Re-materializing Construction
Re-materializing Construction is the outcome of the first and second Holcim Roundtable for Sustainable Construction, a series of two-day meetings with some of the world’s foremost thinkers on sustainability in the construction sector.

27 Propositions for Re-materializing Construction

1  “How much does your building weigh, Mr. Foster?”
2  How much energy is embodied in your building?
3  Quantify global flows
4  Minimize waste
5  Use healthy materials
6  When could volume shrink?
7  Label and measure to inform choice
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27 “If less is more, maybe nothing is everything”
Abstract: Re-materializing Construction

The construction sector uses a considerable amount of material resources, accounting for two-fifths of all gravel and sand as well as one-fourth of virgin wood consumed in the world. It is also responsible for 40% of energy and 20% of water used globally. The magnitude of these figures points to the impact that better material protocols could have in lowering emissions and reducing dependence on resource extraction from the natural environment. Although increasing energy efficiency has been an obvious first step in this process, it is now necessary to foreground material stocks and flows in order to further the objectives of sustainable development.

With this in mind, the goal of the roundtable was to develop strategies at two scales: material use in individual buildings and the logistical chains distributing these materials across regions. The proposed strategies aim to “re-materialize” construction by reducing consumption throughout the material cycle from extraction to processing, transport, installation, maintenance, and removal. Such strategies would contribute to a leaner industry, one with a smaller ecological footprint and no longer driven by the long-standing pretense of infinitely available raw materials. This shift in the construction sector’s mode of operation can only yield lasting results if economic growth is decoupled from wanton material consumption. Measures of quality must be brought into sync with demands for quantity. This would require careful reconsideration of the political, economic, and social frameworks in which the building trade is situated.

The roundtable brought together experts from different fields—material scientists, engineers, architects, sociologists, historians, policy makers, and industry leaders—to devise a clear agenda for retooling and reorienting construction towards a more sustainable future. The participants of the Holcim Roundtable for Sustainable Construction met in 2014 and 2015 to develop proposals for re-materializing construction. The following 27 propositions were debated among the roundtable participants and are presented here in abbreviated form.
1 “How much does your building weigh, Mr. Foster?”

R. Buckminster Fuller once purportedly posed this question, taken from the title of a recent documentary, to Norman Foster. It points to a long-held—and often contested—principle of dematerialization that to reduce the overall use of material is to reduce the embodied energy of a given structure. Reducing a building’s mass should correlate with a reduction in the energy used to produce the building’s components. However, lightweight materials tend to require more energy for their production: the lightness of steel and glass versus heavy masonry does not indicate a savings in embodied energy. Rather, material use should be compared against efficiency: what is the minimum of any given material needed to perform a certain function and how would another material’s performance compare?

We need more information to establish how much buildings should weigh for a given building type, location, and structural system. MIT has created an open-source database for documenting the embodied energy of buildings around the world, documenting typical practice in construction and aiming to identify best practice through data from real projects.

Best practices in building construction can identify not only what buildings should weigh, but also what buildings could weigh, reducing building mass to theoretical minima. Philippe Block’s research group, for example, has developed an ultra-lightweight, pre-fab concrete slab that drastically reduces material use by designing only for compressive loads, thereby eliminating both steel reinforcement and the additional concrete needed to adequately cover it.

1 How Much Does Your Building Weigh, Mr. Foster? Norberto Lopez Amado & Carlos Carcas, Art Commissioners, 2010. Film.

How much energy is embodied in your building?

Buildings are by some estimates directly or indirectly responsible for over half of all global CO₂ emissions. It is produced at every stage of a building’s life, from the material supply chain of the construction industry, to construction, use, deconstruction, and waste management.

The production of building materials contributes significantly to human activity-related CO₂ emissions. Cement production releases 5-7% of all anthropogenic CO₂ emissions—a figure that will increase with ongoing growth in demand. Steel used by the construction sector may also represent another 5% of CO₂ emissions.

In building use, local climate, building quality, and user behavior all influence fossil energy consumption. A European climate with cold winters requires energy for heating. For conventional buildings, heating is associated with about 20% of all CO₂ emissions but innovative heating technology can reduce this output.

In hot weather, cooling demand induces large energy consumption in areas where air conditioning is used. Low-income regions use less energy by using only limited cooling because of the prohibitive cost of energy. In Brazil, for example, only 2% of CO₂ emissions are associated with building use—and this use is mostly attributed to cooking.

As living standards in the global South increase, we must reduce energy use in the North through better building technology. We must also find alternative strategies for heating and cooling that increase efficiency for all consumers.

3 Quantify global flows

A crucial step in ascertaining the future of urban resource needs is accounting for current resource extraction and consumption in every country and city. We have begun to understand these material flows in the developed north but still lack understanding in the critical regions poised to experience the greatest urban expansion in human history. Only when we understand the current state of material consumption can we begin projecting different future resource needs.

We need a robust understanding of urban metabolism—the intricate networks and cross-networks of flows and energies that make up an urban world of urban environments. These flows are not just about materials, chemicals, and capital, but about humans, ideas and institutions as well. We need, therefore, to think of creative ways to ‘measure’ the city and to think of equally creative ways to map and visualize urban systems instead of only reducing them to numbers, lists or graphs.

The aim is to lay bare the various systems, large or small, hard or ephemeral, that make up our lives; to show how difficult it is to change one system without impacting other systems, and in this way to allow for a deeper understanding of global connections.

Illustration source: John Fernández
4 Minimize waste

Make the production and site use of building materials more efficient to reduce the material intensity of construction. In production, increase material efficiency by reducing byproducts and waste or reusing them. Forms of waste reuse are already part of the material supply chain and could be furthered or transferred to other practices. Timber production, for example, incorporates several forms of reuse. Shavings are used to produce particleboard and sawdust can be used to fire kilns used in the lumber drying process.

During construction, inaccurate overage estimates together with improper on-site storage lead to massive amounts of material waste. Recent studies of Brazilian construction sites show that waste for sand and gravel can be as high as 600%.2 Given the relatively low cost of most construction materials, contractors tend to make generous estimates of the material needed for a given project, preferring overage to the risk of running short. Systematic study of actual needed material wastage rates and how to reduce them would allow contractors to make more precise material orders.3

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2 personal communication from Dr. Vanderlay John. USP, Brazil
3 WRAP, Reducing Material Wastage in Construction, 2007

Illustration source: personal communication from Dr. Vanderlay John. USP, Brazil
5 Use healthy materials

Materials that contain chemicals hazardous to human or environmental health are not recyclable, create enduring waste, and may emit hazardous chemicals—especially in combustion. This includes PVC, used for pipes, polyurethane, used for insulation, resin, used for flooring, formaldehyde, used in plywood, and petrochemical-based products used in many products like sealants. Chemicals in hazardous materials travel down and upstream, and some, like PBTs, break down only over long periods of time.

To reduce the release of persistent bioaccumulative toxic chemicals, the materials to avoid include chlorinated building materials, PBT based material treatments, and heavy metal additives or components.  

6 When could volume shrink?

Is bigger always better? As living standards increase, the average area per inhabitant for living space, working space, and infrastructure also grows. The most notable changes have been in residential construction, as residence size has grown while household size has shrunk. In one of the most extreme examples, the average area of a new American home increased from 1,660 square feet in 1973 to 2,521 square feet in 2007, even as the average household size decreased.

An increase in building volume requires more structural materials, creates larger surfaces for finishes, and needs more energy for heating, cooling, lighting, and appliances. The negative effects of these increases may be mitigated through the use of sustainable materials and renewable energy sources but smaller, smarter design solutions reduce the material requirements of a given project more directly.

Changing size needs requires not just better individual design solutions but also, more importantly, a collective shift in consumer expectations.


Label and measure to inform choice

Revealing the impacts that our material needs have is an important first step towards allowing design professionals, companies, and global citizens to make informed choices. The lifecycle costs and embodied energy of materials should be clearly communicated so that it is possible to compare the impact of given products for given projects. Standardized labels as found on food packaging may be one option to consider, though the complexity of how a material’s performance interacts with a site and program is more difficult to calculate and convey than caloric values.

These measures can only address the formal economy. But when a large percentage of the world’s construction is informal, the limitations of measures that work through legislation or professional education need to be recognized. How can similar initiatives reach and impact the informal construction industry? Perhaps one route is through the material supply chain. For some materials, informal construction is still sourced by large, international corporations who could innovate ways to communicate and convey options to local contractors.

In the documentary Urbanized, Tidy Street in Brighton was featured: residents charted their energy use against city averages graphically on the street. Although this in itself became a tool and incentive for residents to cut back their energy use, a further leap was made once residents were given tools to measure the energy requirements for each appliance separately. Finally, they were able to control and make value judgments about their energy habits.7

7 Jon Bird and Yvonne Rogers, “The Pulse Of Tidy Street: Measuring and publicly displaying domestic electricity consumption” in Workshop on energy awareness and conservation through pervasive applications (Pervasive, 2010).
Annie Leonard’s The Story of Stuff looks at both the perceived cost of materials (above) and the real cost of material production (below) in terms of social, political and environmental costs.

8 Get the price right

Assessing and pricing the ecological impact of a given material needs to internalize the currently externalized costs to the environment, to labor, and to finite resources. Commodity producers should be held responsible for the full impact of a material. Presently, national and corporate accounts are not required to account for pollution and environmental effects, causing products to be sold at prices that do not reflect their real costs.

Material costs should reflect the full lifecycle from extraction, to manufacture, de-montage, removal, and recycling; conveying the total embodied energy in a material. If lifecycle accounting were to be reflected in material pricing, the actual impact of material use would be more evident to consumers. Without prices that reflect the full environmental costs of their production, use, and disposal, production and consumption cycles cannot be sustainable.8

Construction has human as well as environmental costs. In accounting for the construction industry’s material flow cycle, human life must be included. The process of creating better material flows is “not just about materials, chemicals, and capital, but about humans, ideas, and institutions as well.” What price should we set for the value of coming generations to have access to the same environmental quality and resources?


Illustration source: The Story of Stuff
9 Mine the city

The city is a rich material resource. There is, for example, more copper in buildings than is left in the earth’s crust—in Switzerland, the total copper stock in buildings is 65 kg per capita. By reusing the materials already deposited in our settlements rather than extracting new raw materials, the rate of material accumulation would be slowed and the amount of building materials removed and redeposited as waste would be reduced.

Formally or informally, we already mine the city. In parts of the U.S., illegal copper extraction from abandoned and inhabited buildings is so lucrative that police task forces have been formed to combat metal theft. But to effectively mine the city, we must set up an economic apparatus that can support the labor needed to sort and select materials for reuse. Presently, although the labor of erecting new buildings is a crucial part of the economy, demolishing them is often done with a minimum of time and labor.

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Illustration source: 1995 Reith Lecture by Richard Rogers, Cities for a Small Planet
10  Create Building Component Exchanges

To reuse building material, it must be recovered, inspected, stored and resold. Institutions able to handle these operations need to be established. Building component exchange companies survey buildings to be demolished/renovated and assess the feasibility of reclaiming individual components; act as experts in demounting materials while keeping them intact; sort, clean, and store the components; and foster a client pool of contractors or designers to whom they can resell. Equally important, however, is their role as legal guarantors for the resold components. Without an entity that can be held liable in the event of material failure, building components—especially structural assemblies that need to be retested—cannot legally be reused.

Material specifications—that allow, for example, the use of irregular dimensions—also need to be written to facilitate the use of reclaimed materials.¹⁰

¹⁰ Maarten Gielen, lecture at ETH Zurich, April 1st, 2015.

Image source: rotordeconstruction.tumblr.com
A building’s projected lifespan should affect the material used and its assembly. Will a building be in use for 200 years, 40 years, 20 years, or two months? Do the amount of materials used and their expected service life make sense? In some cases, projects can and should be designed to encourage longevity through the use of durable materials and assemblies that ensure ease of maintenance. Likewise, it is important to understand how user needs will change over time, and whether these needs will generate new or different demands. For some programs, adaptability can be built-in, allowing a structure to perform beyond the lifespan of its given program. For others, a project can be built with the intention of growth so that additional space and material is only used if and when it is called for and when the inhabitants are able to pay for the expansion.
12 Anticipate end of life

Use materials that can be recovered and reused at the end of a building’s lifespan with minimal reprocessing. Composite materials like fiberglass or reinforced concrete are particularly difficult to reuse because their individual components cannot be recovered. Similarly, the use of adhesives or cement to hold together material assemblies makes even normally recyclable materials like brick unusable. Thus, materials should be combined in ways where they can re-separated or reused as an assembly whenever possible. Werner Sobek, for example, calls for the use of fasteners like magnets or hooks that allow easy disassembly. Further, certain building programs can be accommodated by structures that are designed as components for temporary use, de-montage, and reuse. Like circus tents, Olympic venues or exhibition halls could be thought of as pop-ups instead of fixed or one-time structures, popping up where they are needed and then being shipped to another location.

Temporary Basketball Arena for the London 2012 Olympics with a recyclable PVC skin by Wilkinson Eyre Architects. The arena was dismantled and put up for sale after the Paralympic events finished in 2012.
13 Cross loops

The construction industry must not only reduce the level of emissions used in creating the built environment, but it must find a way to make the construction process more beneficial for the human environment. Materials should be rethought as either biodegradable or endlessly recyclable, as resources that are used and reused rather than discarded and the extracted or produced anew.11

Producing materials that break down into agricultural and industrial nutrients could eliminate the concept of waste. Textiles or fiber panels can be designed to biodegrade so that they can be reused as nutrients. Other durable materials can be designed to be recycled multiple times. Glass can be melted down and reused— a process that points out that the energy intensity of the recycling process also needs to be taken into account.

This cradle-to-cradle thinking, as promoted by Michael Braungart and William McDonough, implies an expansion of the cyclical logic of recycling. Not only should materials flow back into cycles of production, there should also be more exchange between biological and technological cycles of renewal.


Illustration source: Gary Anderson
Currently, the value of materials in buildings is reduced to zero between the time they go into the building and the time it is torn down. Materials become demolition liabilities, which makes no sense from a financial or material standpoint. This is down-cycling. But the business opportunity exists for every building material and product to be a nutrient for use in biological or technical cycles. Cradle-to-Cradle design chemistry proposes re-designing building materials in a positive way so they can be reused or repurposed at high quality. The proposition to up-cycle one-ups the recycling argument. Instead of merely postponing the inevitable consumption of material, there must be a move to completely reverse this process and create valuable products out of used material.

Doing so requires not just engineering but changes to the value attached to new goods. Challenging or ultimately replacing the societal value placed on newness with the value of thrift is coupled with a call for creativity. Ideally, by adopting a cradle-to-cradle mentality, lists of positive goals can replace lists of negative harms and emissions.
15 Tax the costs and rank the benefits

Quality and efficacy need to be recognized alongside quantity and efficiency in the equation for material choice. Current metrics in material decisions rely heavily on quantified data. But many variables cannot be quantified well and are thus often left out of decisions.

The numerator:
 reduce harm, keep the numerator small

M3: the economic, environmental, and human cost-benefits of the production/extraction of source materials

d: distance of material travel

M3: the economic, environmental, and human cost-benefits of the assembly of materials on site

Q: quantity of material used

The denominator:
 maximize benefits, make the denominator large

we*: the social benefit of the materials used

re*: capacity for environmental regeneration of the materials used

xe*: material/assembly ability to serve multiple purposes

T: time; the length that a building or assembly will provide service

\[
\frac{M3 \ d \ M3 \ Q}{we* \ re* \ xe* \ T} < 1
\]

Attempting to work out an equation to incorporate quality
Decouple growth and material consumption

Resource consumption is still directly tied to economic growth, making it undesirable for governments and large companies to limit the extraction of raw materials. To reduce the production of waste, depletion of resource reserves, and environmental degradation now associated with economic growth, material consumption and economic activity need to be decoupled.12

Is it possible to make dematerialization profitable? Doing so implies that we focus not only focusing on ‘minimizing damage’ but also on re-embedding urban material cycles within wider sustainable, socio-technical, and ecological cycles.

17 Increase resource productivity

To reduce material consumption in urbanization, the productivity of materials embedded within it needs to be increased. The Factor Ten Institute is one actor pressing for increased resource productivity. They maintain that “without radical dematerialization in advanced countries, sustainability cannot be reached.”

Productivity can be increased by producing more with fewer raw materials or by reducing the amount of byproduct waste created in a material’s production. To make use of raw materials, typically two to three times as much mass needs to be extracted. For some resources, as a deposit is extracted, this ratio continues to increase, requiring more and more removal for the same resource extraction. Earthworks for infrastructure construction can be equally wasteful, depositing, excavating, and sometimes covering resource deposits on a large scale without productive use.

At the end of the lifecycle, easing the reuse of the material can also increase efficiency. Improving productivity should result in lower material costs for manufacturers, a potential incentive to improve product supply chains. Enacting legislation that would ensure lifecycle costing for material prices could be a further driver for change.

As deposits are exploited, mining and quarrying tend to become more materially-intensive as the ratio of resource to waste rock decreases.
Think of the process of construction as the potential creation of social and microeconomic value. Using customary construction techniques or new ones that can be taught to a community allows craftsmanship to enter collective local knowledge and equipping local firms or individuals with the tools and knowledge to construct, repair, and demount their own physical environment.

When construction knowledge remains with a local community, they can re-build, adjust, or expand according to their needs. Techniques – like rammed earth, stone masonry, or thatched roof construction – that require periodic maintenance keep technical knowledge alive through regular cycles of repair. This way, the techniques remain skills that can be used for new projects. Each maintenance cycle allows for the training of new craftsmen and is a stimulus of income for local workers. As long as the knowledge remains, buildings can erode and return to compost and coming generations can shape new habitats according to their needs – what is treasured and worth conserving will always be maintained generation after generation.

Construction and maintenance are then less likely to depend on the availability and cost of external materials or expertise, promoting self-sufficiency. Building a tool to increase the social sustainability of a community, as acts of construction or repair work with and strengthen the social fabric. If the techniques being used are unfamiliar, an important component of the design will be strategies for passing on and maintaining knowledge and standards, developing, if necessary, unconventional forms of representation or communication.

If local or vernacular construction also addresses climate regulation passively, long-term savings on energy expenditure may also be a benefit.
Using locally sourced materials – whether high or low-tech – holds a number of social and economic benefits. It may also reduce the energy costs of transportation, though these are often negligible compared to material production. In some contexts where certain materials are not available, this may mean prioritizing, when possible, materials according to local availability and, in the long-term, encouraging and investing in the development of local material industries. Developing countries still rely heavily on building material imports. In Ethiopia, for example, more than 80% of construction material is imported.\[15\]

While local material use reduces emissions and the expenditure of fossil fuels for transportation, manufacturing is not universally clean – the embodied energy for concrete produced in Switzerland is lower than for concrete produced in Brazil, for example. Thus, although local material use will not always immediately result in a savings of embodied energy, investing in local industry can eventually give material supply chains the economic basis to become cleaner, making a long-term positive change to a community’s material flow.


Illustration source: genderandinnovation.org
20 Eliminate corruption

Corruption greatly affects the implementation and efficiency of construction, particularly in large-scale, public sector projects like infrastructure. A recent survey ranked Public Works and Construction as the business sector most likely to pay or receive bribes.¹⁶ According to a World Bank working paper, 5 to 20 percent of construction costs worldwide in infrastructure are being lost to bribe payments.¹⁷

Bribe payments decrease the economic efficiency of all projects, whether they are sustainable or not. But because sustainable construction tends to incur higher initial investment and is often seen as an ‘add-on’, the inclusion of sustainability measures may particularly vulnerable to the financial losses incurred through corruption.

Corruption also takes other forms. After the tender process, a contractor or supplier may reduce the quality or amount of material used from what was specified in the bid. Material substitutions or reduced material use negatively affect the performance and lifespan of a given project and risk vulnerability in the case of a natural disaster.

¹⁶ Transparency International, Bribe Payers Index 2011
¹⁸ Brazilian infrastructure and corruption, Risk Advisory, permanent link: http://news.riskadvisory.net/index.php/2013/10/brazilian-infrastructure-and-corruption/

Illustration source: Mario Osava/IPS, ipsnews.net
21 What’s the labor cost?

In counting the cost of materials, where does labor come in? In evaluating material choice, the conditions of the labor used to produce a material must be considered, from raw material extraction to the factory and construction site. Workers should have the right to a safe and healthy work environment; any materials produced without these conditions cannot be sustainable.

Where labor is located in relation to the building site should also be considered. If construction is organized in a way that employment circulates within the community, even private projects have an immediate local benefit through the influx of wages and potential new skills. If work is done remotely, under what conditions has it been conducted and on what grounds? Has labor been outsourced to a low-wage context to reduce costs or to reduce labor altogether through prefabricated assembly and what are the ramifications of these decisions?

Finally, who gets the profit? Workers should be employed under socially and economically ethical conditions, with a living wage, health care, and fair contracts. In the construction industry, however, these conditions are often not met—most construction work worldwide is carried out as day labor or under temporary or informal contracts. 19


One challenge in changing material use is the difficulty in pinpointing how decisions are made. Some patterns of consumption are cultural values acquired over centuries, some are a matter of availability and technical limitations, and some are a matter of larger political forces. Discussion about material consumption and decisions regarding how it is negotiated must re-enter the politics of the possible instead of centering on a bureaucratic management of an externalized foe, for example, humanity versus CO₂ or climate change: a faceless, nameless enemy. By replacing the false problem of “running out of materials” with a “resource distribution problem” it becomes clear that the agency of actors is a powerful tool. By re-politicizing the debate, we make visible the actors and agents who benefit and lose from certain environmental decisions, allowing communities to become agents, engaging in open decisions about their material consumption. Identifying the main actors at key moments of the material flow cycle helps to identify what levers can be manipulated in crafting a desirable material flow cycle. Achieving more sustainable metabolic flows is dependent on coalitions of urban actors that collaborate to forge alternative futures. Material reduction affects different actors in different ways: by making visible who benefits and how, we are able to make clear, open choices about the way we want to consume in the future.

Consider immaterial flows

Immaterial flows of knowledge provide a way for a society to develop a sustainable approach in construction by maintaining environmental capital while increasing social and economic capital. If the embedded know-how in material is strongly anchored within the surrounding society (craftsmanship, salaries) this social and economic power can have major consequences on the materialization of construction.

It is important not only to preserve our resources but to preserve and further develop our know-how. To do so, social and economic policies that increase the immaterial flow through the construction industry need to be promoted. Policies are needed that valorize knowledge over the material itself, or that would tax the polluting emissions but also “de-tax” beneficial contributions to immateriality. Finally, whatever know-how is used, it is fundamental to adapt it to local social contexts so that further maintenance of buildings will be easier.

The notion of a resource does not come from the intrinsic characteristics of a material itself but from our ability to use it. In the past decade, the use of waste in both open and closed recycling loops has reduced new material consumption. Waste stops being waste once we learn how to use it. At that moment, one has produced a material without initial virgin matter, but only with the know-how associated with the transformation of waste.

Illustration source: Guillaume Habert
Alternative mobility solutions are an example of sustainability initiatives that have had wide success scaling up operations with increasing rapidity over the past few decades.

24 Incubate effective solutions

To achieve dematerialization of construction it is important to have many more innovations encouraged and incubated, identified and shared when they take place, and the context and mechanism of the innovation understood. Innovations need to be up-scaled by making knowledge transferrable and encouraging cross-context learning. While there are many mechanisms that identify and praise innovative practices, very little attention is paid to encourage, understand, and up-scale them. Critical questions need to be asked, like how such innovation should take place, can it be replicated in a different context or at a larger scale, are there commonalities across different cases, can transferrable knowledge be drawn across different cases, and how can up-scaling be facilitated in order to transform construction towards more sustainable ends.20


Illustration source: EMBARQ World Resources Institute, 2013 cityminded.org/five-reasons-optimistic-sustainable-urban-mobility-11981
25 Make it attractive, desirable, and beautiful

The attractiveness of solutions that reduce the material cost of building is an important component in whether they are fit for widespread adoption. Desire is, after all, a stronger driver in mobilizing human force than responsibility. Is there a way to transform sustainability from a responsible resignation of benefit to an immediate gain of some kind?

The food industry can be looked to as a reference for how to transform the weak force of responsibility into the strong force of desire. People are willing to pay a higher price for a sustainable, organic, pesticide-free tomato not only because it is more sustainable but because it tastes better. Science and technology may develop new, very efficient, low-carbon footprint materials, but unless they are cheaper, faster or easier to use than conventional ones, they are not going to be preferred. In order to promote sustainable materials with the strong force of immediate gratification, we should find a way to make tangible the joy of them.
26 Envision alternate futures

Once a system is in place to track and measure material flows for buildings and cities, the next step is to understand how much material will be needed to fill growing demand by 2050. 52% of the urban fabric and society that is expected to exist by 2050 does not exist yet. Even with rough calculations, it is easy to recognize that meeting these demands using current business-as-usual models is not possible given the limitations of the planet. New material futures need to be imagined; ones that will radically alter political and economic structures. Urban infrastructures need to be reconceptualized and reconfigured to achieve more sustainable metabolic flows.

Transitions to a more efficient material economy are dependent on coalitions of urban actors that collaborate to forge alternative futures. Intermediaries play a key role in these coalitions, providing the capacity for transition. What socio-political coalitions are needed to drive urban transitions?


Multiple possible futures exist, depending on the efficiency of material flows and infrastructures implemented today and their long-term performance
Construction has the possibility to substantially contribute to and even form society. We may, however, also sometimes ask whether construction is an appropriate response to a given situation. Considering the general rate of new construction and the continual increase in embodied matter in our cities, this question can be asked without risk to the larger operations of the construction industry itself while potentially productively delimiting the amount of new mass being added to urban agglomerations.

A 1996 project by French architects Lacaton & Vassal embodies a possible alternative. Asked as part of a brief to embellish an existing square in Bordeaux, they studied how it already functions and determined that change was unnecessary. “Embellishment has no place here. Quality, charm, life exist. The square is already beautiful. As a project we’ve proposed doing nothing apart from some simple and rapid maintenance works—replacing the gravel, cleaning the square more often, treating the lime trees, slightly modifying the traffic—of a kind to improve use of the square and to satisfy the locals.”

Roundtable Participants, 2014-2015

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