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Name of candidate: PENELOPE (First Name) CRISPIN (Middle Name) (Family Name)

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CIRCULARITY HUBS: A PROPOSAL TO ADVANCE THE CIRCULAR BUILDING MATERIAL ECONOMY IN NEW YORK STATE

COMMITTEE SIGNATURES:

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Penelope Crispin

(Student Signature)

CIRCULARITY HUBS: A PROPOSAL TO ADVANCE THE CIRCULAR BUILDING MATERIAL ECONOMY IN NEW YORK STATE

A Professional Report

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Regional Planning

by

Penelope Crispin

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ABSTRACT

This professional report analyzes the proposed development of building material reuse hub facilities ("Circularity Hubs") in New York State to advance a circular building material economy in the state. The report summarizes the impacts of linear and circular economies globally and regionally. Then, it presents profiles of current building material reuse establishments in New York and Maryland. It provides recommendations and considerations for key aspects of Circularity Hubs such as ownership structure, location, and functions. Then it gives a brief analysis of favorable economic and legislative conditions in New York for the investment in Circularity Hubs and the circular economy. To conclude, there are suggestions for further research and implementation.

BIOGRAPHICAL SKETCH

Penelope Crispin is a reuse enthusiast. As a daughter of two curators of independently owned and operated museums, auctions, flea markets, antique stores, and thrift shops were part of growing up. As a hobby, Crispin makes art from wood lathe reclaimed from the 1890 building that houses her parents' museums.

Originally from Kansas, Crispin worked for youth-serving non-profit organizations in Kansas, Illinois, Texas, and New York for 18 years. Most of that time was spent working for the Girl Scouts organization, creating and delivering program and training for youth and adults to develop leadership skills that would help girls become courageous, change-making women of the world. Crispin decided to pursue a Master of Regional Planning degree to change the angle from which she works for a just and sustainable world, and she found an inspiring community at Cornell University and in Ithaca, New York.

ACKNOWLEDGMENTS

I would like to thank, first and foremost, the members of the CR0WD network who welcomed me as a curious student and taught me a tremendous amount about deconstruction and reuse in a short period of time. Gretchen Worth and Diane Cohen especially assisted with the direction and development of this professional report with their vast knowledge and experience. I am grateful to all CR0WD members who dedicate their time and energy to advancing a more sustainable world and to sharing their enthusiasm and wisdom with newcomers like myself.

I thank the interviewees from Community Forklift, Historic Albany Foundation's Warehouse, ReUse Action, and the Broome County Eco Center who gave their time to explain their operations and professional opinions with me. Scott Buga, Tom Patzkowski, Kevin Hayes, Debra Smith, and David Ritrovato especially were generous with their participation in my research, and gave me insight into the great work they accomplish for building material reuse.

I also want to thank Jennifer Minner and Mildred Warner, whose guidance in the research and writing of this report has been invaluable, and whose instruction during my Master of Regional Planning program has been inspiring.

Thank you also to the City and Regional Planning faculty, staff, and peers for the experiences that will be my foundation as I launch the next phase of my life.

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LIST OF ABBREVIATIONS

ASRI	Architectural Salvage and Reuse Industry
BRIC	Building Resources Innovation Center
CBPPP	Community-Based Public Private Partnership
CDD	Construction and Demolition Debris
CLCPA	Climate Leadership and Consumer Protection Act
CR0WD	Circularity, Reuse, and Zero Waste Development
DEI	Diversity, Equity, and Inclusion
HELP	Home Essentials Program
HAF	Historic Albany Foundation
MSW	Municipal Solid Waste
PPP	Public Private Partnership
ReSET	Reuse Skills and Employment Training
RIC	Reuse Innovation Center
RISSE	Refugee and Immigrant Support Services of Emmaus
SCCCP	Susan Christopherson Center for Community Planning
SIB	Social Impact Bond
UGS	Used Good Stores

PREFACE

In Fall of 2021, at the beginning of my Masters of Regional Planning program at Cornell University, I learned about CR0WD (Circularity, Reuse, Zero Waste Development), a network of individuals and organizations concerned about demolition and advocating for building deconstruction as a sustainable alternative and significant portion of a circular economy. Interested in reuse and circularity, I attended meetings where I learned a tremendous amount about deconstruction and the policy, practice, and possibilities of its utilization in the state of New York and across the country. In the summer of 2022, I was a summer intern for the Susan Christopherson Center for Community Planning (SCCCP), one of the founding organizations of CR0WD, and delved deeper into the issues surrounding demolition and deconstruction. In interviews with city and county planners, land bank executives, and community members, the question of where building materials go when a building is deconstructed emerged repeatedly, especially in rural areas where critical infrastructure for a circular building material economy is non-existent or severely limited in capacity. Rural landbank executives questioned the benefits of utilizing deconstruction, which is typically more expensive than demolition, and then paying transportation costs to take materials across sometimes multiple counties to a facility or multiple facilities that could receive the materials.

CR0WD, too, was thinking about possibilities and solutions for these problems. In 2022, the Draft Scoping Plan created by the New York Climate Action Council for the NYS Climate Leadership and Consumer Protection Act (CLCPA) was open for public comments. Diane Cohen, Executive Director of Finger Lakes Reuse, Inc., another founding member of CR0WD, submitted a public comment with her recommendations for clarifying and strengthening the support of reuse in the Draft Scoping Plan. In these comments, she described a "Hub & Exchange" model for reuse, with large county

facilities to intake building materials for processing, storage, and return to the market, at least partially through movement of materials to reuse retail establishments ("Exchanges"). Interested in this concept and how it could provide critical infrastructure for the circular economy, as well as what criteria would make facilities successful as Hubs for this purpose, I approached Gretchen Worth, Project Director of the SCCCP, about producing a professional report for CR0WD. I proposed taking deeper look at this recommended system and how it could successfully advance a circular building material economy. This report has been created for CR0WD to provide data and analysis about a proposed statewide approach to building material reuse that is unprecedented in the United States.

CHAPTER ONE: INTRODUCTION

Across the United States, local municipalities are striving to address the environmental, social, and public health challenges created by demolition. Curtailing the construction and demolition debris (CDD) filling landfills, reducing air and water pollutants from building demolition, retaining embodied carbon and historical and cultural value in building materials, and encouraging an environmentally responsible reuse economy are some of the goals in the development of circular economy initiatives being moved forward through city incentives and ordinances.

Deconstruction, according to advocacy network CR0WD, is the "careful and systematic dismantling of a part or whole building structure in order to maximize recovery of valuable material" (CR0WD, 2022, p 30). In New York State, individuals and organizations such as CR0WD are advocating for municipalities to support efforts to replace demolition with deconstruction. Multiple precedents across the United States, such as Portland, Oregon, Los Altos Hills, California, Nashville, Tennessee, and recently San Antonio, Texas, demonstrate how cities' actions can divert building materials from the waste stream and support a circular economy.

While efforts move forward in New York State to connect and educate professionals, students, elected officials, and the general public around the legislative and regulatory angles of developing a circular economy, the ecosystem of services needed to support this economy is also in focus. Workforce development, transportation and

hauling services, storage and processing of reusable materials, resale establishments, and reuse buyers are required for successful implementation of municipal efforts for a circular building material economy. In Ithaca NY, where efforts to grow this economy are being actively supported by actors across the ecosystem, a facility large enough to receive, process, and resell reusable building materials has been identified as a critical need to advance the efforts. Such a facility, which may be referred to as a Circularity Hub, would increase the amount of materials that could be taken in and provide infrastructure for the needed ecosystem of services. In rural counties of New York, where there are limited or no building material reuse facilities, deconstruction of buildings is seen as less efficient if materials must be transported across multiple counties.

In the Draft Scoping Plan released by the New York State Climate Action Council in 2021, investment in waste reduction and building de-construction and materials reuse is mentioned in general, but without specific plans (New York State Climate Action Council, 2021). In response to this lack of specificity, Diane Cohen, the Executive Director of Finger Lakes ReUse, a non-profit organization in Ithaca and one of the founding members of CR0WD, submitted a letter during the public comment period with detailed recommendations. Included in the recommendations is the state funding of "hubs," large warehouses that meet the requirements of the abovementioned Circularity Hub, to receive bulk materials to be processed, refurbished, and redistributed to markets (Cohen, 2022). Hubs would be appropriate to absorb both reusable deconstructed

building materials and surplus construction materials, both of which contribute significantly to CDD waste.

The hubs in Cohen's proposed "Hub and Exchange" model support retailers, non-profits, and direct buyers of building materials (Cohen, 2022, p. 4). These types of facilities have been described in detail by entities such as StopWaste, which published their *Building Materials Reuse Analysis* to propose a Building Resources Innovation Center (BRIC) in San Francisco (StopWaste, 2022). Such facilities are critical infrastructure in the circular economy.

In this report I analyze the role of Circularity Hubs in the growth of a circular economy in New York State and how public funding for these facilities would provide the infrastructure necessary to support building deconstruction at a level that would divert significant waste from landfills, lower pollution and public health risks, retain the environmental and cultural value of building materials, and grow local economies based on reuse. As this particular approach is unprecedented, this report aims to provide data, analysis, and recommendations for CR0WD to utilize in its advocacy efforts.

CHAPTER TWO: IMPACTS OF LINEAR ECONOMIES AND BENEFITS OF CIRCULAR ECONOMIES

Advocacy for circular economies is taking place internationally, with organizations such as the United Nations and Ellen MacArthur Foundation heavily contributing to research and strategy development. The disastrous effects of the linear economy are well recognized around the globe and increasingly documented in academic and professional studies. The self-described global impact organization Circle Economy, which measures global circularity has reported in their 2023 Circularity Gap Report that the percentage of materials cycled in the economy dropped from 9.1% in its first measurement in 2018, to 8.6% in 2020, and is reported at 7.2% in the 2023 report, while consumption and resource extraction has risen (Circle Economy, 2023). Their annual reports clearly explain the threats linear economies pose to planetary health as extraction far outpaces recovery of resources for reuse. "By 2050 material extraction and use is expected to double relative to 2015 levels, threatening a total breakdown of Earth's life support systems, which are already at a breaking point. Without material management strategies that keep us within planetary boundaries, the UN has warned of 'total societal collapse', driven by concurrent climate change disasters, economic vulnerabilities, political instabilities and ecosystem failures" (Circle Economy, 2023, p. 17).

Despite such heavy warnings, Circle Economy's reports, and those by the United Nations and Ellen MacArthur Foundation, among others, also illustrate how a transition to a circular economy provides a path to sustainability and provides a wide range of positive impacts in social, economic, environmental, public health, and equity realms. Due to the large amount of CDD sent into the waste stream, the extensive extraction of natural resources to produce new building materials, and the large percentage of CO2 emissions embodied in buildings, building materials are a substantial threat to sustainability in linear economies and an enormous opportunity in circular economies. In this section, I will highlight some of the negative impacts of linear economies and positive impacts of circular economies in general and in building material reuse specifically.

Waste Diversion

The argument for building material reuse is most straightforward as it addresses waste reduction. Globally, CDD is the largest component of the waste stream (López Ruiz et al., 2020). At more than twice the mass of municipal solid waste (MSW) in the United States, CDD debris amounted to 600 million tons in 2018, 90% of which was generated by demolition activities, as seen in Table 1 (United States Environmental Protection Agency, 2020).

Table 1

CDD Debris Generation by Material and Activity

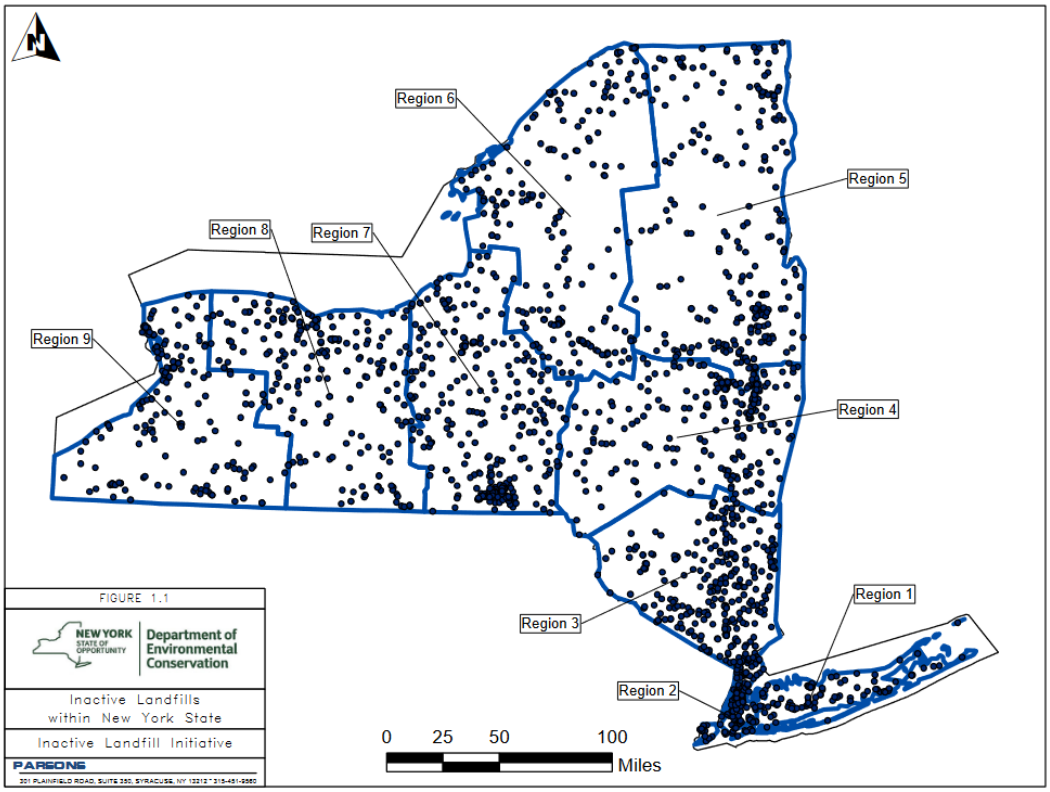
	Waste During Construction	Demolition Debris	Total C&D Debris
Concrete	24.2	381.0	405.2
Wood Products[7]	3.4	37.4	40.8
Drywall and Plasters	3.9	11.3	15.2
Steel[8]	0	4.7	4.7
Brick and Clay Tile	0.3	12.0	12.3
Asphalt Shingles	1.2	13.9	15.1
Asphalt Concrete	0	107.0	107.0
Total	**33.0**	**567.3**	**600.3**

Note. Quantities in millions of tons. Source of image: United States Environmental Protection Agency. (2020). *Advancing Sustainable Materials Management: 2018 Fact Sheet*. https://www.epa.gov/sites/default/files/2020-11/documents/2018_ff_fact_sheet.pdf, p. 20. Copyright 2020 United States Environmental Protection Agency.

The challenges of managing the mass of waste created by construction and demolition are shared across the globe. Countries are enacting policies and legislation to reduce, reuse, recycle, and recover CDD, and yet the majority of the waste is still directed to landfills (Menegaki & Damigos, 2018). Of the estimated 10 billion tons of CDD generated annually around the world, approximately 3.5 billion tons are landfilled (K. Chen et al., 2021). This requires significant land consumption. New York State has 1,901 inactive landfills in the state, shown in Map 1 (New York Department of Environmental Conservation, 2021).

Map 1

Inactive landfills in the state of New York



Note. Source of image: New York Department of Environmental Conservation. (2021). *New York State Inactive Landfill Initiative: Comprehensive Plan to Address Priority Solid Waste Sites for Potential Impacts on Drinking Water Quality*. https://www.dec.ny.gov/docs/materials_minerals_pdf/inactivelandfills2021.pdf, p. 3

Beyond the challenge of the sheer mass of waste countries are struggling to landfill, the environmental impacts of the landfilling of CDD are well documented. CDD landfills are a cause of significant pollution to air, water, and land due to their compositions. CDD usually contain one or more of: heavy metals, pesticides, chlorides, solvents, and oil, all of which pose serious risks to air, water, and ground surrounding landfills through leaching (K. Chen et al., 2021). Mitigation measures landfills must engage to avoid damage to the surrounding land are often resource- and energy-intense, adding to the cost of operations and resource extraction and use (K. Chen et al., 2021).

Building material reuse can divert valuable resources from the waste stream into the resource stream. According to the Delta Institute, up to 25% of building materials from a deconstructed home can be reused and up to 70% can be recycled (*Delta Institute*, n.d.). With up to 95% of materials suitable for diversion from the waste stream, as CR0WD explains in their educational presentations, "It's not waste. It's just wasted" (Gretchen Worth, 2022, slide 3). Significant reduction in the amount of CDD through waste diversion translates to decreased maintenance costs, resource use, land consumption, and health and environmental risks. As will be addressed later in the report, as CDD is diverted from landfills, the resources and investments are diverted to social and environmental benefits in a circular building material economy.

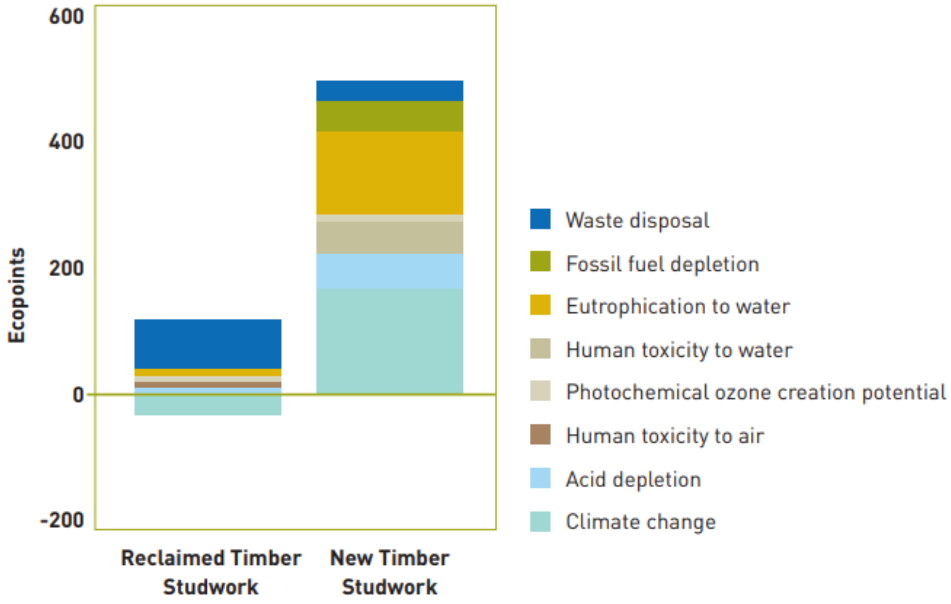
Natural Resource Protection

Reuse of materials presents an enormous opportunity for the protection of environmental resources by reducing landfilling, but also by reducing resource extraction. 46% of raw materials extracted globally are used for the construction and buildings maintenance industry (BioRegional Consulting, 2018). The results of a study of demolition techniques of buildings in Portugal "show a reduction of 76.9% in climate change impacts" when full deconstruction, reuse, and recycling are utilized, compared to demolition (López Ruiz et al., 2020, section 4.5.1). Reuse is significantly more sustainable even than recycling materials, which is often energy- and resource-intensive. Reuse retains the highest value of materials without requiring additional processing. For this

reason, reuse has been referred to as the "highest form of recycling" (Essex, J. & Herbert, L., n.d., slide 12) and "one of the best waste management practices for the recirculation of materials" (López Ruiz et al., 2020, section 4.6.1). A diagram presented by Jonathan Essex (BioRegional) and Lewis Herbert (WasteWise) illustrates the stark difference in environmental impact between the production of new timber studwork and reuse, seen in Figure 1.

Figure 1

Environmental impact of timber studwork reuse



Note: "Environmental impact saving by reclaiming and reusing 54,000m of timber studwork." Source of image: BioRegional Consulting. (2018). *Build a better future with the Sustainable Development Goals*. https://www.bioregional.com/resources/build-a-better-future-the-built-environment-and-the-sustainable-development-goals, p. 6

Figure 1 also refers to sources of public health issues such as air and water pollutants that are created in the production of new studwork that are avoided in reuse.

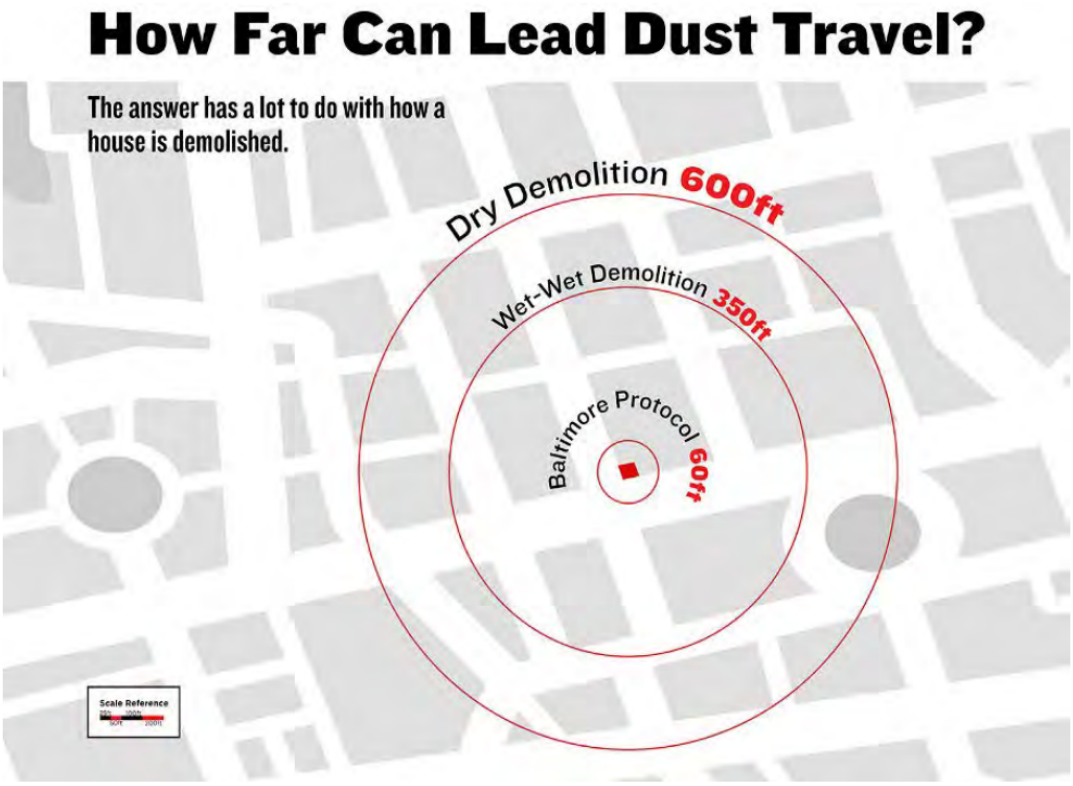
Public Health and Environmental Protection

In addition to resource extraction processes that create pollutants that affect public health, landfilling CDD creates public health risks with contaminated air, ground, and water, as well as H2S gases emitted as a result of the high gypsum content in CDD (Z. Chen et al., 2022). As reported in the New York State Inactive Landfill Initiative Comprehensive Plan, almost half of inactive landfills in New York State that were tested for groundwater contaminants were found to have levels of specific contaminants exceeding New York State maximum contaminant levels and EPA lifetime health advisories (New York Department of Environmental Conservation, 2021). Twenty-five of the landfills with elevated levels of contaminants were referred to the Department of Environmental Remediation for consideration of whether they "pose a significant threat to public health or the environment" requiring placement on the list of designated State Superfund Sites (New York Department of Environmental Conservation, 2021, p. 14).

The processes involved in reclaiming and reusing building materials also replace building demolitions that are also known to release toxins in the air, ground, and water, usually directly within populated neighborhoods. In cases such as San Antonio, these pollutants disproportionately affect low-income populations (PlaceEconomics, 2021). "Hazardous pollutants such as asbestos, lead, and other particulates can be released on a demolition site as a structure is pulverized and churned by heavy machinery" (Paruszkiewicz et al., 2016, p. 3). Figure 2 illustrates the extent to which lead dust may travel from a demolition site.

Figure 2

Lead dust travel during building demolition



Note. Source of image: PlaceEconomics. (2021). *Treasure in the Walls*. https://www.sanantonio.gov/Portals/0/Files/HistoricPreservation/Deconstruction/Treasure%20in%20the%20Walls.pdf , p. 47.

Green House Gas Emission Reduction

The built environment is a significant source of greenhouse gas emissions globally. 40% of energy-related CO2 emissions globally are associated with buildings and construction (BioRegional Consulting, 2018, p. 6). Aside from the heating, cooling, and operational use of buildings during their functional lifetime, the embodied CO2 from the building material extraction, production, transportation, demolition, landfilling, and

incineration “make up an increasing proportion of the total life cycle impacts, often more than 50%” (Nußholz et al., 2019, section 1).

A circular building material economy could lead to a reduction of CO2 emissions by 38% in 2050, according to the Ellen MacArthur Foundation (2021, p. 32). The Ellen MacArthur Foundation identifies the reuse and recycling of building materials as one of the top three strategies for reducing emissions from the built environment (Ellen MacArthur Foundation, n.d.). “Careful disassembly can facilitate material reuse and recycling, which together can prevent 0.6 billion tonnes of CO2 emissions every year” (Ellen MacArthur Foundation, n.d.).

By valuing the embodied carbon of used building materials and extending the materials’ lifespans through secondary (or multiple) uses, Circularity Hubs reduce the emissions associated with the disposal and replacement of each material. This public good, and the principles associated with it, are part of the value proposition of Circularity Hubs.

Green Economy Growth

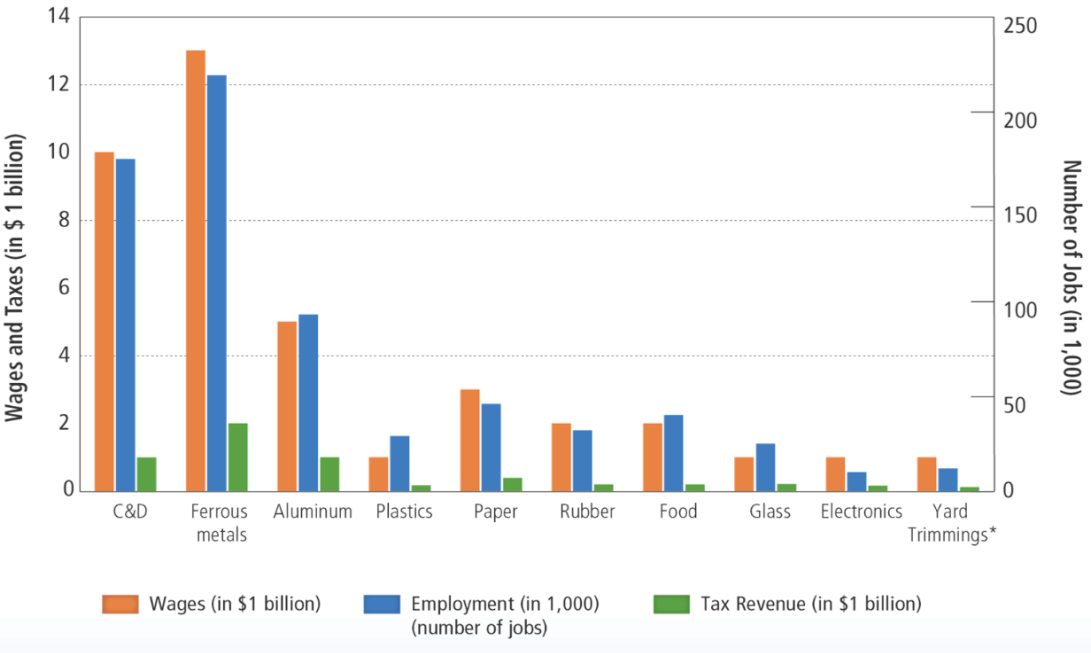
Sustainability also makes good economic sense. In “quick facts” in the 2018 guide “Build a better future with the Sustainable Business Goals,” BioRegional Consulting reported that pursuing sustainable and inclusive business models “could unlock economic opportunities worth at least US$12 trillion a year by 2030,” and “80% of CEOs

believe that demonstrating a commitment to societal purpose is a differentiator in their industry" (2018, p. 6).

While the United States EPA does not separate recycling and reuse information in their reporting, they estimated that in 2012, reuse and recycling of materials generated 681,000 jobs, $37.8 billion in wages, and $5.5 billion in tax revenues, and conclude that recycling increases economic security (United States Environmental Protection Agency, 2020). Construction and demolition recycling is a major contributor to the recycling economy in the United States, seen in Figure 3.

Figure 3

Wages, Taxes, and Jobs Attributed to Recycling



Note. Recycling construction and demolition (C&D) waste, along with ferrous metals and aluminum utilized for building materials, makes up the vast majority of wages, taxes, and jobs attributed to recycling in the United States. Source of image: United States Environmental Protection Agency. (2020). *Advancing Sustainable Materials*

Management: 2018 Fact Sheet. https://www.epa.gov/sites/default/files/2020-11/documents/2018_ff_fact_sheet.pdf, p. 15.

In Chapter Five of this report, Circularity Hubs – as well as building deconstruction and building material reuse in general – are presented as pathways to job training and certifications and livable wages for people, including those who are historically disadvantaged and have barriers to traditional employment. Chapter Six provides more details about the economic conditions of the lumber and building materials industry, home improvement industry, used goods industry, and demolition and wrecking industry in New York State that are favorable to the circular building material economy and the establishment of Circularity Hubs.

Social Opportunity

Building materials circularity is not just good for the environment and the economy. Because the industry presents "green collar" training and employment opportunities accessible to marginalized populations, it integrates social equity into the green jobs market. "[T]he circular economy [is] a powerful tool to cut emissions and combat climate breakdown…And if done well, it can work to reduce inequalities in the process. It acts as a framework that supports a more resource-smart, people-centric future" (Circle Economy, 2022, p. 15). Deconstruction, compared to demotion, is a labor-intensive activity. Utilization of deconstruction creates opportunities for workforce development and employment. This worker-focused investment also supports

local economies through “spending induced by the new income of local deconstruction crew members,” whereas mechanical demolition-focused investment involves revenue “leaking” from the local economy through supply chain purchases (Paruszkiewicz et al., 2016, p. 20).

Demolition appears to be more cost-effective than deconstruction because “externalities of waste generation and resource extraction are insufficiently internalised in prices” (Nußholz et al., 2019). All of society, however, is paying the cost differences between unsustainable linear practices and sustainable circular alternatives. Choosing building deconstruction over demolition invests in people rather than continuing to spend money for resource extraction and waste management processes that degrade the environment and public health on multiple levels.

CHAPTER THREE: METHODOLOGY

To analyze the opportunity for the proposed Circularity Hubs and the "Hub and Exchange" model to advance the circular building material economy in New York State and achieve the positive impacts outlined in Chapter Two, I divided my research into three parts. The first part was research of currently operating building material reuse facilities, both in and out of markets where deconstruction is currently supported by ordinances or incentives. The second part was research of reports and studies by governmental, consultant, and academic sources about deconstruction, reuse facilities, and the circular building material economy. The third part was a review of industry and legislative conditions in New York State relevant to a building material reuse economy. The results of this research are divided into the following chapters.

In Chapter Four, I present profiles of four building material reuse facilities. To understand how building material reuse facilities are currently operating within local circular economies and to gather data related to their functions, I reached out to 22 building material reuse establishments across New York and the United States to invite representatives to participate in interviews as part of my research. I conducted interviews with representatives of four establishments who responded and successfully scheduled interview sessions. Three of these facilities are located in New York – one in Central New York, one in Western New York, and one in the Capital Region. These

three establishments operate under three different models: non-profit, for-profit, and public ownership. The fourth establishment is a non-profit located in the Washington D.C. metropolitan region and was selected for its scale and success of operations and involvement in building deconstruction activities. The four establishments are located in cities of four different population ranges: Edmonston, Maryland (1,501 town population, but located within the DC Metropolitan Region with over 6 million estimated population); Buffalo, New York (276,807); Albany, New York (99,224); and Binghamton, New York (47,566) (U.S. Census Bureau, 2022).

The interview questions were decided by Gretchen Worth, Diane Cohen, and myself to acquire information most useful for CR0WD's advocacy work. Interview questions (provided in Appendix) asked for information regarding facility location, ownership, employment and hiring practices, materials and services in the facility, and community involvement and collaborations. Cohen's "Hub and Exchange" model was discussed with interviewees, eliciting insights on how such a model might impact their establishments. Interviews were conducted on Zoom. Chapter Four presents a profile for each of the four establishments based on information received during interviews and information published on the establishments' websites.

In Chapter Five, I compile a list of recommendations and considerations for Circularity Hubs in New York State. This list is based on analysis of the reuse establishment profiles, utilizing a literature review of publications by governmental agencies, consultant agencies, and academic research, as well as my own knowledge and

understanding of the needs of the circular building material economy gathered from presentations attended, research conducted, and conversations held over the past year and a half as a part of CR0WD.

In Chapter Six, to analyze the market conditions for Circularity Hubs in New York, I reviewed reports of four specific industries in New York state: lumber and building material establishments, home improvement establishments, used good establishments, and demolition and wrecking. I then reviewed the New York Climate Council's Final Scoping Plan for the CLCPA, where strategies listed include funding and resource support for reuse market development, workforce development, public education, and other services that are proposed in this report to be provided by Circularity Hubs. Based on these sources, I provide an analysis of the favorable conditions for Circularity Hubs as supportive infrastructure for a circular building material economy.

CHAPTER FOUR: PROFILES OF BUILDING MATERIAL REUSE FACILITIES

Of the 22 facilities that were contacted regarding this research, the following four establishments scheduled interviews to answer questions about their operations. The profiles below offer insight into their challenges and successes in mission-driven goals of diverting waste and returning used building materials to the market. Lessons from their experiences contribute to the recommendations and considerations outlined in Chapter Five.

Community Forklift

Information in this profile is sourced from interviews with Scott Buga, Director of Marketing and Communications, and Tom Patzkowski, Director of Donations in March 2023, except where otherwise cited.

Figure 4

The Community Forklift Warehouse in Edmonston, Maryland

Note. Source of image: Community Forklift. (n.d.). *Hours and Directions*. Hours and Directions. Retrieved April 19, 2023, from https://communityforklift.org/our-store/hours-directions/

About the Organization

Community Forklift is a nonprofit organization located in the Washington DC metropolitan area in Edmonston, Maryland. It was formed for the purposes of diverting waste, providing low-cost building materials to the public, supplying free materials to nonprofits and individuals in need, and educating the community about reuse ("About Us," 2021). In 2022, Community Forklift made donations of building materials, furniture, appliances, and other items to 65 partner organizations through its Community Building Blocks Program (Community Forklift, n.d.-a) and provided materials valued at over $69,000 to households with limited incomes through its Home Essentials Program (HELP) (Community Forklift, n.d.-b).

Community Forklift has won numerous awards including *Washington Post Express* Readers' Choice Awards in 2010-2013, *Washington City Paper* Readers' Choice Awards in 2010-2021, Green Business of the Year Award in 2013, Ebay Shine Awards for Small Businesses in 2017, National Association of the Remodeling Industry's 2019 NARI Metro DC Community Service Award, and more (Community Forklift, n.d.-d). The organization has also received numerous recognitions and certificates.

Location and Facility

Community Forklift operates in an adaptively reused building on top of an active brownfield site formerly used by Hyattsville Gas and Electric (*Brownfields Master Inventory, Active, By County*, 2021). It is noted, with pride, that the organization has transformed a historically polluted site to one that provides economic and social benefit to the community.

Ownership and Employment

The non-profit was founded by construction, design, and architecture professionals who saw the waste in their own professions and decided to collect the materials to find uses for them. The organization now employs over 30 people and is growing, with several positions open (at the time of this writing) that pay over minimum wage and include health, dental, vision, and short-term disability insurance. Community Forklift works with staffing agencies that work specifically with "returning citizens"

(Community Forklift, n.d.-e) and people who have barriers to traditional employment, some of whom Buga specifically highlighted as in managerial positions now.

Buga states that the organization is "very open to members from all different communities" and includes Diversity, Equity, and Inclusion (DEI) training for all new hires. The specifics of their hiring and employee policies, including references to DEI, are currently being rewritten. Buga expects the organization's "openness" to be more fully enshrined in the completed rewrite.

Materials and Services

Community Forklift, as noted above, began as an endeavor focused on surplus and used building materials. Large appliances are also a large part of their focus, due in large part to their very successful program HELP that assists people with low incomes in attaining essentials like small and large appliances, furniture, and building materials. As part of their donation guidelines, building materials donations must be whole, de-nailed, free of mortar, or otherwise in an acceptably clean and usable state. No processing of building materials is done on-site. Large appliances must be in working condition with all included parts. The only items that are repaired on site are light fixtures, if needed, to be ready to install.

Community Forklift conducted a "soft deconstruction" pilot for six months with the goals of retrieving additional materials, providing a service offered on a limited basis in the area, and creating jobs with trade skills training. Tom Patzkowski described the

potential impact of a deconstruction training program for employees. “If you’re in the trades, if you can do the reverse engineering and deconstruction, then you can probably translate that into getting a solid job that will in many cases, with the focus on people with barriers to employment, could make generational changes in people’s families.” Two important lessons learned from the pilot are tied to the organization’s goals to provide fair-wage, green job opportunities in line with their economic and social impact goals. Patzkowski stated that in the future, hiring will be done in-house rather than through sub-contractors, so that Community Forklift has greater control over wages, benefits, and fair conditions for employees. However, Community Forklift also faces the reality that by providing these employment conditions, other companies that don’t pay fair wages or provide benefits regularly underbid them on deconstruction and demolition projects.

The organization currently performs two to five projects soft-stripping easily removable structural and architectural components per month. One challenge Community Forklift faces is homeowners who want to arrange pick-ups of materials when a building is demolished, but sub-contractors perform a “quick smash,” and materials are sent into the waste stream before they can be recovered from the site.

Although focused primarily on building materials and appliances, Community Forklift accepts donated items that include limited amounts of housewares and occasionally electronics. These and other miscellaneous items are most often donated to residents in need or area nonprofits or are resold in the warehouse. The space allotted for

these items is spatially-restricted because “we are bursting at the seams pretty much always” with the building materials and appliances inventory.

Community Involvement and Collaborations

Buga identifies the majority of purchasers from the building materials retail operations as small business owners, landlords, and homeowners. New business owners purchase materials from Community Forklift to reduce start-up costs. Coffee shops in the area have purchased reused building materials to create the specific aesthetic they desire with quality materials at low costs. Restoration, upcycling, and crafting professionals also purchase materials to create their own inventory, including an artist who converts tiles to artistic coasters and a retired man who restores and sells old furniture pieces he finds at the Community Forklift warehouse. At one time, a woman would restore furniture in the warehouse, but her work became so popular that she expanded to her own space outside of the organization. Consignment also provides opportunities to collaborate with artists and small businesses in the community, such as a company that reconditions donated paints, and Treincarnation, which salvages trees from storm damage and development to produce live-edge wooden slabs that are sold in the warehouse. There is considerable pride in the impact Community Forklift has on local small businesses.

Community Forklift has a strong community presence through public events, workshops, and a slate of programs. They have hosted “First Friday” events (set to

resume in May 2023 after being on pause due to the Covid-19 pandemic) described as a reuse party with live music, food, and artisan vendors who get their materials from the warehouse. Other programs on pause include free workshops that expand beyond reuse to include beekeeping, composting, and other subjects related to environmental sustainability.

Circularity Hub Concept

When asked about the Circularity Hub concept and Community Forklift's potential as part of a Hub and Exchange model, Patzkowski noted some factors that he considered important to such a facility's success: an online marketplace for large quantities of materials: a focus on items needed in large quantities like lumber, rather than smaller items like drawers and sash windows; strong partnerships with nonprofit organizations that can quickly find homes for materials; space for processing and cleaning that prepares materials for next use; easily accessible drop-off location(s); and a network of value-added services such as artists, repairers, and creative businesses. Patzkowski emphasized, "If you're going to have that volume, it's got to be figured out how you subsidize new businesses, how you donate as much as possible, how you share that in different organizations, and ultimately, who pays for the cost for that."

ReUse Action

Information in this profile is sourced from an interview with Kevin Hayes, Founding Manager, in February 2023, except where otherwise cited.

Figure 5

The Reuse Action facility in Buffalo, New York

Note: Source of image: Google. (2022a, May). *Google Street View: 980 Northampton Street, Buffalo, New York*. Google Maps. https://www.google.com/maps/@42.9071673,-78.8301403,3a,75y,320.65h,104.85t/data=!3m6!1e1!3m4!1sqSLecyNcGMW9X0DnO-9LTA!2e0!7i16384!8i8192. Copyright Google 2023.

About the Organization

ReUse Action is a for-profit social enterprise founded in 2011 and based in Buffalo, New York (ReUse Action, 2016). The founder, Michael Gainer, was one of the co-founders, along with Hayes and others, of a non-profit organization called Buffalo

ReUse in 2007. Buffalo ReUse was founded partially as a "proof of concept" project in response to the Buffalo Mayor Byron Brown's plans to demolish thousands of vacant houses in the city within five years in the "5 in 5" plan developed in 2007 (Lyons, 2009). With a grant from Empire State Development, Buffalo ReUse set out to divert building material from the waste stream and return it to the market in Buffalo while providing training and employment opportunities. The organization deconstructed ten houses before the 2008 recession struck and nearly put the organization out of business. In 2011, Gainer and other Buffalo ReUse founders left the organization over differences of opinion and formed the social enterprise ReUse Action, with a new business plan. The business plan for ReUse Action, which has been adapted over time, is now focused on four activities: reclaimed and surplus building materials resale, contractor services (primarily carpentry), specialty salvage and soft deconstruction, and small business incubator rentals.

In November 2022, Michael Gainer, Kevin Hayes, and Lorraine Eads were elected as the new directors of the nonprofit Buffalo ReUse. In December 2022, Buffalo ReUse announced that its retail operations had closed permanently and much of the remaining stock was transferred to ReUse Action between January and March 2023 (*ONE LAST TIME! We Need Your Help! – Buffalo ReUse*, 2023). According to Hayes, Buffalo ReUse will continue its community education programs, and ReUse Action will continue its current operations.

Location and Facility

ReUse Action is located primarily in a 100-year-old, 45,000 square foot, 3-story daylight factory building that was used originally by a shoe manufacturer, then also as a silk company, printing company, and mixed use. Using only one-and-a-half stories of the building for their operations and store (because there is not a functioning elevator to make efficient use of more of the upper stories for building materials), they rent out the third floor and half of the second floor to approximately 50 tenants as a small business incubator for artists, photographers, crafters, and other small businesses. ReUse Action has a second facility, previously used as an axle plant for General Motors, with approximately 2,000 square feet and high ceilings used for additional storage space for rigid insulation and other overflow materials. It is located approximately a mile away from the main facility.

Their total square footage usage for their building materials operations is approximately 23,000 square feet, but divided across two buildings and two floors, which is not ideal for operations. ReUse Action would prefer to have one contiguous facility with more space for retail, but where they could continue to make income from renting studio and small business spaces. The real estate market in Buffalo has changed significantly in the years since they acquired their two buildings, however. According to Hayes, viable commercial, industrial, and residential buildings continue to be torn down, making the market worse. There is some discussion about possibly building a pole barn

on open land as a more cost-effective method of attaining a new facility with the flat, open space and high ceilings needed for their warehouse and retail operations.

Ownership & Employment

Michael Gainer is the owner of ReUse Action. Several of his co-founders of Buffalo ReUse are in leadership positions at ReUse Action now. When asked about the differences between functioning as a nonprofit or for-profit, Hayes pointed to one significant difference, and one that wasn't as substantial as they had thought it would be. In contrast to their experience in the Buffalo ReUse nonprofit, Gainer now has more authority over decision-making and is able to produce profits through the enterprise, which was a struggle in the nonprofit. In Hayes's experience, the lack of tax deduction letters as part of the donation process are of little importance to most donors. Not having those letters available has not noticeably impacted people's decisions to donate materials.

Hayes notes that ReUse Action is located in an area of Buffalo that was hard-hit by the razing of vacant homes during the "5 in 5" plan operations, and the neighborhood has a high population of people of color. This location was deliberately selected to benefit the neighborhood with job opportunities and low-cost building materials. Hayes says Gainer comes from a teaching background and has had a goal to run programs for out-of-school, out-of-work young adults between the ages of 17-30, and he is very good at training and putting this population to work. However, the enterprise's training programs and collaborations with other social organizations to hire employees with

barriers to traditional employment are handled informally due to the lack of staff to provide case management-type services to assure successful completion of formal programs.

Materials & Services

ReUse Action's focus is on reclaimed building materials acquired through donation, pick-up, or salvage/soft deconstruction services. In their facility there is a workshop for materials processing and value-added services. They have found there's a good market for fireplace mantles made of barn beams for homeowners, and they produce and sell them regularly. For architects, designers, and developers, ready-to-use joists, beams, flooring, and rigid insulation are in high demand.

Appliances are also a large part of what they accept and sell. On a much smaller scale, specialty art and antiques are sold on a consignment basis and are known to draw customers looking for unique items. Recyclable metal is accepted because is profitable, but furniture, electronics, general housewares, and appliances that require repairs are referred to other organizations in the city.

Community Involvement and Collaborations

ReUse Action has hosted community events, such as upcycling classes, on a limited, ad-hoc basis. Buffalo ReUse historically has run community engagement and education programs to inform the public about reuse and circular economies. Now that

the leadership of ReUse Action have been elected as directors of Buffalo ReUse, the intention, according to Hayes, is for community outreach to continue to be managed by the non-profit Buffalo ReUse, and building material reuse retail will be managed by for-profit ReUse Action. Historically, Buffalo ReUse's community engagement has focused on the four areas of regenerating neighborhoods, beautification and gardening, young adult mentorship, and reuse advocacy (Buffalo ReUse, 2023).

Circularity Hub Concept

Hayes believes having an enterprise like ReUse Action in every county is a viable idea. From personal experience, he stresses the importance of having a facility that either has a good elevator, or sufficient space on the ground level, with the ability to drive vehicles into the building, and ideally ceilings higher than 12 feet. "Essentially one big room," Hayes says is the ideal building materials retail space. In addition to the industrial use buildings that Hayes has worked within, large supermarket/retail buildings also can provide sufficient one-level, high square footage space.

Being selective and specific about accepted materials is crucial to such a facility's success, Hayes said, as is being prepared to dispose of unwanted and unsellable materials. As the person who takes the majority of the phone calls and emails for ReUse Action, Hayes turns down up to half of the items people offer to donate. "It's easy to fill up a building with stuff you can't sell," he said. Part of the downfall of Buffalo ReUse, he told me, is that they accepted too many materials they wouldn't be able to sell, and then

didn't have arrangements for disposal of unsellable items. Hayes emphasized making strong business decisions, saying, "We're in this business to make money and to survive and to employ people, and to have some impact on the flow of materials. Okay, it's tiny. We've done a lot of work, but it's still a very small piece of the action."

Hustling is crucial for the business model of reclaimed building materials to work, according to Hayes. Knowing where valuable building materials can be reclaimed (warehouses and schools are two sources he mentioned specifically) and how and where to move inventory out is necessary for viability. A nod to the Hub and Exchange model, he added that he would definitely purchase reclaimed flooring from another reuse center because he is confident in its demand and profitability in his region.

Broome County Eco Center

Information in this profile is sourced from an interview with Debra Smith, Broome County Landfill Director, in February 2023, except where otherwise cited.

Figure 6

Broome County Landfill in Binghamton, New York

Note. The Eco Center is located at the Broome County Landfill site. Source of image: Broome County Recycles. (2021, September 27). *Broome County Recycles Facebook*. https://www.facebook.com/photo.php?fbid=226769452824151

Introduction

In 2014, Broome County, New York opened the Eco Center for building material reuse at the Broome County Landfill in Binghamton, New York. The Eco Center was designed to divert usable building and construction materials from being dumped at the landfill. The program aims to incentivize waste diversion by reducing tipping fees for those who donate materials rather than dump them. Those diverted materials are made available for no cost to Broome County residents, assisting homeowners with resources to complete home projects. The facility's opening was correlated with municipalities like the City of Binghamton issuing requests for bids for deconstruction of buildings, and an anticipation in an increase of building material reuse in the area. The costs for building

deconstruction being higher than demolition, the practice was determined to not be financially feasible and didn't continue. This meant, unfortunately, that the increase in secondary building materials did not materialize for the Eco Center as expected.

Location and Facility

The Eco Center facility was built specifically for the building material reuse program. The building is 3,840 square feet with 14-foot ceilings, located on the property of the Broome County Landfill. The landfill is located approximately 12 miles outside of Binghamton, New York. The Eco Center is open during normal landfill operating hours. Other services on the site include collection of landfill waste, composting material, hazardous household waste, and recycling.

Ownership and Employment

Broome County fully owns and operates the Eco Center. There are no staff dedicated specifically to the Eco Center facility or its operations. Staff attendees at the Broome County landfill will accompany anyone making donations to the Eco Center to supervise the safe unloading of materials into the building, and similarly will accompany residents who go to the Eco Center to pick up materials, to supervise safe loading. Landfill staff who direct vehicles at the landfill are meant to keep an eye out for suitable materials brought in for disposal and suggest they be unloaded into the Eco Center instead, diverting materials at the last minute from being dumped in the landfill.

Materials and Services

Donations of building and construction materials in usable condition are accepted. As there are no staff designated to the Eco Center, there are no value-added services, no processing, and no retail operations, so the facility is strictly for storage between donations and pick-ups. Some furniture goes through the facility as well, but on a limited basis. No general housewares, books or media, textiles, or electronics are accepted. The Eco Center's guidelines state that any drop-off of materials over 500 pounds will be subject to a $20 per ton fee, but Smith states that the Eco Center has "never come into a situation where we even come close to having to charge anyone." In fact, acquiring materials is the Eco Center's greatest struggle. "Going into this winter we were completely cleaned out," Smith stated.

This challenge the Eco Center faces is consistent with research finding that "most of the [Construction Demolition Waste] collected from construction and demolition sites is mixed or contaminated due to the lack of sorting at source" and once materials leave a site, they are less suitable and less likely to be retrieved for recycling or reuse (López Ruiz et al., 2020, section 4.4.1). Thus, truckloads of waste arriving at the landfill are unlikely to be in a condition to separate or sort useable materials on the spot.

There is no shortage, however, of people interested in picking up materials when they're available, so materials do not stay long in the facility. When asked about potential criticism that giving the materials away for free devalues a reuse market in a

circular economy, Smith responded that the Eco Center does not operate at a scale at which this is a concern. She related that if there was a large quantity of material moving through the facility, she might consider a possible negative impact, but as circumstances currently are, the amount of free materials available to residents doesn't have a significant impact on the building material reuse economy.

Community Involvement and Collaborations

Broome County creates advertising specifically targeting homeowners to recruit them to make donations to the Eco Center rather than pay tip fees to dump materials into the landfill. There is also a webpage with information and guidance for property owners, managers, and developers on how to reduce waste and expenses by planning for recycling and reuse of building and construction materials (*Construction & Demolition Recycling | Broome County*, n.d.). The Eco Center has engaged in outreach to local small businesses, home improvement stores, and contractors to find reclaimed building materials, surplus construction materials, or damaged or flawed lumber and building material inventory that cannot be sold but still has functional value. Smith stated this is an opportunity for significant amounts of building materials to be rerouted into the Eco Center. Efforts to divert these materials to the Eco Center have not been fruitful. Large box stores like Ace Hardware, Lowes, and Home Depot have stated that insurance and liability prevent them from diverting damaged materials away from landfill disposal.

The Eco Center limits who can pick up materials to residents (no businesses are allowed to pick up materials for commercial projects), so the majority of materials picked up are going to home renovation projects. Smith notes that construction of back-yard greenhouses using reclaimed windows is a popular use for the materials.

Smith cited the facility's location and the ease and availability of technology used to sell and give away used materials as two reasons for the lack of materials at the Eco Center. Binghamton has an active community that uses Freecycle, a web-based nonprofit that facilitates movement of materials for free to divert waste from landfills. Freecycle and other apps and websites such as Craigslist provide the ease of arranging pick-up of materials rather than a special trip to make a delivery to an out-of-town facility.

Circularity Hub Concept

Smith did not comment directly on the Circularity Hub concept, but considering how the Eco Center operates and the specific conditions the Eco Center is experiencing, one could assume that it would not purchase materials from a Circularity Hub in the region. However, the Eco Center could potentially accept overflows of certain materials that would benefit homeowners in Broome County.

Albany Historical Foundation Architectural Parts Warehouse

Information in this profile is sourced from an interview and emails with David Ritrovato, Warehouse Manager, in March 2023, except where otherwise cited.

Figure 7

HAF Architectural Parts Warehouse in Albany, New York

Note. Source of image: Google. (2022b, June). *Google Street View: 83 Lexington Ave, Albany, New York*. Google Maps. https://www.google.com/maps/@42.6608536,-73.7660569,3a,51.7y,280.57h,98.98t/data=!3m7!1e1!3m5!1si_VidzVVPMjLsUbpCa4l_w!2e0!6shttps:%2F%2Fstreetviewpixels-pa.googleapis.com%2Fv1%2Fthumbnail%3Fpanoid%3Di_VidzVVPMjLsUbpCa4l_w%26cb_client%3Dmaps_sv.tactile.gps%26w%3D203%26h%3D100%26yaw%3D101.63907%26pitch%3D0%26thumbfov%3D100!7i16384!8i8192, Copyright Google 2023.

Introduction

The Historic Albany Foundation (HAF) is a non-profit organization created to "preserve and protect buildings that have architectural, historic, or civic value" in Albany (Historic Albany Foundation, 2023). In 1978, HAF opened its Architectural Parts

Warehouse (Warehouse hereafter) as a repository for historic building materials from houses that couldn't be saved (Historic Albany Foundation, n.d.-c). According to their website, the Warehouse is the only non-profit architectural salvage warehouse in New York's capital district (Historic Albany Foundation, n.d.-c) and the "oldest continuously operating not-for-profit architectural salvage building in the country" (Historic Albany Foundation, n.d.-d).

Location and Facility

Located near downtown Albany, the Warehouse has been housed since 1996 in an adaptively reused historical building that has been used as an auto dealership, an auto repair shop, and the Capital Staple Company. The building was donated to HAF after the owner had difficulty finding a buyer. The Warehouse has approximately 10,000 square feet, 90% of which is estimated to be building materials retail space. However, HAF and the Warehouse will be moving soon to a new location – the oldest building in Albany – in downtown Albany. The Warehouse will have a smaller amount of space at the new location, so staff are making plans for how to prioritize inventory for the move and for their retail space thereafter.

Ownership and Employment

HAF is a non-profit organization which operates with limited employees. There are two full-time employees and a few part-time employees (including Ritrovato, the

Warehouse Manager, a retired teacher who started as a volunteer and now works approximately 23 hours per week). The rest of the work of the organization is done by volunteers and (as of summer 2022, unpaid) interns (Historic Albany Foundation, n.d.-b).

Materials and Services

Although there is a preference for pre-1940s architectural parts in the warehouse, other high-quality, unique items are accepted at the staff's discretion. All items in the Warehouse have been donated or recovered through salvage and are offered for resale at low prices. Homeowners, businesses, contractors, architects, and designers purchase materials from the Warehouse. No significant repair, refurbishing, processing, or other value-added services are conducted in the Warehouse.

Community Involvement and Collaborations

Historic Albany Foundation coordinates a variety of community events and workshops, a tool lending library, guided tours, and other engagement activities. In response to a need for craftsmen with preservation skills in New York, and through a partnership with the New York State Historic Preservation Office and Workforce Development at Hudson Valley Community College, HAF offers a Historic Trades Certificate Program that includes courses such as historic carpentry, historic plastering, masonry, and window restoration (Historic Albany Foundation, n.d.-a). Workshops for

community members include electrical wiring, gardening and soil preparation, and basic carpentry.

Loyal followers, patrons, and experts are regulars at the Warehouse and offer their expertise and advice to volunteers, customers, and one another. Ritrovato has seen business increase post-pandemic as New York City residents have moved upstate and are performing renovations. First-time home buyers are also frequent customers as they look to save money while restoring older homes. Ritrovato said that in general, the "vibe of 'reuse' is really gaining momentum."

HAF and the Warehouse work closely with other non-profit organizations in the area. They donate tools to the S.T.E.A.M. Garden (a nonprofit with live/work space focused on business incubation, innovation, co-working, and training), and work regularly with the Refugee and Immigrant Support Services of Emmaus (RISSE) program to donate furniture and other basic goods needed by refugees relocating into Albany.

Circularity Hub Concept

Having accepted only donated and salvaged (and predominantly pre-1940s) materials since the Warehouse's opening, and facing a move in the near future where downsizing will be necessary, Ritrovato could not foresee interacting with a Circularity Hub in the region in the near future. How they might interact in a more distant future is unclear, but Ritrovato viewed the concept positively.

CHAPTER FIVE: MODEL FOR CIRCULARITY HUBS

Utilizing the profiles of building materials reuse establishments in this report and the research and recommendations made for similar facilities in reports by governmental agencies, consulting agencies, and academic research, in this chapter I outline important guidelines and recommendations for a model of a Circularity Hub that could support the growth of the building material circular economy in New York. This chapter begins with clarification of the concept and purpose of Circularity Hubs, followed by sections on location, agglomeration economy and reuse ecosystem, ownership and funding, facility specifications, and then the functions and services of transportation and hauling, salvage and deconstruction, material processing and value-added services, workforce development, online marketplace, and community engagement and education.

Concept

Cohen, of Fingerlakes Reuse, defines her recommended Hubs as "large warehouses with high ceilings and multiple loading docks where bulk materials can be absorbed, processed, refurbished, and redistributed to appropriate markets, and larger scale building materials can be effectively sorted and displayed for purchase" (Cohen, 2022). In correlation to these Hubs, Cohen defines exchanges as "convenient and visible

retail outlets that double as donation drop-off points" and says, "a minimum of one hub and multiple exchanges per County is a recommended starting scale" (2022).

In the *Building Materials Reuse Analysis* report, StopWaste defines the advantages of a potential BRIC, a concept similar to that of the Circularity Hubs but with a focus on commercial building materials as:

- *Developing a regional solution that reinvests in the local economy, reducing impacts from supply chain uncertainty and reducing transportation costs and related energy use.*
- *Providing materials storage space and an escrow model to smooth out lumpiness inherent in re-used commercial building material supply and helping align that with construction schedules.*
- *Adding resiliency to the existing global building product ecosystem by offering a local network node for material reuse collection and redistribution, extended the useful life of these products.*
- *Engaging the local community through building industry education programs, workforce development, and community partnerships.*

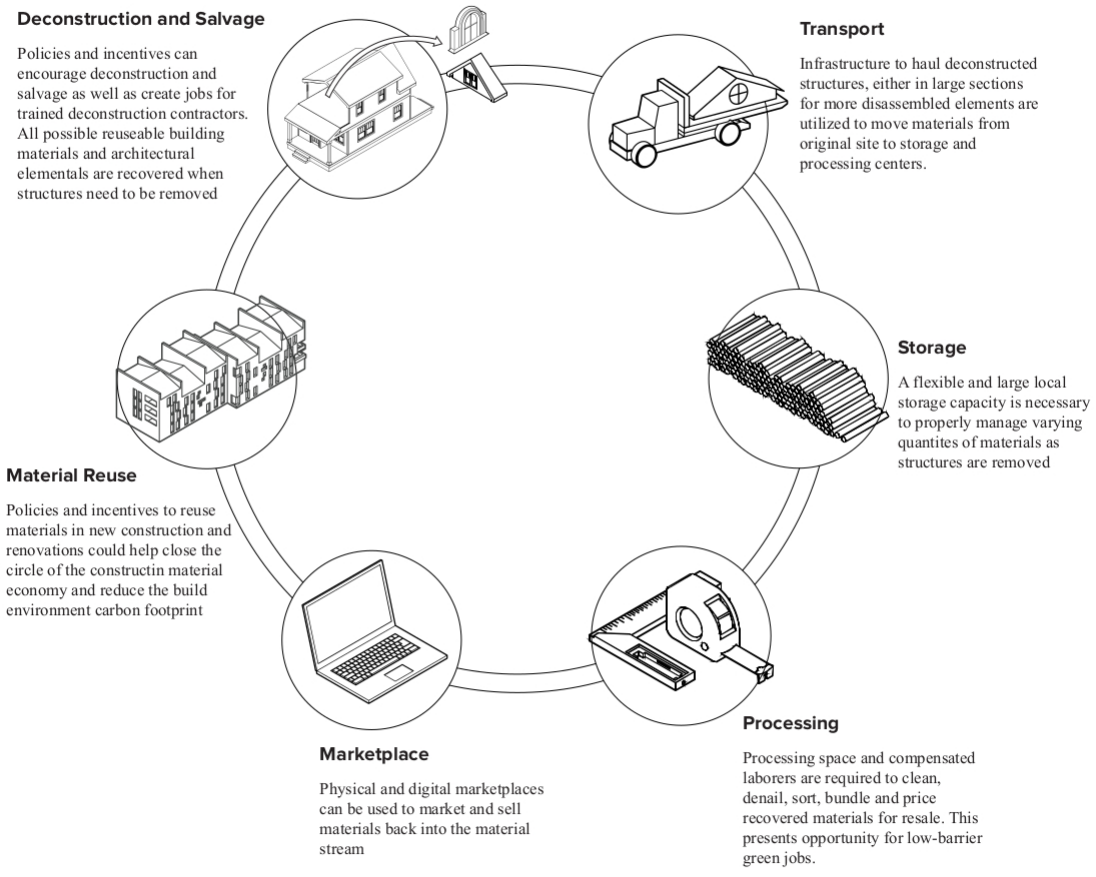
  (StopWaste, 2022, p. 4)

Circularity Hubs, as proposed and described in this report, serve the same purposes described by StopWaste above. The Circularity Hub model has potential to provide the infrastructure and range of services that support the growth of a circular

building material economy ecosystem. These additional services include transportation and hauling, salvage and deconstruction, material processing and value-added services, workforce development, an online marketplace, and community engagement and education. As seen in Figure 8, most of these services are identified as essential infrastructure for a circular building material economy.

Figure 8

Essential infrastructure for circular building material economy



Note. Image created by Wyeth Augustine-Marceil, Just Places Lab for CR0WD. (2023). *Toward Building Sustainable Communities and Circular Economies: A Local Government Policy Guide to Alternatives to Demolition through Deconstruction and Building Reuse*.

Location

Cohen's recommendation of the establishment of a Circularity Hub in each county creates a network and economy of scale. Further, locating Circularity Hubs near cities or city centers within each county provides proximity to material sources and buyers, a workforce, other circular economy ecosystem businesses and nonprofits (or prime location for their formation), and communities within which an audience can be engaged with outreach and educational efforts.

Proximity to suppliers and buyers of reused building materials reduces the costs and environmental impacts of transporting materials long distances. The costs of transporting materials may hinder material acquisition efforts on the part of the Circularity Hub, or it may deter contractors or other buyers from using reclaimed materials if new materials cost less to procure. Transportation of materials over long distances can also counteract the environmental benefits of material reuse. "Transport processes are one of the most influential elements in environmental impacts and condition the application of recovery alternatives" (López Ruiz et al., 2020, section 4.4.2). Minimizing transport distances is crucial for reaching goals of greenhouse gas emission reduction.

From the profiles of building materials reuse facilities in this report, the location within a county for collecting donations of materials is critical. The Broome County Eco Center has struggled with procurement of materials due to the distance from the nearest city, especially given that it relies completely upon drop-off donations. Whether donors are individual homeowners or contractors for construction or demolition, the time and costs of transportation to unload materials may be a disincentive. While other remedies could assist in overcoming this obstacle to acquiring materials (e.g. active procurement methods such as pick-ups and salvage activities, dedicated employees, etc.), a convenient location in a populated area where special trips for donation aren't required is an influential variable in the attraction of donors and acquisition of inventory.

Proximity to a large potential workforce is also important for Circularity Hubs' functions, not only for the ease of recruiting employees, but also for the ease of employees to access the work site. Accessibility is a key factor in providing training and employment opportunities to populations that have been marginalized and historically disadvantaged. Reducing times and costs of commutes and, if possible, taking advantage of public transportation options will help Circularity Hubs reach goals of employing people with barriers to traditional employment in "green collar" jobs. Additionally, rural communities often see workforce development efforts result in the newly trained workforce seeking higher wage jobs in nearby urban centers. Siting Circularity Hubs in cities assures continuous access to new employees and training program participants.

Cities also provide advantages for small business incubation and the development and support of a reuse ecosystem. A location that appeals to artisans, crafters, carpenters, retailers, and other reuse-adjacent entrepreneurs will affect the success of business incubation and partnerships. Start-ups and small businesses will seek to control costs and improve access to customers. Low costs (both in dollars and greenhouse gas emissions) of transportation between beneficiary nonprofits and potential reuse "exchange" establishments can have considerable impact long-term.

A location in or near a city center is likely also an influential factor in community engagement. It's not possible to compare the Eco Center's isolated location impact on this matter with the other profiled facilities' successes since community events and involvement are not a goal of operations. However, it is likely that the collaborations within the reuse and waste reduction ecosystem impact the success and breadth of opportunities available to conduct educational and engaging community events that develop a broader understanding and appreciation of reuse and circular economy principles.

Agglomeration, Local Industry Clusters, and the Reuse Ecosystem

Where advocacy for deconstruction requirements through statewide policies or adaption of new municipal ordinances and incentives advances in New York State, siting of Circularity Hubs shows great potential for large impact in creating a local circular economy. The infrastructure provided by Circularity Hubs supports an increase in

quality and quantity of materials to support operations at scales that affect the circular economy ecosystem. Where building material reuse is successfully established, an economy of procurement, processing, distribution, resale, refurbishing, and reuse emerges. Agglomeration occurs when there can be cost savings by locating businesses close to a trained workforce, source materials, or other shared resources. Local industry clusters are related industries that arise to support one another, such as the variety of services required to support a circular building economy.

A city's deconstruction requirement, Willingham et al. (2017) say:

> *would very quickly increase the number of required deconstructions for a very small local industry… much like the birth of new markets that follows deregulation in other industries, the city's requirement would potentially spur development of a unique cluster of businesses surrounding building removal and salvage material resale, including the growth of a labor market that both overlaps that of the area's extremely tight construction market and has the potential to improve economic opportunity for small businesses and the industries workers.* (p. 3)

The circular building material economy both requires and supports an ecosystem of services that span design, construction trades, transportation, retail, storage, and material manufacturers. At a large scale, this ecosystem also incorporates workforce development, small business innovation, non-profit organizations, hazardous material abatement, and more. Building materials salvaged from the waste stream support

repair/refurbishing services, added-value artisans and tradespeople, and in the long-view, innovative design and production of materials purposed for multiple uses and iterations before being recycled or otherwise transformed. This variety of services may create a local industry cluster of businesses that contribute to or rely upon building material reuse, or an agglomeration of similar businesses such as those producing refurbished furniture or architectural components.

The Reuse Innovation Center (RIC) model championed by Dave Bennink, CEO of Reuse Consulting, capitalizes on the agglomeration or cluster of reuse-related services that surface in proximity to building material reuse operations. The RIC model rallies stakeholders to identify and develop elements of a reuse economy, including retail, specialty businesses, repair/refurbishing, education/training, public spaces, and storage (*Ulster ReUse Innovation Center Stakeholder Meeting*, 2023).

The CR0WDSource guide *Deconstruction: A Guide for Local Government* provides a directory of services within New York state that are adjacent to building material reuse in the six categories of Demolition/Deconstruction, Hazard Management, Salvage Retailers, Trade Courses, Transport/Hauling, and Waste Handling/Diversion (CR0WD, 2022). This surface-level inventory of service providers lists 118 establishments, including some that specialize in building material reuse, and some whose general services can or do support a circular building material economy and ecosystem. Although far from exhaustive in its depth or scope, the directory illustrates the range of services and specializations across non-profits, for-profits, and educational

institutions that exist as part of the current, underdeveloped circular building material economy in New York state.

With no deconstruction ordinances currently in place in the state, the ecosystem is currently a niche market supported largely by conscientious actors. However, municipal actions that incentivize or require building deconstructions (policies such as this are increasingly being presented to city officials across New York state) or state regulations will require economic (in addition to conscientious) solutions in all steps of the circular building material economy. Economic solutions will include new business development to fill gaps in needed services and capitalize on new opportunities.

Ownership and funding

The profiled facilities in this report are examples of public, private non-profit, and private for-profit ownership. Nationally and internationally, non-profit and for-profit enterprises successfully contribute to the reuse economy through the sale of reclaimed building materials. However, achieving a true circular economy will require upfront costs and investments to increase the scale to profitability and compete with the current practices that ignore the invisible costs of social and environmental degradation. Negative externalities produced by the current market system for building materials and construction are unsustainable. Organic market corrections are not spontaneously emerging, and even deconstruction pilot programs (such as those by Community Forklift

and City of Binghamton) fail because of the established incentives of time and cost savings using the existing infrastructure of a linear take-and-waste economy.

The circular building material economy must be scaled up with governmental support that will correct the market failures. The necessary services involved (e.g. workforce training, transportation, processing, reselling) overreach the typical scope of publicly owned enterprises, but governmental support of Circularity Hubs is crucial to maximize the social, economic, and environmental impacts of the building material reuse and circular economy in New York State. Support from public sources would not only invest in more sustainable local economies and the reduction of waste and environmental degradation, but position the cities, counties, and New York State as leaders in sustainability.

Cohen's recommendations in her public comments on the CLCPA include seed money for independently operated reuse centers (Cohen, 2022). This funding could support acquisition of property for a facility and operational expenses. "By investing in larger-scale Hubs in each County, this will give a meaningful starting point to effectively provide the necessary infrastructure to absorb, process and stage building materials from deconstruction and surplus from construction projects" (Cohen, 2022, p. 4). This support is in line with the strategies listed in the New York State Climate Action Council Scoping Plan. A list of references to the specific objectives, most of which involve funding, that align with the functions of Circularity Hubs is provided in Chapter Six of this report.

Public private partnerships (PPPs) present opportunities for a more collaborative approach. Waste Management divisions of counties or cities could contract services for construction and demolition waste diversion via Circularity Hubs. The effectiveness of PPPs in strategic planning for circular economies in Australia and Sweden is documented in a recent study. "Findings from the City of Malmö reflect a tradition of more collaborative governance… most sustainable development initiatives were public-private partnerships in Sweden" (Bolger & Doyon, 2019, p. 2200). In the United States, Community-Based Public Private Partnerships (CBPPPs) are being established for green infrastructure projects that prioritize community health and sustainability and provide flexible options for the quick delivery of much-needed climate change mitigation and resilience (US EPA, 2015). The CBPPP model could be utilized as an approach to addressing the substantial and immediate environmental threat posed by the linear economy.

An additional funding option is the use of performance-based Social Impact Bonds (SIBs) for outcomes related to waste diversion, workforce development, and social supports through programs like Community Forklift's HELP program or ReUse Action's donations to the RISSE refugee program in Albany. The functions of Circularity Hubs provide a variety of easily quantifiable data on which benchmarks for pay-outs can be established. This option allows governmental agencies to reduce their risk in funding innovative circular economy initiatives and to measure and verify cost-saving and/or public good-serving results before making certain pay-outs. This option also attracts

private investment dollars to Circularity Hub start-ups. SIBs are already being used to reduce greenhouse gas emissions and finance renewable energy projects.

Grant funding, PPPs, and SIBS are opportunities for funding to catalyze the circular economy to produce a scale at which additional services in the ecosystem can organically develop. As deconstruction incentives and ordinances emerge across New York state, Circularity Hubs and adjacent services will provide the infrastructure for their success.

Facility Specifications

Circularity Hubs must be sized to house a larger scale of inventory than a typical reuse retail establishment and services beyond retail (e.g., workforce development, transportation, processing). In order to expand the circular building material economy in New York, Circularity Hubs must include retail space with high square footage, open (undivided) space, ability to drive in and out of the facility and/or loading docks, and high ceilings. While some uncovered space may be acceptable for storage of limited types of materials, the majority of the space should be sheltered from weather. Adaptive reuse of large commercial, manufacturing, and retail spaces can provide these amenities, but representatives from both the Broome County Eco Center and ReUse Action mentioned large pole buildings or barns as inexpensive options that provide the essentials.

To expand beyond the customer base of homeowners doing do-it-yourself projects and small businesses purchasing low-cost materials and to reach the small- and medium-sized design and construction firms, Circularity Hubs must acquire and store large enough quantities to meet their needs. "In a [Circular Economy] context, the materials used for projects should be sourced from recycled or reused material providers rather than raw materials… [E]nsuring material availability is highly dependent on the market maturity. However, researchers claim that regional shortages of recycled or reused materials are still common in practice" (Q. Chen et al., 2022, section 5.1).

"To obtain large quantities of reclaimed materials can take months to build up stock, especially for large projects requiring large quantities of materials… Provision of space on site, or close to site, to store reclaimed materials as they become available will overcome this problem and enable storage of one-off reclaimed opportunities" (BioRegional Consulting, 2018, p. 10). Examples of one-off reclaim opportunities that require a large storage space include the opportunities that have arisen for the Reuse Innovation Center based out of Bellingham, Washington, to do salvage and deconstruction of an elementary school and a high school, where 125,000 pounds of materials were diverted from waste, and over 25 types of building materials reclaimed (*Ulster ReUse Innovation Center Stakeholder Meeting*, 2023). Another example is that of Community Forklift partnering with a 450-unit hotel to divert materials (Tom Patzkowski, personal communication, March 14, 2023). Circularity Hubs with substantial square footage will have the ability to absorb large quantities of materials and

redirect them to the sales floor, to local nonprofits, to other reused building material retail establishments ("exchanges"), or to other specific and appropriate locations for their reuse. Typical reuse retail establishments would be challenged to handle frequent large quantities of materials, like three of the four establishments profiled that report to be nearly always at capacity.

The study of economic activity resulting from the deconstruction ordinance in Portland, Oregon is explicit in the matter of the need for square footage to scale up the building material reuse economy. According to this study:

> *On the supply side, the largest barriers to potential resale outlets include the difficulty and expense of transporting, storing, and processing bulky materials. Furthermore, given the somewhat niche nature of reused materials, it is not clear that modestly-sized (i.e. numerous) outlets could generate profitable sales volumes, with the important exception of boutique selections of high-grade or artistically-desirable items. For general use materials such as framing lumber and other items, a fairly strong case for economies of scale points to larger, logistically-intense operations… First, increasing the reliability of the stock would likely attract more regular consumers – constant, well-organized stock, clean presentation, and fully-prepared lumber would appeal to both casual and professional buyers.* (Willingham et al., 2017, p. 13)

The StopWaste guide presents detailed options for layouts of the proposed BRIC for commercial building materials, with diagrams and cost estimates for half-acre, one-acre, and one-and-a-half-acre site options (StopWaste, 2022). The layouts include estimates for functional areas including space for training and workforce development, workspace, offices, events, and the most significant amounts of space dedicated to material storage and retail (StopWaste, 2022).

Transportation and hauling

Until the time (and possibly beyond) that contractors are required to divert a percentage of materials from building demolitions from landfills, the responsibility of pick-ups and hauling of reusable building materials will fall to some degree on Circularity Hubs. Although donations and limited salvage can easily fill the HAF's Warehouse's 9,000 square feet with specialized materials, transportation services can secure larger quantities of materials of value. As evidenced by the challenges of acquiring materials in the Broome County Eco Center, and Hayes's emphasis on "hustle" as critical to the business model of ReUse Action, Circularity Hubs should expect the active pursuit of building materials to be essential to their success, especially where deconstruction ordinances, incentives, or requirements are not yet in place. The ability to perform transportation and hauling also creates opportunity for the establishment of convenient drop-off and donation stations in strategically accessible and convenient locations for additional ease of acquiring materials.

Should local ordinances or state requirements be introduced that require demolition contractors to divert building materials from the waste stream, the contractors may want to sub-contract the pick-up and hauling of materials to Circularity Hubs, which would cover the Hubs' costs of the transportation services. Given the importance of on-site sorting in maximizing the quality and quantity of salvaged building materials (López Ruiz et al., 2020, section 4.4.1), on-site collection containers provided and collected by Circularity Hubs would greatly impact the efficiency of acquiring materials at deconstruction or demolition sites.

Salvage and deconstruction services

Especially in coordination with transportation services and workforce development, salvage and deconstruction services can increase the acquisition of valuable building materials and provide training opportunities. Salvaging or soft deconstruction activities can be completed before buildings are demolished, reducing the landfill tipping fees for demolition contractors and allowing property owners to make donations to help build a more sustainable circular economy. Both Community Forklift and ReUse Action utilize salvage, soft-stripping, and limited deconstruction services to boost their inventory and acquire especially valuable materials that are in demand in their markets. Full deconstruction services, especially when incentivized by local governments, expand the social, environmental, and economic value.

Material processing and value-added services

Whereas Community Forklift requires that building materials be processed before being donated, they also attest to the popularity and value of refurbished materials. ReUse Action has identified and capitalized on profitable value-added projects such as the fireplace mantles made with barn wood. Especially when acquiring building materials at larger scales, the ability to process, refurbish, and refinish inventory gives the facility greater capacity to secure large quantities of high-demand items. These activities may create higher labor costs, but these abilities will also increase the value and desirability of materials. Construction contractors, designers, and architects who would purchase larger quantities of materials prefer they be in ready-to-install condition.

Workforce development

Workforce development in building material reuse facilities provides green jobs with low barriers to entry and living wages to people who have been traditionally marginalized or disadvantaged, and/or have barriers to employment. Deconstruction certification and training programs offered at Circularity Hubs in New York state would amplify the economic effects of the circular building material economy not just by preparing workers for deconstruction jobs, but by providing a pathway into general construction occupations, truck driving, point of sale operation, repair and refurbishment, and more (Alphonse, J. et al., 2022).

Workforce training and certification programs support the capacity of Circularity Hubs to perform soft or full deconstruction and situate the Hubs and their employees to provide in-demand services if future ordinances require deconstruction training or certification for deconstruction of buildings. In Portland, Oregon, after the deconstruction ordinance was passed, a study of the resulting economic activity found that a workforce trained in deconstruction added to efficiency for contractors and lowered the labor costs (Willingham et al., 2017). Several contractors indicated their plans to hire additional trained staff in the near future, "indicating the potential for unmet labor demand in the sector" (Willingham et al., 2017, p. 11).

As deconstruction ordinances and incentives are increasingly introduced across the United States, formal training and certification programs also are emerging. Build Reuse is a nonprofit organization focusing on the development of deconstruction workforce development programs. Portland, Oregon's deconstruction ordinance requires that contractors who perform deconstruction must be certified by one of the trainers in Build Reuse's National Registry of Deconstruction Trainers (*Deconstruction Ordinance*, 2016). San Antonio, Texas requires deconstruction contractors to be certified through a training program conducted by the city's Office of Historic Preservation (*Deconstruction Ordinance*, 2022), which contracted their first ever deconstruction training program through The ReUse People, Inc., whose founder, Ted Reiff, is on Build Reuse's National Registry of Deconstruction Trainers (*Contractor Training at the Pooley House*, n.d.). Reiff also provided guidance in the development of a *Pathways in Domicology:*

Deconstruction Workforce Development: A Curriculum Building Template published by the Michigan State University Center for Community and Economic Development (Hooper, 2019). The ReUse People specifically publicize on their website that their training programs are opportunities for people with barriers to additional employment by listing "ex-offenders" and "community-corrections enrollees" as previous trainees in their Deconstruction Worker Certification program (*Deconstruction Training | The ReUse People*, n.d.).

Dave Bennink, who has presented at multiple events in Central New York and the Capital Region, and is consulting for the development of a Reuse Innovation Center in Ulster County, New York, is also on Build Reuse's national registry. Bennink is well-known by members of CR0WD and many advocates for deconstruction in the state of New York, and his involvement in New York efforts has provided invaluable support.

Utilizing resources such as those available through Build Reuse, certification and training standards could be developed to be recognized by individual cities or counties as is being done in San Antonio, Texas. Alternatively, a statewide standard could be adopted, such as that overseen by the Oregon Construction Contractors Board. In both of these cases, the governmental agencies relied upon experts in deconstruction and training to guide official requirements. Establishment of official deconstruction training programs in Circularity Hubs across the state of New York could similarly prepare local experts to guide certification and training requirement conversations in local and state deconstruction legislation.

A study of the Architectural Salvage and Reuse Industry (ASRI) in the U.S. affirms that the industry employment pool includes a large number of people fighting recidivism or coming from African-American communities (Alphonse, J. et al., 2022), and that training and employment programs such as the ones utilized by Second Chance Reuse, based in Baltimore, provide "an opportunity to upskills themselves and make a livable wage" in green jobs (Alphonse, J. et al., 2022, p. 28). Finger Lakes Reuse, in Ithaca, delivers a Reuse Skills and Employment Training (ReSET) program to provide basic employment and reuse skills to disadvantaged populations (Finger Lakes ReUse, n.d.).

Online marketplace

An online marketplace for building material reuse is a critical piece of infrastructure for the circular building material economy. To increase the scale at which materials are reused in new construction projects, the current difficulty in sourcing specific quantities and types of materials needed must be addressed. While individual establishments' online marketplaces increase the visibility and accessibility of materials, an online marketplace that connects all New York state Circularity Hubs simplifies the process for buyers and sellers and optimizes the sourcing of needed materials.

Rather than each individual hub creating and maintaining its own online marketplace, one can manage the site for all Hubs, which contribute their listings individually. In the case of a Circularity Hub in each county of New York, the online

marketplace will provide outstanding visibility of and access to materials. "It will be necessary for contractors to engage with additional new suppliers to source reclaimed materials. Reclaimed suppliers mainly supply locally. Many work together as a network, especially for larger orders" (BioRegional Consulting, 2018, p. 10). This saves time especially for architects, designers, and contracts who need to secure specific quantities of specific items. This across-network collaboration increases the scale of projects for which materials can be sourced and the appeal to contractors, which is a largely untapped business opportunity for building material reuse retail. "There is an opportunity for growth in the business-to-business customer segment. The commercial customers only result in 3% of the overall industry revenue" (Alphonse, J. et al., 2022, p. 25).

Community engagement and education

Building deconstruction and circular building material economy are concepts that are slowly gaining attention but are largely still not understood by general populations in the United States. Community outreach and events are needed to widen the support and advocacy for a more sustainable approach to building material and CDD waste. Additional services specific to the needs of the community in which a Circularity Hub is located can be incorporated into their services, such as a tool library, maker space, or creators' workshop space to support social cohesion. In the 2019 study of Malmö's local government's strategic planning efforts in recycling and reuse, the authors find, "[t]he

vision for Malmö as a socially sustainable city is strongly associated with sustainable environmental and economic development. The Comprehensive Plan for Malmö asserts that 'ecological sustainability efforts can serve as a motor for social sustainability'" (Bolger & Doyon, 2019, p. 2197).

Educational efforts are critical for the success of a new economy in New York. For potential buyers to choose secondary materials over virgin materials, they must know information such as what is available, where it can be sourced, and how it can be used. Before deconstruction ordinances are in place, potential donors must also know what materials are reusable and how and where to donate them. Reuse education and engagement catalyzes changes in behavior that support a circular economy over the status quo. Engaging a variety of stakeholders across different levels of the reuse ecosystem increases buy-in and successful strategic inroads.

HAF, Buffalo ReUse, and Community Forklift have engaged in a wide variety of community engagement activities to increase awareness of reuse and the circular economy, host celebration and education events, conduct workshops for skill-development, and interact with community members in meaningful, positive ways. Their engagements have extended beyond building material reuse and focused on composting, beekeeping, historical tours, and much more. These activities center these facilities as social, economic, and environmental hubs within their communities, and strengthen the social bonds while increasing awareness and sustainable choices.

CHAPTER SIX: FAVORABLE CONDITIONS OF THE MARKET IN NEW YORK

IBISWorld Market Reports

IBISWorld provides high-quality market research reports for over 700 U.S. industries, accessible online (Cory Tucker, 2006). Since a specific building material reuse industry is not included on the list, I utilized reports on the lumber and building material industry, home improvement industry, used goods stores industry, and the demolition and wrecking industry to understand current and future industry conditions. I then analyze how these conditions may provide favorable conditions for Circularity Hubs.

The industry research report done by IBISWorld on lumber and building material stores in the state of New York indicates that the number of establishments in New York decreased during the period of 2017-2022 and is expected to continue to decrease 2022-2027 (2022c). Revenue generated in total by these establishments in New York, however, has been above the national average for the same five-year period and is projected to continue to grow in the coming five years (IBISWorld, 2022c). Home improvement establishments are following the same trend in New York – the number of establishments has been decreasing and is expected to continue to decrease, while revenue has increased (IBISWorld, 2022b).

These trends indicate that although lumber and building materials and home improvement supplies and services are growing in demand, the accessibility to these establishments in the state of New York is decreasing. This presents an opportunity for Circularity Hubs to meet the needs of those who want to shop locally for low-cost materials. County-by-county locations reduce transportation costs for buyers who otherwise would have limited or no local options as lumber and building material and home improvement establishments continue to decline in number in the near future.

Key external drivers of the reduction lumber and building material stores in New York include lower housing starts, lower consumer confidence, and lower private spending on home improvements (IBISWorld, 2022c), all of which could also reasonably be assumed to increase purchase of reused materials at lower costs. New York state is also a suitable location for reuse-related workforce development. The state is ranked 4th in the U.S. for the number of Used Good Stores (UGS), with 88,672 establishments, and the average wage of New York UGS employees is 49.2% above the national average (IBISWorld, 2022d). This supports the argument for reuse jobs as "green collar" jobs that can earn livable wages in the state of New York.

The demolition and wrecking industry in New York is expected to do well in the next five years, suggesting that opportunities for deconstruction and salvage will also be increasing. Revenue, employment, and wages are projected to outpace the national average for the time period of 2022-2027, along with an increase in demolition and wrecking establishments (IBISWorld, 2022a).

The combination of the demand for demolition services increasing and the advocacy efforts in support of deconstruction incentives and ordinances by municipalities presents the possibility of a new, large market opportunity for deconstruction contractors and services. Circularity Hubs would be primely positioned to provide the necessary infrastructure, training, workforce, and mission-driven operations to meet this need across New York state.

New York State's Climate Leadership and Community Protection Act Scoping Plan

The Climate Leadership and Community Protection Act (CLCPA) was signed into law in New York State in 2019. The law "requires New York to reduce economy-wide greenhouse gas emissions 40 percent by 2030 and no less than 85 percent by 2050 from 1990 levels" (*New York's Climate Leadership & Community Protection Act - New York's Climate Leadership & Community Protection Act*, n.d.). The Climate Action Council developed a Scoping Plan to provide the framework for the achievement of these goals, and released the Draft Scoping Plan for public comment in 2021 (*Scoping Plan*, n.d.). Comments by Cohen, which I have referred to throughout this report, were submitted as public comment during the open comment period. The Final Scoping Plan was released by the Climate Action Council on January 1, 2023 (*Scoping Plan*, n.d.).

In the Final Scoping Plan, the New York State Climate Action Council has stated explicitly that now is the time for public investment in market development of climate-

smart solutions. The Plan prioritizes financial and strategic support for the activities performed by a Circularity Hub, stating the state and its agencies should:

- *"[C]reate a revolving loan fund for building decarbonization and the reuse of buildings and building materials"* (New York State Climate Action Council, 2022, p. 202)
- *"[I]nclude workforce skills and broad public awareness and engagement that motivates behavioral change in areas of focus for market development and innovation"* (p. 206)
- *"[E]ncourage the use of materials exchanges and sharing platforms through development of resources and facilitate the development of avenues for material reuse"* (p. 326)
- *"[E]stablish a targeted grant funding program to support reuse"* (p. 327)
- *"[S]upport policy approaches that increase the capture and use of building deconstruction materials and recovered aggregate"* (p. 327)
- *"[P]rovide financial support from new funding provided to implement the Climate Act and other sources, for local reuse centers, material exchanges, and repair shops"* (p. 327)
- *"[S]upport workforce development, job training, and trade skills in repair, refurbishment, remanufacturing, recycling, and innovative materials reuse"* (p. 327)

- *"[I]mplement new and expand existing statewide campaigns for reduction, reuse, and recycling targeting New York residents and businesses"* (p. 327)

All of these initiatives are included in the functions of Circularity Hubs as outlined in Chapter Five. As outlined in Chapter One of this report, a circular building material economy has enormous impacts on the environment, public health, social justice, and local economies. These sources of information about the industry performance and projections in New York and the agenda of the New York Climate Action Council suggest two-fold favorable conditions: strategic investment from state agencies and market conditions that position Circularity Hubs to address the market conditions projected.

CONCLUSION

As the review of governmental, professional, and academic research shows, circular economy principles are necessary for a sustainable future. The construction and demolition industries are producing unmanageable environmental harms to land, water, and public health. The devastating impacts of a linear economy, however, present vast opportunities for circular economies. Building material reuse is one phase of the circular building material economy, and its practice is gaining attention and support around the globe.

Due to market economies' failure thus far to incorporate "invisible" costs of environmental harm, social injustice, and waste management, the circular building material economy has not yet proven financially viable. Despite this, advocacy has pushed forward policy and incentives to further develop the reuse economy and redirect dollars from the negative externalities of a take-and-waste approach toward a people-centered, principled, and sustainable alternative.

Initiatives to advance the circular building material economy in the United States and New York are gaining traction and attracting attention from practitioners, academics, and policymakers. Now is the ideal time for considering a state-wide approach to securing the infrastructure necessary to support this new economy and to maximize its most positive impacts. Circularity Hubs across the state present greater

opportunities than piece-meal or patchwork tactics and can expedite the materialization of positive outcomes.

Members of the CR0WD network, including Gretchen Worth, are currently analyzing vacant school buildings across the state for their potential to be revived as functional pillars of community activity as Circularity Hubs. The opportunity may exist to transform 62 vacant buildings in 62 counties into a network of building material reuse. School buildings, commercial or industrial buildings, supermarket or retail spaces, and other facilities all contain potential for future sites.

Members of CR0WD, and Cohen of Finger Lakes Reuse particularly, are hoping to be involved in a pilot program as a "proof of concept" of Circularity Hubs, either in an advisory role or active participation. Future research can assist with identifying appropriate locations and services for specific Circularity Hubs. The following are some areas where further study and data analysis may be useful for determining optimal "proof of concept" projects.

Analyzing concentrations and spatial patterns of demolitions and construction projects within the area can assist in estimating the potential material flow to determine the size of buildings and scale of services required. Climate and economic justice overlays can be used to identify communities that could most benefit from the green job training and employment opportunities. Saturation of existing reuse establishments and services could indicate favorable conditions for agglomeration of compatible reuse-

adjacent business opportunities and small business incubation. Areas where access to virgin building materials is limited may be studied for possible market opportunities.

Mildred Warner, Professor at Cornell and a researcher specializing in economic development, recommends further research into various actors in the reuse ecosystem, such as potential buyers of reclaimed materials, to clarify the market demands in an area where a Circularity Hub may be potentially sited (Warner, M., 2023). The increase in scale of materials for larger projects being a goal in the establishment of Circularity Hubs, a study of which contractors' needs within the building services industry are not being met or could be met more economically or efficiently should be conducted. Education and information-sharing with these actors will be critical in establishing a successful market.

This report provides suggestions and considerations as the Circularity Hub concept and circular building material economy move forward. As advocacy efforts advance and CR0WD seeks to provide guidance in policy and recommendations for infrastructure to support the circular economy in New York State, this report can serve to support the proposal of a statewide approach of Circularity Hub facilities.

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APPENDIX

INTERVIEW QUESTIONS

1. Organization Name:
2. Your Name and Title
3. Is your facility an adaptive reuse of a pre-existing building, such as a school or warehouse? If yes, what is the building's original use?
4. What is the ownership structure of your reuse operation?
5. What materials are handled in the facility?
    a. Furniture
    b. Building materials
    c. Textiles
    d. Housewares
    e. Books/media
    f. Computers/electronics
    g. Appliances
6. What services/programs are included in your facility operations?
    a. Deconstruction training/certification
    b. Other trade training
    c. Other workforce development
    d. Appliance repair
    e. Other repair/fix-it
    f. Building materials processing for resale (de-nailing, etc.)
    g. Value-added/up-cycling/production creation
    h. Retail
    i. Hazard abatement
    j. Textile bailing
    k. Materials recycling
    l. Compost/organic waste diversion
    m. Workshop/studio/maker space
    n. Community engagement/events
    o. Small business incubator
7. How many full-time equivalent employees are in the organization?

8. Do hiring policies include Diversity/Equity/Inclusion language, or do hiring practices help people overcome employment barriers (marginalized populations, previously incarcerated, single parents, etc.)?
9. What collaborations exist with other entities for workforce development, supply/demand, or other critical operational purposes?
10. [After explanation of Circularity Hubs concept] How do you think your establishment would interact with a Circularity Hub if one were located in your region?