be applied to the current situation facing Hennepin County.

Hennepin County Environment and Energy Department's Commitment

“The Department of Environmental Services protects and preserves the environment to enhance the quality of life for current and future generations. ... We focus on reducing and responsibly managing waste, protecting and preserving ecosystems, delivering clean energy and promoting environmental stewardship” (“Strategic Plan 2013-2020” 2013).

Intent

From an environmental and statutory standpoint, landfilling is considered the least preferred method of waste disposal in Minnesota. Hennepin County’s 2012 Solid Waste Management Plan outlines multiple approaches to reduce landfilling. One of those strategies is to divert construction and demolition (C&D) waste by supporting deconstruction services. For many years, Hennepin County partnered with the Green Institute, a nonprofit economic development organization that provided deconstruction services and retail sales of salvage and surplus building construction materials. The Green Institute went out of business in 2011 and that necessitated Hennepin County’s exploration of other opportunities for deconstruction partnership(s).

Environment

Hennepin County possesses market attributes that should make deconstruction a viable enterprise within its borders. Certain “place” characteristics tend to accompany deconstruction’s potential for success. Those feasibility indicators include housing stock built prior to 1950, a community possessing strong environmental and social values, a viable reuse market with ongoing demand for used building materials, and strong governmental policies that correlate with local deconstruction services (Guy 2008).

The median year Hennepin County housing units were built was 1969; housing units in the City of Minneapolis, however, make up 35% of total units in Hennepin County and the median year these units were built was 1944. The city is one of the top 50 remodeling markets in the country, signaling salvage opportunity as well as demand capacity for used building materials (“Emerging Trends in the Remodeling Market” 2015). In addition, The Green Institute’s retail store was very successful, regardless the failure of its parent company (Thomas 2016).

Supportive Actions

Practice and Policy

Hennepin County commissioned a study on landfill diversion of C&D waste in 2015. That study produced six recommendations for consideration. Of those, Hennepin County is currently exploring ways to make information on C&D materials reuse retail outlets and recycling services more available to contractors and building owners. For example, Hennepin County is working

on producing educational materials for contractors that Minneapolis can display and distribute at its permit counter (“Construction and Demolition Diversion Capacity Study” 2015).

Additionally, the County is reviewing possible policy options to encourage more deconstruction and salvage of materials through the permit and approval process for demolition projects. Next year, the County may look at better data collection methods for C&D facilities reporting, and develop incentives for cities within the County to pilot C&D diversion efforts. Currently, HCEE is planning to recommend that the Hennepin County Board of Commissioners adopt an ordinance requiring 70% landfill diversion of C&D waste, and 5% reuse, when County buildings are going to be demolished.

Deconstruction subsidy

In August of 2014, Hennepin County entered into a two-year contract with BFM. BFM provides salvage and deconstruction services in Hennepin County and receives structured reimbursements based on percent of landfill diversion by weight, type of work, and building ownership. The contract funding allows for up to 25 residential deconstructions and 20 salvage jobs. To date, however, BFM has performed full-structure deconstruction on less than ten properties.

BFM is a nonprofit organization that supports a number of businesses helping formerly incarcerated and/or homeless men develop work experience, and provides them with the supportive services they need. Deconstruction is a relatively new business endeavor for BFM and the organization has been growing its expertise and capacity in that arena. BFM has experienced difficulty in attracting property owners to choose deconstruction. That issue was a factor in leading to this Capstone Project.

Overview of Deconstruction and Demolition

Deconstruction is the “disassembly of structures for the purpose of reusing components and building materials” (Kibert, Chini, and Languell 2001, 182). The term may be used to describe both the complete, piece by piece disassembly of a structure, as well as partial disassembly or a piece-meal approach referred to as “soft stripping” (Tezdogan and Demirel 2014). The underlying goal of deconstruction is reuse, wherein materials are repurposed in their existing form, a so-called “closed-loop” materials flow (Denhart 2010).

Demolition refers to the mechanical removal of a structure, resulting in a mixed pile of debris which is then usually hauled to a landfill (Kibert, Chini, and Languell 2001). Demolition typically doesn’t differentiate among types of material, and may result in both hazardous and high-value materials ending up in landfills. While deconstruction was the norm in structure removal prior to the industrial revolution (Bell 2012), demolition was the standard practice throughout the 20th century.

In practice, demolition and deconstruction exist on a spectrum. Proponents of deconstruction strive for complete closed-loop material flows, in which all of the materials from one structure are used to build another structure (Chini and Bruening 2003). However, true closed-loop materials flow is generally not possible with current building materials. For example, drywall cannot be reused (Endicott et al. 2013). Because of this, deconstruction and demolition are not mutually exclusive. Instead, structure removal often uses a mix of deconstruction and demolition, and a mix of recycling, reuse, and disposal. For example, hardwood floors, cabinets, and fixtures may be removed from a house, even if the walls and roof are deteriorated or otherwise unsalvageable.

One dividing line between deconstruction and demolition comes in the form of the differences between “reuse” and “recycling.” In a generalized way, materials that are reused are not altered, and therefore could potentially be reused repeatedly. When recycled, the base form of a material is altered, and the number of times it can be recycled is limited (Chini and Bruening 2003). For example, a piece of lumber recovered from a building may be ground and used as animal bedding, or shingles may be recycled as asphalt paving. In both of these cases, the material flow only goes one direction. The animal bedding cannot be converted back into lumber.

It is important to assess the uses of the terms “recycling” and “reuse” carefully when evaluating businesses and media coverage. In many cases, the terms are used interchangeably, but in the research, and within the discipline, they have specific implications.

Diversion

An alternative approach to the terminology around reuse and recycling is simply to examine the rates of diversion. Diversion is generally defined to be any reuse or recycling that prevents materials from entering the landfill, though it generally does not include waste-to-energy incineration (Chase 2010).

For entities that are primarily concerned with slowing the growth of landfills, and the negative environmental impacts they cause, a greater focus on diversion has been an important strategy. A number of counties and municipalities have adopted regulations to enforce diversion rates for structure removal. The mechanisms of diversion are left to the property owner and their deconstruction or demolition provider.

For example, Cook County, Illinois, mandates a set of demolition debris diversion requirements for any demolition permit. These include the reuse of, at minimum, 5% of a structure (by weight) and a total diversion requirement (reuse plus recycling) of at least 70%. After the expiration of the permit, the permit holder must submit a report to verify that the requirements were met. Properties that fail to meet the diversion requirements may be fined up to \$1,000 (Demolition and Diversion, n.d.).

Portland, Oregon has gone further, requiring deconstruction for any residential structure built in 1916 or earlier. Permit holders are required to document the reuse or resale of materials, and may be fined up to \$500 for a failure to deconstruct (for the first offense). There are greater penalties for using mechanical equipment that prevents feasible reuse by intentionally damaging material (Draft 2016).

Cost Differentials

While deconstruction and demolition each have characteristics that overlap in terms of process, equipment, and skillset, they have different cost drivers. The mechanical removal of a structure is a relatively straightforward process, and can often be accomplished in one or two days by a small crew of workers (Denhart 2010). Demolition generates a large amount of undifferentiated waste. In some cases, this material may be transported to a recycling facility that will roughly sort the waste by material type (Endicott et al. 2013). In a non-recycling workflow, material will simply be transported directly to the landfill.

In most cases, the cost of disposal in a landfill, or “tipping,” is a large component of the cost to demolish a structure. A typical 2,000 square foot home will generate 127 tons of construction and demolition waste (“Green Building and Deconstruction Report” 2015). Nationally, tipping costs vary considerably, but \$50 per ton is roughly the average. Minnesota fees are currently approximately \$50 per ton.

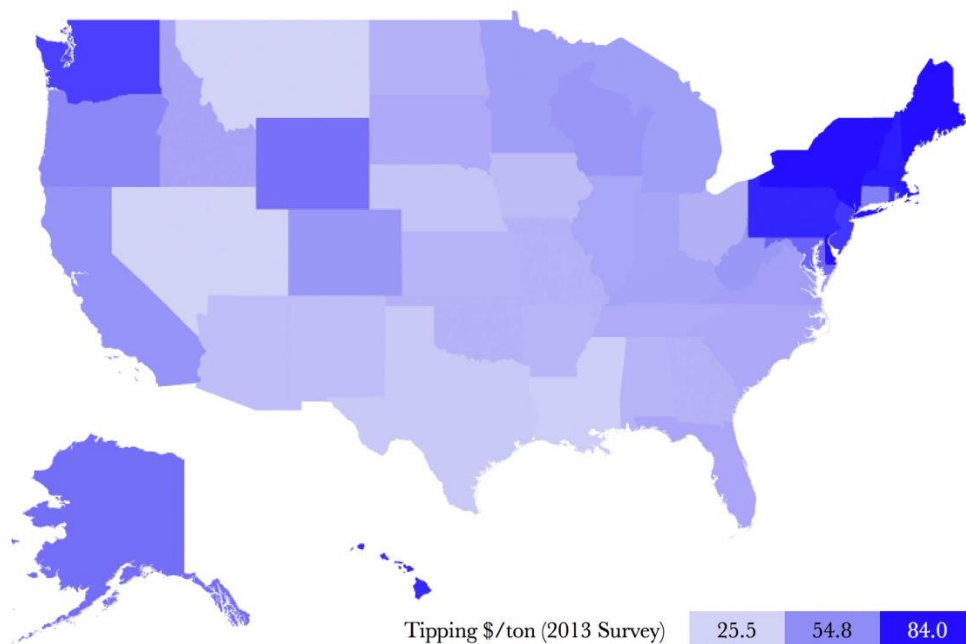


Figure 1: Tipping Fee Distribution (“Landfill Tipping Fees in USA” 2013)

Deconstruction is a much more labor intensive process, typically involving multiple weeks on-site with a larger labor force. Because reuse of materials depends on the materials remaining intact, deconstruction also requires a wide skillset and therefore more training. These factors

mean that labor is a substantial component of the cost of deconstruction (Dantata, Touran, and Wang 2005). Because deconstruction inherently results in a substantial portion of material being diverted from a landfill, the relative costs of tipping are much less as compared to demolition.

While costs vary among markets and providers, the top-line cost for deconstruction is generally about three times greater than demolition of the same structure. However, this comparison is often not the full picture for the property owner because of the availability of tax deductions for deconstruction. This deduction applies to privately held property, for which the owner has sufficient tax liabilities to claim a substantial discount (Tam 2012). To claim the deduction, the property owner donates the salvaged material to a non-profit organization for resale or reuse. Property owners will hire IRS-qualified appraisers to value the materials, and can then claim the total value as a deduction on their federal income taxes (“Owner’s Guide to Donating Used Building Materials,” n.d.).

For property owners in a high tax bracket, who are deconstructing a relatively high-value property, the tax benefits may more than offset the cost of the deconstruction (Tam 2012). However, this benefit is not worth nearly as much to lower income property owners, or to those who are deconstructing homes with limited salvage value. Some groups have advocated moving from a tax deduction to a tax credit model, at either the federal or state level, which would serve to incentivize deconstruction more fully, regardless of the type of property or the tax bracket of the property holder (Bell 2012).

In some cases, deconstruction firms operate as non-profit organizations, and are able to accept materials donations directly. They may then be able to resell those materials to reduce their costs or provide funding for other programs. The degree to which materials can be resold is dependent on the regional market for salvage materials, as well as the types of materials being salvaged. There are some materials that are very valuable and easily sold. For example, old growth hardwood lumber, particularly large-dimension pieces, are easily sold regardless of region. Similarly, historic brick is in high demand, as long as it is salvaged in a good condition (“A Report on the Feasibility of Deconstruction: An Investigation of Deconstruction Activity in 4 Cities” 2001).

In other cases, material resale may be more difficult. Construction industries rely on clean, predictable, and consistent supplies of lumber, which cannot be guaranteed in markets with limited deconstruction rates (Falk and McKeever 2004). Small, local salvage sellers may also be unable to provide this type of consistency. However, smaller salvage firms may be able to sell material to exporters on a wholesale basis, who are able to pool materials and then move them to overseas markets (“A Report on the Feasibility of Deconstruction: An Investigation of Deconstruction Activity in 4 Cities” 2001).

One of the major gaps in the research around material reuse within the deconstruction process comes from the differences between the claimed material value and the actual resale value. In theory, these values should be equivalent. In practice, based on conversations with

deconstruction providers nationwide, the actual material resale value is often much less than the claimed amount. This is due to the previously mentioned variability in the resale market, as well as other business factors that impact the resale business.

Logistics of Deconstruction

Deconstruction firms exist for a variety of purposes. Some operate as traditional for-profit firms, some operate as low-overhead cooperatives, some are non-profit subsidiaries of larger non-profits, and some exist with a focus on social transformation. Each approach results in differing perspectives and structures.

As stated in the previous section, labor is a major component of the cost of deconstruction. The skills involved with deconstruction are well-aligned with the skills involved with other construction trades (Bell 2012). Because of the amenability of the deconstruction process to the provision of job training, as well as that of direct employment, deconstruction is often utilized as a workforce development tool (Penn et al. 2003). The Department of Housing and Urban Development has even published a guide to deconstruction, which emphasizes the community development and job training aspects of deconstruction (Tezdogan and Demirel 2014). However, the need for a well-trained workforce in order to deconstruct structures efficiently may be at odds with the goals of assisting a large number of workers.

Another approach to deconstruction is to focus on the environmental benefits and energy savings. In general, deconstruction with direct reuse is low-intensity from an energy and carbon-emission perspective, as compared with the use of new building materials (Falk and McKeever 2004). Careful deconstruction is also better able to prevent hazardous materials from entering the waste stream, as compared with traditional demolition (Denhart 2010). Even with a relatively low volume of reuse, the additional sorting and more intentional diversion of deconstruction can provide needed reductions in carbon emissions (Chase 2010).

In some markets, a focus on historical preservation and continuity is an important part of the deconstruction process as well. This may include using portions of a building to construct a new structure at the same site, or repurposing materials as accent pieces in other spaces. In both cases, the storytelling associated with the materials is a key component.

Public Incentives

Nationally, there are few direct incentives for deconstruction. We cover the incentives in place in Akron, Ohio and Portland, Oregon, in the findings section. The primary financial incentive comes in the form of the federal tax deduction. Other non-financial incentives that have been experimented with include expedited permitting for deconstruction, as well as waived permitting fees (Bell 2012).

In markets with large volumes of blighted properties, some municipalities have created incentive structures to attempt to make deconstruction more financially viable. These approaches aim to leverage the environmental and labor-creation benefits of deconstruction by providing financial support for deconstruction firms, while acknowledging that deconstruction is not often the most cost effective way to remove a structure (“A Report on the Feasibility of Deconstruction: An Investigation of Deconstruction Activity in 4 Cities” 2001).

Future of Deconstruction

Going forward, deconstruction will continue to rely heavily on the favorable tax treatment from the IRS at the federal level, or the development of other financial subsidies. If the IRS were to become more aggressive in their evaluation and treatment of the deduction of salvaged materials, the financial calculus for deconstruction would shift dramatically. Alternatively, a major upward shift in the market for salvage building materials would narrow the gap between the appraised values and the actual resale values in most markets.

Longer term, there is a slow shift among architects and design firms towards a “designed for deconstruction” approach, which means building structures that can be more easily disassembled, and using materials that are well-suited to reuse. In some cases, this may mean changes in adhesives and fasteners, or using alternatives to materials like gypsum drywall (Endicott et al. 2013). Buildings designed for deconstruction also require less time to disassemble, narrowing the labor gap with traditional demolition (Chini and Bruening 2003). This approach is not currently included in building codes, but is being practiced voluntarily by some builders. In fact, many modern building processes have meant that newer buildings are much harder to deconstruct than structures built in the late 19th or early 20th century (Shami 2008).

Research Questions

Defining the research questions for this project presented a challenge for the Capstone Project team. HCEE had a goal of defining and supporting a business model for BFM in order to develop success without subsidy. In addressing that goal, it would be necessary to (a) understand BFM’s current business model, and (b) develop a clear sense of the relationship between the two entities. The result would be assumed to be a successful business model for deconstruction firms.

Another goal was to increase the use of home deconstruction within the County, as the most preferred method of diverting C&D waste from landfills, according to the US Environmental Protection Agency (US EPA, n.d.). The full EPA waste management hierarchy is outlined in figure 2.



Figure 2: Waste Management Hierarchy

This would require research into successful practices for promotion, incentives, and priorities for firms and communities to use to move towards this goal.

As the team began the task of defining research questions to determine these successful practices, it became clear that the research was much less about HCEE and BFM specifically, and much more about what happens in communities where there are successful long-term deconstruction firms with and without local government support.

This research is focused on gaining the wisdom of local governments and deconstruction firms that are addressing, successfully, the goal of increasing home deconstruction in their communities. As a result, the final research questions for this project are:

Question 1. What is the process for building destruction in Hennepin County?

Question 2. How do Better Futures Minnesota's deconstruction methods and costs compare with other deconstruction companies?

Question 3. Are the current policies and incentives in Hennepin County well aligned to spur deconstruction?

Methods

The goal of this research was based on the following Opportunity Statement: This study is driven by determining opportunities to increase the rate of property deconstruction in

Hennepin County. In working towards this goal, we used the following methods for each research question.

Question 1. What is the process for building destruction in Hennepin County?

In order to address this question, we first needed to understand what home deconstruction is, at a project level and at an industry level. The team began with a review of the literature. Searches in the major scholarly sources, including Google Scholar, JSTOR, and Academic Research Premier, were conducted using search terms like “property deconstruction,” “construction diversion,” and “construction materials reuse.” This provided information on individual case studies, specific elements of home deconstruction, and student research.

Once we developed an understanding of how home deconstruction functions as a business model, and as a means of supporting environmental goals in the marketplace, we moved from scholarly research to industry descriptions, goals, and implementations. We identified and used documents developed by home deconstruction organizations to explain, develop, and promote the home deconstruction industry.

We then delved deeply into how home deconstruction functions within Hennepin County, keeping in mind that BFM is the only organization currently providing home deconstruction in the Twin Cities area, and is subsidized by Hennepin County. We collaborated with Carolyn Collopy of HCEE, and Steve Thomas of BFM; this included meetings, emails, and ongoing conversations. Each organization also provided us with internal documents as well as external documents prepared for each organization. (See Appendix A for documents.)

Question 2. How do Better Futures Minnesota’s methods and costs compare with other deconstruction companies?

HCEE provided us with contact information of other deconstruction firms. Using these contacts, as well as contacts gained through internet searches, emails were sent to deconstruction firms across the country. Based on responses, and other contacts provided as interviews went on, a semi-structured interview with deconstruction organizations across the US was developed. The questions within this email were used as the structure for interviews. Identifying information has been redacted at the request of the interviewees (see Appendix B). In addition, we collected a variety of data on the tipping fees across the country. We used both publicly available data, and directly contacted a variety of transfer stations.

Question 3. Are the current policies and incentives in Hennepin County well aligned to spur deconstruction?

We used semi-structured interviews with representatives from local governmental units that have enacted policies to promote home deconstruction, including Ramsey County, Minnesota and the City of Portland, Oregon (see Appendix C). We were unable to connect with other

governments with these policies, but were able to use ordinances passed to fill in the developing picture of local governments and options for deconstruction promotion.

Limitations

Limited scholarly research exists regarding home deconstruction, likely due to the fact that home deconstruction as an industry is still in the early stages of development.

In addition, due to the lack of this research, there is no organized framework to work with individual municipalities, counties, or states to collaborate on regulations that could increase home deconstruction overall.

Research that does exist reaches varying conclusions, mainly due to the fact that such research is limited to case studies or specific elements of home deconstruction. One exception is “Survey of Deconstruction Operations by Building Materials Reuse Organizations in the US” by Bradley Guy, 2008. In this survey of 21 respondents, there are many findings that corroborate the findings of this study (Guy 2008).

The data retrieved from interviews of deconstruction firms, while extremely valuable to this study, also introduce challenges to the data. First, the low number of firms we were in contact with cannot constitute a full study. Second, several of the firms requested that their data be anonymous; we honored that by removing all identifying information from the data. One exception to this is The ReUse People, who conduct business in Oakland, CA, and are affiliated with deconstruction firms in 15 additional states.

The time limitations for this Capstone Project included a shortened summer semester. While this project is comprehensive and forward thinking, our ability to connect with organizations, and then to process and analyze these data required a hard deadline. We are grateful to all the home deconstruction firms that provided us, sometimes passionately, with the input necessary to complete the project.

Findings

What is the process for building destruction in Hennepin County?

The purpose of the first research question is to establish a documented baseline for the current state of building deconstruction in Hennepin County, the groups involved, and any obvious shortcomings.

BFM is currently the only deconstruction provider operating within Hennepin County. Prior to BFM, deconstruction in Hennepin County was performed by the Green Institute, a non-profit organization that also managed a reuse storefront. The Green Institute ceased operation in

2011 (Gillard 2011). BFM is contractually supported by the HCEE. The two-year contract provides a financial subsidy of \$9,000 for each privately held residential property deconstructed, and \$18,000 for each residential property owned by a city, the county or a public entity. HCEE does not have any direct involvement in individual deconstruction projects. BFM is responsible for arranging the reimbursement with HCEE. The reimbursement is to BFM, not to the property owner.

It is a challenge for property owners to discover the option of deconstruction in Hennepin County. Ramsey County includes BFM in a Resource Guide on the Pre-Demolition Inspection page of their website. Additionally, each city in Ramsey County provides a brochure of options to those who receive a demolition permit. BFM's own website is prominent on a Google Search of "Home Deconstruction Minnesota". This search, however, is predicated on the prior knowledge of deconstruction.

Other property owners currently learn about BFM and their deconstruction services primarily through word of mouth or internet links. The owner contacts BFM and then works with them to do a walk through, agree on a bid and arrange for deconstruction services. The property owner connects and works with an IRS approved appraiser to determine the value of the donation of salvage to BFM. BFM provides the property owner with a receipt for the donation and removes the materials, either by sale or to storage.

[How do Better Futures Minnesota's deconstruction methods and costs compare with other deconstruction companies?](#)

BFM has engaged in relatively few full-structure deconstruction projects. As outlined in previous sections, many elements of the deconstruction workflow are reliant on a steady stream of business in order to maintain a consistent workforce, and to ensure a stream of reuse materials sufficient to build a stable reuse market.

Deconstruction firms come in many shapes and sizes. Some are non-profits that look very similar to BFM, including a social benefit mission related to the staff they employ. Others are for-profit or co-operative businesses. Some focus primarily on the environmental benefits of deconstruction, while others focus on the historical preservation aspects. Most firms are operating without any public funding, though some non-profits were reliant on public or foundation funding as part of their startup process. All of the firms that were studied cite labor as the primary cost driver for their business, and all of them rely heavily on the federal tax deduction to incentivize deconstruction.

Deconstruction Profile: This New England-based deconstruction firm operates as a cooperative. They attempt to operate with very low overhead. The owner previously ran a non-profit deconstruction firm, and decided the overhead and complexity wasn't worth it given the amount of benefit being delivered. They partner with a local non-profit to accept the material donations from the deconstruction. In some cases, they'll run a site-sale from the deconstruction project, and take a commission on the sales. However, any income from materials sales is purely "gravy," and they aim to make money on the deconstruction itself. They typically bring three or four people to a job, and average 750 square feet per week.

This firm emphasizes a message of "do the right thing." This means not just the "right thing" for the environment, but also for the history of the property and the families that have occupied it in the past.

When looking at only the full-structure deconstruction projects completed by BFM, and factoring out the costs for demolition, we arrive at an average of approximately \$16 per square foot. This figure does not take into account business overhead or administrative overhead. When those figures are factored in on previously completed jobs, the average cost is \$37 per square foot. This is substantially higher than the costs per square foot being achieved by most deconstruction providers nationwide.

Many of the deconstruction firms we spoke to were reluctant to provide us with specific costs, or didn't have historical data readily available. In order to overcome this challenge, we generalized the information provided to us by The Reuse People, who are affiliated with firms in 15 states. They cite a range of \$10 to \$15 per square foot as their recommended goal. Of the deconstruction firms we interviewed who did provide costs, the range aligned closely with the ReUse People guidelines, ranging from approximately \$10 to \$16 per square foot.

In addition to cost, time is a major factor in the deconstruction process. Looking at the same full-structure deconstruction jobs, and taking into account all the staffing hours involved (including staff, crew, and trainee time) we arrive at a figure of approximately 30 minutes per square foot per staff member. This figure would imply that with ten people, a rate of 200 square feet per work week could be achieved. While there was some variance among deconstruction providers, most aim for between 500 and 1000 square feet per week, with an average crew size of 7.

While these numbers indicate a large disparity between BFM and the industry norms, our research indicates that neither of these measures is the primary factor in adoption of deconstruction, and we caution against an analysis that overemphasizes either cost or pace.

Because successful, efficient deconstruction requires a highly skilled workforce, deconstruction firms consistently highlight the importance of a stable, long term workforce. Even

deconstruction firms that engage in workforce development along the lines of the BFM mission aim to maintain their employees over the long term. While many firms in the deconstruction field are relatively young, they often point to employees who have been with the firm for more than three years as keys to success. BFM does not currently have that sort of long term labor force among its returning-to-work population. We recognize that this is in part a “chicken or egg” situation, as a lack of consistent work makes it difficult to retain the labor force that is key to efficient deconstruction.

Even in the case of the most efficient deconstruction provider, a project is unlikely to be completed in less than two weeks. This is a major impediment if the deconstruction provider is brought into a project late in the process. If the property owner has already made the decision to perform the structure removal, and is ready to move on to construction, an additional two-week delay may be untenable. For larger properties, the delay could easily stretch to a month or more.

Deconstruction providers have addressed this issue in a variety of ways. Some deconstruction providers maintain close relationships with demolition providers, and are able to soft-strip properties during the waiting-period before a demolition permit is issued. The legality of this is dependent on local regulations. By far the most common trend among successful providers is a reliance on a network of relationships with builders, architects, and realtors. These professionals are involved in a building process from the very beginning, and are able to bring a deconstruction provider into a project early enough so that the length of deconstruction does not impede the timeline.

Because builders and architects often specialize in the types of clients for whom the tax deduction is valuable, many successful firms have explicitly built connections with “green builders,” who focus on environmentally sustainable buildings and building practices. This is a natural connection for deconstruction. Hennepin County has a number of green building firms and green architecture firms.

Deconstruction Profile: This Midwestern deconstruction firm operates as a nonprofit. It's been in operation for over twenty years, but began by helping others identify the value of salvage material, and has gotten into hands-on deconstruction more recently. Their goal is to create an entire deconstruction industry in their market, and they focus on finding outlets for the materials from deconstruction. They work with the ReUse People, and in the private market focus on higher value homes. This firm relies on a labor force made up of chronically un- or under-employed people. They recognize that this slows their process, and they average around 500 square feet per week. Their goal is to break even on the job itself, and they receive no ongoing outside support.

This firm operates a salvage warehouse, though they try to move directly from site to buyer as much as possible. They've created ongoing relationships with consumers of salvage material. This firm is also able to salvage old barns, which helps subsidize the warehouse business. They work closely with a nearby large industrial city to spread knowledge about deconstruction, and occasionally work to salvage city-owned properties.

Tipping fees are another substantial cost for both deconstruction and demolition providers. Much of the non-academic literature around deconstruction argues the tipping costs are a primary driver towards the adoption of deconstruction. The actual data on this are less clear. Nationally, tipping costs average around \$50/ton for construction and demolition waste. While markets with very low tipping fees (as low as \$24/ton) do accentuate the cost differences between demolition and deconstruction, costs above the \$50/ton level do not seem to lead to substantial variation in deconstruction rates. In other words, simply raising tipping fees from the current average in Minnesota (\$47/ton) to about \$60/ton would be unlikely to impact the adoption of deconstruction in a meaningful way.

BFM is not a licensed demolition contractor, but does engage with demolition contractors in a variety of ways. In the case of a full-structure deconstruction, BFM may take the structure down to the foundation, and then subcontract the demolition work to a demolition contractor. They may also act as subcontractors for a contractor. There is a wide amount of variance in how other deconstruction firms operate as well. In some cities and states, they are explicitly required to operate with a demolition license. In others, they operate in close relationship with demolition providers, depending on the demolition contractor to carry the permit for structure removal.

[Are the current policies and incentives in Hennepin County well aligned to spur deconstruction?](#)

Most deconstruction firms operating in the United States today do so without any outside funding. Even the non-profit organizations that were studied aim to operate at a break-even basis or above, solely on the cost of deconstruction. Because of the sporadic nature of the

reuse market in most regions, firms are not reliant on the sales of reuse materials to fill any gaps.

In areas where there is public support, it generally takes the form of a mandate or encouragement, rather than a subsidy or grant. In Ramsey County, for example, there are mandatory pre-demolition inspections to provide oversight on the disposal of hazardous waste, which also provides an opportunity for the county to advocate the salvage of high-value material from properties, or to inform property owners about the possibilities of deconstruction. This approach likely suffers from the timing-related limitations indicated earlier: at the point of a pre-demolition walkthrough, property owners are unlikely to be willing to accept a multi-week shift in their timeline. However, a soft-stripping process could provide for reuse without substantially impacting a timeline.

Two local governments that do financially support deconstruction and/or salvage are Portland, Oregon and Akron, Ohio. In Portland, a new deconstruction ordinance has been passed and will go into effect this fall. The grant program portion of it, however, only has \$50,000 in city appropriations, and those with whom we spoke do not expect the financial subsidy to continue indefinitely. In Akron, Habitat for Humanity of Summit County has been supported by Akron Community Development Block Grant (CDBG) funds and by Summit County Land Bank as a sub grantee from an Ohio Housing Finance Agency grant. The total funds received by Habitat for Humanity of Summit County through these contracts has been \$221,200 since 2011. (Sibbio 2016)

The examples from Cook County, Illinois and Portland, Oregon were highlighted in an earlier section. These approaches are the most certain way to ensure a consistent demand for deconstruction, while also achieving goals of landfill diversion. We have not found any areas in which property owners are directly subsidized or compensated for choosing deconstruction. However, there have been advocates pushing for an alternative to the current tax-deduction model, and that would allow for those outside the highest income brackets to benefit as well. Any change in this space would need to take place at the federal or state level.

When evaluating options for spurring deconstruction, the county should also be aware of the potential concerns around the federal tax deduction. The IRS is aware of deconstruction, and has performed in-depth audits of some deconstruction providers, including the ReUse People. Nationwide, the market for deconstruction, and therefore the number of tax deductions for salvage material, is relatively small compared to more commonly used tax deductions.

Should the IRS choose to be more aggressive in its handling of salvage deductions, there is a chance the deductions could become less generous. Based on research into the current state of the reuse market, it does not appear that there is a strong correlation between the values being claimed for the salvage deduction and the actual values of the material being achieved in the reuse marketplace. There has not been any in-depth research tracking individual materials from the deconstruction site through their eventual exit from the resale market.

Recommendations

In determining recommendations for HCEE, the Capstone Team decided to focus on those we believed would lie within current control of the Department and/or Hennepin County. We do, however, suggest that careful attention be given to potential policy actions by the State of Minnesota and the Federal government that would affect deconstruction. As mentioned previously, current federal income tax deduction policy may change. Advocating an alternative that benefits more than wealthy property owners could help increase demand. Determining ways to advocate for statewide deconstruction standards is something to consider. And, being involved in design for deconstruction as it relates to building codes is similarly a space in which HCEE should involve itself.

Recommendation 1: Build on current progress in policies and practice

Propose Diversion and Reuse Ordinance to County Board as planned, and implement recommendations of FOTH study (“Construction and Demolition Diversion Capacity Study” 2015): HCEE is planning to recommend that the County Board of Commissioners enact an ordinance requiring 70% diversion for demolition of County owned facilities. This would be a start toward more supportive regulation regarding deconstruction. In 2015, HCEE had a construction and demolition diversion capacity study completed. There were six recommendations that came out of that study, some with direct implications for deconstruction. Of those recommendations, Hennepin County is currently working to make information regarding retail outlets for C&D materials more widely available for contractors and building owners. HCEE is also reviewing policy options to encourage more deconstruction and salvage through the existing permit and approval process for demolition projects within cities. In our conversations with HCEE, we also discussed an incentive to cities or property owners to pilot C&D diversion efforts, including deconstruction, based on the success of this approach in Portland, OR.

[Explore partnerships with other local governments](#): Ramsey County has implemented a pre-demolition inspection program with an intent to deal with hazardous waste. Encouraging deconstruction, especially partial deconstruction and soft-stripping, could be incorporated into a program like this. Current efforts with the City of Minneapolis include development of educational materials for contractors to have at their permit counter. Materials like that might be similarly valuable to other local units of government within Hennepin County.

Minneapolis has shown interest in deconstruction, and discussion regarding possible collaboration of effort should be considered and undertaken. Reviewing the partnership in Akron, Ohio with Community Development Block Grant (CDBG) funds supporting Habitat for Humanity of Summit County may provide a replicable or adaptable arrangement in Hennepin County.

Conduct a market feasibility analysis for deconstruction and materials reuse: Engage a consultant(s) who can determine supply and demand variables for structural and nonstructural deconstruction across Hennepin County. This analysis will provide a roadmap for targeted marketing by deconstruction providers. Similarly, an analysis of the market for reused materials can assist deconstruction providers in determining potential profit from sales.

Recommendation 2: Engage deconstruction stakeholders in “dialog to action” conference

Successful deconstruction is complex and relies on a system-wide approach. As such, it needs to include the voices, ideas and efforts of all stakeholders. These stakeholders include demolition representatives, architects, builders, realtors, contractors, local government representatives and interested property owners. They could also include other Hennepin County Department representatives as appropriate, such as Facilities Services, Transportation, as well as community and economic development staff from cities within the county. In Hennepin County, too few stakeholders are currently engaged in making deconstruction successful.

Our recommendation is to bring these stakeholders together in a one-day “dialog-to-action” conference. Given the fledgling nature of the deconstruction industry, it will be important to include expert presentations. The agenda should be well structured to provide maximum opportunity for stakeholder input as well as incorporate next steps for action. The Public and Nonprofit Leadership Center at the Humphrey School provides facilitation services along these lines and could serve as a resource for HCEE should this recommendation be adopted.

From examination of successful deconstruction markets, we believe that a foundation built on public awareness would be a first step in creating, incrementally, an environment conducive to deconstruction and the support needed for industry viability. We further believe that the type of conversation proposed will be key to encouraging other entrants into the deconstruction industry, by providing a concrete manifestation of the county’s commitment, and by bringing demolition providers into the deconstruction space. Over time, a continuing dialog among stakeholders will be instrumental to lobbying for larger policy changes.

Create a deconstruction task force or working group: Portland, Oregon has a “Deconstruction Advisory Group” with members from city staff as well as advocates and practitioners in the field. A good idea could be to use the recommended conference above to find interested and skilled stakeholders to serve on this task force or working group.

Recommendation 3: Encourage any deconstruction provider operating in Hennepin County to follow successful practices.

Educate on deconstruction: Disseminate information regarding successful practices of deconstruction to interested stakeholders. This could be incorporated into the conference agenda to generate discussion.

Evaluate County investment: Analyze best use of financial support for deconstruction so that it spurs demand: given our research, most local governments don't do much to support deconstruction. Hennepin County's monetary commitment to BFM, including the reimbursement to BFM for residential and public deconstruction work, is generous in comparison. Portland, Oregon provides very small grants for deconstruction out of a fund with a total of only \$50,000 for the city as a whole, and those who are involved there do not expect the grants to continue indefinitely.

Tell the full sustainability story: When in partnership with mission-driven deconstruction providers, the value of the social benefits provided should be included in the story. The true economic value of a deconstruction model that includes workforce development for disadvantaged people implies social impact as well as environmental impact. Being able to tell this full story has the potential to spur additional demand within the target market and provide public accountability.

Conclusion

A vibrant and successful deconstruction provider cannot exist in a vacuum. Building and sustaining deconstruction requires a systems-level approach that takes into account policy provisions, property owner needs, contractor awareness, and workforce development issues. Hennepin County is well-positioned to be a builder of bridges among these parties, and has the opportunity to play a role as an unbiased advocate and matchmaker. Places like Portland and Cook County are leading the way and showing that deconstruction can play a stable and economically viable role in a healthy waste diversion marketplace. Hennepin County is well situated to join them in leading the nation on deconstruction.

About the Authors

Lorrie Janatopoulos: Lorrie is the Planning Director at Arrowhead Economic Opportunity Agency (AEOA), a Community Action Agency with an anti-poverty mission. She has worked at AEOA for nearly 20 years developing programs for the homeless, for job-seekers, for the very young and the very old. Additionally, she is a life-long community activist working for women, children and the Lesbian, Gay, Bisexual and Transgender (LGBT) community. She has run for elective office twice. Lorrie is a 2016 BUSH Foundation Fellow. She and her wife, Sharon, live on the end of a dead-end road in the woods of northern Minnesota.



Don Jorovsky: Don is a graduate student at the University of Minnesota's Humphrey School of Public Affairs. He has worked at the Minnesota Senate and House, as a Legislative Assistant, Researcher, and Committee Administrator, and at the Minnesota Department of Human Services as a Task Force Liaison; he is currently heading back to the Senate staff. Don lives in St. Paul with his wife Jo, an administrator at the U of M's College of Education and Human Development, and their Jack Russell Terrier, Petey.



Suzanne Lantto: Sue is a graduate student at the University of Minnesota Humphrey School of Public Affairs. She has previously worked in the field of domestic violence in Hennepin County and has focused her work on providing resources and options to both victims and offenders, while seeking to incorporate the voices of each into the institutional responses to the criminal offenses of domestic violence. She is the mother of 3 children, Gen, 22, Katey, 20, and Max, 16. Sue lives in Minnetonka, Minnesota.



Colin McFadden: Colin is a technology architect with the College of Liberal Arts at the University of Minnesota, where he seeks to reduce the barriers to the use of technology in education and research. He is particularly interested in the intersections between policymakers and the science and technology communities. Colin lives in St. Paul with his wife Kathleen, and spends his free time rock climbing, cooking, or dreaming of his next travel destination.



Appendix A

Documents from Hennepin County and Better Futures Minnesota.

- A140975 Network for Better Futures signed contract with Hennepin County, August 1, 2014 – July 31, 2016.
- Attachment B Preliminary Financial Data as of 12-31-16
- Current Cost Model compared to Proposed Cost Model for 2016 Budget
- Framework for 2016-2018 Better Futures Business Plan
- Deconstruction and Materials Reuse Progress Report for Hennepin County Environmental Services 5-15-15
- Six Month Status Report from Better Futures MN 12-30-15
- Preliminary Summary Report for Hennepin County Environmental Services 2-29-16
- Construction and Demolition Diversion Capacity Study, August 2015, Foth Infrastructure & Environment, LLC
- The Network for Better Futures Annual Evaluation Report for the Minnesota Department of Corrections, 1-16-09, The Improve Group
- Recycling Progress Report: On the path to zero waste landfilled, April 2015, Hennepin County Public Works, Environment and Energy
- HCEE Strategic Plan 2013-2020
- Green Building and Deconstruction Report, March 26, 2015, City of Minneapolis, Department of Community Planning and Economic Development - CPED
- Request for Minneapolis City Council Committee Action from the Department of Community Planning and Economic Development – CPED, May 13, 2014
- Hennepin County Solid Waste Management Plan, April 12, 2012

Appendix B

Email to Deconstruction Firms (n = 11).

Carolyn Collopy with the Hennepin County Environment and Energy Department suggested we contact you regarding a research project we are conducting in collaboration with her agency. We are a team of graduate students at the Humphrey School of Public Affairs at the University of Minnesota. Our capstone project is to provide Hennepin County with an analysis of home deconstruction cost structures and methods in order to encourage more deconstruction within the county.

We are hoping you can provide data that can be incorporated into this analysis.

Specifically, we are requesting the following information from you, either electronically or via a conversation:

- 1. Cost breakdowns for individual private home deconstruction projects. Overall, we're looking for a cost-per-square-foot and a days-per-square-foot. Other information that would be helpful would be date built, square feet, revenue from client and from salvage, with a net profit/loss 1. each project and its original bid amount.*
- 2. Information about how you work with property owners on the tax implications of deconstruction.*
- 3. Information on the market for salvage and used construction products in your region, as well as the dumping costs in your market.*
- 4. The cost model used by your organization for estimating bids.*
- 5. Any subsidies/grants you receive to provide deconstruction services.*
- 6. Finally - any thoughts or ideas you think we would find valuable in addressing/assessing the greatest problem that Hennepin County and its contractor struggle with - the cost of deconstruction being so very much higher than the cost of demolition.*

We would greatly appreciate your assistance in this project. We are available via phone if you'd rather talk directly. If you're unable to provide that information above, any data you do have would be very helpful.

Thank you for your time.

Lorrie Janatopoulos, MPA Candidate

Don Jorovsky, MPA Candidate

Colin McFadden, MPA Candidate

Suzanne Lantto, MPA Candidate

Appendix C

Table 1. Interviews with Deconstruction Firms (n = 6)

Area	Bus model	Funding	Contracts
Great Lakes Area	Non-profit	no outside support	Contract with City
Southwest	Non-profit	no grants/subsidies	training, materials resale
Mid-Atlantic	Social enterprise	grants/funders invest	Contract with City
Mid-Atlantic	Non-profit	Block grant funding	None
Northeast	Co-op	no external funding, deconstruction only	None
Great Lakes	Non-profit	no grants/subsidies	None

Table 2: Tipping Fee Survey

City	Fee/ton	Notes
Baltimore, MD	\$65/ton	
Burnsville, MN	\$43/ton or flat \$125	
Detroit, MI	\$22.15/ton	Most likely substantially cheaper due to huge amounts of abandoned properties; 140,000. (Kurth and MacDonald 2015)
Eau Claire, WI	\$65 gate fee up to 1500 lbs.	prorated as volume increase, 1800lbs = \$84
Elk River, MN	\$50/ton	
Evanston, IL	68.50/ton	
Maple Grove, MN	\$148/ton	
Milwaukee, WI	\$40-50/ton	
Oakland, CA		“even in CA, fees might be 15% of project” (from an interview with the Reuse People)
Vermont	\$85-100 plus \$250 can drop	clean wood \$125 can drop plus \$50/ton, shingles a little cheaper

Table 3: Nationwide tipping fees data (“Landfill Tipping Fees in USA” 2013)

State	tipping \$/ton (2013 survey)	State	tipping \$/ton (2013 survey)
Alabama	\$37.60	Nebraska	\$31.13
Alaska	\$60.88	Nevada	\$24.83
Arizona	\$33.05	New Hampshire	\$77.85
Arkansas	\$36.50	New Jersey	\$72.39
California	\$52.07	New Mexico	\$33.80
Colorado	\$49.60	New York	\$86.30
Connecticut	\$57.15	North Carolina	\$42.59
Delaware	\$84.00	North Dakota	\$38.92
Florida	\$43.65	Ohio	\$39.66
Georgia	\$38.27	Oklahoma	\$38.31
Hawaii	\$75.17	Oregon	\$55.74
Idaho	\$44.41	Pennsylvania	\$75.96
Illinois	\$43.46	Rhode Island	\$75.00
Indiana	\$44.20	South Carolina	\$42.61
Iowa	\$34.15	South Dakota	\$41.90
Kansas	\$37.46	Tennessee	\$41.15
Kentucky	\$44.69	Texas	\$28.95
Louisiana	\$26.96	Utah	\$24.29
Maine	\$91.00	Vermont	\$82.32
Maryland	\$62.70	Virginia	\$46.11
Massachusetts	\$78.50	Washington	\$70.44
Michigan	\$46.82	West Virginia	\$49.46
Minnesota	\$47.04	Wisconsin	\$50.20
Mississippi	\$26.48	Wyoming	\$60.40
Missouri	\$38.38		
Montana	\$25.51		

Appendix D

Interview Questions

- Questions for Cook County and Portland
 - Both:
 - Why do you promote deconstruction (eco, etc.)?
 - What types of properties are being deconstructed?
 - Have you worked to establish deconstruction vendors?
 - What's the market like for salvage materials?
 - How do you think about the IRS savings?
 - What are your local tipping fees?
 - Cook County:
 - What can a county do to increase deconstruction?
 - How do you think about the difference between deconstruction and other types of diversion?
 - Portland:
 - Will the subsidy be sunset?
- Questions for Ramsey County
 - *How did you engage the cities to get buy-in for this program?*
 - *How are these inspections funded?*
 - *How does Ramsey County think about deconstruction as part of this program?*
 - *Do you have any thoughts on differences between Ramsey County and Hennepin County?*

Interviews

- Sara Baldiali, Member, Deconstruction Advisory Group, Portland, Or
 - Interviewed 7/1/16 via telephone
 - Interviewer Don Jorovsky
- Shawn Wood, Construction Waste Specialist/Staff Lead, Portland, OR Bureau of Planning and Sustainability
 - Interviewed 7/9/16
 - Interviewer Don Jorovsky
- Michael Reed, Pre-demolition Inspector, Ramsey County, MN
 - Interviewed 7/7/16 via telephone.
 - Interviewer Sue Lantto

Unable to contact an interviewee from Cook County, IL. Incorporated information from Proposed Ordinance sponsored by Robert D. Steele, County Commissioner "Substitute for Communication 318999 Cook County Demolition Debris Diversion Ordinance".

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