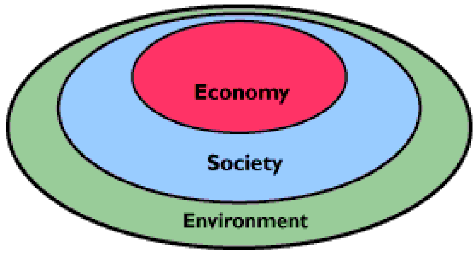
Building Deconstruction, Puns Intended

This schematic is offered by Maureen Hart as "a better view of sustainable community," in her discussion of "What is sustainability, anyway?" [MH]



This tool graphically shows "that both the social and economic domains are (a) human creations and (b) dependent upon the natural environment," as noted by the Urban Ecology Coalition [NS, p. 9]. It also provides the organizing device for this paper, which will work "from the inside out," examining some of the promises of and impediments to the practice of deconstructing buildings, within the context of Sustainability and the Built Environment.

Bradley Guy and Eleanor M. Gibeau have defined deconstruction as:

> … a process of building disassembly in order to recover the maximum amount of materials for their highest and best re-use. Re-use is the preferred outcome because it requires less energy, raw materials, and pollution than recycling does in order to continue the life of the material. As a consequence of deconstruction, there are also many opportunities for recycling other materials along the way. [G2D, p. 7]

In the Californian literature, most information about building deconstruction is found in conjunction with consideration of construction and demolition (C&D) waste, and teasing out meaningful numbers about the latter is not easy. Methods and terms of comparison differ from one publication to another, and the seasonal and cyclical nature of the building industry can cause significant variability. Many sources do not carefully maintain Guy's and Gibeau's distinction between re-use and recycling. An appreciation of the continuing and current enormity of California's C&D waste can, perhaps, best be garnered from a June 2006 report prepared for the California Integrated Waste Management Board (CIWMB) [Char W], from which 2005 statewide landfilled C&D waste can be estimated at 4.4 million tons, or *a sliver short of a staggering 250 pounds for each person in the state.*[*] This same study found demolitions to be the largest single contributor, at 21%, with another 30% attributable to combined residential and commercial remodels; other studies divide the whole differently and usually arrive at much higher fractions for these sources. (Nationwide, the EPA reported that demolition

[*] Calculations were done by the author, using study data and an estimated 2005 population of 36 million. Note, too, that the research for this report was conducted *five years after* municipalities were required to reach a mandatory minimum standard of 50% recycling for the waste generated in their jurisdictions, as established under AB939, following numerous active campaigns to divert waste from landfills.

debris comprised up to 48% of C&D wastes[BDI].) Any way it's divided, the pile is enormous, and it represents a great loss of "highest and best" use.

Similarly, rigorous and consistent sources that compare the costs of deconstruction and demolition are not readily available; once again, the terms of comparison vary from study to study, with components sometimes considered but often disregarded. Much of the information is anecdotal. However, one general conclusion across reports does seem clear: "Deconstruction cost no more than demolition and may have cost less" [RAFI]. "…Case studies of deconstruction projects around the U.S. are showing savings. Deconstruction costs are averaging 30 to 50 percent less than demolition costs" [Man] **.** Jim Primdahl, then director of Portland, Oregon's, DeConstruction Services for the ReBuilding Center, was quoted in 2001, after having disassembled more than 70 houses and many other structures: "What we have discovered is that our crews are cost competitive straight up with the bulldozers" [BC]. Likely to have been factored in to his cost calculations, and those of many deconstruction operators, is the tax credit the deconstructed building's owner received for donating the salvage to a non-profit.

One university-based study [CE] looked at the 1999-2000 deconstruction of six wood-framed Florida residences, built between 1900 and 1950. These were either one or two story homes, ranging from 1000 to 2000 square feet, and no unusually valuable components, such as specialty hardwood floors or old growth timbers, were identified. The authors say the project appeared to be representative of residential demolitions in the U.S., where more than 90% of the residences built each year are light wood-framed construction. No details were provided about the wages paid for deconstruction, nor the amount of labor, although "deconstruction in almost all cases requires significantly more time than demolition" [Pres, p.6]. Table 1 shows the cost comparison data as presented by this study [CE].

Table 1: Comparison between demolition and construction costs

From: Brad Guy & Sean McLendon, "How Cost Effective Is Deconstruction?" In *BioCycle*, July 2001, p. 78.

Costs [/ sq. ft.:]	**Demolition**	**Deconstruction**	**Deconstruction Savings**	**Add'l. Costs for Decon. As % of Total Demo Costs**
Labor	$1.74(33%)	$3.64(56%)	-$1.90	0.35
Disposal	$2.17(40%)	$0.97(15%)	+$1.20	-0.22
Hazardous	$0.97(18%)	$0.97(15%)	$0.00	0
Other	$0.48(9%)	$0.89(14%)	-$0.41	0.08
Total	**$5.36**	**6.47**	**-$1.11**	**0.21**
Salvage	$0.00	$3.28/$1.64	$3.28/$1.64	-61% to -31%

Net Costs	***$5.36***	***$3.19/$4.83***	***$2.17/$0.53***

The “Total” line, above, reflects the relatively higher –nearly doubled– labor costs and the much lower disposal costs of deconstruction, with no accounting made for the value of recovered salvage. Once the salvaged material was considered (using conservative estimates of 25-50% of the price of new for the lumber and having the other reusable materials assigned very low used goods values by an experienced local retailer), the average net costs of deconstruction were less than two-thirds those of demolition. If half this salvage value is subtracted, to approximate the costs of transport to and operation of a redistribution center or business, the net deconstruction costs were approximately 10% lower than traditional demolition.

Another case study provides less detail and analysis, but notably similar cost information. The Bay Area deconstruction and resale firm, Beyond Waste, had “costs for deconstructing a building in San Francisco’s Presidio [that] totaled $53,000 but generated sales revenues from salvaged materials of $43,655 yielding a net cost of $9,345. Demolition of the site was estimated at $16,800” [Man].

Deconstruction can be a valued source of low-cost building materials, and it can also be a source for value-added, high quality components, while taking pressure off stressed natural sources. In the CIWMB manual subtitled *Waste Management Reuse and Recycling at Mather Field*, the description of recovered virgin heart lumber itself seems to glow: “When sanded down and refinished [it] gives off a light and texture that cannot be found in wood taken from trees harvested today” [MFT, p. 6].

The fraction of the materials recovered and their monetary value would be expected to vary from case to case, depending upon the buildings’ age, location, type, and condition, and the extent to which reuse and resale markets are developed. Reports in the literature meet this expectation. The case study of deconstruction in the Presidio estimated that 87% of the building’s wood was salvaged [Pres]. **“**On a typical 1920s house, McVay [a deconstruction estimator for DeConstruction Services] says 65 percent of the materials are recovered and reused, 25 percent are recycled and 10 percent are disposed. The reusables include doors, windows, cabinets, flooring, plywood and lumber” [2Gd2]. Appliances and HVAC equipment, doorknobs and pipes, trims and moldings, and bathroom and electrical fixtures may also be included as reusables, sometimes recovered by a more superficial deconstruction practice known as “soft stripping.”

Often deconstruction has less tangible qualities that make it attractive. In the late 1990s, following Hurricane Fran, after decision-makers for the City of Kinston, North Carolina, volunteered as laborers for the deconstruction of a pilot home, they decided to support both deconstruction and resale. They chose deconstruction for all 200 houses in Kingston slated for removal due to chronic flooding damage, and they planned to establish a retail business – by leasing a former tobacco warehouse— for the reusable building materials to be salvaged [NC]. In September 2006, the Federal Emergency Management Agency (FEMA) first agreed to the use of its monies for the deconstruction of historic homes "red-tagged" to come down after being damaged by Hurricane Katrina.

> In the case of New Orleans, the slow and steady pace of deconstruction instead of demolition also allows personal items to be returned to their owners and historic architectural details to be preserved. "You have time to notice a photograph on the wall or an old china tea cup… ." [WW]

Another program manager involved in reclamation work in New Orleans, Mercy Corps' Preston Browning, noted that:

> Deconstruction also helps create new jobs—four or five jobs per project. "I see it as a job-skills training program," he says. "In six months or a year, the workers are ready for an entry-level job in the trade....There's a huge need for people with building trade skills down here." [WW]

The Center for Economic Conversion estimates that there are ten resource recovery jobs for every landfill job [BCI]. In early 2000, the U.S. Department of Housing and Urban Development (HUD) printed *A Guide to Deconstruction: An Overview of Deconstruction with a Focus on Community Development Opportunities*, prepared for it by the National Association of Home Builders Research Center, Inc. (NAHBRC). The report highlights business and community development strategies with an emphasis on training and employment. Most of its many "Project Profile" sidebars, or mini-case studies, include descriptions of social benefits. As noted by HUD/NAHBRC, deconstruction offers unusual learning opportunities:

> Taking a building apart can be one of the best ways to develop skills in the construction trades. Use of tools, familiarity with various building materials, fasteners and joinery, construction sequence, and jobsite safety are only a few of the skills that can be learned. Deconstruction projects may be an excellent vehicle for unions to provide apprentices with training. [HUD, p. 10]

The Institute for Local Self Reliance (ILSR) reported on two deconstruction projects, one in Hartford, CT., and one in Washington, D.C., where:

- Expanding its offerings to include deconstruction helped the initial C&D firm win new contracts and provided a reliable source of usable, low- or no-cost materials for its construction projects.
- In Connecticut, all nine trainees, residents of public housing, not only became union members, with full-time jobs, but also became part-owners of the joint-venture construction company for which the project provided impetus.
- In D.C., 48 men and women who received training moved into full-time jobs in the construction trades.
- In both cities, "ILSR's trainees have become homeowners, often purchasing newly built homes on the very site of their deconstruction training," helping to maintain social cohesion, "while building individual assets and increasing residents' equity and involvement in their community" [ILSR].

Since deconstruction makes so much economic and social sense, why is it not a more prevalent practice? The reasons will vary locally, depending on the socio-economic matrix. Some of the issues have already been addressed here. The following is a listing of other frequently cited objections or disincentives with suggestions for overcoming them; it draws from many sources, most heavily Guy and McLendon [CE], *Deconstruction Training Manual: Waste Management Reuse and Recycling at Mather Field* [MFT], and Wachtel [2gd2]:

Time & up-front costs	🛠 Tailor & streamline deconstruction permitting process; waive deconstruction permit fees; reduce delays relative to demolition; base demolition fees &/ deposit on waste

	quantities; deconstruct some buildings on a site & demolish others to shorten lags.
Low landfill tipping fees	🛠 Raise fees & set them to encourage local priorities: Use volume basis to promote general & wood recovery/ recycling; weight-based fees for denser materials diversion.
Lumber reuse restrictions	🛠 Develop easy & cheap methods for re-grading salvaged lumber; change codes.
Liability risks & costs	🛠 Reform insurance billing, using deconstruction safety data; lobby through professional organizations; train demolishers in deconstruction.
Inertia: Industry & civic	🛠 Publicize successes; heighten visibility of services & products, e.g.: Home Expo booth exhibits; engage civic leaders & educate about triple-bottom line benefits.

While the effort may seem daunting and the resistance entrenched, it may be heartening to remember that these domains of economy and society are human creations, subject to collective re-creation, after all.

It is in the realm of the third concentric circle, the environment, that the importance of deconstruction may be best understood. It is a practice that shrinks and lightens our environmental footprint, on the site where less intense dust and noise are generated, at the landfill where the burden is eased, in the forest where pressures lessen, and out in the larger spaces which will benefit from a recovered resource's extended use, conserved energy, and reduced pollution. A 2005 analysis applied EIO-LCA —a combination of process-based life cycle analysis and economic input-output analysis-based LCA— to data from a Northern Californian partial residential deconstruction in an attempt to calculate and compare the associated environmental impacts of deconstruction and demolition [UCB]. The categories examined were conventional pollutants; hazardous wastes, toxic releases, and weighted toxics; global warming potential; and total energy consumption, all assessed by EIO-LCA sector. Impacts from materials were then subtracted from the impacts of the deconstruction service itself. The conclusion? "Overall, deconstruction is by far the more environmentally friendly option" [UCB, p.33] – and this deconstruction did not even recover the valuable hardwood floor!

In addition to this technologically based assessment of environmental impact, the practice of deconstruction has value in the context of an emerging "Green Economy" ethos. In his paper entitled "Building Materials in a Green Economy: Community-based Strategies for Dematerialization" (!), Brian Milani literally gives deconstruction a central place in the discussion [Mil]. While a detailed consideration is far beyond the scope of this paper, it offers a tantalizing vision, important framing, and valuable analytical tools. Briefly, deconstruction is a manifestation of the "eco-modernization" orientation to waste, as coined by Murray (author of *Creating Wealth from Waste*) and cited in Milani, with its closed-loop, intensive recycling (i.e., reuse), and innovative collection strategies. Deconstruction supports "one of the central objectives of green economic transformation[:] *to move extractive industry from the country to the city*" [Mil]. Finally, deconstruction has the potential to push the building industry towards *design for* *disassembly*, and ultimately to benefit tremendously from it: The processes would be mutually reinforcing.

In conclusion, Neil Seldman and Mark Jackson of the Institute for Local Self-Reliance offered this summation of the potential value of deconstruction in 2000:

> If deconstruction were fully integrated into the U.S. demolition industry, which takes down about 200,000 buildings annually, the equivalent of 200,000 jobs would be created and $1 billion worth of building materials would be returned to the economy, with accompanying reductions in virgin material extraction. [Mil]

How much would it be worth today?

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