

# What You Don't See Matters: Supply Chain Capitalism and the Architecture of Production

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**Based on analyses of both tangible and intangible forces of production, this paper posits the value of studying supply chains in architecture and architectural education in search of a more thorough understanding of sustainability. The argument consists of three parts. First, expanding the system boundaries of what constitutes architecture enables a more politically engaged practice. Second, enlisting visual representation in the delineation of spatial problems expands the agency and relevance of architecture in contemporary discourse. Third, envisioning alternative futures introduces the politics of possibility and leverages a uniquely architectural mode of inquiry.**

## INTRODUCTION

In the corporate literature of Georgia-Pacific, the trademark “What You Don’t See Matters” refers to the branded building products used in many light construction projects (Figure 1). Understood in the context of supply chain capitalism, however, the phrase takes on new meaning. “What You Don’t See” in the production of these building products includes: 4 tons of sub-bituminous coal leaving a single mine in Wyoming every second; 22 tons of this coal burning at a single power plant in Georgia every minute; and, 62,000 tons of carbon dioxide entering the atmosphere every day as a result of this process. Needless to say, it “Matters.”

This paper is part of an ongoing project that examines the supply chain of building products in search of a more thorough account of the social, economic, and environmental effects of architecture and urban design. The goals of this project are threefold. First, it seeks to critically evaluate the forces of production in the making of buildings. Marxist geographers have long identified the forces of capitalist development and its uneven spatial effects, and in recent years, the tradition has expanded to include detailed analyses of specific networks of production.<sup>1</sup> More radical approaches, often emerging in feminist geographies, have imagined alternatives to the hegemonic depictions of capitalism symptomatic of much Marxist scholarship.<sup>2</sup>

Second, it aims to provide an empirical base for theories of urbanization that posit the coproduction of urban and rural environments. Beginning with William Cronon’s famous history of Chicago and its hinterlands, many subsequent studies have contributed to deciphering the imbricated material networks that constitute the contemporary city.<sup>3</sup> And, building on Henri Lefebvre’s proclamation of complete urbanization in *The Urban Revolution*, many theoretical investigations have shown the dissolution of urban and rural distinctions in both historical and contemporary contexts.<sup>4</sup> Third, it seeks to problematize the distinction between social and natural forces in networks of production. Introduced by Donna Haraway in the 1980s, the idea of hybrids, cyborgs, and socio-natures have gained traction in many fields.<sup>5</sup> In architecture, theories of the social construction of nature find articulation in the work of David Gissen.<sup>6</sup> Outside of architecture, Marxist geographer Jason W. Moore argues for understanding the coproduction of nature and capital through both human and extra-human agents.<sup>7</sup> In each case, the arguments emphasize the historical contingency of both social and natural environments.

In this paper, the narrative begins with the extraction of sub-bituminous coal from a surface mine in Wyoming, and continues through the supply chain of plywood sheathing from a factory in Georgia. Along this path from nonrenewable natural resource to consumer building product, the story emphasizes the historic materiality that enables each transaction. Next, the narrative retraces the supply chain with an eye toward the intangible forces of production. This time, by following the money, relations of labor, class, race, and gender become apparent (Figure 2).

Based on analyses of both tangible and intangible forces of production, this paper posits the value of studying supply chains in architecture and architectural education in search of a more thorough understanding of sustainability. The argument consists of three parts. First, expanding the system boundaries of what constitutes architecture enables a more politically engaged practice. Second, enlisting visual representation in the delineation of spatial problems expands the agency and relevance of architecture in contemporary discourse. Third, envisioning alternative futures introduces the politics of possibility and leverages a uniquely architectural mode of inquiry.



**Georgia-Pacific**  
Wood Products



**STRUCTURAL PANELS  
ARE OUR STRENGTH**

**What You Don't See Matters.™**

Figure 1: Cover of a corporate publication from Georgia-Pacific, 2010 (Image ©Georgia-Pacific, revisions by Brent Sturlaugson)



Figure 2: Map of tangible and intangible forces of production in the supply chain of plywood manufacturing from sub-bituminous coal (Image ©Brent Sturlaugson)

### FOLLOW THE COAL

North Antelope Rochelle Mine, located in the Powder River Basin of Wyoming, is the largest surface coal mine in the world. In 2014, coal production in the United States topped 1 billion tons, of which 400 million tons came from the Powder River Basin.<sup>8</sup> Of this, North Antelope produced nearly 120 million tons, which equates to 4 tons per second.<sup>9</sup> Resource extraction of this magnitude requires not only sophisticated technology and expert knowledge, but also the historical and theoretical construction of resources as valuable, a process that relies in large part on the production of visibility.

Following its establishment in 1879, the United States Geological Survey (USGS) was guided by economic interests of resource extraction, and in the early years of the USGS, the extraction of coal fueled the national economy.<sup>10</sup> An early departmental history described this pursuit in two ways: by publishing handbooks on existing deposits, and by producing detailed structural studies of particular mines.<sup>11</sup> In both cases, integral to the functioning of the USGS was its capacity to make resources visible. An excerpt from an 1883 publication reads:

“Clear presentation of the subjects with which most scientific papers deal demands the use of illustrations, and many appear in the reports of the Survey. These illustrations are not selected for their pictorial value, but because they assist the reader to understand the text and the subject treated. In works of paleontology, for example, the need of illustrations is so great that it is necessary to figure each type, and often each species, in order to adequately describe its characteristics. For similar

reasons the geologist illustrates his paper with structure sections, maps, and landscapes, in order that the reader may see, almost as well as if he were on the spot, the phenomena under consideration.”<sup>12</sup>

To achieve this widespread visibility, the USGS created a publication branch that managed all printed media, including texts, maps, illustrations, and photography. By 1903, this branch had distributed nearly 4 million copies of USGS publications.<sup>13</sup>

Coal mining in the Powder River Basin began prior to the formation of the USGS as Union Pacific charted its transcontinental route in relation to available fuel and water sources.<sup>14</sup> In so doing, the discovery of easily accessible sub-bituminous coal prompted the founding of the Union Pacific Coal Company, which controlled every coal mine in Wyoming for much of the twentieth century. Years later, the USGS documented the extent of available coal resources in Wyoming, finding, “The capacity of these beds is indefinite. They would be able to supply at any time the whole demand of the Far West with a uniformly good coal.”<sup>15</sup> Throughout the twentieth century, development of coal in the Powder River Basin grew significantly, and in the 1970s, mines in Wyoming overtook those in Appalachia as the country’s leading producers. In 1979, the environmental impact statement for North Antelope included visualizations that built on the legacy of USGS. In 1983, the mine opened and those visions became reality.

Today, mining at North Antelope begins with a fleet of bulldozers scraping the vegetation and topsoil from the gently undulating landscape and exposing the gray loamy soil beneath. Draglines then remove millions of tons of overburden, which haul trucks transport to the edges of the deepening pit. After the coal seam is exposed, electric shovels move the coal from its prehistoric bed to the haul truck, which takes it to the crusher (Figure 3). After reduced to a consistency of two-inch pieces, the coal is conveyed into silos. Once orders are processed, the coal flows into hopper cars linked together as unit trains as they pass through the belly of the silo. One of the largest orders of sub-bituminous coal from North Antelope comes from Plant Scherer in central Georgia, over 1,500 miles away.

Plant Scherer, located on 3,500 acres in Monroe County, Georgia, is the largest coal-fired power plant in the United States. Each year, Plant Scherer burns nearly 12 million tons of coal, all of which comes from the Powder River Basin; over 2 million tons derives from North Antelope alone.<sup>16</sup> Coincident with the rate of coal combustion, of course, is a similarly high rate of carbon dioxide emissions. In addition to being the largest coal plant in the country, Plant Scherer is also the single largest point source of carbon dioxide in the United States, emitting nearly 23 million tons annually.<sup>17</sup> At full capacity, Plant Scherer produces 3,600 megawatts, or approximately 20 million megawatt hours annually.<sup>18</sup> One of the largest manufacturers of building products in the United States—and by association, one of the largest consumers of electricity—is Georgia-Pacific.<sup>19</sup> Among its many manufacturing facilities is Madison Plywood, less than 50 miles away. While not the most energy intensive manufacturing process,

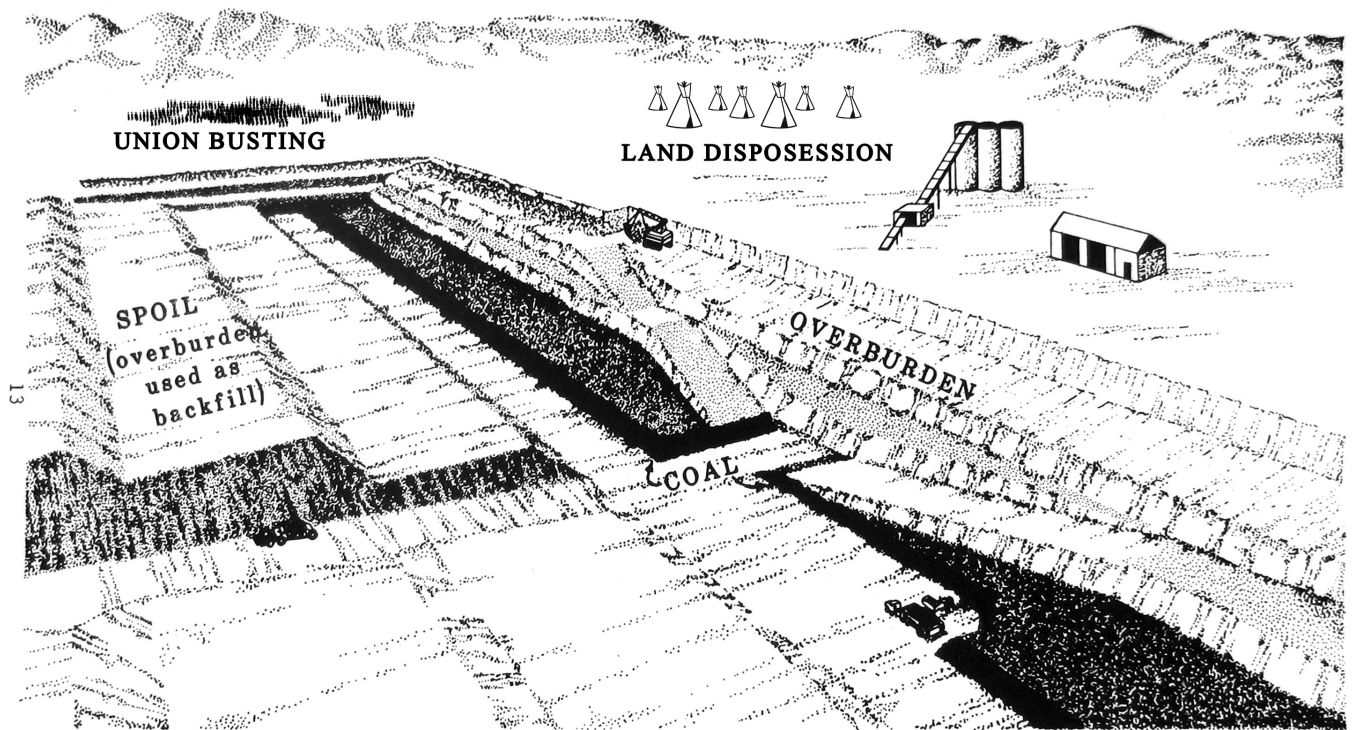


Figure 3.--Typical mining and reclamation operations.

Figure 3: Schematic diagram of surface coal mining in the Powder River Basin, 1988 (Image ©Department of Interior, revisions by Brent Sturlaugson)

the making of plywood stands out for the ubiquity of its products. Located in Morgan County, Georgia, Madison Plywood contributes to the inventory of Georgia-Pacific, which is the leading plywood producer in the country.<sup>20</sup> Production begins by harvesting locally grown loblolly pine, and after debarking, the logs are soaked for several hours before being peeled into thin veneers by a large lathe. The veneers are dried, glued, cross-laminated, compressed, and sawn before being bundled and stamped.<sup>21</sup> Before Madison Plywood was renovated in the 1990s, the manufacturing process produced over 15,000 tons of carbon dioxide, 2 tons of sulfur dioxide, 13 tons of nitrous oxide, 118 tons of carbon monoxide, and 6 pounds of lead, none of which leave a lasting visual impression.<sup>22</sup> Now, it produces 20 tons of methane and trace amounts of dioxin.<sup>23</sup> From Madison Plywood, the supply chain continues into the suburban developments of Atlanta, and elsewhere, where plywood is used to sheath thousands of single-family detached houses measuring upwards of 2,500 square feet.

Documenting the tangible transformation of sub-bituminous coal into plywood sheathing makes clear several effects of converting nonrenewable resources into everyday construction material. While this analysis considers the supply chain of a single commodity from a single resource, the production of buildings and landscapes is

infinitely more complex and must consider not only tangible realities, but also intangible forces of production.

#### FOLLOW THE MONEY

Georgia-Pacific was founded in 1927 and has grown to be one of the largest building products manufacturers in the world. Today, Georgia-Pacific employs more than 35,000 people with over 7,000 working in Georgia, 2,600 of whom report to its administrative home, the Georgia-Pacific Center in Atlanta.<sup>24</sup> Designed by Skidmore, Owings & Merrill (SOM) in 1982, the building rises 52 stories above Peachtree Street. Built on the former site of Loew's Grand Theater, Georgia-Pacific Center was celebrated as an early step in the revitalization of downtown.<sup>25</sup> From the east, the building steps up in a series of terraces, and its west edge is chamfered to reinforce the grid shift at Carnegie Way. The building envelope consists of pink granite cladding and a uniform grid of square fenestration, and in 2012, the building received LEED Silver Certification.

Capital for the Georgia-Pacific Center renovation and Madison Plywood expansion came from its parent company, Koch Industries. In 2005, Koch acquired Georgia-Pacific for \$13 billion, adding to its current portfolio, which is valued at \$100 billion.<sup>26</sup> Of the Koch industrial empire, editor and journalist Daniel Schulman writes:

"They preferred to operate quietly—to run, as David [Koch] once put it, 'the biggest company you've never heard of.' But



Figure 4: Photograph of Plant Scherer in Monroe County, 2013 (Image ©Civitas Institute, revisions by Brent Sturlaugson)

Koch Industries' products touch everyone's lives—from the gas in our tanks to the steak on our forks and the fertilizer that helps our crops grow, and from the drywall, windowpanes, and carpets in our homes and offices to the Brawny paper towels and Dixie cups we keep in the pantry.<sup>27</sup>

How the consumption of these everyday products affects politics becomes clear when following the trail of money. In the 2016 election cycle, the Kochs spent nearly \$900 million on campaign contributions and policy research.<sup>28</sup> Koch spending also includes donations to policy institutes, think tanks, and universities.<sup>29</sup> Thus, analyzing the flow of capital within Georgia-Pacific alone renders plywood sheathing more than cross-laminated veneers of loblolly pine. For Koch Industries, building products manufacturing is a political affair, the expression of which includes a newly illuminated tower in downtown Atlanta, which draws its electricity from further up the supply chain, back at Plant Scherer.

Plant Scherer is owned by several utilities companies, the largest of which is Georgia Power. Georgia Power is the leading subsidiary of Southern Company, which is the second largest private utilities provider in the country. In recent years, Southern Company has received international attention for its role as the leading sponsor of research that denies the human involvement in climate change.<sup>30</sup>

In 2012, an extensive report on the environmental justice of coal-fired power plants found a “disproportionate location and impact of coal-fired power plant activity on low-income communities and people of color,” and the report gave Southern Company a failing grade for its “corporate environmental justice performance.”<sup>31</sup> In 2014, Southern Company spent \$12 million on lobbying, the most of any electric utility in the United States.<sup>32</sup> As with Koch Industries, the trail of money encircling Plant Scherer renders the production of electric power from sub-bituminous coal an eminently political activity with unevenly distributed effects (Figure 4). Still further up the supply chain, the flow of capital returns to the hole in the ground in the Powder River Basin.

North Antelope Rochelle Mine is operated by Peabody Energy, the largest coal company in the world. Founded in the 1880s, Peabody has 26 active coal mines in the United States and Australia. Its assets are valued at \$15 billion, and it has an average annual revenue of nearly \$7 billion, \$2 billion of which derives from the Powder River Basin.<sup>33</sup> On March 31, 2016, 235 workers were fired from North Antelope, having little recourse as nonunion workers,<sup>34</sup> and on April 13, 2016, Peabody Energy filed for bankruptcy.<sup>35</sup> Some reports have documented the redoubled efforts of Peabody to reclaim 8,000 acres of North Antelope's 28,000 acres with a drastically reduced workforce, however, their \$1.4 billion bond obligations to reclaim previously mined sites is at risk of being abandoned.<sup>36</sup>



Figure 5: Photograph of mine operations in the Powder River Basin, 2016 (Image ©Brent Sturlaugson)

## CONCLUSION

Building on these analyses, this paper tracks human and nonhuman relations in the supply chain of everyday building products. In describing the transformation of sub-bituminous coal into plywood sheathing, it presents three main arguments.

First, redrawing the system boundaries of architecture to include both tangible and intangible networks of production promotes a more politically conscious practice. In this case, the boundary of the production of everyday building materials reaches from the point of electric power production to the source of raw material, thus placing plywood sheathing, carbon dioxide emissions, sub-bituminous coal, and capital flows within the same architectural system. Second, using visual representation in the analysis of supply chains caters to the strengths of architecture. Most empirical and theoretical analyses of supply chains are firmly rooted in verbal media, often housed in business and economics departments, and when visual media does factor in, it remains largely anecdotal, appearing either as data visualization or documentary photography. Concerted spatial analysis of supply chains, however, requires that networks of production register visually. In this paper, edited images from the archive begin to show “What You Don’t See.”

Third, imagining different outcomes to complex spatial problems is germane to the practice architecture. For architects to be involved in analyses of production, however, requires both redrawing system boundaries and mobilizing visual representation. In the supply chain of building products, the territory for speculation is vast, ranging from alternative configurations of reclaimed mine sites to different forms of nonrenewable resource valuation.

In addition to the effects outlined at the beginning of the paper, “What You Don’t See” in the production of building materials also includes a host of intangible effects: \$10,000,000 in chief executive officer compensation at Peabody Energy; \$12,000,000 in energy industry lobbying by Southern Company; and \$900,000,000 in campaign spending by Koch Industries, to name only a few. This, too, “Matters” in the supply chain of spatial production.

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