The Building Material Reuse Ecosystem

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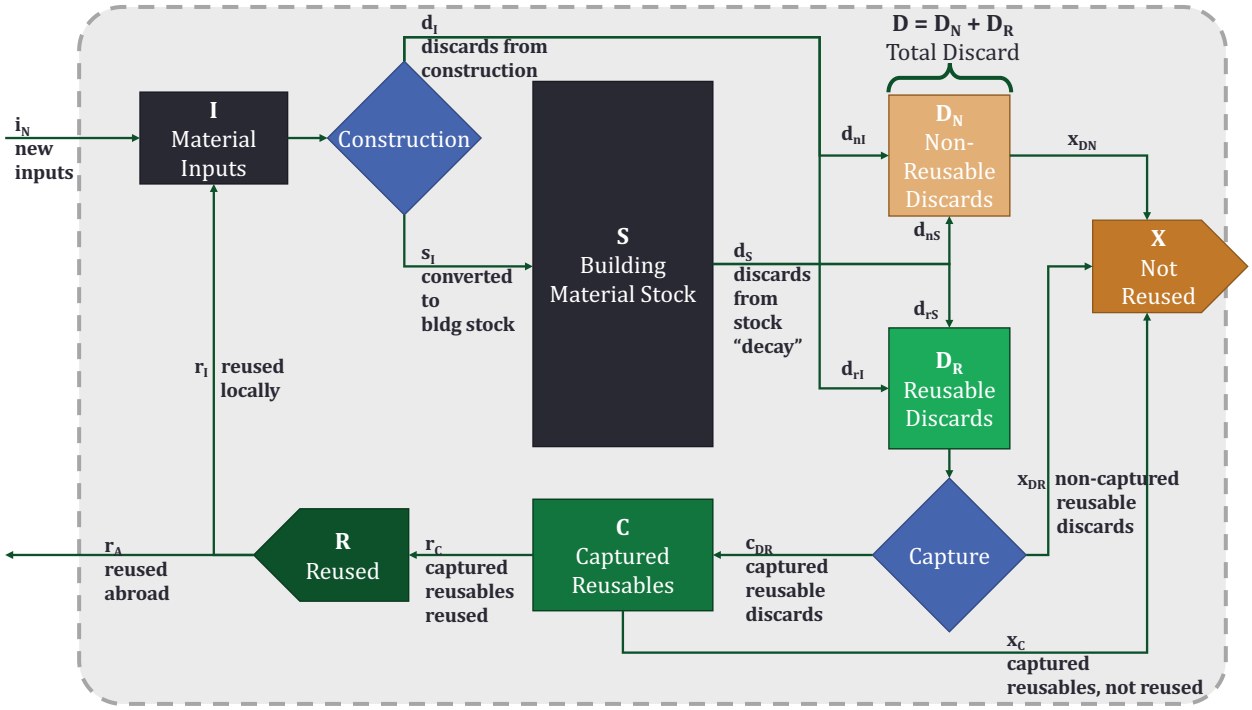
Using standard Material Flow Analysis (MFA) methodology, I attempted to model the stocks, flows and processes that make up the building material reuse ecosystem. The model is relevant for tracking *reuse* activities. All other ways of handling discards - downcycling, recycling, landfill, combustion, etc. - simply fall under *non-reuse* in this model. The model may be applied at many scales, from a single building/facility to metropolitan, regional and national scales.

Modeling the building material reuse ecosystem in this way illuminates the many metrics that we might aim to grow, shrink or modify in some way within the system, depending on goals. Some goals and corresponding metrics are presented on slide 3.

Then we can ask, when we pursue these goals (ie. when a factor is increased or decreased), what happens in other parts of the system? Important for the question of sustainability: What happens in the bigger picture of material use and environmental impact when a factor is scaled up or down?

Example analysis

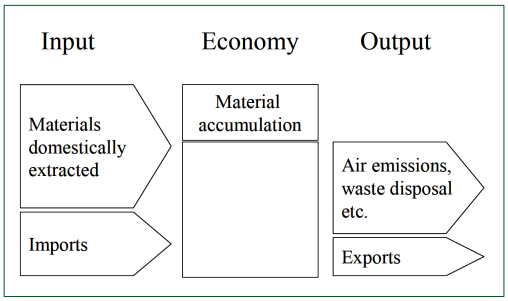
Goal:	Increase the quantity of building material discards going to reuse.
Metric:	***R*** (see diagram)
Example Analysis:	Assuming no changes in promotion of reuse or capture of reusables from the discard stream, ***R*** can be increased by simply increasing ***I***, a measure of construction/material consumption activity, which would come with negative consequences for overall sustainability. This calls for clarification of the goal, or use of an alternative metric such as reuse *rate* ($\frac{R}{D}$, $\frac{R}{D_R}$, *or* $\frac{R}{C}$).



Building Material Reuse Goals & Metrics. *Relevant metrics for each goal are marked with "•"*

		Stocks								Flows										Ratios & Percentages							
	Metrics	**I**	**S**	**D_N**	**D_R**	**D**	**C**	**R**	**X**	**i_N**	**d_I**	**s_I**	**d_S**	**c_{D_R}**	**r_C**	**r_A**	**r_I**	**x_{D_N}**	**x_{D_R}**	**x_C**	$\frac{R}{C}$	$\frac{R}{D}$	$\frac{R}{D_R}$	$\frac{r_I}{I}$	$\frac{r_I}{r_C}$	$\frac{d_I}{I}$	$\frac{C}{D}$	$\frac{d_s}{S}$
Goals																												
	Increase BM Reuse						•	•						•	•	•	•				•	•	•	•	•		•	
	Increase diversion of Reusables						•							•													•	
	Increase local reuse activity						•	•									•							•	•		•	
	Increase reusable exports															•												
	Decrease discards			•	•	•			•		•		•					•	•	•						•		
	Decrease the use of new material	•								•	•	•														•		
	Decrease in-use BM stock turnover				•								•															•

Definitions
Basic Material Flow Analysis Framework:
(Weisz 2016)



Industrial Ecology: "looks to 'natural' ecosystems as models for industrial activity" (Reid Lifset in Suh 2009, Chapter 1)

References

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- Weisz, H. 2016. Social Metabolism: Concept and Tools presented at the GloFoodS project P-G&City: Methodology Workshop Urban Metabolism, February 19, Paris, France.

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