Deconstruction Insurance Policy: An Innovative Proposal to End Property Abandonment

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The statements, findings, conclusions and recommendations contained within this work are solely those of the authors and do not necessarily reflect the views of Michigan State University.

Introduction

Residential structures, as well as industrial and commercial complexes, have lifespans; without constant upkeep they eventually become decrepit and abandoned. When this occurs, local governments commonly become responsible for these properties and must commit the funds to pay for their removal. In cities across the Midwest, residential abandonment has characterized many communities and has proven to be extremely costly. For already struggling cities, entire blocks of blighted housing only worsens their challenges. The practice of demolishing housing sends millions of tons of building waste to landfills each year. The policy proposal outlined in this paper seeks to address this cycle of structural abandonment through a mandatory insurance policy which would hold property owners responsible for structures from their construction all the way to their final deconstruction. The goal of this policy is to limit the liability of taxpayers and municipalities from having to bear the costs of removing private property while also seeking to divert tons of usable structural material from landfills.

Scale of Issue

Residential abandonment within the United States can trace its roots back to many different causes including declining economic conditions, loss of population, loss of industrial jobs, and higher foreclosure rates as a result of the 2008 housing market crash (LaMore, 2013). Typically, when a site has been abandoned the costs of demolishing the structure fall upon the public which must fund the removal of these blighted structures. Cities such as Detroit, Chicago, and Cleveland have had to deal with this problem for many years. Estimates in Michigan for demolishing a single family home can cost approximately $20,000 (Skidmore, 2018) and statewide spending can total to approximately $100 million annually (AlHajal, 2016). Aside from

financial costs, families and communities also must deal with the societal and financial costs associated with abandonment. For example, abandoned buildings are correlated with higher crime rates, poverty, potential exposure to lead and asbestos, lost tax revenues, and decreased property values, thus furthering the plight of already struggling cities (National Vacant Properties Campaign, 2005).

Philadelphia, for example, spends approximately $20 million annually in maintaining around 40,000 abandoned buildings which conservatively translates into about $5 million in lost tax revenues (HUD, 2014). For the city of Detroit, the estimated cost to remove all abandoned houses is even higher at $850 million to one billion dollars (Karoub, 2014). To mitigate this problem nationwide, the cost of demolishing all abandoned residential properties with subsequent cleanup and restoration of those sites is calculated to cost around $78 billion taxpayer dollars (LaMore et al, 2015).

Although one typically associates blighted and abandoned structures with central urban areas, this problem has also placed a significant burden on rural areas. Throughout Michigan, there are a substantial number of abandoned farmhouses, barns, gas stations, and mobile homes. Outside of the three most populated counties in Michigan (Wayne, Oakland, and Macomb), there are 105,303 abandoned residential structures across the state (Census Data, 2016). With much more limited resources and smaller populations to draw a tax base from, smaller rural communities have very limited capacity to tackle the problems associated with structural abandonment.

Environmental and Social Impacts

Demolition of abandoned and blighted structures places significant environmental costs on communities stricken with abandonment. “548 million tons of C&D debris were generated in the United States, in 2015—more than twice the amount of generated municipal solid waste” (EPA, 2017). Deconstructing a building rather than simply demolishing it can reclaim and recycle usable material instead of sending it to a landfill where approximately 90% of all C&D debris is generated through demolitions (EPA, 2017). Materials such as bricks, wood, glass, metal, and electrical wires, among others, have the potential to be reused or repurposed. The city of Portland, Oregon noted that increases in deconstruction projects could divert 8 million pounds of waste annually from entering landfills, where it can be reused and also has the capacity to create new jobs and opportunities in the building and construction profession (City of Portland, 2016). Communities seeking to reduce their waste and landfill costs can pursue structural deconstruction as a smarter choice than simply demolishing abandoned structures.

By ensuring that the costs of deconstruction are born by property owners, critical public resources may be allocated for other community needs such as education, infrastructure, and public safety. Additionally, if owners are held responsible for removing obsolete structures there are other community benefits. For example, a study in the American Journal of Public Health suggests that urban blight removal can decrease crimes such as gun violence in communities. Abandoned residential structures may be used as shelter for illegal activity and removal of them may be a cost-effective way to sustainably reduce violent crimes in a troubled area (Branas, et al, 2016). Abandoned structures also have the capacity to attract other crimes such as arson and lead to decreased property values (Skidmore, 2018). Many studies have also

found that dilapidated housing conditions can lead to negative health impacts such as asthma, allergies, and exposure to lead or asbestos, (de Leon & Schilling, 2017). For cities with the desire to improve their societal health, blight removal is an important step to take.

Communities that are burdened with blight and abandonment on a large scale are confronted with these significant impacts that can prove costly. As noted above, the presence of these blighted structures can harm overall community health and vitality. With these significant impacts, it would seem that a mechanism to aid in the removal of abandoned structures is of compelling public interest.

Reactive – Proactive Continuum of Blight Removal

In addressing blight, practitioners and policy makers have employed two basic approaches. The reactive approach, which focuses on present structural degradation and removing existing abandonment and blight, and the proactive approach, which seeks to prevent future blight and abandonment and reduce the social, environmental and economic impacts of this phenomenon. (See Figure 1)

These are not mutually exclusive approaches, and local and state policy can and should embrace both of these strategies to combat the negative consequences of blight and abandonment. Figure 1 introduces the science of Domicology[1] and identifies some of the actions that might be taken in preventing and removing blighted and abandoned structures. It also identifies key stakeholders such as government, the construction industry, planners, and

[1] Domicology is the study of the structural lifecycle. For more information on this emerging field of study readers are referred to https://domicology.msu.edu/

others who participate in the maintenance or removal of a structure at the end of its useful life. These roles will be discussed further in the following sections.

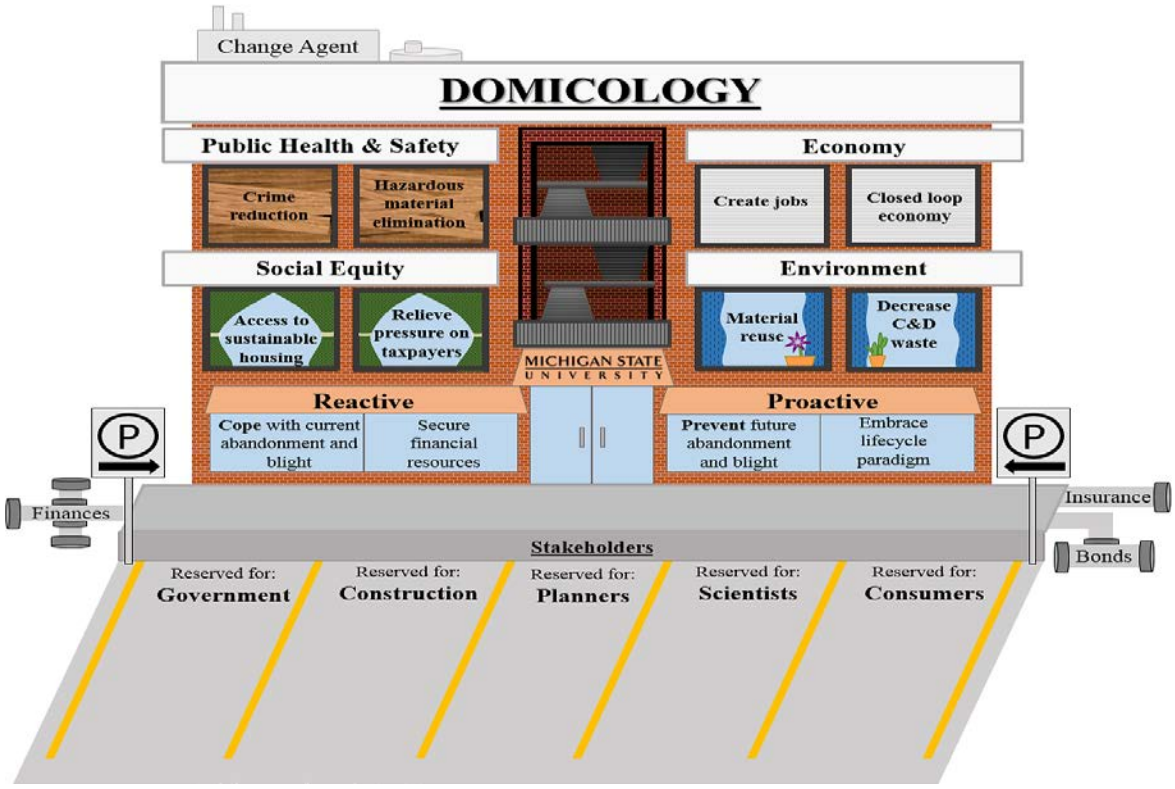

Figure 1: Domicology

The Reactive Approach

Following a Reactive approach, local governments principally look to remove blight through exercising their constitutional police powers to preserve and protect the health and safety of a community. This would include a continuation of actions ranging from such practices as enforcing polluter-pay policies to actual property acquisition through eminent domain or tax foreclosures. In some cases, when local governments act as the "last owner on record" the property will be demolished using public resources. Some local governments have adopted policies for deconstruction and management of C&D waste with the goal of reducing landfill waste. For example, local ordinances have been applied to deconstruction requirements, debris

diversion rates, landfill disposal rates, diversion fees, construction and demolition projects, and as required management plans (Armstrong & LaMore, 2018). A basic characteristic of the Reactive approach is that it fundamentally ignores a lifecycle conceptualization of a built environment and relies heavily on public subsidies to remove existing blight.

The Proactive Approach

Following a Proactive approach, communities would seek to end the cycle of structural degradation and abandonment. Proactive practices include registration of abandoned structures so communities can better track abandonment, strict building code enforcement, designing building for reuse/deconstruction (D4D), performance bonds, community benefit agreements which will remove structures at the end of their life, and "insurance policies" that provide funds for site cleanup and structural removal. Proactive strategies recognize that structures have a predictable end of useful life and anticipate that end by seeking to preserve, renovate, reuse, or salvage the structure and its materials without placing a financial burden on the general public.

In introducing an "insurance policy" alternative, the authors contend that such an innovative policy is not without legal precedent and provides for a more socially just and equitable method of managing our built environment, eliminating the financial burden of removing abandoned structures from the general tax payer.

Current Mandatory Removal Policies

Extended Producer Responsibility

Synonymous with innovative policies to "close the circle" of material waste is the idea of extended producer responsibility (EPR). This approach seeks to hold producers responsible for

proper disposal or treatment of their products and the end of their useful life. The reasoning behind this practice historically has been to limit the amount of hazardous materials from entering landfills such as those rare metals found in consumer electronics such as televisions, lithium-polymer batteries, and cell phones, and to encourage companies to design their products to be more easily recylced (OCED). A few example policies on how companies could extend their responsibility may include programs where the producer offers to reuse and recycle products at the customer's request, partnerships with governmental bodies for collection and return of certain products, or a mandate that all packaging and components used in producing the product can be recycled (Camus, 2017).

One specific example where extended producer responsibility is used today is the European Union's 2000 End-of-Life Vehicle Law (Directive 2000/53EC). This comprehensive law mandated that auto manufacturers could no longer use mercury or lead in vehicles assembled after July, 2003. Manufacturers were also required to design their cars to be easily recycled and reused and had to publish reports to consumers on proper disposal of vehicle fluids. In addition, future regulations were set stating that by 2006, 85% of all vehicular components had to be recyclable and by 2015, vehicles had to have a recycle and recovery rate of no less than 95%, (Stewart, 2010). By 2013, almost all member nations surpassed the 2006 goal of 85% vehicle reuse/recovery and nine member nations had already surpassed the 2015 goal of 95% vehicle reuse/recovery (European Union, 2013). Seeing that this policy has been in place for almost 20 years now, it is apparent that policies to direct disposal responsibilities away from the general public back onto the producer are viable, as we shall also see with bonds and insurance policies.

Another place leading the charge in EPR policies has been Canada, which in October 2009 passed the Canada-Wide Action Plan for Extended Producer Responsibility (CAP). Under this proactive plan, Canadian jurisdictions commit themselves toward passing EPR legislation and regulations on identified products and materials. A few examples of waste being targeted under these policies include electronics, automotive parts, construction and demolition materials, and appliances. Following adoption of the CAP, jurisdictions are given 2 years to create a comprehensive list of all products to be managed under EPR programs (Canadian Councils of Ministers for the Environment, 2009).

Since the program's approval in 2009, most provinces have adopted legislation to assign additional products to be covered under EPR programs and the number of products assigned to these programs has almost tripled (Canadian Councils of Ministers for the Environment, 2014). Many provinces across the country have actively taken up these policies quite well. For example, 9 out of 10 provinces have some form of regulations or stewardship approaches for the recycling of electronics. Québec has also established EPR programs for paint, batteries, and mercury-containing lamps (Canadian Councils of Ministers for the Environment, 2014). These policies have proven to be effective in decreasing the amount of waste disposed annually, with residential and non-residential waste decreasing between 2006 and 2010. Waste per capita has also significantly decreased, going from almost 850 kg per person in 2006 to approximately 725 kg per person in 2010 (Canadian Councils of Ministers for the Environment, 2014).

Construction and demolition waste accounts for approximately 27% of all solid municipal waste generated in Canadian landfills (Yeheyis, Muluken, et al., 2012). This waste is generally generated through demolishing structures, disposing of excess building materials,

inefficient building practices, and changes in structural design which require different building materials. Material use reduction and composting of biodegradable materials (wood and cardboard) has been recommended for some waste; for bricks, glass, metals, and concrete, however, other methods have been examined and implemented (Yeheyis, Muluken, et al., 2012). Nova Scotia, for example, has taken a progressive role in the recycling of C&D waste. This type of waste is currently regulated under the province-wide *Solid Waste Resource Management Regulations.* This program seeks to aid industries which attempt to divert building material from entering landfills. The C&D waste portion of the program also funds municipal and regional waste diversion programs with additional funding based on the volume of waste diverted. This extra incentive is vital to rural regions which may be farther away from recycling centers (Jeffrey, 2011).

The Halifax Regional Municipality's by-law L-200 further encourages the recycling of C&D waste. This law goes beyond the provincial requirements by requiring that reclaimed C&D waste must be brought to a certified processing facility. It also has a requirement that 75% of all C&D materials received at processing facilities must be recycled or diverted from landfills (Jeffrey, 2011). These requirements have allowed Halifax, Nova Scotia to maintain around a 75% C&D diversion rate since the law's passing in 2001.

With the success and progressive approaches brought through by the Canadian Action Plan for Extended Producer Responsibility, governments within the United States can perhaps look to their northern neighbors as a model for adopting their own EPR policies to help decrease toxic materials and other waste heading for landfills.

Bonding

Bonding is a current method to ensure private sector performance in a manner appropriate with community expectations and public safety. Current practices within Michigan often require developers to acquire a performance bond on residential, commercial or industrial developments for their initial construction and modification phase to ensure the completion of a project. Such actions seek to ensure that development occurs in timely manner and construction sites are not left "unattended" for extensive periods of time causing hazards and safety concerns in communities.

Bonding has also been applied to secure the removal of other structures at the end of their useful life. For example, this practice has been applied to the deconstruction of cell towers. Since those sites present a clear and present danger if abandoned, a bond purchased by the developer and issued to municipalities holds owners of cell towers liable for the structure's entire lifespan including its deconstruction and site cleanup costs (LaMore and LaBlanc, 10). Clark County, Nevada requires this type of bond on all cell towers, which covers 100% of the removal and site restoration cost plus an additional 15% in contingency funding. Deconstruction must be completed within 12-months following the date the tower is no longer in use (Clark County, NV)

Wind turbines have also been subject to similar statutes. In 2017, Montana passed a law requiring a deconstruction bond on all windfarms built within the state. The issuance of a bond on companies owning and operating wind turbines requires them to cover the costs of decommissioning and final deconstruction. For wind turbines constructed before this bill was

passed, a 15-year adoption period is given to owners to provide adequate time to secure the bond (Puckett, 2017).

Shiawasse County, Michigan also requires a decommissioning plan for commercial wind energy developments. Within this plan, all commercially operated wind turbines must be removed at the end of their useful life and owners are required to restore soil and surrounding vegetation back to their original state. They must also include a timeline of the structure's life cycle and a detailed plan on how it will be removed. The costs of removal are secured with a surety bond or a letter of credit placed in an escrow account. The county is also given the legal right to fine owners of wind turbines additional costs if the price of removing the wind turbine exceeds the initial performance bond (Shiawassee County). The costs associated with deconstructing wind turbines is approximately 0.44% of the construction costs before salvaged material costs are assessed for resale (LaMore & LaBlanc, 2013), with an estimated construction cost between $1.2-$4 million (Windustry, 2013 & LaMore & LaBlanc, 2013). These practices provide a foundation where the entire lifecycle of a structure is taken into account so that at the end of its lifespan it does not become the financial responsibility of the local municipality to remove them.

In addition to wind turbines and cell towers, oil rigs fall under deconstruction regulations set by the federal government. Any site that has once dealt with crude oil extraction presents a clear danger to the environment and surrounding ecosystem in their abandonment. Because of this, oil rigs are required to be either fully or partially deconstructed at the end of their lifespan. In instances of partial deconstruction, some underwater parts of the rig are left behind to create artificial reefs. Landfills fall under a similar ruling as well. Since some landfills

may contain potentially hazardous materials that are harmful to organisms, the State of Michigan has a 30-year requirement for landfills to be monitored after their final use. Funds for this are secured through a required bond which goes directly toward monitoring costs post closure. Even on a large scale, the Trans-Alaskan Pipeline, one of the longest pipelines in the world, requires monitoring and proper dismantling at the end of its useful life. Although no official date has been set for decommissioning, the pipeline's operators are required to deconstruct and remove all pipes and pump stations along the way. This is done to prevent hazardous oil leaks from occurring and was set and agreed upon by state and federal statutes. In all, many different fields of operations have some form of method to secure funding for the deconstruction of abandoned structures and has the potential to successfully be applied to other types of structures, as outlined later (LaMore & LaBlanc, 2013).

Bonds for removal of structures at the end of their useful life is a proven tool and is relatively simple to administer and transfer to new owners. There are limitations to this practice, however. The "up-front" costs to these bonds may vary greatly. As stated prior, Clark County, Nevada requires 100% of deconstruction cost for cell towers with an additional 15% to be paid in contingency for future monetary inflation or fluctuations in deconstruction costs. In contrast, Sweden only requires a 15% initial cost paid for wind turbine deconstruction bonds; the remaining 85% of the bond must be paid off prior to final decommission and removal (Uppsala University, 2014). Depending on the local laws, the "up-front cost" of bonding, if applied to all structures including residential, may result in higher initial costs creating additional barriers to new homeowners or financing affordable housing. Another challenge for bonding is the difficulty in accurately estimating the true cost of deconstruction of a structure

at its end of life; in some cases, additional contingency funding may be necessary to complete the removal/clean-up, placing an unexpected cost on the owner or the community.

Insurance

Beyond bonding, a mandatory insurance policy for structural deconstruction could end the current phenomenon of property blight and abandonment. The historical application of insurance policies can be traced back to England in the late 1600s when Edward Lloyd began operation of Lloyd's of London out of his coffee shop. His operation began as an issuer of insurance policies for ships and their cargo in return for a premium. Lloyd's policies on marine cargo were in heavy demand during the 1700s and 1800s, especially during the American Revolution and Napoleonic Wars where shipping assets were at risk of capture or loss to other nations and outside threats. Over the centuries, the desire for protection from unexpected loss and financial catastrophe has expanded to other types of insurance such as car, homeowner, aviation, travel, health, life, disability, and even unusual items. A few peculiar examples throughout history include the facial hair from forty members of the Derbyshire Whiskers Club, a £100 million policy for former soccer player David Beckham's legs, and Rolling Stones' guitarist Keith Richard's hands for $1.6 million (Lloyds of London). Even to this day, some three centuries later, insurance is still held for the same general purpose -- to protect investors and stakeholders from catastrophic loss. Domestically, the U.S. global insurance industry had a net income of $34 billion and employed over 2.66 million people in 2018 (Deloitte, 2018 & Statista, 2017).

The precedence of mandatory insurance already exists. The state of Michigan requires that all drivers be covered under a no-fault insurance policy. This policy covers damages

regardless of which driver was at fault in a vehicle collision. Under no-fault insurance policies, insured drivers will be covered for personal injury, property damage, and residual body injury/personal property liability. Drivers caught without having insurance can be charged with a misdemeanor and face fines from $200-500 and a suspension of their driver's license (Department of Motor Vehicles).

Under the 2012 Affordable Care Act, all United States citizens are required to have health care coverage. The ruling was passed following a close 5-4 approval in the Supreme Court in 2012 on the basis that the Constitution of the United States does not forbid any such tax. Ultimately, the requirement for this type of insurance was approved so that all citizens have access to affordable health care coverage (Liptak, 2012).

Flood insurance is also required for the acquisition and/or construction of federally funded buildings in high-risk flood areas, and of buildings requiring federal financial assistance. In areas that are not at such risk, federal law does not require flood insurance; lenders may require it as a term for a loan on the property, however (FEMA, 2014). Within the state of Michigan, flood insurance is only offered in communities that are participating in the National Flood Program as an addition to homeowners insurance. According to FEMA, 1,020 Michigan communities are participating in the program, making them eligible to receive national flood insurance.

Fire insurance for residential structures is generally covered under a homeowner's insurance policy, which while not required under state law, is often stipulated to receive a mortgage loan for purchasing or constructing a structure. In a practical sense, if you need to

borrow money to build your structure, you will be required to secure an insurance policy to protect the lender from loss. If residential structures are built in areas that are high-risk for fire damage (such as California), insurance policies usually have additional costs which specifically go toward fire damage costs (Lazarus, 2017). According to the Insurance Information Institute, approximately 95% of American homeowners hold policies for homeowner and fire insurance (Insurance Information Institute, 2016).

Railroads are required to hold insurance policies that cover the cleanup of environmentally damaged sites as well as coverage for the health and safety of environmental inspectors (LaMore & LaBlanc, 2013). Additionally, if a railroad company wants to discontinue operations or remove track the action must be preapproved by the Surface Transportation Board authority (Environmental Protection Agency). In other words, railroad companies are held liable to any environmental harm they cause and also for removing and cleaning up the land they operate on. They are also not allowed to freely abandon their operating lines when they are no longer in use. Such policies can reduce the public cost of restoring these sites.

Just as automotive, health, and homeowner's insurance are required as a way to protect the health and safety of citizens, mandatory deconstruction insurance might be justified as a way to protect the public from bearing the cost of removing abandoned structures and the clean-up of contaminated sites. In all, this application of the concept of insurance may protect communities from catastrophic harm due to any number of social, economic, or natural hazards.

How Might This Policy Work?

To proactively end future abandonment and the cost of blight removal and site clean-up by the general public, a Deconstruction Insurance Policy (DIP) would hold those who use or construct structures accountable for the structure's end of life cost and restoration of the property. Currently in the U.S. there are no local or state policies that require an insurance policy for the removal of structures or restoration of the property at the end of a particular use on the property. At the international level, however, the European Union allows member nations to take any measures necessary to prohibit structural abandonment and guarantees the right to lay down and enforce penalties on these infringements (European Union, 2008).

While many variables can affect the specific scope of such a mandatory insurance plan (such as environmental cleanup cost, design of the structure, and lifetime use of structure- See Figure 2.) the policy at its basic conception should secure the costs of deconstruction and removal of the structure as well as other costs for site restoration and cleanup. Issuance of policies could be obtained through private insurance companies with payments facilitating the creation of jobs in the insurance sector. Newly-constructed structures would require proof of insurance at the certification of occupancy. For preexisting residential structures, a 5-year adoption period may be considered so that owners are given some time to adopt this policy without initial penalty. A 5-year period could give property owners adequate time to secure funds and a competitive policy for this purpose.

Factors Impacting the Cost of Deconstruction Site Clean-Up Insurance			
Structural size	Design of structure	Lifetime use	Age of structure
Physical additions to structure	Brownfield status	Presence of toxins or hazardous materials	Value of salvage materials
Landscape or vegetation restoration	Location of structure	Square footage of structure	Condition of physical structure

Figure 2: Cost Factors

Other factors such as policy transferability to new owners at the sale of a residential unit could be a part of individual negotiations between the interested parties and the insurance company. The choice of insurance provider or changes in insurance premiums as a result to structural changes could also be addressed within policy negotiations as well. A private competitive deconstruction insurance market is likely to yield a variety of policies and provision to account for such variables as length of occupancy, type of structure, use/contamination, and material salvage values.

In conceptualizing an innovative application of a well-used practice such as an insurance program for structural removal and property restoration, consideration must be given to the cost burden associated to a mandatory policy program. While the cost of operating a business or homeownership will increase for the owner/occupant of a property, the costs for blight removal and contaminated site clean-up would fundamentally shift from the general taxpayer to the consumer/owner of a product or property. The burden of paying for removing an

obsolete structure or cleaning up a contaminated site would longer be borne by the general public but would be a predictable cost of homeownership or doing business.[2]

Job Creation and Environmental Benefits

This proposed insurance program not only has the capacity to relieve taxpayers and municipal governments from bearing the costs of removing dilapidated housing, but it also has the potential to add new roles/jobs to the insurance sector and the deconstruction economy. The insurance industry is a high-growth, high-wage sector of the economy, and in supporting job creation can result in positive economic benefits, as the average income for insurance agents is estimated to be $49,710 (BLS, 2017). Additionally, new jobs for insurance building inspectors/claim adjusters who may assess abandoned sites can also be expected.

In addition to growth in the insurance sector, if more structures are being deconstructed rather than demolished, the number of jobs in deconstruction/salvage can be anticipated to experience growth. Average income for recyclable material workers stood at $38,920 and employed 1.25 million people (BLS, 2017 & LeBlanc, 2018). The adoption of this policy not only has the potential to relieve cities from the burdens of abandonment, but also may bring more jobs into the community.

It is also noteworthy to point out the potential environmental benefits of a mandatory deconstruction policy can also be substantial. It is a reasonable assumption that if developers/owners are responsible for the removal of a structure at its end of useful life that they will seek to maximize the value of the salvage material at the time of deconstruction. New

[2] The Authors offer some "back of the envelope" estimates the costs of commercial and residential premiums for deconstruction insurance in Appendix A.

practices may be employed in design (design for deconstruction) and salvage. Demolition is estimated to create 20 to 30 times more waste as compared to the construction phase. Most of this waste ends up in landfills (Zhao, et al, 2017). Reusing and reducing the disposal of building materials can save both greenspace and landfill capacity. Repurposing salvaged materials could also decrease the demand for virgin materials and conserve resources and external costs. Recovering C&D materials can also lower the cost of construction which can effectively save money and resources (EPA, 2017).

It is also reasonable to assume that deconstruction and site clean-up insurance policies will take into account potential environmental cleanup costs; if property users introduced expensive cleanup costs, then their policy premiums would increase to reflect the added costs of cleanup. We could reasonably expect insurance providers would routinely monitor sites to insure that no unforeseen contaminates are released increasing the restoration cost substantially. Just like an auto insurance policy, those who have poor driving records see higher insurance premiums. Similarly, businesses that fail to follow appropriate environmental regulations would likely see their premiums increase as a result of the “poor behavior.”

Summary

Our current paradigm of the built environment fails to recognize that man-made structures have an end of useful life, and places a severe social, economic, and environmental cost to vulnerable people and places where abandonment and blight are present. Local and state governments, in fulfilling their primary obligation to protect the health, welfare, and safety of a community, have the authority to change this current scenario. This policy brief outlines a feasible strategy – the adoption of a mandatory deconstruction site clean-up

insurance policy that fundamentally changes our relationship with the built environment, and can prevent current and future abandonment and blight.

Appendix A

Initial Monthly Premium Cost Estimates

The cost estimate formula of an insurance policy for abandoned residential and commercial properties would follow as:

$$P_M = ((C_{SF} * S)/T) - X$$

Where:

P_m = Estimated Insurance Monthly Premium

C_{SF} = Average Deconstruction Cost per Square Feet

S = Average Structure Floor Space (Sq. Ft.)

T = Average Length of Occupancy (Years/Months)

X = Estimated Value of Salvaged Materials (USD$)

Insurance Monthly Premium Cost Estimate for a Commercial Property

$C_{SF=}$ $20 per sq. ft.
S= 6,500 sq. ft.
T= 30 years
X= $80,000 the true value of salvage materials depends on the local salvage market, quality of material, and sale price of salvaged materials

$$P_M = ((C_{SF} * S)/T) - X$$
$$= (\$20 * 6{,}500 \text{ s.f.})/30\text{yr.}/12\text{mon.}$$
$$= \$361 \text{ per month (minus value of salvage materials)}$$

Insurance Monthly Premium Cost of Residential Property

C_{SF}= $20 per sq. ft.
S= 2,600 sq. ft.
T= 70 years
X= $32,000 the true value of salvage materials depends on the local salvage market, quality of material, and sale price of salvaged materials

$$P_M = ((C_{SF} * S)/T) - X$$

= ($20*2,600 s.f.)/70/12
=$62 per month (minus value of salvage materials)

Insurance Premium Cost of Industrial Property

The estimated premium cost for industrial properties carries additional variables that could affect the total cost such as the property use, cleanup costs, brownfield status, and/or presence of hazardous materials. For that reason, no formula is given as additional research needs to be conducted to create a consistent and accurate formula for abandoned industrial sites. It should be noted, however, that the total estimated cost for brownfield remediation falls around $602,000 (Capps, 2014) while non-petroleum industrial sites typically cost $600,000-$1,000,000 for complete cleanup and restoration of land (Northeast Midwest Institute, 2008).

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