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Voorwaarts Lin Sen Chai	Food for Thought Gavin Fraser	Pre-Fabulous Allison Bernett
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The call for a circular economy is also a boundary-spanning yell for circular economists. It is a holler that requires more fantasy and less framework. It alerts our attention to shifting roles and deprecating definitions. It causes our design agency to loosen, untether, and rove over social, ecological, and economic terrain, expanding our ethical territory with urgency.

8 Strategies for Circular Design envisions buildings as the crucible of a circular economy, where their construction, deconstruction, and maintenance are the staging grounds for a future without waste. Rethinking our building strategies redefines a building's value, which is the worth of all the spaces, materials, and components to people who own, maintain, inhabit, or will inhabit a building.

The act of claiming new agency requires as much imagination as it does intention and intonation. In each of the crisply drawn, time-eliding scenarios in this booklet, is an implicit provocation: What do we imagine for ourselves and our profession when we strive toward a circular economy? If we are to be circular economists what new knowledge, new relationships, new competencies, and new outcomes do we desire and why? In a circular economy might we, in addition to our strategies, claim also what we want to become?

I am a soothsayer and prognosticator. I am a fortuneteller. I coalesce all things and through me, I distribute all things. I arrange them in space and over time and imbue them with longevity, working into them a notion of what they will become, and become and become.

Or not.

I am a cog in a system, a part, a position—I delimit through delineation. People understand and misunderstand the boundaries of my visions. Who can see what I see? My drawings inspire notions of prosperity, carbon emissions, and shopping sprees. I scream, "What are we all shopping for?" as my plans take the basic form of ingredients like sand and shale, clay and ore, some rare earth metals, too. These are the untold ingredients of my architecture.

Or not.

I am a time traveler moving back and forth between what was and what will be. I am more precise than fuzzy as I negotiate the trouble with moving matter from where it has been to where it will go. My form-making powers impact generations of people, communities, economies, and ecosystems. Who and what do I serve?

Whether or not we imagine the role of a visionary, logistician, passenger, or any other for ourselves, the call for a circular economy is also boundary-moving work. It requires actions with technical and social dimensions at the deep core and ragged edge of our design domain. As we take in this work, we will find the means to describe what architecture can be.

Or not.

How to

0 ecome 9 circular economist. Or not

Revolutions

Circularity has been integral part of our profession since the very beginning. In a world not driven by monetary value, a circular economy relies on the balance between two basic principles: necessity and scarcity. Architecture has responded to these two principles through the **need** for shelter and the **availability** of materials. Historic building practices often struck a balance that resulted in primitive forms of shelter produced by using readily available resources in the immediate contexts: wooden structures in forests, tents from animal hides in the desert, stone shelters in mountainous regions, and so on.

Since then, construction methods have been the subjected to adaptation and evolution through the advent of better processes, materials, and manufacturing techniques. Resources were made more easily accessible thus creating a surplus of material and an imbalance between necessity and scarcity. This surplus resulted in the linear model of 'take, make, throw' that has, unfortunately, become standard practice throughout many developed regions of the globe. Only recently has the irresponsible risk of this model become clear to a wider audience. Our earth does not appear to be an inexhaustible source of fossil fuels and raw materials and as an ecosystem it is only partially resilient to human intervention.

As opposed to a linear economy, where raw materials are mined, processed, consumed, and ultimately discarded as waste at the end of their useful life, a circular economy strives to optimize the **use** of objects, not the means by which we **process** them. In a circular economy there is no waste and raw materials have the ability to be used over and over again. By retaining material stock and its value, material scarcity is reduced, if not eliminated, energy loops are closed, and damage to the ecosystem of our earth is limited.

Waste No More

For a long time, waste was conceived as a harmless byproduct of our way of living. Waste was not considered to be a problem when there was an abundance of resources available. This is not so anymore. Waste increases raw material consumption, contaminates our soil, pollutes our air, and can now even be found in our food sources. Waste generates climate change.

As architects we envision our designs to last an eternity, but reality teaches us that this is rarely the case. Most of the buildings that we design will inevitably be demolished, often even during our lifetime. Demolition is economically the least preferred option, but the amount of waste generated by our society proves otherwise: more than half of which is construction waste. In current society we, as architects, design this waste.

Our profession has to become a waste-free profession. This means that we will have to design in such a way that we take care of the afterlife of our buildings. The objective of this publication is to examine ways of thinking that helps us doing so.

A series of case studies investigate design strategies for buildings that are future proof, that is: truly designed for eternity. Not in the sense that our buildings will never be demolished, but in a way that the death of our constructions will result - in whatever way - in new life for something else. Linear system logic (from resource to construction to waste) will be replaced by a circular mode of design thinking (resource to construction to reuse, infinitely).

Architecture

in a Circular Economy

New Construction Dynamics

For the construction sector, the transition to a circular economy means a fundamental paradigm shift across the full breadth of the field: from project definition to design to realization.

The new possibilities are not only in the field of different use of materials or better construction methods. The projects presented here show that circular design leads to new system logics for all processes that involve the building sector: from new financing models to new construction methods, from new typologies to parallel construction processes. The switch to a circular economy not only ensures that we can maintain and improve our current level of prosperity. It also makes new ways of living and working possible. As soon as we live in a world in which material never becomes waste again, but always retains its value, we have profit on all sides: buildings are never demolished, but always reused. The dynamics of building and rebuilding is an always positive arrangement and rearrangement of material, people and program. Within such a context we can challenge the status quo and move beyond simply designing with sustainable materials as a part of our buildings but instead tackle the questions of today that prove difficult to answer within the framework of a traditional economy. How do we make living in the city affordable for everyone? How do we design spaces where you can live in old age? How can we respond to changing needs for living and working?

This booklet is based on of the work of architecture students at the University of Arts in Amsterdam and Cornell University. The students are the true authors of this document. An introduction has been written for each project that places the project in the context of new circular strategies. We hope that the projects inspire and stimulate new ways of thinking. It is this thinking that will change the world into a more beautiful place where everybody and all is in constant transformation.

Architecture

in a Circular Economy



Top: Retail & Autoshop Middle: Lobby / screening ramp / Garage club Bottom: Flexible space plan and fixed services create density In a circular economy constructing a building becomes an act that leaves little or no harmful traces for the next generation. The act of building becomes a guild-free process. By inventing new system logics that are based on intelligent use of materials, labour, program and money we can build in abundance, prosperity and happiness, not just for ourselves but also for future generations.

Using new circular system logics, we can build whenever there is a need. A building can become an immediate expression of a program. Whenever the program changes, the building changes. A new building accelerates programmatic regeneration.

strategy 1

program

Building and program can have an intimate relationship that changes at the speed of their mutual dynamics.

The project **Voorwaarts** of **Lin Sen Chai** uses time as a design element for programmatic compaction and adaption. Each space within the existing static structure is adapted for different programs over a short period of time. Over a (somewhat) longer period of time, the building can modify itself by the use of an integrated onsite crane. The programmatic flexibility guarantees the raison d'être over time.



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strategy 1

program





Year 2 Mechanic Scrap Yard Alt. Art Venue

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Year 5

Car Charging

Dealership Retail



Year 7 Office / Housing Retail / Bakery Club





Top: Cranecore court Bottom left: Elevated street fair Bottom right: Arcade retail







Detailed section of a growing cell. We see a collection unit situated underneath the composting vat and growing space above. The food grown in the greenhouses is redistributed to the local restaurants and marketplace beyond. Materials are integral to every architectural project. They allow us the ability to create a range of experiential possibilities and help to inform the environments we inhabit daily. However, if we continue our current habits of mining and resource consumption, these materials will soon no longer be available. A new relationship between material and construction is needed to fundamentally change building processes of the future.

Future buildings must consider new materials and material alternatives to our current practices. Rather than extracting and processing precious raw materials only to be assembled in a fixed state, materials

strategy 2

are designed and fabricated to be replaced, reused, and recycled. The building itself becomes a resource.

The project **Food for Thought** by **Gavin Fraser** is the design of a complex for recycling food waste in Amsterdam. Nutshells, potato, starch, flax and wheat fibres are used to fabricate construction materials. Also, fuels, plastics, compost, leather and fabric are derived from the food waste stream. The complex starts with one collecting unit. With the growing fabrication of construction materials, the complex grows and results in a commercial material plant.











Top: The entrance, sorting and marketplace cells create the final destination of the transformed waste. From this marketplace, the transformed products are redistributed to the city.

Bottom: The sorting cells of the food for thought system rely on both land and water drop-off methods. A central crane accentuates this part of the development as a landmark.

strategy 2

material



View of Upper workshop. 10m height assembly spaces provide generous workspace, flanked by trade areas, upper apartments, and planted terraces. Within a circular economy one can easily adapt buildings: they are more flexible. Different people with different lifestyles can live in one complex, because bespoke building types are relatively easy to make and change. Circular system-thinking can create typological richness within one building or one building construction system.

Spatial divisions between working and living evaporate. Creating space is a dynamic pro-cess of assembling and disassembling for spatial qualities that are desired at a given moment. Households can start small and grow bigger at will. Neighbourhoods can change at a pace that suit the need for

strategy 3

transformation at any given time. The building is not static but has itself become a process: an ongoing dance of material and program.

The project **Pre-Fabulous** by **Allison Bernett** is a housing manufacturing program that allows for retrofit building and testing while also producing free onsite living quarters for the workers themselves. As the need for housing retrofit and manufacturing decrease over time, the building can radically transition from a typical manufacturing facility to a sustainable and energy efficient housing complex using the existing infrastructure of the facility.



construction





Existing







strategy 3



construction

Year 20



Year 30



Year 50



A quiet exterior indicates the varying cycles of activity through change in illumination of spaces inside.

New economic models lead to new dynamics in the building process. The building as temporary storage of a collection of valuable materials creates new opportunities. Materials can be seen as a service instead of as a product that one has to own. The same logic could hold for labour. Labour can be paid after the work has been done, but in a circular economy it can also be seen as a healthy investment in a healthy business. Designers, technicians and builders can become shareholders, so that everyone remains owner of the building after the construction has been done. Little additional funding is needed since the initial investment is lower than in a traditional financing system. All owners benefit from the rental income. As owners of the building accountability is shared throughout the whole process, which leads to better building quality.

strategy 4

The project Investor Tech by Yu Sun provides a new live/work environment where young professionals have the ability to interact with start-up companies. In the project, a new financial system logic is designed to construct a building that maximizes interaction between start-up companies and bigger corporations. The new programmatic interaction allows for the exchange of labour in return for intellectual capital while producing unforeseen creative opportunities. The different activity cycles and varying time frequencies between the young professionals and corporations allows for a layering of program. As time progresses, the building organization accommodates the growth of smaller companies and new learning opportunities for individuals through this economic exchange.



economics









The floorplans orchestrate interaction between startup companies and established high-tech firms.

strategy 4

economics



The urban farm is not just for food production, but is also public space and plays an important role in a sustainable climate system for the building by directing air, rainwater and sunlight.

Building construction generates waste. However, the detritus generated by construction is only considered waste because there is currently no value for it. As building practices continue to evolve, so should our ability to design in a way that offers flexibility and adaptation for various construction materials. Instead of cutting away excess material and discarding it or throwing out formwork after it has served its purpose, what if we could benefit from it? A circular building would instead produce no waste at all, and these leftover materials would be reused time and time again. Whether used as formwork or an interior finish, each material's potential value is maximized through finding alternative opportunities for their reuse. Using concepts like design for disassembly, where building elements

strategy 5

adaptation

can be taken apart and put back together, allows for the building, and its materials to adapt over time. Materials that were once considered undesirable can be temporarily stored until they are ready to be reused again in future applications.

The project **Reframing Trash** by **Maiara Camilotti** focuses on transforming waste into valued assets that can be put to use in a circular process. The promotion of circularity early in the design process allows for increased possibilities of reuse even before construction starts. In the project, offcuts and scrap pieces of CLT panels are reused as interior elements, bringing a new use and life to what was once considered trash.













Adaption is implemented on different scale levels: materials can be re-used, but also larger building elements are suitable for re-use in different configurations.

The biogas collection point is the starting point of the project. The waste collection point fuels the cultural center, food production, and consumption.

strategy 5

adaptation







A living, working, and retail experience offers opportunity for chance encounter and collaboration between members of diverse backgrounds. A traditional design process consists of a strict division of activities and responsibilities: it is a linear and sequential process. In the case of architecture, the project-owner makes a brief, the architect a drawing, and the structural engineer a calculation. Specifiers make a technical description, the main contractor draws up a budget, and organizes the construction process. At the very end of the journey there is a builder who - and her or she alone - holds actual material in their hands and assembles it.

The traditional order of hierarchy exists by virtue of separate worlds: each discipline works independently of the others. Such

strategy 6

a process is unthinkable in a circular economy. Instead of separating responsibilities, we need to consider working together and involving one another with each phase of the design process.

The project **AgriTech North** by **Ami Kurosaki** prioritizes efficient and circular waste streams, involving both agricultural and food consumption industries. By including housing for farmers, scientists, and researchers, new agricultural collaborations allow for the optimum combination of ecological principles with modern technologies, new partnerships, and community engagement.











Top: Indoor farms glowing at night Middle: Common kitchen adjacent to indoor hydroponics farm Bottom: Shared exterior corridor



Old and new work together creating a dialogue between past and future.

The classification of our built environment in today's world is rather schizophrenic: an existing building is either a monument, and then you have to stay away from it, or it is of no value - and it eventually becomes waste. Until two hundred years ago, both views would be considered ridiculous. Freezing the transformative properties of monument can lead to a zombie existence. The building as a relict might still be there, but it is not really participating in our society anymore. With a circular system logic, a monument has a head start in sustainable development. The beauty of what already is gives the opportunity to continue an interesting conversation in an interesting way. Circular approaches for improvements may continue a meaningful dialogue. Monuments that are transformed into buildings that are energetically healthy, programmatically modern and climate-adaptive span storylines from the past to the future. It is precisely these long lines of history that provide meaningful, living environments.

The demolition of a building to make way for new construction also shows little empathy: the story of the history of the

strategy 7

existing building (the cultural dimension) is brutally cut short. We don't just eliminate the physical object, we also remove a layer of time and history. Old objects possess a strong narrative; age tells a story. What if we could solve the problems of a site without completely removing the existing buildings?

In the project Antagonistic Synergy by **Sian McGrath** a generic building block is deconstructed and reconstructed in a new building. By using the existing elements, the experiential storytelling of the new is strengthened. A friction between old and new creates an intriguing dialogue from which a new narrative can be created. Storytelling capabilities is one of the things that make us human. People are programmed to find a narrative and a story in an object, place or experience. It is how we connect to things - a connection that is deeply personal and dependent on our own imaginations. By designing a building that allows for an exaggerated narrative, we can create spaces that ignite our imagination.









Debris placed in openings in an existing wall function as cavity-closer.

narrative



Flexible and adaptable spaces provide an everchanging building condition for users to engage with one another. Planned projects are tested in advance for their financial and social feasibility. Financial feasibility means that you can proof that the project yields more money than it costs. Social feasibility is mainly an assessment of whether the neighbourhood will not complain too much.

It is surprising that project results are mainly expressed in short-term returns. In fact, the outcome of a project should be expressed in terms of happiness and well-being. Has the project contributed to an increase in a positive feeling of the neighbourhood? Are the people using the building happier than before? Is the building perceived as pleasant? Do people get smarter?

strategy 8

typology

Circular design strategies should ensure project results other than just money. A healthy living environment gives healthier people. Making use of new system logics can result in abundance, more intelligent users and an increase in happiness.

Project **Play Grounds** by **Olivia Meyers** proposes a new type of housing model for empty nesters paired with a hands-on school for adults and affordable housing for students. Demountable connections and adaptable spaces allow empty nesters to share their homes with students, subsidizing their income and providing affordable housing. Play Grounds is a school that combines living with the principles of a kindergarten, where learning occurs through incidental, unprescribed, and hands-on experiences.



typology



Year 1 "Macro" Learning Space Programming



Year 10 "Macro" Learning Space Programming



typology

publication by Research Group Architecture & Circular Thinking Academy of Architecture Amsterdam University of the Arts Amsterdam

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Arcadian Anthropocene

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Academy of Architecture Amsterdam

Futureeco – systems for knowledge and nature

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Building as a Circular Product

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After beginning his career in experimental

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Since 2019 Peter is also professor

are discovered and implemented.

Architecture and Circular Thinking at

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and building the full potential of material

use, energy, waste flows, smart living & working and development processes

Dillon Pranger is a licensed architect,

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