

Building materials in a green economy: A book review

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Abstract

This paper reviews the book 'Building Materials in a Green Economy' written by Brian Milani (2005). The book has eight chapters. This paper deals with the importance of building materials in our lives. The book mainly focuses on the centrality of building materials in all forms of society global indicates how materials are produced, used and reused, which will inevitably affect the quality of lives of those who harvest/create them versus those who benefit from the materials. Brian Milani highlights that the current process for managing building materials is not done in an eco-conscious manner that would entail conservation, maintenance and recycled materials. He addresses how regulation and education will be the key in making changes in the proper management of building materials. Also looks to understand how the building industry informs 'positional economic development'; warns the readers about the destruction of the Mother Earth by corporations; and manufacturing not eco-friendly building materials and their wastage. Hence, it is important that corporations should produce building materials that are eco-friendly and care for environmental sovereignty.

Keywords: building materials; eco-materials; eco-labeling; green economy; post depression economy

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1. Introduction

First chapter 'The Problem: Materials Use and Sustainability' draws a very important point about the current analysis as it relates to building: energy focus. A focus on energy solely prevents us from looking at a relationship between what we are doing and what is being produced. A look at building materials affords us that view point. Milani aims to '*...look at the evaluation, production, consumption, recycling and regulation of building materials, in ways that point to possibilities of economic development*' (Milani, 2005, p. 2). He also focuses on the need for green economic change and how this may be applied to a particular industry. Ultimately, Milani hopes to look at how green economic change can shape and positively impact society, especially the lives of those living in impoverished countries that need straightforward resolutions. Solutions come in not limiting growth, but defining it in ways that are beneficial to women, whose work is often undervalued, and invisible resources.

The book identifies a key term in addition to decentralization – detoxification. Both terms are used to outline dematerialization. "Detoxification means the production and use of more benign materials – materials that are not only healthier, but that can also be cycled and recycled in closed loops, and eventually safely returned to nature as compost (Milani, 2005, p. 9). The analysis that the author endeavors to merge comprises of theory and practice. In the book, Milani's interest in this work stemmed from his draw to building and the political-economy. His education and professional work allowed him to practice as a green carpenter and builder. The challenges with deciding to reuse materials versus new ones lead his company to create the Eco-Materials Research Project (Ibid, p. 12). Drawing from his educational and practical experience, Milani uses this in addition to "*...library research, the internet, interviews and direct observation/participation of local initiatives*" (Ibid, p. 14).

Milani highlights that in order to understand eco-building, an analysis of building materials over the course of the last 200 years must be sought. His conclusion is that the claims of efficiency that the industrial revolution produced were not the case. The perceived efficiency and cost saving cycles back to the invisibility of eco-system costs and the labor of minorities communities. Linking back to Milani's experience, he discusses the decision to use new materials within the building industry instead of up-cycling. Using new materials has been more financially fruitful which continues to drain the Earth. The Earth is in ill-repair because of the carbon footprint of communities, corporations and individuals. The effects of materials over use can be seen in the number of human diseases that have been borne. In order to address these issues, Milani hints to his solution, "*Sustainability depends, on one hand, on moving the bulk of the extraction industry from the hinterlands to the city where waste must be turned into a resource; and the other hand, the gradual displacement of petrochemicals by biochemical and my more natural, less highly-processed regional matters*" (Milani, 2005, p. 26).

Milani attributes the widespread inability to choose the more ecological process or thing to a system that does not offer incentives to be eco-conscious. Lower prices abound because impoverished counties continue to exploit resources because they are forced to export versus be self-sufficient. This allows western countries to overuse with the belief that natural competition has provided an abundance of goods and services. This includes subsidies provided by governments which allow companies to source new materials instead of reusing and maintaining old ones. Moreover, negating the idea that service enterprises (those that focus on services versus product generation) would create a type of socialism. Service enterprises function because they are decentralized. The way that this works is through extended producer responsibility or EPR. This means that whoever produces the product ensures that the product is maintained through the life and death of said product (Milani, 2005, p. 32). In this introductory chapter, Milani uses Benyus' (1997) definition "biomimicry" [the mimicking or imitation of the elegance of ecosystems in order to reach a higher level of resource-productivity (Milani, 2005, p. 33-34)] to add another way in which changes within the building industry can improve social impacts. This is included in

what is called the lake economy where things are exchanged for another versus the river economy (everything runs downstream).

Second chapter: The Value of Revolution: Information & Service in the Building Industry. Here the writer focuses on quality through Extended Producer Responsibility involving distributors, developers, users and producers who focus on the relationship between people and the environment. EPR is at the moment voluntarily. Milani highlights Xerox and Interface as two companies who have seen the value in EPR. Within the building industry, in order to consider EPR plausible one must look at the economy, the community, the building and the product or material (Milani, 2005, p. 50). Milani focuses on the latter two. More important to Milani's thesis and necessary in EPR is the life-cycle approach which looks at a product's origin(s), purpose(s) and deposit(s). Life cycle analysis can be used in terms of products, systems and social factors.

Brian Milani outlines that resources, pollution and performance will determine if something is green material. Resources include *"the materials and energy used to extract, process, use and dispose of it...Pollution includes all the emissions...products used to clean and maintain the material...Performance refers to how well the material does its intended job"* (Milani, 2005, p. 52). The author identifies the rating of performance and durability as being important measures for building materials because they are *"use-dominated"* (Milani, 2005, p. 53). In order to assess the greenness and viability of building materials, Milani offers that functional equivalence is needed to compare items. This is so that unequal materials are not compared and value is not lost when the analysis done. Life-Cycle Assessments (LCAs) are done for LCA specialists, decision-makers, manufacturers, policy-makers and consumers. LCA systematically tries to quantify all the resources used, and the releases emitted to the environment, through every stage of a products life cycle – with the goal of making improvements that will reduce these impacts (Milani, 2005, p. 58).

The author of the book cited SETAC – the Society of Environmental Toxicology and Chemistry, which has been at the forefront of organizations developing standards for LCA. The main steps of a life cycle assessment include: goal setting, life-cycle inventory (LCI), life-cycle impact assessment (LCIA) and improvement analysis. The second step, life-cycle inventory is the most difficult as it involves collecting and quantifying raw data. The challenge lies in companies' willingness to release information. Other overall challenges include transparency in making assumptions about how the material will be used and disposed of. Macro-Scale LCAs begin with macro statistics and deduce resource use (Milani, 2005, p. 71). This gives an overview of impact in a sector, but may not be as effective as a normal LCA. Baseline Green is one such macro-scale LCA. BREEAM – the British Research Establishment's Environmental Assessment Method is the most influential LCA that began in 1990. The Green Building Challenge (GBC) has been a site where researchers and practitioners can test new systems. The largest challenge of GBC is to move beyond new construction and look at existing sites.

Eco-labeling falls into three categories where a company can either use: type 1 – which is analysis by a third party; type 2 – a company places self-declaration labels on its products with the percentage of recycled or recyclable materials; and type 3 – are reports by a third party organization that evaluates through voluntary reports. Type 2 is most vulnerable to criticism as companies can use ambiguous eco-labels that are unquantifiable and used to lure consumers. The latter label faces criticism of the criteria used. Some companies go as far as to say that eco-labeling and corresponding legislation, internationally, is discriminatory. There is also a fear that poorer countries are not negatively affected by labeling.

In light of the need for wood in most building construction, the certification of wood has become a central issue. Certification, however, has not had a large positive effect on preventing deforestation. Wood certification began after activists began challenging deforestation. The politics of international alliances has caused for critique towards organizations such as World Wildlife Fund which partnered with the World Bank. The lack of independence of WWF has led some organizations to accuse the WWF of allowing more deforestation than should have been allowed. He states that local Green Product guides face similar pressures. Key pressures involve funding (balancing funding with perceived conflict of interest) and pressure from companies who may

seek legal action for not being included on green-friendly lists.

Chapter three is 'Production: Materials in Green Industrial Strategy'. Here Malini's main argument is "*Green manufacturing produces material things, but it does so primarily as a means to provide services to meet human and environmental need*" (Milani, 2005, p. 104 emphasis the author's). This means it works to facilitate the final use of stage such as food, shelter and entertainment. It is not an end in itself, to acquire capital and financial status. The building industry has two phases for processing: primary and secondary. 'Primary' deals with the initial level after the raw materials have been extracted. 'Secondary' deals with how materials are then used in products. Metals, chemicals, paper and plastics make up the four primary material processing industries. Milani argues that the effort put into the primary stage is drawing down on the human resources that may be used in the second stage.

This specifically points to the waste in extraction where efforts may be directed at reuse and recycling. This however "*...represents a challenge to capitalist values of accumulation*" (Milani, 2005, p. 107). He suggests, "*Green industrial strategies must include industrial ecology as it looks at systems versus individual companies. It understands the human economy as a subsystem of nature*". One of the challenges of industrial ecology is the slow process of detoxification. From this understanding comes the formation of eco-industrial parks (EIP). EIPs are "*...communities of businesses that cooperate with each other and with the local community to efficiently share resources...*" that benefit economically, environmentally, and socially (Milani, 2005, p. 110). EIPs can be grouped by type: Materials Recovery Facility EIP, Green Technology EIP and Bio-Materials EIP. EIPs exist internationally. Despite the progress of a service society, it will not reform everything within the society, it will also have to work with the manufacturing sector.

The author finds petrochemical use grew in the 20th century, because oil was able to be transported easily. A centralized system also facilitated many derivatives from oil. Now, the allure of oil is dying due to support for decentralization, smaller economies of scale and community activists putting pressure on industries to account for costs previously not allotted for. The use of resources that are renewable (hemp, straw, soybean) is a part of the "Carbohydrate Economy" which is returning power to rural communities and allowing for green spaces in urban settings. These renewable sources can be found in clothing, food and building materials.

Milani outlines three important terms when discussing green industry: bioprocessing, biodegradation and biomimetics. "*Bioprocessing is the making of processes from natural processes...(B)iodegradation is the opposite of (bioprocessing), breaking down chemical and cellular processes...(B)iomimetics...focuses on studying and replicating the processes of living organisms, including the making of materials*" (Milani, 2005, p. 128). Despite the positive impacts from the carbohydrate economy, oil is still central to capitalist industries. Little research is being done on the benefits of plant-based production.

In order to address virgin timber extinction concerns, the Composite Panel Association came out with an Environmentally Preferable Products to promote products from reclaimed wood. This would be products with reduced uses of polyvinyl chloride (PVC) mostly found in engineered wood products. Another complication of said products is the binding. Volatile Organic Compounds (VOC) has been linked to causing illness in human beings. They are found in the binding of engineered wood products.

Along with wood, concrete has been a central aspect of building and '*...is the most widely used construction material in the world*' (Milani, 2005, p. 142). It has the opportunity to be environmentally advantageous; but in its current use, it is destructive because of the carbon dioxide it produces. The ways to mitigate the effects of concrete is to: use steel instead of concrete, reduce the use of concrete, use pier foundations that are made from recycled paper, use block and form products and transforming its composition. Lastly, it can also be recycled.

Plastics are another major concern of green building materials. The building industry is the second largest user of plastics (after packaging). Despite the positive impacts of plastics, the carcinogenic nature of plastics far outweighs the benefits. The challenge against the banning of plastics is because of the powerful lobby that

continues to support their use. PVCs were and continue to be championed not because of their multi-use attributes, but because of their profitability which is attained through the ignoring of varied human/health and environmental costs. Perhaps having informational resources available to builders, designers and retailers will reduce their use. The book also mentions that the indoor air quality has been another factor of building materials that carry toxic characteristics. Indoor air quality is worse than outdoor air quality. This has produced health issues with those working in office buildings. This accounts for 20-30 percent of the workforce. LEED and BREEAM have used labeling and LCAs to address indoor air quality issues.

Chapter four 'Recycling: Recycling, Reuse and Deconstruction' focuses on building materials characters, their wastage destroying environment. Building materials are best looked at for their durability and adaptability - characteristics that are important for dematerialization (using less materials) and re-materialization (reusing materials in closed-loop cycling loops). Buildings, however, have not been made to be adaptable and durable. Builders construct buildings in a whirlwind and cheaply. The buildings themselves are made up of materials that are neither durable, nor adaptable and were not created for recycling or up-cycling.

In the capitalist society, money has affected the quality of building in as much as it is seen to purchase items for current use not for future use. Money also shapes how time is used, real-estate markets are damaging to continuous communities which are sought for investment instead of dwelling and mortgages are unattainable and when they are attainable they outlast the life of the property due to interest rates. In response to these factors there has been a building movement for building preservation (Milani, 2005, p. 178 emphasis the author's).

Duffy created the concept of 'shearing layers' (Milani, 2005, p. 177), which involves: The layers-the six S's-distinguish between the ways different parts of a building age and change. The Site can be very long-lived, measured in geologic time; the Structure, anywhere from 3 to 300 (typically 50) years; the Skin or exterior envelope, around 20 years; the Services, typically from 7 to 15 years; the Space Plan, like interior partitions, would vary from 3 to 30 years; and the movement of furnishings and other Stuff might be daily or monthly (Milani, 2005, p. 178; emphasis the author's). Contemporary designers do not follow these layers which have implications for buildings and materials. It can also be considered socially, where designers allow users to shape buildings to their needs (Milani, 2005, p. 179). Designs should be created for reuse, remanufacturing and recycling (in that order) to maintain sustainability. Guy and Shell (2002) created a composite list of questions that designers should consider when designing holistically for buildings (Milani, 2005, pp. 182-183). Milani outlines them in the work. He also outlines Crowther's (2001) list for disassembly (Milani, 2005, p. 183).

In response to a demand for designers to ensure up-cycling, deconstruction services are working with demolition companies to salvage stuff from buildings in order for reuse and recycling. Deconstruction is difficult due to hazardous materials, lack of materials, awareness of benefits, etc. Despite this, as of the year 2000, there were over 200 used building material retailers in North America. There are exchanges where sellers and consumers can exchange used materials. Exchanges occur over the internet as well. The phenomena of resource recovery parks (RR parks) go above and beyond exchanges. "*An RR park is a collocation of reuse, recycling and composting processing, manufacturing and retail businesses in a central facility to which the public can bring all their wastage and recoverable materials*" (Milani, 2005, p. 195). Wood, concrete, brick and plastics can be used in recoverable ways.

Chapter Five looks at natural buildings and recommends for alternative building materials are recommended. Brian Milani defines natural as "*materials used by the many varieties of pre-industrial and vernacular building -stone, earth, straw, timber, grass, etc.*" (Milani, 2005, p. 203). He acknowledges that natural building materials are indigenous to a particular region or a site. It is traditional, appropriate to technology and informal. It is also close to community. It goes beyond technology to the spiritual. Milani defines and describes the history of several wall structures: rammed earth, adobe and compressed earth blocks, cob, light-clay, straw bale, timber frame and stone, cordwood masonry, bamboo, earthbags and papercrete. The author highlights the challenges with each (work intensiveness, insulation, etc), but also balances this with challenging common assumptions and

shedding light on unknown benefits and current use of such materials. He closes by addressing the quirks of some of these building structure materials, acknowledging that common use will change people's perception. He points to the renaissance of traditional structures globally. Accepting these structures comes down to decisions of need versus want - in light of economic development.

The book sixth chapter talks about consumerism versus local markets and bioregionality. As much as a shift in production is necessary to make green sustainability a reality, so too is a shift in consumption. The organization and character of consumption is important. Production must consider the end-use i.e. the consumer's need. Green consumerism must be aware of ecological alternatives, decrease material consumption, overcome consumer isolation, address social justice issues and influence production. This entails "...*co-housing, eco-industrial networks, car-sharing, renewable energy co-ops, product leasing, etc...*" (Milani, 2005, p. 242). Consumerism does not, however, occur organically and must be supported with an education-gear environment.

An example of a support body is the Sustainable Products Purchasers Coalition (SPPC), which is based in Portland, Oregon and has networks domestically. According to Brian Milani building Suppliers are of three types: 1) those that sell green products exclusively; 2) common retailers who supplement inventory with green supplies; 3) big box stores who include green products as a result of legislation, market and the growth of the green industry. Despite the positive initiatives of the latter group, big box retailers negatively contribute to the environment and social issues. Under this scheme, prices will have to reflect the cost involved in building green: the product, processing/harvesting, up-cycling and education. Cost will have to be shared by the producer, retailer and consumer. Sites that sell and trade items should contain used material depots and information and learning centers (Milani, 2005, p. 255, emphasis author's). Most spending comes from governments. Legislation that mandates governments to buy 'green' will not only help the environment, but provide a leading example to everyday consumers. Municipal governments are much more visible and have the power to enact immediate change – connecting politics and economics.

Chapter seven reviews building materials technologies, existing rules and regulations, extended producer responsibility, society and the state. The book states that after the great depression, the state became a central part of the economy and corporations brought in a form of managerial capitalism (Milani, 2005, p. 265). In order to build the post-depression economy, demand had to be created. Demand was created through credit, new forms of money and waste. Waste became a burden, however, and technology allowed the state to recede while corporations succeeded. It also prevented governments from regulating investment. In order to manage this "*a 'next regulation' of regulatory techniques; emerged, including self-regulation, co-regulation, voluntary agreements, environmental partnerships...*" and many others (Milani, 2005, p. 268).

Authors Commoner, Braungart, and McDonough argue that prevention instead of regulation is the optimal tactic. Regulation is what we are left with and must include not only the government, but communities, organizations and individuals. He suggests the state must take a position that includes extended producer responsibility (EPR). EPR was created in Sweden in 1990. It includes responsibilities that deal with liability, economics, physical, informative and ownership. In order to address the economy-wide system, Braungart came up with a labeling system of consumerables, products of service and unmarketable. According to him "*Consumerables are those products meant to be completely consumed in one use...Products of Service...might not be so benign in their environmental impacts, but...would be more tightly constrained in terms of disposal...Unmarketable are products and materials which cannot be consumed or used in any environmentally sound way*" (Milani, 2005, pp. 282-283, emphasis author's).

Another way to become greener is a system called 'product-service systems' that covers the sale of the use of the product, operational leasing instead of consumer ownership and repair as opposed to consumer disposal after use. ETRs or ecological tax reforms could assist in motivating corporations and organizations to reduce their carbon footprint. Lastly, substance bans and phase-outs could assist in ushering green sustainable buildings

and materials. The state must coordinate activities to ensure social and ecological values are respected.

The last chapter draws conclusions on 'Building Materials in a Post-Materialist Transition'. Becoming ecologically cognizant and practical has caused a shift from quantity to quality and hence a redefinition of wealth within capitalist societies. The author highlights that the "...primary concern of this thesis has been to understand the role of building materials in an industry geared to service and regeneration" (Milani, 2005, p. 298). The decentralization nature of green development is a great point at which to start when looking to address the economy. Focus should be on knowledge and value which play directly into our understanding of our physical, emotional and spiritual environment; transforming consumption which looks at the need and purpose not the money or production value. The latter involves removing individual consumerism and making the invisible visible (Milani, 2005, p. 303). He closes by reminding that all aspects of the design industry (builders, communities, regulators and designers) must see the opportunities in green development for it to succeed.

It is necessitate learning to live together, create common space for care giver for all local people (Elton, 2010) and promotes local green economy by using local green buildings materials with honoring the local Mother Earth. The book gives us exposed to different types of building materials and their negative effects to our habitat livings, ecology and local economy. People are depended on corporate building materials for their housing that contained health hazard materials and produce huge non-destroyable and unrecyclable wastage that degraded our environment.

The corporate building materials have a bigger negative perspective to our eco-friendly life, local resources and habitats that to and destroy our customized quality of life as well as damage local living economics and local employment. Hence there need a flexibility where green building materials can be manufactured locally by using local resources by local manufacturers that employ local people and care for the Mother Earth. Otherwise, our Mother Earth shall never be free from the exploitative hands of the corporate world whose prime motto are profit making instead people wellbeing and environmental wellbeing. Therefore, it is necessary for us to challenge and protest against these non eco-friendly building material manufacturing corporations and look for alternative clean technologies that can produce more green friendly building materials that have no eco-hazardous materials. The locally produce green building materials could help local investors to invest locally, promote 'homo economicus' (Brown, 2010) by using local building materials, employing local people and caring for the local ecology. This local investments process would help in the move towards local environmental sovereignty to make our world better and sustainable (Sumner, 2003).

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