



# A FUTURE WITHOUT WASTE?

Zero Waste  
in Theory and Practice

Edited by  
Christof Mauch



Transformations in  
Environment and Society

2016 / 3

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Christof Mauch

## Introduction: The Call for Zero Waste

### I

The call for zero waste is a recent phenomenon—a reaction to an enormous rise in waste that set in about a hundred years ago and accelerated after World War II. In the nineteenth century, households, even in the Western world, produced little garbage. Leftover food was boiled to make soup or fed to animals. Things that lost their use for adults became playthings for children, broken objects were repaired, and durable goods and items, like furniture, clocks, and watches, were handed down from generation to generation. In agriculture and animal husbandry manure was used as organic fertilizer, straw was reused in construction, rags found a new purpose in papermaking, bones were valued in the production of soap, and ashes were used to control pests and to fertilize soils. Even dog excrement was a sought-after commodity, as it served a purpose in the process of tanning leather. For thousands of years, economies were circular economies: they produced very little waste.

There has never been a society or culture in history that had no waste at all. But before the industrial age, waste was rarely a concern for humans. This began to change with urbanization and rising populations and, more importantly, with the advance of assembly-line manufacturing that made cheap mass-produced items available throughout the world. Consumerism created a throw-away society, particularly in the United States, that produced an excess of easy-to-use, disposable items. “Garbage,” says one of the protagonists in Steven Soderbergh’s famous independent film drama *Sex, Lies, and Videotape*, “All I’ve been thinking about all week is garbage. We’ve got so much of it, you know? I mean, we have to run out of places to put this stuff eventually.” Indeed, we are approaching local and global limits to how much garbage we can heap up, put in landfills, or dump into the sea. Plastic is a case in point. Rapidly increasing amounts of microplastics in our oceans threaten marine creatures, ecosystems, and human health. As the ecological impact of waste can no longer be ignored, clamors for a reduction or an elimination of waste are growing louder and louder.

The term “zero waste” was first publicly used in industry. Paul Palmer, a chemist with a PhD from Yale who later became the founding director of the Zero Waste Institute in Vacaville, California, coined the term in the 1970s. His interest in zero waste was scientific and monetary rather than ecological. Palmer noticed that high-tech businesses in the newly emerging Silicon Valley were discarding valuable “clean” chemicals that could be reused. As a result he started a company that marketed waste products; over time his company identified new uses for every chemical discarded in the Silicon Valley. Palmer’s definition of zero waste is based on the principle that articles should be reused instead of used once and then discarded. Zero waste, unlike recycling, is thus not an end-of-pipe strategy; it implies the recovery of all resources instead of burning or burying them.

Today zero waste is a slogan and an economic or visionary goal and the term carries a wide variety of meanings. Cities and territories from Carrboro, North Carolina, to Canberra, Australia, from Buenos Aires, Argentina, to Alapuzha, India, and from Nelson, New Zealand, to Ljubljana, Slovenia, have developed and implemented zero-waste strategies. Big corporations like Toyota, Nike, and Xerox have followed suit. But zero waste means different things in different parts of the world and in different institutions and agencies, and there is often a large dose of irony in this new eagerness to become sustainable. Take, for instance, Wal-Mart, the world’s largest retailer and for many a symbol of the problems of globalization and cheap, mass-produced products. The company’s stores are dramatically reducing their solid waste; they are substituting plastic for corn-based food packaging, they are composting unsold food, and in pilot projects in Wal-Mart’s “green store” in Aurora, Colorado, they have used old cooking oil as fuel for heating the building. In advertisements Wal-Mart is propagating a goal of “zero waste across global operations,” while using “diversion rates” as an indicator of success. However, diversion (“zero waste to landfill”) is not identical with recycling, and recycling agendas do not constitute a true concept of zero waste. A strict definition of zero waste suggests that waste should be eliminated not through diversion or recycling but through design elements that allow reuse of all materials and are built into products from the start. In zero-waste thinking, recycling becomes obsolete and waste is essentially seen as a design flaw.

Despite aspirations to reduce waste around the world, most current estimates assume that the amount of disposed materials is rising rather than sinking, while recycling and reuse rates remain moderate. A recent study by Austrian ecologist Willi Haas and his colleagues suggests that only 4 gigatonnes per year of waste were recycled globally in the year 2005.



This is a low number compared with outputs of 41 gigatonnes and processing (mostly for energy production) of 61 gigatonnes per year. As much as we aspire to reduce waste, progress towards this goal is slow. Is total circularity of global material flows a realistic goal? Is zero waste, as William K. Townsend puts it, “an aspiration or an oxymoron”?

## II

For waste managers around the globe, waste primarily poses a technological challenge. But the idea of zero waste implies more than a management approach. It involves values as much as practices, visions as much as strategies. More than anything else “zero waste” is a philosophy. The essays in this volume address the many different meanings of zero waste: they discuss zero waste as a vision, as a historical concept, and as an international practice. Scholars from four continents and from ten different academic disciplines share their analyses and insights in essays and a roundtable discussion.

The volume’s first section focuses on a set of diverse “visions” for the future. Chinese philosopher Tian Song challenges the assumption of zero-waste proponents that waste could be eliminated entirely through recycling and reuse. He argues that a true zero-waste society will always be an illusion, if only because the laws of thermodynamics and the concept of entropy teach us that garbage cannot be entirely recycled or reused. For Tian Song the goal of recycling waste is too narrow a concept. At the same time he sees it as a valuable first step on the way to a postindustrial and sustainable “ecological civilization” that in his opinion needs to operate in a “brand-new cultural mode.”

German chemist and former Greenpeace activist Michael Braungart takes a more pragmatic and optimistic approach. Famous author of the international bestseller *Cradle to Cradle: Remaking the Way We Make Things* (with William McDonough), Braungart pleads not for a postindustrial approach but for an industrial revolution that challenges the belief that human industry necessarily damages the natural world. Rather than following calls for sustainability through thriftiness and reduced consumption, we should begin, Braungart argues, to “love our ecological footprint.” His concept of “Cradle to Cradle” suggests that waste is nothing but the result of bad design: “Once everything is designed to become part of an ongoing biological or technical cycle, we can celebrate abundance.” Economist Herbert Köpnick, formerly a senior official in Bavaria’s Ministry

for the Environment, applies Braungart's concept to a specific product as he suggests a new marketing scheme for mobile phones based on a zero-waste circular economy.

While the first section of this volume looks into zero-waste perspectives for the future, the second section discusses lessons from the past. Sociologist Zsuzsa Gille argues that zero-waste programs of governments and corporations, as much as they claim to be unprecedented and innovative, have a precursor in socialist countries. In her essay she focuses on the social experiment of 1950s Hungary, where zero-waste efforts were introduced as an integral part of the government's planned economy. At that time, for economic rather than ecological reasons, the Communist Party established new agencies for the redistribution, reuse, and recycling of "waste materials." The campaign was popular at first. However, unintended consequences that resemble many twenty-first-century challenges (including problems with subcontracting, unrealistic quotas, and waste oversupply) brought the program to a halt.

Historian Carl Zimring echoes Gille's contention that the idea and practice of reusing waste materials did not start during what Joachim Radkau has termed "the age of ecology." Instead, it has a long history. Zimring's interest is in upcycling (rather than recycling) and he reminds us that in the past automobiles have been made from railways, and skyscrapers from destroyed buildings. The main focus of his essay is on aluminum, a material that became part of the waste stream after World War II, when campaigns to salvage this metal evolved into eco-friendly campaigns for upcycling. In the case of aluminum, scrap is today the primary source of this metal, as recycling holds both economic and ecological benefits compared with extracting new aluminum via mining. Recycled aluminum has been used to create durable goods of greater value (such as designer furniture and high-end guitars) as well as serving as a component of products that are designed for disassembly (such as computers). Zimring's essay raises questions about energy use in the history of recycling, and about opportunities and limits in designing products for recirculation versus for "immortality."

The essays by Jutta Gutberlet and Stefania Gallini in this volume's section on "transitions" both take us to Latin America. Geographer Gutberlet suggests that the idea of zero waste requires shifts in cultural values rather than new technological solutions. While countries with advanced economies boast an abundance of new products, inspiration for sustainable waste policies and management will, according to Gutberlet, likely come from countries in

the Global South where consumerism and discard-oriented production are not yet fully established, where economies are less fixated on growth, and people's lifestyles are not yet "cocooned in the consumption bubble." Drawing on examples of informal and cooperative recyclers in Brazil, Gutberlet argues that these workers have developed effective practices and policies supporting circular economy, sufficiency, and solidarity.

As in Brazil, informal waste pickers—called *recicladores*—play an important role in the waste disposal process in Colombia. However, as Gallini's article vividly illustrates, waste management is embedded within larger, and at times precarious, political contexts. When Gustavo Petro, then mayor of Bogotá, attempted to introduce a new zero garbage program that would allow these informal recyclers to receive proper wages, his plans failed dramatically. Private waste collectors, disgruntled at losing their lucrative contract, allowed garbage to accumulate in the streets. Petro found himself in the middle of a hygienic crisis that was used by his political opponents to try to remove him from office. Garbage had become a battlefield upon which the struggle against corruption for social reform and justice was carried out.

Gallini's essay shows that the transition to zero waste does not occur in a vacuum and cannot simply be legislated into existence. It requires the input of all actors in society working towards a common objective. While changes in cultural values are essential for achieving zero waste, these changes are meaningless if the institutions in place hamper rather than foster our progress.

The volume closes with a "discussion across disciplines" about the feasibility of a future without waste, focusing on Germany and Munich in particular. It brings scholars from engineering, ethics, and anthropology into a dialogue with each other and with a lawyer and a parliamentary spokesperson on environmental affairs from the City Council of Munich.

### III

The text of the last section is a shortened and updated transcript of a roundtable discussion titled "Gibt es eine Zukunft ohne Müll?" that took place at LMU's Center for Advanced Studies (CAS) in May 2013. The roundtable served as a public kickoff event for the CAS research focus on "Waste in Environment and Society." This research focus

brought together 15 Munich scholars from many different disciplines, who, over a period of several years, discussed social, political, cultural, ecological, and economic issues of waste management and waste policies from an international perspective.

With the exception of the final section, all other contributions to this volume are revised and updated versions of presentations that were given at a CAS conference entitled “Whose Waste? Whose Problem?” in October 2014. Other papers from this conference were published in an *RCC Perspectives* volume, *Out of Sight, Out of Mind: The Politics and Culture of Waste*, and a third set of papers from the CAS research focus has appeared in a volume edited by Jens Kersten, *Inwastement: Abfall in Umwelt und Gesellschaft*.

I would like to take the opportunity to thank all my colleagues who were part of the CAS research focus on waste (they are listed at the end of this volume), as well as Dr. Annette Meyer, Dr. Sonja Asal, and Prof. Christof Rapp for their generous support of our project at the CAS. Most of all, I would like to thank Brenda Black, Senior Academic Editor at the Rachel Carson Center, for spending long hours on this project. Brenda has done an exceptional job in improving the essays in this volume both in terms of form and substance.

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Zero Waste Institute. Official website. [www.zerowasteinstitute.org](http://www.zerowasteinstitute.org).



## **Visions**





Tian Song

## **An Impossible Ideal: The Use and Misuse of Zero Waste**

In mainstream ideology and public discourse, waste or garbage has always been seen as a technical or a management problem. Many people believe that garbage is merely a wrongly placed resource, and thus the garbage problem could be solved with sufficient technological progress. As one organization puts it:

Zero Waste (ZW) is a re-envisioning of how society relates to production, consumption and disposal of the products and materials we use every day. ... Its goal is to end the generation of toxic and unnecessarily wasteful products through systemic redesign, channeling remaining discards into reuse or recycling for the creation of new products, and using those materials as engines of local job growth. It requires coordination between engaged producers and consumers, governments and citizens, neighborhood activists and neighbors.<sup>1</sup>

This understanding of zero waste pins its hope on two things: efficient technology and efficient social management. Simply put, the zero-waste movement is predicated on the idea that it is possible to have a society that does not produce any waste because everything is recyclable and everything can be used again. However is this, in fact, a reasonable assumption?

If we look at the issue from the perspective of thermal dynamics and ecology, achieving a truly zero-waste society is impossible. However, by examining the principles behind the “circular economy” as well as the guiding principles of contemporary economic systems, zero waste can offer us some valuable insights into what we need in order to create the basis for a future ecological civilization.

1 “Don’t Waste This Opportunity: Policy Recommendations for a Path to Zero Waste and Good Jobs for Boston,” Boston Zero Waste Task Force, 11 March 2014. [http://cleanwateraction.org/files/TaskForce\\_Recommendations.pdf](http://cleanwateraction.org/files/TaskForce_Recommendations.pdf).

## Zero Waste as a Closed Cycle: Biosphere 2

The challenges facing the zero-waste model can be illustrated by using the example of Biosphere 2, an attempt to create a closed ecological system which failed dramatically during two trials in 1991 and 1994.

Constructed in Arizona in 1987, Biosphere 2 was supposed to be a rehearsal of the conditions in a space shuttle traveling to another galaxy. It is based on the ideal of a closed material cycle, a complete recycling of matter. For example, humans breathe in  $O_2$  and breathe out  $CO_2$ , plants take in  $CO_2$  and release  $O_2$ . Humans eat parts of plants and discharge fertilizer for them. This, after all, is how it works on “Biosphere 1”—the Earth itself. Biosphere 2 was supposed to be a smaller version of Biosphere 1 and imitate the bioprocesses of nature. If this works, a space shuttle supplied with the necessary basic materials, including water and soil, bacteria, plants, animals, and humans, may run as a self-sustained system; the astronauts living in this space shuttle could have food forever. This is the ultimate zero-waste system in which the matter inside, supported by solar energy from outside, could be used again and again.

In practice, however, this proved to be much more difficult. The first trial of Biosphere 2 began on 26 September 1991. Eight scientists were supposed to live inside independently for two years: they planted food and tried to recycle and reuse everything inside; the only thing from outside was to be the sunshine. Ultimately, the experiment lasted for 21 months and the eight scientists had to leave on 26 June 1993. The experiment failed because Biosphere 2 was not able to be maintained as a self-sustained system. Scientists tried one more time; the second experiment started in 1994 and only lasted for 10 months.

How do we explain this failure? Was it merely due to human error and the immense difficulty of recreating something as complex as an entire ecosystem? Or can it tell us something about other unavoidable problems inherent in the very concept of a self-sustaining, closed system? The laws of thermodynamics can shed some light on this matter.

## The Problem of Entropy

As early as primary school we learn concepts such as water circulation: sunshine evaporates water in the ocean and the vapor condenses into clouds, the clouds move above the continents, turn to rain, and fall down to the earth; the rain water flows into rivers and finally returns to the sea. If water can travel in a cycle like this, it seems that there will always be water available: it cannot be used up because it always exists in one form or another. This agrees with the first law of thermodynamics, the law of conservation of energy and matter. Energy and matter can neither be created nor destroyed, but only transformed from one state to another.

But consider the second law of thermodynamics: the principle of entropy increasing. The transformation of matter and energy is not unlimited, and it always progresses in one direction: from a low entropy state to a high entropy state, from a usable state to an unusable state. Consider the example of a pendulum: as it swings, the ideal pendulum returns to its original starting point. But in reality, an ideal pendulum does not exist, because there is always some friction that creates resistance: the distance of each swing is a little shorter than the one before, until the pendulum eventually stops.

The concept of entropy is not only applicable to energy, but also to matter, and similarly, matter usage can't be 100 percent efficient. That means garbage recycling can never be 100 percent. While matter may never disappear, over time its form becomes less and less usable for us: the structure of materials such as plastic and even metal breaks down over time, becomes disorderly and mixed with other elements. Therefore, while recycling may enable reuse, it cannot offer unlimited reuse. Moreover, manufacturing processes require energy. And no matter how efficient we become, no matter what energy sources we use, some of that energy will be lost every single time.

In other words, zero waste is impossible from the perspective of thermodynamics. Now, consider a pendulum with a clockwork spring that is powered by a source like solar energy—will it run forever? Actually, this is the simplest model of Biosphere 2: to build a perpetually self-circulating system of matter, supported by an inexhaustible source of energy from the outside, solar power.

Nonetheless, the powered pendulum will eventually stop because the axle will be worn down by friction. What then?

This seems like a sophistry. But it is true for all physical systems in reality. Take an engine, for example: in fact, there are two processes happening during an engine's running. On the one hand, it turns energy to waste heat; on the other hand, the engine itself gradually wears out. Biosphere 2 seemingly could run a self-cyclic system for some time, but eventually its mechanisms will wear out and the system will collapse.

### **Garbage: A Globalized Problem**

If we consider a city as a thermodynamic system, it becomes clear that, generally, matter and energy with high entropy goes out of the city, and that with lower entropy goes into the city. Food, clean water, gas, oil, and electricity go into the city, and garbage, dirty water, and polluted air go out of the city. To remain healthy, it needs the supply of energy and matter from outside, as well as a possibility to get rid of garbage by sending it outside. This is the precondition of a city's existence and functioning.

Paul Gauguin, a French post-impressionist painter, raised three questions in a famous painting entitled "Where Do We Come From? What Are We? Where Are We Going?" We can ask these questions about everything produced in the industrial world. Traced to its source, everything in the city comes from outside: wood, mineral resources, and natural water resources. Then, it turns into different forms of garbage after it has been worn out. Soon garbage will be everywhere.

To continue this analogy, globalized modernization and modernized globalization is a food chain: the upper stream area has the priority to take the resources, energy, and matter with lower entropy value from the downstream area and discharge its waste to those areas.

The upstream and the downstream are intermingled with each other. Generally speaking, North America, Europe, Japan, and other industrialized nations are in the upstream, and South America, South Asia, Africa, and China in the downstream. But within a country there is upstream and downstream too. In China, the east is the upstream, and the west is the downstream. In any city, the central part is the upstream, and the urban part of the city is the downstream. Thus it is a common phenomenon that every city is surrounded by garbage dumps—what we might call the garbage-besieged city.

## **The Growth Model of Society**

Economic growth is one of the key values of industrial society. Every economic activity is concerned with a transformation of energy and matter, so that society is like an engine which transforms nature into garbage; the more developed it is, the more garbage it produces.

In the ideology of industrial civilization, economic growth, development, and progress are all good words and admirable notions. So someone like Steve Jobs was seen as a hero, and the invention and update of iPhones, iMacs, and such things are highly esteemed by society, governments, and people. Young people are hailing the new generation of iPhones and expecting the next. Actually, such things are protected and promoted by the whole social structure, the economic and legal system, and the institutions of science and technology. Every round of updates of industrial products is connected to a transformation chain of energy and matter, and to a transformation of nature into garbage. Modern industrial societies are based on the principle of economic growth. And yet this is a paradox: how could the economy increase continuously and ceaselessly? Even just a small rate of increase every year would result in an exponential increase and end up in collapse. It would require infinite resources and energy, and would definitely output infinite waste. Thus, if we consider the implications of this growth model, industrial civilization is definitely not sustainable.

## **Industry and Its Discontents**

Nature, our Biosphere 1, is an ecological system that spans the entire globe. Things in nature depend on each other. The waste of one species might be the resource of another species. Is it possible that the Earth is a zero-waste system? And if Biosphere 1 is a zero-waste system, can humans imitate it?

In prehistory, every species depended on the others, and their behaviors were part of the natural ecological process. Humans were one species among many. However, as human civilization developed, human behavior departed farther and farther from natural processes. Although agriculture in ancient China was no longer a part of a natural ecosystem, it still tried to be in harmony with the environment and nature, or Heaven in

Chinese. But in industrial civilization, a factory is totally alien to the natural ecosystem. In today's concept, nature is just a collection of materials and resources. Humans have the ability to move mountains, thus, mountains were moved; they have the ability to fill a lake, lakes were filled; they have the ability to dam up a river, rivers were dammed. Such anthropocentric behavior will inevitably lead to a comprehensive environmental pollution and ecological crisis. Normally an industrial factory takes in raw material, water, and electricity from the local environment and outputs garbage into the local ecosystem—harming the ecosystem in the process.

The chemical industry was an important turning point in the relationship between humans and nature. After the development of the chemical industry, humans started to use more and more artificial materials. Today, the components of garbage are totally different than in a preindustrial society. Traditional garbage was mainly made of materials derived from nature, such as wood, metal, animal skin, and bone, and nature had evolved corresponding microorganisms for degrading them. They came from nature and could easily return to nature, from dust and back to dust. But most industrial chemical products have never existed in nature: they are created by humans, so there are no microorganisms to decompose them.

For industrial garbage, so-called garbage treatment is actually garbage transfer: from one state to another state, from one place to another place, from upstream to downstream, or from a place people can see it to a place too far away to see. The garbage problem became a problem only because people suddenly discovered that humans cannot put garbage outside human society.

In the age of a limited Earth, the garbage problem will become the most severe social problem, surpassing even the energy problem or food problem. Thus garbage is not a marginal issue, but a crucial one. In the future, wars may very well be caused, not as a result of plundering energy and resources, but for sending out garbage. In a sense, the Kyoto Protocol and the Copenhagen Climate Change Conference are global games of gaseous garbage emissions.

But what if future technology could imitate natural processes and result in a zero-waste system? Unfortunately, it's impossible. Biosphere 2 showed us why.

If industrial civilization is going to collapse in the near future, what should we do?

We are at a turning point of civilization. Humans have to find a new way of life and stop their harmful behaviors to nature. The solution that many have suggested is creating an “ecological civilization.” This is a positive term in China right now, even a political buzzword. But what does it mean when we talk about this?

“Ecological civilization” is a new ideological term in China that refers to a change of direction of society. With this slogan, the Chinese government moves away from the emphasis on economic development that began in the late 1970s. Instead, it builds on a national aim that started in the 2000s to promote “scientific development,” which prioritizes social justice and equality to create a “harmonious society.” Ecological civilization integrates aspects of the Western notion of “sustainable development,” but potentially has a broader meaning. Generally, it refers to a new kind of civilization that contrasts with “agricultural civilization” and “industrial civilization.”<sup>2</sup> However, there is no general agreement about the precise characteristics of this society or the framework for making it a reality.

### **Saving Ourselves through Science?**

The most prevailing and dominant version of ecological civilization in China regards it as a more advanced stage of industrial civilization that could be reached by improving industrial civilization or repairing its problems: replacing contemporary technology with “lower-carbon technology,” fossil fuel energy with “clean energy,” and the current wasteful economy with a “circular economy.” To some extent, zero waste is based on this idea: it suggests that humans could live sustainably and avoid an ecological crisis while still continuing their modern lifestyle.

This is accompanied by a specific understanding of science. Science or technology is a double-edged sword, but generally, the positive part is seen as the main one, and the negative parts are local, random, and temporary, and could and will be overcome by more advanced science and technology in the future. To solve the problems created by science, the argument goes, we must rely on science.

2 For more on this idea, see: James P. F. Oswald, “What Does Eco-civilisation 生态文明 Mean?,” *The China Story*, 4 September 2014, <https://www.thechinastory.org/2014/09/what-does-eco-civilisation-mean/>.

This vision of ecological civilization is highly dangerous. Einstein once said that you can't solve a problem using the method that caused the problem. Our attempt to do this is based on a misunderstanding of science and technology, a misunderstanding of the history of science, and a misunderstanding of human civilization. It provides a deceptive illusion of a good future that could cause us to waste the limited time left for humanity to save itself.

In fact, the negative parts of science are never fixed by new science. Generally, the more advanced science is, the greater its potential negative effect. As soon as the cumulative negative effects of science are greater than the positive ones, we would have to say that, generally speaking, science and its technology are harmful to human society and nature. And the harmful effects are not temporary, but long-lasting; not accidental, but determinate; not local, but global; not curable, but terminal.

This is because the primary role of institutional science and technology in industrial civilization is to increase capital, not to serve the needs of humans. The only science and technology that can be easily funded, developed, and applied is that which promises to make money and help the economy grow. Money has its own logic, and it tries to proliferate in the most effective way.

Science has not always been like this, however. From ancient Greece through the Middle Ages, science was a part of natural philosophy. During this period, the purpose of science was to explore the mysteries of nature, and to satisfy the human craving and curiosity for knowledge. Since industrial civilization started, the role of science and scientists has gradually changed. In industrial society, the scientific community is first an interest or profit community, then a knowledge community, but never a moral community. As an interest or profit community, the best policy for the scientific community is to ally with capital and political power. There are many interest groups promoting science and technology: GMOs, nuclear power, nanotechnology, and so on. Every group tries to apply higher and higher technology to society and nature. So there is an emergent task for society: to warn science, to establish an institutional system to prohibit science from harming society and nature.



## A Change of Direction

However, there is also an alternative understanding of ecological civilization, one which regards it as a totally different style of civilization. It is not a 180° turn, an attempt to backtrack or reverse course. We need to make a 90° turn: the beginning of a new path. It necessarily involves a comprehensive transformation of industrial civilization, including mainstream ideology, social structure, and lifestyles. The revolution of ideology is the basis for other changes.

What will this new civilization be? Since it is a new kind of civilization, nobody knows exactly what it will look like. But unlike industrial civilization, it will have to be sustainable. Humans have to learn how to make a life, a happy life on the one and only Earth and under the one and only sun—the simple fact that we only have one of each means that the resources and energy humans can use are limited.

Nowadays the ecological premise of overall human society has become difficult to achieve. Mankind has enough technical ability already. The pattern of human civilization needs to be adjusted; we need to abandon industrial civilization and build a brand new cultural mode. I suggest that there are two principles we should use to establish an ecological civilization.

Firstly, we need to reevaluate the current industrial civilization comprehensively and completely. We need to reimagine the aim of society and envision a standard for a better society. This requires examining our basic way of thinking, social structures, the economic and legal systems, the role of science and technology, and so forth.

Is economic growth necessary for a society? Social development treats economic activity as a measure of progress, and ultimately changes the overall system of human society. The need to obtain more material and resources from nature (and the accompanying increase in garbage discharge) threatens to destroy the ecological premise of civilized existence.

We could imagine a different kind of society: one in which the population is stable around a constant number and humans live a stable life by producing the same products every year, within a stable environment. Their happiness would not depend on having the newest iPhone model, but on spiritual creation, such as poems, painting, and music.

Secondly, we need to learn from ancient wisdom, from traditional cultures. Learning from traditions does not mean regressing to ancient times. Industrial civilization may be a single, homogenized form of society, but traditions are plural—they are different within different environments. Traditions are the only source of knowledge gained from generations of continuous practice that we could use for reference.

Time flows in only one direction, and the environments in which most traditional societies existed have been destroyed, so it's impossible to go back. So how about stopping instead? Stop development, stop the ideology of economic growth, and stop the update of iPhones? If people start to think about how to stop, they will naturally go more slowly. If more and more people think about how to stop, maybe humans could find a workable approach for saving human civilization.

This is why the idea of zero waste is useful after all. Although in practice it is an impossible ideal, it offers a good attempt to start saving human civilization. There are different kinds of zero-waste efforts. Some of them still pin their hopes on new science and technology; they try to promote eco-friendly technologies and make notable advances. But under the social structure of industrial civilization, such eco-friendly technology could only be used in certain idealistic communities, and it could not be applied to the whole of society, because such technology would not help capital to proliferate effectively.

Some people pin their hopes on so-called clean energy. They firmly believe that clean energy can either save industrial civilization or lead human society into ecological civilization. However, there is no energy that could be called clean. The key point is not what kind of energy, but how much energy we use. Any energy could be dirty if our usage exceeds a certain amount. Moreover, in industrial society, new energy technology is no more than a tool for capital's proliferation, a tool for new capital competing with the old. With regard to the second version of ecological civilization, establishing eco-friendly technologies and clean energy as the final aim is dangerous. But if we simply understand it as a temporary approach to explore a new kind of civilization, it is operable or workable. Similarly, zero waste should not be our final goal, but if we strive for it, it will be a great starting point and an operable approach that will lead us towards the larger goal of an ecological civilization.

Thanks to Yuan Gao for helping me check and edit the draft.

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Michael Braungart

## Learning to Celebrate Our Human Footprint

Over the last decades, people have tried to protect the environment by destroying less. Different methods are used to communicate the same message: shrink your ecological footprint by reducing your water consumption, energy use, and waste production. Traditionally, people think they are doing good if they are less bad. This approach does not lead to environmental protection; it is actually just minimizing damage. If I prevent my child from running into traffic only half of the time, I'm not really protecting my child. Following this logic, you can also claim that Poland during the Communist Era “protected” the environment much better than West Germany, merely because its industries were inefficient and poorly developed and thus did not manage to do as much damage.

For years this has been a basic premise of the environmental movement: we can only save the world if we choose lives of thriftiness—use less, reduce consumption, and minimize our ecological footprint. This design principle is based on four tenets:

- 1) It is impossible to have a positive impact on the environment; instead, all we can do is decrease our negative impact;
- 2) Environmental friendliness is incompatible with (economic) growth;
- 3) Waste cannot be eliminated; we can only try to reduce it;
- 4) Since we feel so guilty, we constantly have to make sacrifices in our daily lives—for the sake of sustainability.

In other words, traditional sustainability focuses on becoming more efficient and reducing use. This message is not at all attractive for business, politics, or society. Especially for companies and entrepreneurs it is rather difficult to communicate the “consume less” principle to their customers. Ironically enough, this negatively focused approach will not even save us and it creates no long-term answers to the root causes of today's challenges. Such an approach only adds suffocating layers of pessimism and gloominess to our society, through which we ultimately get stuck in a negative spiral. What humanity actually needs are narratives of hope and the encouragement of true innovations.

## **Green Living**

To give some examples of how absurd this attitude is: if we really think that the “less bad” philosophy will help, there are endless opportunities to employ it. Eating oysters, for example. Each oyster contains at least 1,500 microplastic particles; the more oysters you eat, the more plastic we get out of the plastic soup in the ocean. We can also minimize our carbon footprint by emptying our digestive system before we enter the airplane; when flying from Munich to New York, it would save five tonnes of jet fuel. Moreover, if people were to fly naked to go shopping in New York, we could even save another two tonnes. During your shopping spree in New York, you should always avoid the “healthy” stairs and only take the elevators in the shopping malls. Because if you are using the elevator, it takes five times less energy than the stairs. Since our perverse agricultural industry needs ten calories of energy to produce one calorie of food, it is far more environmentally friendly to use the low-calorie elevator.

Moreover, in our quest to be less bad for the environment, we have failed to consider all the effects of our “environmentally friendly” choices. You return from your eco-trip to your “passive house,” in which the air quality is about three to eight times worse than the urban outdoor air. Your house is sealed, but at least you are saving energy. Half of our buildings have mold problems and it is affecting our health; asthma is by far the most widespread children’s disease in Europe. We are trying to minimize the energy consumption, instead of first asking: “What is the right thing? How can we have healthy indoor air quality?”

## **The Impact of Wording**

Our current efforts to be “less bad” by reducing waste seem incredibly ineffective: Europeans have a lot of “unnecessary” waste because they have to feed their waste incinerators: 80 percent of the calorific value of municipal waste in Europe comes from paper and plastic. They call it euphemistically “waste to energy” or even “green energy” by burning more than 92 percent of the embodied energy. This keeps recycling rates low compared to the amount that we actually have the technological capability to recycle.

And even though the USA is home to a thriving second-hand culture, its citizens seem to be generally more prudish when it comes to recycling. It is notable that US Americans

have five times more one-way products than Europeans. As a matter of fact, in Europe we make a distinction between primary and secondary raw materials; Americans call the primary materials virgin materials. This dissimilarity in wording implicitly illustrates the socio-cultural view of materials and how to treat them. It makes much more sense to recycle primary materials instead of virgin materials, even though we're talking about the same substances.

Isn't it typical that humans are the only species on this planet who are generating waste—products which aren't biodegradable or cannot be reused for other purposes without losing their quality and value? Since the idea of waste is still so deeply ingrained in our daily life, it is challenging to move away from the concept. We can try and change the name of waste into “nutrients” to alter people's mindset, but even then, it is hardly something to capture the imagination.

### **Efficiency Will Not Save Us**

Nor is the solution to become more efficient. When I was a child, a cow produced 5,000 liters of milk a year. Today in the Netherlands, dairy cows produce up to 12,000 liters. Would it be right to squeeze another 1,000 liters out of this poor cow in order to reduce our methane emissions? Instead of continuing to try to improve a system that is broken, why not rethink our eating habits entirely? If we learned to base our diet on eating algae, mushrooms, and bacteria, we would have an elegant means of feeding the more than 50 billion people on the planet and safeguarding Earth's biodiversity without destroying other species. Moreover, if we learn to enter the food chain at that level, our protein intake is much healthier. From beef, you pick up only about 20 percent of the protein, whereas from algae it is more than 90 percent.

The latest policy trend is to become climate or carbon neutral; not only companies but even major cities like Copenhagen or Sydney are convinced that this is the way to stop global warming. What an extraordinary ambition: you can only be climate neutral when you do not exist at all. Have you ever seen a climate-neutral tree? Trees are always beneficial for the climate and their environment; they absorb carbon dioxide, produce oxygen, clean the air and generate food and shelter for living beings. Why is our only choice to be “less bad”? For being less bad, we are too many. Why can't we imitate the tree and try to be “good” instead?

Instead of trying to minimize our ecological footprint, we can celebrate our human footprint. In order to do so, we need to transform our footprint into a fertile wetland. When you are in Sweden or the north of Canada, each footprint means destruction; that is why we want to minimize our footprint. But when you walk along the Rhine or the Mississippi River, you are creating a small retention space. Your footprint means that the water stays longer in the meadow. Look at a cherry tree in the spring: no reduction, avoidance, or guilt management. The cherry tree is not efficient, but very effective.

### **Native to the Planet**

The way we live our lives is such a paradox. We are trying so hard to become efficient that it leads to bizarre production processes; at the same time, we romanticize nature because we are trying to compensate for having destroyed so much of the natural world. There are cultural reasons why we cannot see ourselves as native to the planet. This is why we feel so terrible about what we have done to our environment. Even if nature and human business can be made to work together, the approach is not fully effective. There is not one organic label in the whole global food industry that allows our own essential nutrients to be returned to the soil. Our organic agriculture, in other words, excludes us from the nutrient cycle. This is a critical point, because phosphorus is actually far more crucial for humans than, for example, oil. Without phosphorus we do not have any teeth or bones, and we cannot store energy in our bodies. Since phosphorus is essential for life, but we are afraid of using our own nutrients—feces—in agriculture, we have found a very primitive solution: phosphate mining that extracts phosphorus in a cumbersome manner and exposes us to much more radioactivity than is used in all the nuclear power plants of the world.

### **Cradle to Cradle**

Merely minimizing our footprint is simply not an option. Since green legislation is clearly so ineffective, a new approach is needed: we have to reinvent the whole system. We need to stop thinking about nature as our mother and feeling guilty about harming her. Let us not forget that the most toxic chemicals we know are those found in nature, as are the strongest carcinogens. Nature is not our mother; nature is our



teacher and partner. Nature would not make chemicals that accumulate in breast milk, because this leads to extinction.

We can learn from nature endlessly. We call this “Cradle to Cradle”: it is a world where everything is beneficial. In a Cradle to Cradle world, waste is just an indicator of bad design. When all materials are nutrients and everything is designed to become part of an ongoing biological or technical cycle, we can celebrate abundance. Instead of asking “Is there a future without waste?” it would be more appropriate to question the future of humankind if we don’t manage to banish waste.

### **Learn to Celebrate Life**

Cradle to Cradle enhances the quality and value of materials and products; they become beneficial for human health and nature while improving profitability. This approach helps us to become independent from scarce resources and raw materials. Cradle to Cradle aims to start material banks in which materials maintain their status as resources and can be used over and over. In this way, we will be freed from our current responsibility to reduce any negative environmental effects our behavior has.

In 1859 Charles Darwin had already discovered that human development is not about efficiency, but effectiveness: “In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed.” We can learn to celebrate human life again. When we are afraid, insecure, or have lost our sense of identity, it is easy to become greedy. But if people feel safe, accepted and valued, they can be warm-hearted and generous. This is the reason why it is so important to celebrate our human footprint—so that we can truly recognize and increase our positive impact on the planet. Instead of Al Gore’s global warning to fight overpopulation wherever we can, Cradle to Cradle has an alternative message for a newborn child: “Welcome to the planet. How wonderful that you are here!”



Herbert Köpnick

## Why Wait for the Future? There Could Be a Present Without Waste

### A Dream of the Future

I have a dream. The iPhone 10 has just been revealed. Apple's new product presentation is nearing its end. Just as it appears to be over, CEO Tim Cook utters the famous three words "One more thing," briefly pausing between each word, only further fueling the burning anticipation in the room. With these three words, Cook begins the reveal of not another new Apple product but of Apple's new and innovative business model.

*"Ladies and Gentlemen," Cook begins, "I present to you our new business model, 'Apple to Apple' (A2A). As you know, Apple has been dedicated to sustainability for many years, and now, with this new model, we are taking the decisive step towards creating a zero-waste economy.*

*Up until now, our mission has been to sell products to our customers. Now though, our mission is to sell you services. From now on, you get our products 'for use'—you don't have to buy them. We at Apple simply request that people return every single iPhone, iPad, and Mac when they are ready to replace it. This, we believe, is the only sustainable way to produce new and innovative electronic goods for centuries to come.*

*Our new business model is a win-win-win situation.*

*Winner number one: the consumer. Honestly, what do you plan to do with an obsolete mobile phone you no longer use? We all know how many of you have old iPhones in your drawer at home. But do you realize how many toxic materials are in that device, especially in the battery? Storing your old phones in a drawer is a bad idea. Someday you will clean out your drawers, though, and throw these old phones away, perhaps into your trash can. This, however, is another bad idea—the reusable materials in the phones will simply be burned and vanish into the ashes. We know it is not easy for you, the consumer, to dispose of electronic products safely, and this is why we are offering a new solution: the best, easiest way for you to get rid of your*

*old mobile phones is to return your old ones to us when you buy new ones. And not to worry—we at Apple guarantee full protection of your data.*

*Winner number two of this new business model: Apple, Inc. With this new business model, we will only have to buy the majority of the needed raw materials a single time rather than yearly, as we have been doing. Apple will be its own supplier of raw materials. No longer will we at Apple worry about the changing prices of the raw material markets—we will have a secure supply of scarce raw materials like gold, silver, and rare earths for a very long time.*

*And finally, winner number three of this business model: the environment. Obtaining one tonne of gold by recycling 40 million used mobile phones is not only much easier and cheaper than getting one tonne of primary gold out of the Earth; such a method is also much less harmful to workers and to the environment. We have the technology to recycle over 95 percent of the 15 precious metals that are in a mobile phone. By employing these techniques, we can extend the lives of finite resources as much as is physically and technically possible.*

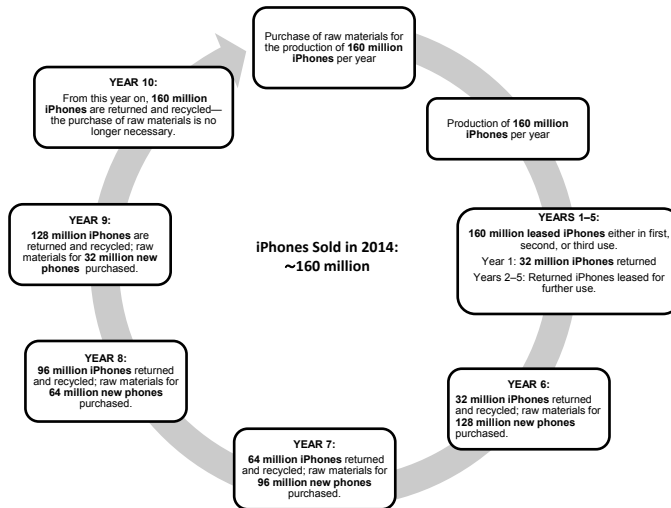
*We believe that you, our devoted customers, will understand and embrace our new A2A business model. And we hope that, just as in the past with smartphones and tablets, our competitors will follow Apple's example.*

*"Ladies and Gentlemen," Cook concludes, "let's start the new Apple era together, today."*

### **Awakening from the Dream**

Why are mobile phone companies sawing off the branch that they themselves are sitting on by using primary raw materials to produce two billion mobile phones every year—a figure that continues to increase? Why do they still pay so little attention to the dwindling supply of these resources in the long run? While I admire the innovative power of Apple, Samsung, and more recently Huawei in producing smartphones, I question their lack of attention to the waste issue their commodities create.

## The “I Have an Apple Dream” Circuit in Numbers



Some goods manufactured according to the C2C model have already proved successful with consumers; one could list, for example, several brands of cleaning supplies, biodegradable and reusable building materials such as carpeting, flooring, and tiling, and recyclable office chair designs.<sup>1</sup> I believe that consumers would embrace this model in the mobile phone industry as well. Our society is moving towards a sharing economy: an economy that emphasizes the sharing of used goods instead of ownership. We replace our mobile phones an average of every 18 months—they are clearly products that do not need to be owned forever. By changing the ways we dispose of them, we will be much closer to achieving a zero-waste economy.

I hope my dream of Apple’s “one more thing”—its new business model—will convince you that a zero-waste economy—a circular economy—can be possible today if market players, producers, network operators, traders, and consumers act intelligently and sustainably in cooperation with each other. Let’s start this new era today.

If I couldn’t convince you, I’m curious about your thoughts—let’s start a dialogue.

<sup>1</sup> For some examples see Cradle to Cradle Products Innovation Institute, “2013 Innovation Stories,” [http://assets.c2ccertified.org/pdf/Interactive\\_Innovations\\_Stories.pdf](http://assets.c2ccertified.org/pdf/Interactive_Innovations_Stories.pdf).

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## Lessons





Zsuzsa Gille

### **Waste Utopias: Lessons from Socialist Europe for the Twenty-First Century**

Many corporations and governments—at all scales, local, regional, national, and supra-national—have agreed on implementing or have already implemented a zero-waste plan. What they mean by a goal of zero waste varies. What unifies them, however, is an implicit assumption that this is an objective never tried before. Even if these zero-waste plans or other analyses of them acknowledge the wartime recycling efforts of national governments, they claim that current projects are novel due to their much broader scope. However, not only is there in fact a historical antecedent to contemporary zero-waste programs, but experiences of their implementation can offer lessons for us today.

The historical analogy to zero-waste programs proffered in contemporary societies of the Global North I have in mind is the centrally planned economies of mid-twentieth century Europe; in this case, the specific example of socialist Hungary from the early 1950s to the 1970s. That social experiment, while not flawless and originally not framed in environmental terms, did share some of the progressive elements of contemporary zero-waste efforts.

It has long been argued that centrally planned economies were systemically wasteful. This is well documented by their records of material and energy intensities and their waste/GDP quotas, which were significantly higher than equivalent Western indicators. Despite this reputation, there is overwhelming evidence that an elaborate system of waste registration, collection, distribution, and reuse—and, to a lesser extent, reduction—had already taken root during the Stalinist years of state socialism. A piece of Hungarian propaganda material in 1951, according to which “there’s no such thing as waste,” aptly captures the mentality underlying these efforts, and will sound familiar to us today in the midst of our proliferating zero-waste programs.

In central planning, each individual and even each and every nail was accounted for and could be utilized only according to its function as prescribed by the plans. Production wastes were no exception and thus quotas were also introduced for by-products. Other waste-reduction tasks, however, emanated from conditions of scarcity. Planners

designed and established several institutions dealing with waste. Extensive legislation prescribed to state enterprises how to record industrial by-products and what do with them, and the various organs of the state made sure that these were then redistributed and reused or recycled in a way that helped plan fulfillment the most. (Between 1950 and 1959, 34 central regulations on the collection, storage, delivery, and price of waste materials were issued.) Material conservation and waste recuperation were, however, not left only to institutions, administrators, and laws. Waste also became a key issue around which the public was mobilized. Numerous campaigns, organized either by the main waste collection company (MEH) or various party organs, aimed at collecting wastes and/or reusing them in factories, in agricultural co-operatives, in schools, and in districts of cities and villages. Metal-collecting weeks were organized; brigades dedicating themselves to waste reduction and reuse, waste-collecting stewards, and youth and female troops mushroomed and busied themselves, mostly after regular working hours. The culmination of these campaigns was the *Gazda* movement, which, unlike recycling, gave priority to reusing waste materials in their original materiality without chemical or substantial mechanical transformation.

Claims about the movement, such as “there are thousands of ways and possibilities to re-use wastes” and “here ingenuity and creativity are given a free rein,” indicate not just the expectations encouraging this apparently “from-below” initiative, but also the perceived lack of limits to waste reuse. Clearly, the early socialist waste discourse treated waste as a useful material—what’s more, a multi-purpose, pliable material—and as something not to be displaced from the sphere of production but rather to be reintegrated into it again and again. Anthropologist Mary Douglas defines dirt (and by implication trash) as “matter out of place”—that is, for her it is not the material but where it is that causes us to see something as dirty or useless. In contrast, in socialist Hungary waste was seen as always useful and valuable, and as such as a material that must be meticulously registered, collected, redistributed, and reused.

Such waste collection and waste reuse campaigns were much more popular than the other movements the party devised for (over)fulfilling the plan because they resonated with people’s own experiences of scarcity during the war and thus their appreciation of thriftiness and reusing practices. However, like other party initiatives, these campaigns and efforts still suffered from problems that were partly rooted in systemic features of central planning. At the same time, some of the shortcomings of waste reuse campaigns express

more general difficulties that go beyond the specificity of a country or even socialist societies as a whole. Four of them appear to plague currently existing zero-waste policies and projects as well.

First, there is in any zero-waste project, or really in any alternative production, an assumed but largely invisible “Other,” a shadow side without which the program could not work at all. In state socialism, while state-owned industrial enterprises comprised the key arena for waste collection, they were not always the primary locus of reuse or recycling. They mostly maintained control over the recycling of valuable wastes, such as metal. However, in the case of waste materials that were harder to reintegrate into production, the Party designated the residual private and cooperative sector, i.e., the sectors with no significant role in industrial production, to find possible reuses. In today’s zero-waste projects I see two similar shadow sides emerging. One is a reliance on sub-contractors, often in other countries, that “take care” of the part of the production process that just cannot be made zero waste, either because of the technological difficulties or the costs. Another Other is the vast sector of the economy that has not implemented or even declared the necessity of a zero-waste plan. Its presence is relevant especially for corporations that see the main benefit of going zero-waste in the marketing advantage that is earned by an improvement in their image, or what a CEO calls the goodwill of the public. Once everyone crosses over to the zero-waste side, this advantage will disappear, and the profitability of such schemes will be undermined.

Second, just like in state socialism where metal scrap in particular was treated as always and infinitely recyclable, there is a tendency today to promise full recyclability, hence the term “zero waste.” The key obstacle to zero-waste technologies, as current examples suggest and as most experts admit, is the mixing of different materialities and the increasing complexity of waste materials. Since full reuse and recyclability depends on the ability to select and separate different materials, zero-waste projects are exceedingly difficult and costly. In such cases prevention is the best course of action; that is, avoiding using compounds or certain combinations of them that require such implausible recycling technologies. Prevention, however, is currently barely mentioned in the zero-waste plans. Furthermore, the stories told about companies that have found new uses for waste perpetuate a belief in an eventual technical fix, which, in turn, may produce the same unintended negative consequences that the metallic waste model did in state socialist Hungary. There, within a year of the implementation of waste quotas and requirements to reuse waste, a

counterproductive attitude emerged—in the words of the worker hero of the waste reuse movement: “It does not matter if I produce rejects, since the spoiled product after some modification can still be reused.”

A third negative aspect of the Hungarian waste reuse and recycling campaigns was the Party’s instrumental use of them as yet another disciplinary regime in the factory. Although waste reuse campaigns were relatively popular, the waste quotas meant yet another requirement employees had to meet; the pressure to work after hours to collect waste and to come up with innovative ways to reuse it ultimately added up to more burden on workers with little or no compensation. Industries that used irreversible processes to produce materials (rather than products in the form of discrete items or units) were less able to implement waste reuse programs, and employees resisted the pressure to pledge such savings through material conservation and reuse. In my review of various industrial ecology programs implemented in multinational corporations in the 1980s and 1990s I noticed a similar mobilization of employees: just like workers in central planning, workers in many corporations were compelled to participate in different competitions. Little is said about employees for whom such participation is not a matter of choice (for example because of the particular job description, shift, or post they have) or about whether they will share in the profits resulting from the savings their company makes from reducing its wastes. In a video tutorial for construction and demolition companies, workers are asked to tell the foreman if they notice that wastes have not been placed in the bins designated for selective waste collection. This presumes that workers actually feel comfortable to point out a problem to their supervisors—which, as studies in the sociology of labor suggest, is rarely the case.

Municipal zero-waste programs, just like the 1950s Communist Party, rely on the volunteer and unpaid work of citizens to selectively collect waste and carry it to the proper facilities. At the municipal level, another concern is with the increased burden recycling means for female members of the household and for domestic servants, who also tend to be female. Valeria Bonatti, for example, finds that her informants, immigrant maids in Italy, take the recycling out of the homes where they work, but the selective waste collection stations are so out of their way (and they have no cars) that they just throw it out in the trash bins. Let us notice the similarities of the ideological effects of such mass mobilization in state socialism and in today’s most developed countries: it perpetuates the idea that a small individual act can add up and make a difference and gives people the impression that a lot is already

being done to deal with a serious problem. This is what Samantha MacBride calls “business” in her discussion of waste policies and recycling practices in the US.

Finally, we need to ask what distribution or redistribution is implied in zero-waste plans. In state socialism, where there was no nominal market, the state assumed the role of waste collector and redistributor; however, the oversupply of by-products did create bottlenecks, for example, in paper, so the state ended up exporting paper waste without ever stopping or slowing down its paper waste collection rhetoric and campaigns (which primarily mobilized school children). Catherine Alexander also mentions the problem of recycling textiles into unneeded and low-quality blankets, and we have ample evidence that market prices for recyclates strongly influence sustainability policy outcomes. This suggests the need for a macro-level coordination of waste reuse and recycling, especially for overproduced by-products or overproduced recycled goods, and for industry-to-industry exchange of by-products. In the absence of such a coordinating body, connecting waste producers to waste reusers is haphazard, bordering on the illegal, and energy intensive.. Furthermore, the dirty and unsafe labor of getting wastes where they are needed is obscured.

## Conclusion

As with all utopias, we need to ask what is bracketed out of the main frame of an ideal situation or society and what unseen and unseemly infrastructure is necessary for making that utopia a reality. As we deliberate on how not to have any waste at all, we must also ask: who decides what social cost is not too high for achieving zero-waste cities and companies, or indeed whether these costs are even admissible in the first place? As I showed, in socialist Hungary the materiality and the additional burden imposed on workers and the cooperative sector were ignored, and as a result not only were the utopian goals unfulfilled but reuse and recycling also came to be discredited in the eyes of the public.

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Carl A. Zimring

## Upcycling in History: Is the Past a Prologue to a Zero-Waste Future? The Case of Aluminum

Over the last two decades, upcycling—the creation of new goods from salvaged ones in a way that increases the value of the material—has become a trendy and environmentally conscious form of design. Contemporary upcycling efforts range greatly in scale and kind. Artisans tout their refashioning of old license plates into book covers as upcycling. Industrial designer Boris Bally's work includes chairs and plates fashioned from aluminum street signs. Bally does not remove the paint from the designs, so users can identify the metal's previous use easily before they sit in the chair. Aspiring to be “the ultimate urban alchemist,” Bally stated in 2014: “Making something people value from something they have discarded is the *ultimate* challenge. It's getting them to pay big bucks for your design made of their own discards.”<sup>1</sup>

This work represents a bridge between trained designers working in formal markets and informal reuse of scrap materials in activities that increase the cultural and economic value of the work. This work goes on throughout the world, adding complexity to our understandings of the uses of modern materials. For example, artisans in West Africa incorporate scrap aluminum into cast aluminum cooking pots and utensils.<sup>2</sup>

Of late, however, the term upcycling has become associated with activities on a larger industrial scale, for example, as detailed in architect William McDonough and chemist Michael Braungart's 2013 book *The Upcycle: Beyond Sustainability, Designing for Abundance*. In it, McDonough and Braungart describe how all industrial production should be reconceived to increase value from existing materials with the ultimate goal to never cast any material from manufacture into sinks and to never create toxic wastes. The allure of upcycling to attack environmental problems associated with waste has made its way from artisan producers like Bally to large corporations. The giant shoe company Adidas announced a collaboration with designer Cyrill Gutsch's firm Parley in 2015 to produce a sneaker with, as the press release declared, “a shoe upper made entirely of yarns and

1 Sarah Marchant, “Interview with Industrial Designer Boris Bally,” *Goedeker's Home Life*, 29 January 2014, <http://www.goedekers.com/blog/interview-with-industrial-designer-boris-bally/>.

2 Emily Lynn Osborn, “Casting Aluminium Cooking Pots: Labour, Migration and Artisan Production in West Africa's Informal Sector, 1945–2005,” *African Identities* 7, no. 3 (2009): 373–86.

filaments reclaimed and recycled from ocean waste and illegal deep-sea gillnets.”<sup>3</sup> Parley seeks to find design solutions for the problem of plastic ocean pollution. In speaking of these efforts, Ocean Revolution founder Wallace J. Nichols argued: “Humans adapt. And one of the ways they’re adapting is by turning this mess into other new products. They’re doing science, they’re doing research, they’re communicating and they’re being creative. That’s what we do—that’s what we humans do so well.”<sup>4</sup>

Upcycling represents hope for responsible industrial production. The artisanal model of handmade goods differs in scale and process from Patagonia’s mass-production of fleece or Adidas’s attempts to turn plastics found in the oceans into shoes. The material Patagonia and Adidas use is unrecognizable from its previous incarnation, lacking the shape and branding of its old body or bodies.

Industrial approaches to upcycling include the clothing company Patagonia touting its conversion of PET bottles into polar fleece; the industry trade group Keep America Beautiful (KAB) uses similar rhetoric in its advertising, showing a plastic bottle declaring “I want to be recycled” into various goods ranging from a hairbrush to a park bench. Furniture designers such as Norman Foster advertise their use of secondary aluminum as chairs and tables as upcycling. And fashion designers such as Nathan Zhang identify their use of used denim jeans to create capes that sell for US\$400 as upcycling.<sup>5</sup>

However, although this term for eliminating waste by repurposing still-usable materials is often seen as innovative, in fact the act of manufacturing goods of higher value than the post-consumer or post-industrial material that comprise them has a long history.

Much as the history of recycling delves further back into the past than the advent of curbside collection programs in the environmental era, the history of upcycling should encompass the methods and goals of manufacturers employing post-consumer and post-industrial materials throughout industrial history. This lens illuminates how and why industries have reused materials with greater considerations of value and intention.

3 Ann Binlot, “Adidas and Parley Team Up for Sneakers Made from Recycled Ocean Waste,” *Forbes*, 30 June 2015, <http://www.forbes.com/sites/abinlot/2015/06/30/adidas-and-parley-team-up-for-sneakers-made-from-recycled-ocean-waste/>.

4 “Ocean Plastic: Seeing Opportunity in Waste,” Parley website, 23 April 2015, <http://www.parley.tv/updates/2015/4/20/ocean-plastic-seeing-opportunity-in-waste/>.

5 David Gianatasio, “Bottles and Cans Plead to Be Recycled in New Ads for Keep America Beautiful,” *Adweek*, 19 July 2013, <http://www.adweek.com/adfreak/bottles-and-cans-plead-be-recycled-new-ads-keep-america-beautiful-151303/>.



Such an approach may lead to reappraisals of the automobile made from disused railways, the skyscraper made from demolished buildings, and even the mass-produced book made from rags. It may lead to philosophical debates on the values inherent in transforming plowshares into swords and vice versa. One way this history might be told uses a material largely employed since the mid-twentieth century: aluminum.

### The Case of Aluminum

Aluminum is a useful case study as it became a part of the waste stream in the middle of the twentieth century, and recycling aluminum has both environmental and economic benefits when compared to smelting virgin aluminum. Furthermore, aluminum has been, in different applications, derided as ersatz and celebrated as modern.

Nineteenth-century designers valued aluminum for its durability and lightness, yet the energy requirements of smelting aluminum from bauxite prevented widespread use of the metal. The mass production of virgin aluminum during World War II created an abundance of the metal in the United States and Europe. Between 1940 and 1960, aluminum use spread from aviation to beverage containers and siding for housing. The metal gained a reputation as ersatz, cheap, and disposable, despite the environmental toll inherent in its creation.

To mitigate criticism of aluminum as potential litter, the Aloca Corporation and beverage distributors touted the metal's potential for reuse and recycling. Salvage campaigns during and after World War II evolved into eco-friendly recycling campaigns, culminating in the Keep America Beautiful campaign of the 1970s. The industry's efforts raised awareness among designers that salvaged aluminum was both durable and economically more affordable than virgin aluminum.<sup>6</sup> By 1950, scrap comprised about one-third of all aluminum used in production in the United States; ten years later, scrap comprised more than half of domestic production, and in recent years the proportion of scrap in aluminum production has ranged between 55 and 60 percent. Recycling is the primary source of aluminum in the US.<sup>7</sup> Much of this is used to fashion new soda and beer cans,

6 Bartow J. Elmore, "The American Beverage Industry and the Development of Curbside Recycling Programs, 1950–2000," *Business History Review* 86 (2012): 477–501.

7 T. D. Kelly and G. R. Matos, comps., *Historical Statistics for Mineral and Material Commodities in the United States*: US Geological Survey Data Series 140, accessed 10 March 2013, <http://pubs.usgs.gov/ds/2005/140/>.

an activity that at best can be described as static in value and (as McDonough and Braungart noted) risks downcycling the metal and creating pollutants.

But recycling cans is only one of the many uses of secondary aluminum. Between 1950 and the present, designers have also salvaged the material in new designs of vehicles, furniture, and musical instruments. A few brief comments on each follow.

Transportation inspired the mass production of aluminum in World War II, as the material allowed for faster fighters and larger bombers, such as Boeing's B-52.<sup>8</sup> After the war, commercial and military aircraft manufacturers refined aluminum alloys, with prompt post-industrial scrap used in the manufacture of new aircraft such as the DC-9 and 707 (and later, larger jets, including the 747). In addition, European automobile manufacturers, including Porsche, Aston Martin, BMW, Mercedes, and Ferrari, used aluminum for the bodies of racing cars during the 1950s and 1960s, enhancing the reputation of the metal in sleek, aerodynamic designs.<sup>9</sup>

Before aluminum became more accessible after World War II, designers in Europe and the United States coveted the material for its malleability but designs were limited by cost and scarcity of the metal. After the war, Alcoa worked with manufacturers such as the furniture producer Herman Miller to incorporate the suddenly abundant material into modernist designs. Herman Miller contracted several designers to work with aluminum, most famously Charles and Ray Eames.

For Charles and Ray Eames, the ecological benefits of recycling aluminum were less significant than its materiality. A durable, malleable, yet light metal allowed the construction of minimal frames that could be easily mass-produced. Recycled aluminum made the designs more affordable, allowing Eames furniture to find homes on patios, in living rooms, in offices, and even in airport lounges, where the chairs were valued as being lightweight, stylish, comfortable, and incredibly robust.

8 Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking, 1986); Eric Schatzberg, "Symbolic Culture and Technological Change: The Cultural History of Aluminum as an Industrial Material," *Enterprise and Society* 4, no. 2 (2003): 226–71.

9 Hermann E. Burst and Erich W. Strehler, *The Use of Aluminum in the Porsche 928* (Warrendale, PA: Society of Automotive Engineers, 1978); K. M. Loasby, *The Use and Manipulation of Aluminum in Aston Martin and Lagonda Cars* (Warrendale, PA: Society of Automotive Engineers, 1978).

The Aluminum Group furniture was part of a larger context of acclaimed design for mass production, and the furniture they designed for Herman Miller after 1958 influenced a wave of furniture and appliance design with the metal. Herman Miller continues to sell Eames furniture more than half a century later, with prices for new Aluminum Group chairs ranging from several hundred to several thousand dollars.

In the half century since, aluminum has become a structuring material for furniture from designers from all over the world, including Philippe Starck of Paris, Norman Foster of London (whose 20-06 chair for Emeco, he emphasizes, is made of 80 percent recycled aluminum), Joris Laarman of Amsterdam, and the late Charles Pollock of Brooklyn. If the language Norman Foster uses now explicitly references upcycling, his material use echoes what the Eameses did 50 years earlier.<sup>10</sup>

Guitar luthiers recognized the durability and resonance of aluminum as early as 1928. Luthiers known specifically for working with aluminum became more prominent between 1950 and 1975, bolstered both by lower prices and the abundance of aviation-grade alloys. Three pioneers of the aluminum-necked guitar, Wandre Pioli of Italy and Travis Bean and John Veleno of the United States, fashioned high-performance instruments at the request of musicians such as Jerry Garcia, Keith Richards, and Todd Rundgren.

Musicians appreciated the extended sustain of notes on an aluminum neck and the guitars' relative indestructability compared to wooden instruments. The instruments have appreciated in value; a Travis Bean guitar once cost about US\$400; today, the guitars sell on eBay for between US\$3,000 and US\$10,000 apiece. While scarcity and antique pricing may account for some of the appreciation of these now-discontinued instruments, other designers continue to manufacture aluminum instruments.

### **Sustainable Design in a Historical Perspective**

In each of these applications, the specific material properties and economic context of aluminum shaped particular design decisions and applications. While much of the use discussed predates the term upcycling and even the ecological ethos to use the materi-

<sup>10</sup> Marcus Fairs, *Green Design: Creative Sustainable Designs for the Twenty-First Century* (Berkeley, CA: North Atlantic Books, 2009), 71–75.

als, the applications of secondary aluminum by Charles and Ray Eames in the 1950s and John Veleno and Travis Bean in the 1970s is effectively the same as the consciously green design uses of aluminum by Norman Foster in the early twenty-first century. The Eames chairs may not have undergone a comprehensive life-cycle assessment to assess savings of water and energy in the construction and use of Aluminum Group chairs, although these factors were implicit in the affordability of secondary aluminum that Herman Miller used to mass-produce the designs.

The environmental consequences of recycling aluminum are also instructive. Fashioning aluminum from secondary sources represents a 95 percent energy saving compared to smelting aluminum from bauxite. This energy saving, along with reducing landfill volume, represents much of the case for recycling as an environmentally responsible activity. Yet concerns about pollution from this industrial process exist. Although recycling aluminum presents significant energy savings over producing virgin aluminum, energy is still required, and the process creates both solid and gaseous toxins, including dross (or salt cake), dioxins, and furans. Although recycling this highly malleable material has many benefits, the process is not a completely closed loop. This is true of the aluminum employed in Eames furniture a half century ago and remains true of the aluminum used in Norman Foster's designs in the twenty-first century.

The case of aluminum shows that historians can deepen our analysis of one of the environmental claims for recycling. Does upcycling secondary material promote circular material flows or turning salvaged materials into durables? Toxic byproducts reveal important limitations on circular material flows, but the claim of diverting materials from solid waste disposal invites scrutiny of producing high-value goods as a means of reducing waste. The examples in this paper indicate success at creating durable goods, as the designs are kept or sold decades after their manufacture. (One contrast is Apple's use of aluminum in the bodies of its laptop computers. Though expensive and highly-valued, these machines are subject to technological obsolescence and Apple's use of aluminum is in part intended to allow for recycling of the machines when they are deemed too slow for use.) Creating goods of durable value removes them from the waste stream, but also removes them from a circular flow of materials. This may affect the intentions of designers to design for immortality rather than disassembly, and if we define upcycling as creating goods of greater worth from salvaged materials, such intent is consistent with that definition.

Aluminum, then, represents an important historical example of upcycling. It also invites us to see the limits of applying the term to the wide variety of materials championed as possibilities for upcycling, including paperstock, glass, and especially polymers. This is important, as claims for upcycling of such materials conflict with historical utility of these materials. Unlike aluminum, plastics have a low recycling rate in industrial society. The current debate over upcycling polyvinyl chloride (PVC), polyethylene terephthalate (PET), and other plastics is a contentious one, with concerns including limitations due to contamination, tendency of recycling materials to downgrade, and emissions of toxins (including endocrine disruptors and carcinogens) from manipulating the materials.<sup>11</sup>

The word *upcycling* today has power to affect design strategies and waste management policies. In addition to McDonough and Braungart's expansive use of the word, the Product Policy Institute, founded in 2003 to advocate public policies to encourage waste prevention, clean production, and reduce use of toxics in products, renamed itself UPSTREAM to place the concept at the center of its advocacy efforts. The organization is engaged in a contentious debate with critics of zero waste about how extended producer responsibility factors into design with plastics and their eventual disposal or reuse. Life cycle assessments are crucial to evaluating this material reuse, but so is the demonstrated history of transforming—or failing to transform—secondary materials into goods of enduring value. This modest look at aluminum's history is one way to historicize our understanding of upcycling, and I offer it to encourage zero-waste advocates to inform their work with awareness of the historical applications of recovered materials. Such an assessment will better allow designers and policymakers to devise effective zero-waste strategies in the future.

11 Samantha MacBride, *Recycling Reconsidered: The Present Failure and Future Promise of Environmental Action in the United States* (Cambridge, MA: MIT Press, 2011); Max Liboiron, "Redefining Pollution: Plastics in the Wild" (PhD diss., New York University, 2012).

**Further Reading:**

Recent studies of sustainable design strategies include Hartmut Esslinger, *Design Forward: Creative Strategies for Sustainable Change* (Stuttgart: Arnoldsche Art Publishers, 2012); and Philip White, Louise St. Pierre, and Steve Belletire, *Okala Practitioner: Integrating Ecological Design* (Phoenix, AZ: Okala Team, 2013).

Studies on the history of salvage, recycling, and material reuse include Susan Strasser, *Waste and Want: A Social History of Trash* (New York: Henry Holt, 1999); Carl A. Zimring, *Cash for Your Trash: Scrap Recycling in America* (New Brunswick, NJ: Rutgers University Press, 2005); and Finn Arne Jørgensen, *Making a Green Machine: The Infrastructure of Beverage Container Recycling* (New Brunswick, NJ: Rutgers University Press, 2011).

On the history of aluminum production and use, see George David Smith, *From Monopoly to Competition: The Transformations of Alcoa, 1888–1986* (New York: Cambridge University Press, 1988); and Mimi Sheller, *Aluminum Dreams: The Making of Light Modernity* (Cambridge, MA: MIT Press, 2014).

On mid-century modern designers use of aluminum, see Sarah C. Nichols, Elizabeth R. Argo, Elizabeth Teller, and Paola Antonelli, *Aluminum by Design* (Pittsburgh, PA: Carnegie Museum of Art, 2000); and Marilyn Neuhart and John Neuhart, *The Story of Eames Furniture* (Berlin: Gestalten, 2010).

## Transitions





Jutta Gutberlet

## Ways Out of the Waste Dilemma: Transforming Communities in the Global South

Is there a future without waste? I argue that the only way there will be a future is if we work towards achieving a culture of zero waste in production and consumption. Zero waste requires transforming infrastructures and policies, but also education, training, and ongoing research. This essay considers the conditions needed in order to dramatically change our habits and bring about a culture of zero waste. Above all, more than technological solutions, it requires a society-wide shift in governance, values, norms, and behavior. In fact, some of the most innovative ideas and solutions for eliminating waste can be found, not in wealthy industrialized countries (where, after all, we have little immediate motivation to reduce waste in a society where new products seem endlessly abundant and where neoliberal politics reinforces consumption oriented growth), but in the Global South. India's and Brazil's organized informal recycling sectors, for example, can become an inspiration to change current unsustainable waste management methods and policies. These cases demonstrate how processes such as conscientization and community-based initiatives can be effective in practice.

### The Waste Dilemma

There is a connection between an increase in solid waste production and a rise in gross domestic product. Data from the EU15, the OECD, and North America, for example, demonstrate a per capita increase in municipal waste production of 54 percent, 35 percent, and 29 percent, respectively, between 1980 and 2005.<sup>1</sup> We have an unprecedented waste dilemma in terms of the quantity, diversity, and toxicity of materials produced and discarded every day and everywhere, resulting in an unparalleled environmental crisis.

Waste is the epitomized result of major ongoing negative human impacts and the current economic paradigm based on unlimited growth. An increasing number of scientists now believe that humanity has driven the world into a new geological epoch,

<sup>1</sup> Magnus Sjöströma and Göran Östblom, "Decoupling Waste Generation from Economic Growth—A CGE Analysis of the Swedish Case," *Ecological Economics* 69, no. 7 (2010): 1545–52.

the Anthropocene. The expansion of human populations and the unlimited extraction of the Earth's resources, they argue, are generating alarming environmental impacts. Production, consumption, and waste disposal are at the heart of these transforming forces that are changing the planet in countless, problematic ways.<sup>2</sup>



Figure 1:  
Waste pickers at the  
landfill Gramacho  
in Rio de Janeiro,  
Brazil (courtesy of  
the author).

Waste has many facets and encompasses different and sometimes conflicting rationalities. Objects made of natural resources and transformed through industrial processes can become threats to health and sustainability once discarded, as well as having an aesthetic impact on our wellbeing. At the same time these objects and materials become resources to those who collect, separate, transform, or sell them. Local governments must make challenging decisions about how to best deal with the growing amounts of waste. Often residents end up living in crisis situations due to a temporary breakdown in or a permanent lack of household waste collection. In many countries, large numbers of waste pickers still work on and around landfills. And because this work is informal and unregulated, city administrations rarely arrange for safer working conditions (figures 1 and 2). Society at large still fails to adequately reintegrate wastes into production processes, while re-

2 Noel Castree, "The Anthropocene and Geography I: The Back Story," *Geography Compass* 8 (2004): 436–49.



**Figure 2:**  
Organized recycling  
in the cooperative Coopercata in  
Mauá, Brazil (courtesy of the author).

source extraction continues at full steam. These problematic realities obviously require more comprehensive solutions.

Today geoengineering is still the focus in discourses about how to manage waste, while social and political facets of waste are often deemed irrelevant. Large corporations seem to be the brokers in waste management, and from their perspective more waste means more profit. Private corporations frequently replace local entrepreneurial and informal waste management services when cities undertake modernization projects.<sup>3</sup> Waste incineration technology can create an overcapacity that requires growing amounts of waste, sometimes transported over large distances, and expensive incineration technologies lock cities into long-term commitments for managing municipal waste. These measures generate impacts on recycling markets and waste treatment prices, besides producing intricate social and environmental consequences.

### **A Change in Culture for Zero Waste**

Zero waste is more than waste diversion through recycling. Zero waste encompasses a paradigm shift away from unsustainable consumerism and discard-oriented production

<sup>3</sup> María José Zapata Campos and Michael Hall, eds., *Organising Waste in the City: International Perspectives on Narratives and Practices* (Bristol: The Policy Press, 2013).

and consumption patterns. It embodies a radical political change away from a focus on using industrial and technological innovations to solve citizens' waste management needs, and towards framing waste in the context of issues such as overconsumption and economic growth.

Those who work with waste know that waste is a relative term: one person's waste is another person's livelihood or profit. Similarly, waste is not the final stage in the life cycle of any object. Landfilling or incinerating puts waste out of sight, but in the end, materials decompose and are transformed into other substances, including toxic leachate, air pollutants, or microscopic forms of contaminants such as microplastics that accumulate in our waterways and eventually in the oceans.

Challenging the status quo in development means disrupting business as usual, breaking off the growth-oriented myths about unlimited resources and ever-growing economies. Zero waste comes in tandem with degrowth<sup>4</sup> approaches to economy and development, where smaller amounts of resources are to be used more efficiently to result in a better life. Degrowth challenges the understanding of economic growth as ultimate status and a maximum achievement.<sup>5</sup> Slowing down also requires a philosophical approach in which "less means more" and "enough is enough," ultimately also translating into reduced consumption and less generation of unwanted outcomes. The new values and norms deriving from this innovative and inclusive, heterodox social construct put social and environmental justice and solidarity at the forefront.<sup>6</sup>

### Conscientization for Zero Waste

The zero-waste paradigm implies expanding human awareness in the sense of Paulo Freire's "conscientization," which generates consequent responsible actions.<sup>7</sup> The process of developing a critical awareness of one's social and environmental reality evolves

4 The term degrowth is becoming a common term for (planned) reduction in economic output. See: Tim Jackson, "Confronting Structure," in *Prosperity without Growth? The Transition to a Sustainable Economy* (Surrey: Sustainable Development Commission, 2009), 59–66.

5 Valérie Fournier, "Escaping from the Economy: The Politics of Degrowth," *International Journal of Sociology and Social Policy* 28, nos. 11–12 (2008): 528–45.

6 Frank Moulaert and Oana Ailenei, "Social Economy, Third Sector and Solidarity Relations: A Conceptual Synthesis from History to Present," *Urban Studies* 42, no. 11 (2005): 2037–53.

7 Paulo Freire, *Pedagogy of the Oppressed* (London: Penguin, 1972).

through reflection and concomitant action. Communications that activate social norms can be effective in producing beneficial society-wide behaviors. Objection and action are the ingredients needed to address the current power hegemonies that created our waste dilemma in the first place.

The current linear economic development model is still mainly based on resource abundance, modernization, and technological fixes. These deceptions, which of course suit those with political and economic interests and power, still widely dominate our world-views and corrupt the lifestyles of people still cocooned in the consumption bubble.

Critical reflection alone may not provoke change. Besides a better understanding of the facts and processes that shape current developments and social relations, we need actions to generate the politics and civil responsibility to reduce the negative impacts on our planet. These actions include conscious lifestyle changes, for example, using alternatives to fossil-fuel-powered transportation, or consuming more responsibly and wasting less. However, the actions also need to happen on a government level: for example, rewarding low-carbon choices and penalizing wasteful behaviors, installing safe bike lanes and enabling low-cost access to bicycles and public transportation, stimulating circular economy initiatives, exercising participatory deliberation in decision-making, and questioning why we generate so much waste.

Aiming for reduction (“less is more”), sufficiency, and solidarity can also be nurtured by resetting values and social norms to promote cultural changes that value environmental integrity and diverse forms of sustainable development. In practice, these can guide innovations to do more than just divert waste through recycling, but instead tackle sources of waste before they need to be managed.

Once established, these values can be supported by and communicated via creative and inclusive strategies of social dialogue (education, public events, cultural activities, social media, art and performance, etc.). Through active participation, information becomes meaningful knowledge and has the potential to travel quickly. Over time, actively disseminated and reinforced new social values become norms that have the potential to result in behavioral and lifestyle changes that turn away from unhealthy production and consumption patterns. It is difficult to change behavior. In order to stimulate pro-environmental behavior (e.g., recycling), many challenges need to be addressed, such as overcoming

consumer lock-in, changing old habits, forming new ones, and understanding the complexity of social and cultural logic, as Tim Jackson has discussed in the context of the Global North.<sup>8</sup> Jackson reiterates that policy interventions have a major influence on social norms, ethical codes, and cultural expectations. Getting the educational and policy process right can create powerful forces for pro-environmental and pro-social change.

Recycling programs are far from being efficient, and not enough is invested in avoidance and reuse. Furthermore, you can't recycle infinitely. In many cases, recycling produces hazardous byproducts, involves substantial transportation, and requires a lot of energy. Finally, recycling can also reinforce unsustainable consumption behaviors, as we see everywhere when increased recycling rates come along with increased packaging.

Therefore, the conscientization and politicization processes have to continue. Current waste diversion methods need to be considered critically. Public policies are crucial to a transition towards upstream solutions with a focus on avoidance, reduction, and reuse. Economic instruments in particular can provide incentives to enforce legislation on reducing carbon emissions and conserving resources. But we also need to learn to fully utilize existing practices that may not be recognized because they take place informally and are outside of government waste infrastructure. The informal economy generally includes activities that are not monitored, controlled, or regulated either directly or indirectly by the state. The range of informal workers—most of whom are in the Global South—is quite broad and includes waste pickers, who collect, separate, and sell recyclable materials in many different forms. These diverse kinds of recycling initiatives can become a stepping-stone towards a culture of zero waste.

### **Recycling Cooperatives and Resource Recovery**

Most cities in the Global South do not have formal recycling programs, nor do households generally source-separate their waste. Often municipalities do not provide waste collection services in informal settlements. Yet thousands of waste pickers and small-scale entrepreneurs collect recyclable materials from the garbage. Most of them are still not yet organized. Their work contributes considerably to resource recovery and recycling. Ap-

8 See: Tim Jackson, *Motivating Sustainable Consumption: A Review of Evidence on Consumer Behaviour and Behavioural Change* (Surrey: Sustainable Development Research Network, 2005), 154 ff., [http://www.sustainablelifestyles.ac.uk/sites/default/files/motivating\\_sc\\_final.pdf](http://www.sustainablelifestyles.ac.uk/sites/default/files/motivating_sc_final.pdf).



proximately 0.5 percent of the urban population in the Global South is involved in waste collection and recycling activities. Their tools and methods vary: from collecting with hand-pushed carts to using electric carts and trucks; from separating on the floor without gloves to separating on moving conveyer belts with protective equipment; from selling to middlemen to selling directly to the industry as part of a network (figure 3).



**Figure 3:**  
Workers separating  
recyclables  
at Cooperpires  
in Ribeirão Pires,  
Brazil (courtesy of  
the author).

In most cases this work is truly informal, without any government assistance in the form of either infrastructure or policy. These waste pickers work under extremely vulnerable and hazardous conditions, collecting and separating in the street and on dumpsters. A growing number of informal waste pickers has now organized into groups (cooperatives, associations, trade unions, networks) and has succeeded in getting some support from their local government. For such projects to continue successfully beyond the next election period, the existence of a legal framework has proven to be fundamental. Public policies must be in place to guarantee access to recyclable materials and to safeguard a site and adequate working conditions for material separation and storage. Specific policies are required to ensure fair remuneration for the selective waste collection and environmental services provided by these workers.

Some municipalities include the organized recycling cooperatives in door-to-door collection of recyclables. The city of Mauá in the metropolitan region of São Paulo, Brazil, for example, has recently signed a contract with the regional recycling network Coopcent-ABC (composed of nine groups with a total of approximately 250 members), of which the local cooperative Coopercata is part (see figure 2). Other examples of local governments working in partnership with recycling cooperatives for selective waste collection are the cities Ourinhos, Belo Horizonte, and Londrina in Brazil. In these cases, the recyclers have been successful in accessing capacity development, transportation, space, and infrastructure to do the material separation; they are paid for the service of collecting materials that would otherwise be landfilled. These places are still an exception, however: so far very few cities in the Global South have committed to paying for selective waste collection services, and most municipalities continue to take the free work of waste pickers for granted.



**Figure 4:**  
Door-to-door  
collection in  
Ribeirão Pires  
(courtesy of the  
author).

Nevertheless, the door-to-door household collection provides opportunities for these workers to act as strong allies in the promotion and implementation of zero-waste strategies (figures 4 and 5). The cooperative in Ribeirão Pires (Cooperpires), for instance (see figures 3 and 4), has endured a long struggle over the past 15 years, with many ups and downs in the degree of support from the municipal government. Cooperpires is an example of resistance and persistence, as happens in many places in the Global South. Besides performing selective waste collection, the recyclers also play a key role in the conscientization of the households by educating them about source separation, recycling, and the value in waste and in not wasting.

Such waste management activities are inclusive and by involving citizens in the disposal and final destination of waste, rather than merely entrusting this task to private companies that merely remove the waste from sight,





**Figure 5:**  
Unloading the truck  
after municipal  
door-to-door col-  
lection in Mauá  
(courtesy of the  
author).

these practices encourage taking responsibility for what happens to one's waste. Thus the interaction between the recycler and the household encourages critical reflection on one's own behaviors.

### Challenges in Inclusive Waste Management

Waste has always been a resource for waste pickers, but it has recently also become a resource for corporations and large industries involved in waste management. As a consequence, recurrent conflicts arise between the informal and cooperative recycling sector (the “commons”) and the waste industry over who gets to access these resources. With the recent rebirth of waste incineration using large-scale waste-to-energy technologies, disputes over waste are increasing. Thus, although the commons have long been engaged in collecting and recycling waste materials, their access to these resources is dwindling.

The recyclers face prejudice, aggression, and intolerance, with local governments sometimes even prohibiting waste picking in public spaces. Consequently, recyclers all over

the world have begun to organize themselves as a social movement fighting for formal recognition, better and safer working conditions, and fair remuneration for their services.

While participatory processes have many benefits, they are also not without challenges: they are often conflict laden, time consuming, and complicated to implement. Working in a cooperative system implies facing difficulties on a daily basis, but it also offers opportunities for personal growth and transformation and for professional and political achievements. Key to this is the development of conflict resolution practices. The collective approach to work is challenging for individuals who have spent most of their lives excluded or marginalized. As Freire notes, during the initial stage of the struggle for emancipation, the oppressed tend to become oppressors themselves (sub-oppressors) as a consequence of being conditioned by the contradictions of the concrete situation by which they were shaped (oppression). Partnerships between municipalities and recycling groups in selective waste collection are still in their infancy. In Brazil, workers' aggregations such as the national recyclers' movement (Movimento Nacional dos Catadores de Materiais Recicláveis – MNCR) and recycling cooperative networks such as Coopcent-ABC, as well as initiatives like the Waste and Citizenship Festival (Festival Lixo e Cidadania) in Belo Horizonte are spearheading participatory waste management. Some cooperatives (e.g., Recicla Ourinhos, Cooper Região-Londrina, ASMARE, Belo Horizonte) have developed strong partnerships in waste collection services with their local governments. In India, the Alliance of Indian Wastepickers (AIW) is a national coalition of waste picker organizations, notably from Delhi, Pune, Ahmedabad, Calcutta, and other large cities. Kagad Kach Patra Kashtakari Panchayat (KKPKP) is a trade union of approximately 10,000 waste pickers and itinerant scrap buyers registered since 1993 and based in Pune. Other initiatives include the Project for the Empowerment of Waste Pickers of the SNDT Women's University in Pune, and finally the manifold projects supported by the Indian Self Employed Women's Association (SEWA) and international nongovernmental organizations like Women in Informal Employment: Globalizing and Organizing (WIEGO) or the Global Alliance for Incinerator Alternatives (GAIA), all working towards the strengthening of inclusive and community-driven forms of waste management. There is a growing momentum for these initiatives and projects to expand, demanding change and social dialogue.<sup>9</sup>

9 For more detailed information on informal waste pickers in India see: Soupriya Routh, *Enhancing Capabilities through Labour Law: Informal Workers in India* (London: Routledge, 2014).

## Lessons to Be Learned from the Global South

In spite of the lack of formal recycling programs in most cities in the Global South, informal waste pickers provide many of the services such programs are designed to fulfill: by retrieving recyclable materials from municipal waste, they reduce the quantity of waste that is deposited in landfills and thereby contribute to prolonging the life of landfills and reducing greenhouse gas emissions.

Their activities help close the material loop, reduce dependency on imports, reduce environmental impacts associated with waste disposal (leachate, air contamination), drive innovation in product design, involve citizens in designing a better world, and help educate and generate greater awareness about responsible consumption and zero waste, as well as shaping socio-environmental conscientization. Organic waste can be composted and used in urban agriculture, bringing nutrients back to the soil. In a transition away from wastefulness towards resource recovery, cooperative recycling offers a viable concept of inclusive solid waste management that tackles the objectives proposed by Zero Waste Europe of creating a “low-carbon, resource efficient, resilient and socially inclusive economy” and a society with greater social cohesion.

What can we learn from the experiences of waste pickers and organized recycling cooperatives and their operations?

The first lesson from the Global South is that informal and organized recyclers recover a much wider spectrum of different materials than conventional recycling programs. They separate waste into different types of plastic (based on composition, quality, and color), paper (newspapers, magazines, white papers, mixed papers), cardboard, metal (tin, copper, iron, aluminum), and glass of various sorts. Even dirty plastics constitute at least two separate categories to be recycled. In some cities they also collect cooking oil, wood and other construction materials, fluorescent lamps, batteries, and different types of plastics and metals from electric and electronic products, as well as platinum-group metals. As studies by organizations such as Zero Waste Europe have shown,<sup>10</sup> the praxis of recycling groups working in tandem with local governments to recover recyclable waste is in line with the aims set by zero-waste movements.

<sup>10</sup> Zero Waste Europe, “Zero Waste?,” accessed 14 February 2015, <http://www.zerowasteurope.eu/about/principles-zw-europe/>.

The second lesson is that recycling programs that involve informal waste pickers generate many jobs. The cooperative Recicla Ourinhos in the city of Ourinhos, Brazil, had 87 members in 2013, collecting the recyclables of 40 percent of the city's 110,000 inhabitants and separating 126 tonnes of recyclable material every month. There are still many more jobs to be created by expanding the recycling program to cover the entire municipality.<sup>11</sup>

The third lesson speaks about the environmental education opportunity provided by some of the programs conducted in the Global South, where waste pickers have become educators. While performing door-to-door selective waste collection they also teach the population about material separation and waste avoidance. While in North America and Europe recycling programs may be efficient in regularly collecting household recyclables, very little is done to educate people about ways to improve their recycling habits and reduce or avoid generating waste.

Finally, the experiences from the Global South show us how organized community-based recycling creates social inclusion and helps reduce stigma and marginalization. It restores citizenship, particularly of those individuals who had no sense of belonging and were homeless and unemployed in cities that generally paid them no heed. Unfortunately, there are many people in such situations in the Global North as well. They, too, can be socially included through meaningful work in resource recovery, as projects in some places in Canada have already demonstrated.

Such community-based recycling in the Global North has mostly taken place in the form of stand-alone community initiatives. Some examples from Canada include the recycling and reuse centers in the Gulf Islands (e.g., Saltspring, Hornby, Maine); the recycling cooperative Les Valoristes in Montreal; and United We Can, a bottle depot run as a social enterprise in Vancouver.<sup>12</sup> These experiences demonstrate significant contributions towards generating social capital and building social cohesion, and we can certainly learn from them as well.

11 Personal communication 28.08.2015 and "Sem 'lixão' desde 1993, Ourinhos é premiada por apoio a catadores," *Revista Radis* 139 (April 2014), <http://www6.ensp.fiocruz.br/radis/conteudo/sem-'lixao'-desde-1993-ourinhos-e-premiada-por-apoio-catadores>.

12 For more details, see Crystal Tremblay, Jutta Gutberlet, and Ana Maria Peredo, "United We Can: Resource Recovery, Place and Social Enterprise," *Resources, Conservation and Recycling* 54, no. 7 (2010): 422–28.

## A Future without Waste?

The reconceptualization of waste as a resource has already happened. Urban mining, or recovering deeply buried materials from both disused and active landfills, is becoming more common and attracting the attention of researchers in all disciplines. The scale of the involvement of the private sector in mining these resources discarded decades ago also demonstrates the economic interest in retrieving resources embedded in waste.

Cooperative recycling in the Global South and bottle recovery programs and social enterprises in Canada and Europe demonstrate that there is not one single model for redesigning our waste management practices. It is time to upscale and expand the scope of these initiatives. Recycling programs can have a more significant impact by avoiding and reducing waste generation in the first place, maximizing recovery rates, and increasing the awareness level of government, industry, and the public at large. The current waste dilemma can be addressed in innovative and diverse ways, transforming society at a global level.

Transdisciplinary research, intersectoral policy approaches, and participatory practices are critical when working with the public on waste reduction and waste disposal and when creating municipal, provincial/state, and national/international regulations for avoidance, reduction, reuse, and recycling. An integrated approach must also inform industry and business to create viable products and to mitigate post-consumer environmental problems. Here we can learn from social dialogue and participatory approaches practiced in some cities in the Global South, as demonstrated with examples from Brazil and India, where hundreds of thousands of informal waste pickers have organized in trade unions and workers' aggregations, such as cooperatives and associations, to defend their work in selective waste collection and recycling and thus accomplish significant environmental and social contributions.

If humans are willing to collectively shift away from a regime of waste accumulation molded by practices that exploit labor and the environment, and instead move towards new sets of social, economic, and institutional arrangements guided by a culture of zero waste—then there will be a future without waste. Initiatives aiming towards zero waste should be supported and promoted to inspire other places and people to do better.

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Stefania Gallini

## The Zero Garbage Affair in Bogotá

On 11 December 2012 Gustavo Petro, the mayor of the Colombian capital Bogotá elected early that year, launched the Zero Garbage Program (Basura Cero). This scheme looked like an extraordinary opportunity for radical political and environmental change. On the environmental side, it introduced for the first time ever a recycling policy into Bogotá's municipal waste management scheme. On the political side, it opened the political and economic door to waste pickers, a marginal but numerous population in the capital city.

The proposal, advanced by the Colombian urban ecologists in Petro's team, was explicitly inspired by the global zero-waste movement, particularly by the experiences of Halifax (Canada), Zero Waste New Zealand Trust, and the city of Buenos Aires. As a national antecedent, it also acknowledged a proposal put forward in 2007 by a congresswoman (now Minister of Education) and two congressmen to "instrumentalize the Zero waste culture."<sup>1</sup>

According to the official statement of the Bogotá Basura Cero, it aimed to "minimize the environmental and health impact of debris and solid waste, including special and hazardous residues, produced by the city." This policy required "a cultural, educational and public policy change on waste management"—the official statement declared—that would involve not just the government, but citizens and businesses as well. It provided for various different types of waste reduction measures, including the production of reusable and biodegradable consumer goods, "building a culture of source separation of waste," and improving industrial processes for recycling and minimizing landfill waste. "In the medium and long run," the proposal concluded, "the actions are directed towards the target of reducing waste production, steadily increasing the amount of waste that is reused, and eliminating the social segregation, environmental discrimination, and depredation of the environment caused by the current structure of waste services."<sup>2</sup>

- 1 Gina Parody, Armando Benedetti, and José Name, Proyecto de Ley Número 04 de 2007 "Por medio del cual se instrumenta la cultura de basura cero," Senado de la República, Comisión Quinta, Bogotá 20 Julio 2007.
- 2 Alcaldía Mayor de Bogotá D.C., "Plan de Desarrollo 2012–2016, Bogotá Humana" (2012), 203–6, <http://www.sdp.gov.co/portal/page/portal/PortalSDP/Home/Noticias/OtrosDocumentosArchivados/PlandeDesarrollo/PLAN-DESARROLLO2012-2016.pdf> (author's translation). See also: Secretaría General de la Alcaldía Mayor de Bogotá D.C., "Proyecto de Acuerdo 249 de 2013 'Por Medio del cual se institucionaliza en el Distrito Capital el programa de Basura Cero'" (2013), <http://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=54891>.

This may seem like a straightforward narrative of how a municipal government in the Global South is taking action towards environmental and social justice: a project aimed at protecting the environment by reducing waste, while offering social justice and providing livelihoods for individuals in the informal sector. But reality is usually less straightforward. Indeed, the Basura Cero program of Bogotá is revealing of a complex history of power and politics and economic interests embedded within an urban ecology discursive turn in city policy.

Why is it often the case that the adoption of a waste management system is entangled in the complexities of socio-environmental arrangements? Can a “waste regime” reveal the inner nerve of a social system and its urban metabolism? This Colombian case is a local story, but its national tentacles make it a valuable playground for reasoning about the general political significance of “trivial” garbage.

### **A Landfill and Waste Pickers for Bogotá**

This story begins in the 1980s with the creation of the landfill Doña Juana. Like the US landfill technology on which it was modeled, its aim was to solve a sanitary problem: to dispose of the fast growing solid waste of Bogotá. However, waste was not simply sent to the landfill; before its arrival at the southwestern margin of the city where the landfill was eventually opened in 1988, the waste was searched and selected by waste pickers, or *recicladores*. Their activities were unregulated by the city’s official waste management system. They collected recyclable materials (paper, cardboard, metals, plastics, glass) from public bins and households by opening up plastic bags in the streets. Some of them made informal deals with janitors and neighbors to collect specific types of garbage—i.e., paper or plastic from offices and shopping malls. They traveled along established routes, carrying the waste to wholesalers using handcarts or horse-drawn carts called *zorras*. The wholesalers put the waste back into the economic chain, making substantial profits at the same time.

More than 21,000 recyclers are said to be working informally or in cooperatives in Bogotá. Their existence is socially marginalized—they receive no wages for the services they provide, they are exposed to toxic chemicals, and they have little legal support or protection—but their organization is politically active. In 1990 the Asociación de Re-



cicladores de Bogotá (ARB) was established.<sup>3</sup> In 2003 the ARB helped to set up the Latin American network of waste pickers (Red Lacre), and in 2008 hosted the First World Congress of Waste Pickers. With its some 3,000 members from various cooperatives, ARB has become one of the largest and most influential waste pickers' organizations in Colombia, with an influence that extends to Latin America more generally.

When Petro took office in January 2012, the landfill Doña Juana was an open battlefield of economic and political controversy. Until 2010, a Spanish multinational firm, Proactiva S.A., had run the very lucrative business of municipal collection and disposal. When its contract expired, months of legal controversies and scandals regarding the new contract ensued. Eventually, in 2011 a Brazilian-Canadian-Colombian alliance won the public tender, and Petro would have had to proceed with the acknowledgment of the new operators. Instead, the process came to a standstill. Following a legal suit put forward by Nohra Padilla, leader of the ARB, the Colombian Constitutional Court ordered that the public bidding process be suspended. Padilla, a recycler herself, argued that the waste pickers had been unfairly excluded from the public tender.

Supported by the US-based global action-research advocacy network known as WIEGO (Women in Informal Employment: Globalizing and Organizing) and other NGOs, she based her claim on Article 13 of the Colombian constitution, which stipulates that the state must promote social inclusion of marginalized and discriminated groups, something that the tender patently failed to do with respect to the waste pickers. Although the tender required the new contractor to hire people to provide recycling services for the first time ever, it did not establish strict criteria about the contractor's necessary qualifications on recycling. As a result, it favored opportunistic organizations with very little experience—such as the NGO created by the sons of former Colombian president Alvaro Uribe—instead of promoting long-established associations like the ARB with its three thousand members who were better qualified to perform the task.

The ARB's successful challenge to the waste management tender was the most recent in a series of legal battles aimed at securing more rights for waste pickers. The Constitutional Court had already issued important rulings in 2003 and 2010 that stated the need for measures to include waste pickers in municipal waste management, but the Bogotá

3 The ARB was not the first recyclers' association in Colombia. In 1962 the waste pickers of Medellín created the first such organization in Latin America.

government had not yet done anything to comply. This legal battle was an important victory on behalf of one of the more vulnerable social groups in the country and against powerful private companies; in 2013 Padilla was awarded the Goldman Environmental Prize (awarded annually to grassroots activists around the world) for her efforts.

### **Zero Garbage Program, 2012**

Mayor Petro's Basura Cero program seemed that it would change all this. With its emphasis on environmental and social justice, the program is revealing of the political ideology of the mayor and his staff, but it is also a lucid illustration of how politics are embedded in any waste management system.

Gustavo Petro, a former member of the M19 guerrilla movement, was a congressman in the Chamber of Representatives in 1991–1994 and 1998–2006, and in the Senate 2006–2010, during which time he uncovered several scandals of corruption and influence of paramilitary militias in Colombian politics. He became a prominent opponent of the right-wing Alvaro Uribe, who was president from 2002 to 2010. In 2010 Petro ran in the presidential election; although he was unsuccessful, his popularity won him the election as mayor of Bogotá the next year. The informal sector of the waste pickers was one of his more formidable supporters.

The Basura Cero program was aimed at transforming the work of informal recyclers into a formal economic activity while introducing a recycling policy into the city's waste management. Recyclers would earn a fixed wage from the municipal tariff on waste collection; they had previously received compensation for their work only through the sale of the recyclables they collected. City dwellers would therefore be forced to internalize the cost of urban waste. Additionally, after almost three decades of private handling, the new scheme would put the majority of the lucrative waste disposal business in public hands by assigning it to one single city-run company and firing private contractors, with a net fee reduction for the dwellers of Bogotá.

But good ideas do not go far if they have short legs. Within two weeks of the official launching of Basura Cero, the new scheme had turned into a stinky fiasco. Petro cancelled existing contracts with private waste collectors as he prepared to return waste

management to municipal control. On 18 December and for the next four days, municipal solid waste was not collected in most of Bogotá. The disaster was a product of mixed causes: on the one hand, the unfair opposition by the dissatisfied private contractors, who were accused of having left behind in the streets, on their last day of operation, a third of the waste usually collected daily. On the other hand, the poor planning and mismanagement of the introduction of the new waste management system by Petro and his staff (i.e., not having trucks ready), allowed the fast accumulation of garbage in the streets. Political opponents clamored for Petro's removal; a fierce media campaign urged the same. Faced with a major garbage crisis just before Christmas, the mayor was forced to quickly renegotiate the former contracts with the old private companies and rent 110 used collection trucks imported from Miami in order to cope with the sanitary emergency.

The garbage crisis was gradually resolved, but it sowed the seeds of a major legal and political battle between the elected mayor of the capital city, Gustavo Petro, and Inspector General Ordóñez. Their fight turned into a platform for massive popular mobilization. This magnified the enduring harsh political division of Bogotá public opinion along classic right vs. left lines, but it also revealed the increasing political importance of other, more "postmodern" divides, such as new forms of citizenship, human rights, and urban sustainability.

### **The Zero Garbage Program as a Political Battlefield**

In December 2013, Inspector General Alejandro Ordóñez Maldonado, an ultraconservative and close ally of the former president Alvaro Uribe, ousted the mayor and banned him from holding public office for 15 years, a virtual declaration of political death. He argued that during the four-day crisis in 2012, the mayor had put the health of Bogotá citizens at stake because of the accumulation of garbage in the streets. Furthermore, he claimed, Petro had violated the constitutional principle of free competition by firing garbage collection contractors and putting the waste disposal business in public hands.

This sanction seemed extreme even to many of Petro's political opponents. In a country where legal impunity is more often the rule than the exception, even where

atrocious crimes are concerned,<sup>4</sup> four days of garbage in the streets and a poorly planned change in a municipal utility was a comparatively minor offense—certainly not enough to deserve 15 years of ostracism. Regarding Petro’s ousting, the *Guardian* wrote: “When a legal system confirms the removal of a democratic leader for this kind of technical issue the problem is far worse than just a rightwing ideologue abusing his influential position. The whole system is laid bare, and the fears of millions that they will never get a fair hearing is justified.”<sup>5</sup>

At a time of the year when Bogotanos are usually enjoying Christmas lights in public parks and family *novenas*, Petro successfully called for a massive gathering in the central Plaza Bolívar. His rhetorical ability, a populist use of city-run media and social networks, and the passion of his supporters ignited public opinion so much that “a new Bogotazo” was announced, recalling the violent unrest in 1948 that marks a turning point in Colombian history and the beginning of the period known as *La Violencia*. Under the strict and tense supervision of a helicopter and troops in the streets, a crowd assembled several times in downtown Bogotá. The protesters ranged from the *recicladores* to members of social and indigenous movements, artists, intellectuals, human rights defenders, students, left-wing citizens, and finally residents of the city’s poorest sectors, who arrived on buses provided by Petro’s staff. Waste succeeded in generating a larger political mobilization than many other more traditional causes.

However, as so often in the past, the specter of the revolution that haunted Colombia ultimately put on an attorney’s robe instead: in few weeks’ time, the fight had moved from the streets to the courts. Hours before his removal, Petro’s legal defense team filed a lawsuit against Inspector General Ordóñez with the Inter-American Commission of Human Rights in Washington, DC, which ruled that Petro’s removal from office violated his political rights. After several twists in the legal battle and a new legal order by a national court, President Santos restored Petro to office in April 2014, just in time to secure the political support of center-left voters in the forthcoming presidential election, which Santos won in June 2014.

4 I.e., crimes committed by members of the guerrillas and the state during the more-than-50-year internal armed conflict; crimes committed by paramilitary forces and not fully punished, especially during the 1990s and 2000s; political crimes that have still not been brought to trial, like the extermination of the left-wing political party Unión Patriótica through the systematic murder of its leaders in the mid-1990s; or the disappearance of civilians during the military response to the assault on the Supreme Court by the guerrilla movement M19 in 1985, which is still waiting for the judicial truth.

5 Jonathan Glennie, “Colombian Democracy Took a Backward Leap with Ousting of Bogotá Mayor,” Poverty Matters Blog, *The Guardian Online*, 9 April 2014, <http://www.theguardian.com/global-development/poverty-matters/2014/apr/09/colombia-democracy-ousting-bogota-mayor-gustavo-petro>.

With Petro's return to office, Basura Cero was no longer in danger. It developed smoothly, promoting educational campaigns on recycling and source reduction of waste, bringing more recyclers into the scheme, and implementing a program for replacing horse-drawn carts with motorized vehicles as part of a general pro-animal policy. As a compromise, the old contractors have been kept on in a limited capacity; at the end of Petro's term of office in late 2015, they were responsible for 47 percent of the collection and disposal of municipal solid waste.

While the social and environmental justice content of the Basura Cero program (albeit not necessarily its implementation) was acknowledged as admirable even by several of Petro's opponents, its effectiveness as a waste management system was generally evaluated as poor. Traffic, waste, and insecurity were listed as the three greatest concerns of Bogotá dwellers in opinion polls prior to the municipal elections on 25 October 2015. Even to sympathetic observers, the city looks dirty, while organized and large-scale recycling is still more a promise than a practice. To the citizens' eyes, recyclers continue to work the same way they always have. The Doña Juana landfill also has not changed its role or practices, notwithstanding the continuous warning about its short lifespan.

Sadly, the limited results of the Basura Cero in Bogotá as far as waste collection and recycling are concerned probably helped reduce the appeal of waste as an important issue in the agenda of the recent municipal elections. The next mayor, Enrique Peñalosa, neither included this topic in his proposals as candidate, nor commented about the future of the Zero Garbage Program after his electoral success in October 2015. Quite surprising coming from a man who was granted the 2009 Goteborg Award for Sustainable Development in recognition of his urban development model during his first term as mayor of Bogotá from 1998 to 2000.

### **Waste as a Litmus Test**

Waste is a hybrid, both a sociocultural artifact and a physical matter. Its existence depends on a culturally based decision ("trash is created by sorting," Strasser wrote<sup>6</sup>) entangled with biophysical features and technology arrangements upon which the

6 Susan Strasser, *Waste and Want: A Social History of Trash* (New York: Henry Holt and Company, 2000), 5.

transformability of waste depends. Its management requires social negotiations; it reflects political ideas and reveals expectations about the future. But refuse is also physical material and its disposal occupies concrete space in a specific territory. Because of the enormous volumes of waste, the scale of the technology, and the gigantic financial flows involved, starting in the twentieth century waste has ceased to be simply a local topic: it has become a glocal issue. Furthermore, private and public, individual and collective are never distinguishable in any of the processes for producing, reducing, recycling, or disposing of garbage. Because of all these considerations, waste touches the nerves of social systems, but also the veins of the urban metabolism.

This Colombian case of a political battle about the implementation of a zero-waste program sheds light on the complexities of waste policies in the twenty-first century. In Bogotá solid waste policy acted as the material playground of politics and social institutions, the place where ideas about state vs. market, individual vs. collective, private vs. public, and present vs. future needs materialized. Rather than suggesting a political judgment about the experience of Petro's Basura Cero program, the discussion of this ongoing case of environmental public policy aimed to show the degree to which waste is a political matter.

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## Roundtable



## Roundtable

### Working for Zero Waste in Germany: A Discussion across Disciplines

**Christof Mauch:** I am pleased to have with me today a group of experts at LMU's Center for Advanced Studies who, through their political and academic roles, have been involved with waste in environment and society: Eveline Dürr, a social anthropologist who has studied waste through a cultural lens; Heide Rieke, SPD council member and environmental affairs spokeswoman for the city of Munich; Martin Faulstich, the director of the environmental technology institute CUTECH at Clausthal University of Technology, who is considered "Germany's waste guru"; and the environmental ethicist Markus Vogt, who teaches Christian social ethics at LMU.

Martin Faulstich, the first person I invite to speak today, is chair of the German Advisory Council on the Environment—founded in 1972 and based in Berlin, it is the oldest environmental institution in the country. The members of this interdisciplinary advisory body include physicians, lawyers, and political scientists. Its most recent environmental report includes a large chapter on raw materials. What we're interested in this evening, to begin with, is the technical side of the connection between raw materials and waste. Our guiding question is quite provocative: Would it be possible, from a technical perspective, for us to destroy fewer raw materials in the future and, as a result, eventually end up living in a world without waste?

**Martin Faulstich:** Well, if you look at global consumption, the first thing you'll notice is that for the first hundred years after the Industrial Revolution—i.e., starting around 1850—the consumption of raw materials climbed, but only gradually. Since World War Two though, the curve has ascended steeply—nearly vertically. Second, it's important to consider that of the 118 elements on the periodic table—something you all still surely remember from grade school—we use 90 elements. When Henry Ford was alive, we only used 10 or 20 of these elements, and at that time the industrial age was already well underway. In today's society though, far more elements are being used—for cell phones, microphones, laptops, and cameras, for example.

When attempting to understand the connection between raw materials and waste, it's also important to consider a third key topic: the fact that the debate about raw materials is

mainly dominated by discussions focused on availability. The industry is asking itself: Do we have enough metals? Do we have enough soil? Can we get the raw materials we need? For a long time, we've overlooked the fact that today, nearly all high-tech materials and metals come from developing countries—from Brazil, from Chile, and from China. We're able to improve our environmental footprint here in Germany, because we let the dirty work be done by others in faraway places. Sure, we have very high social and ecological standards in Germany. But in China, it's often the children who are used to excavate raw materials—shafts are often only dug one meter high rather than two, and children are sent underground to work.

And finally, a fourth, important challenge: The demand for raw materials correlates with waste, of course, since any materials one uses and consumes will end up as trash sooner or later—with yogurt containers this life cycle may be only a few minutes, with a car, maybe ten years. It is important to keep in mind that the average American's consumption of raw materials is ten times greater than an Indian's. However, there are “only” 300 million Americans, but in a few years, three billion people will be living in India and China combined. Now imagine that in the coming years, each of those three billion people's demands for raw materials, energy, and meat will match those of an American. You don't have to be a mathematician to realize that the Earth can't handle that. In short, if we continue to manage our resources the way we do now, we can expect that the mountains of waste we create will only continue to grow.

**Christof Mauch:** Can I ask the question a bit more provocatively? How can we achieve a “future without waste”?

**Martin Faulstich:** That would only be possible if we could break down all products that currently end up as waste—from yogurt containers to cars—into their components so that we could return them to the material cycle. One hundred percent renewable energy and 100 percent recycling can be seen as two analogous goals that have not yet been met—for which there are many reasons. A 100-percent closed-loop material cycle, on the other hand, could theoretically work. We would, of course, need a global waste cycle in addition to the global raw-material cycle, since not all products are manufactured in Germany—some are produced in other places in the world—and some are manufactured in Germany but are then consumed somewhere else in the world. Without this, we can't ensure that we can close the loop. And if we want to close

the loop, then we need not only the right attitude and the right lifestyle, but also—and this is the key requirement—raw materials that aren't as cheap. If raw materials were more expensive, recycling would be more profitable. And these raw materials could be more expensive if the social and ecological standards in developing countries were as high as we would like them to be. The aim, and I'm saying this as an engineer, would be to have the same high standards and technical quality for waste disposal and recycling as there are in production facilities. In an automobile plant, high-tech plays a role through the whole process—right to the very end. And yet when we look at the other end of a car's life cycle, in Germany or anywhere else, they end up in junkyards, which are often mere backyard workshops—this is where the standards drift apart. But it's not just a question of technology—it's also a question of intelligent models of consumption and use. What if, for example, a cell phone manufacturer leased its cell phones rather than selling them, or if a car manufacturer leased its cars rather than selling them? These manufacturers would remain the owners of their products and would thus have a whole different motivation for making sure that they got the raw materials from their products back. Maybe then from the start, manufacturers would think about how their products could be broken down into raw materials. The way it is today though, is that as soon as a product has left the factory gates, the responsibility of the manufacturer is out of sight, out of mind. And this idea of “out of sight, out of mind” is one we need to get away from if we want to achieve closed-loop material cycles worldwide. If we could achieve that, the concept of “waste” wouldn't really exist anymore—instead, it would be a material constantly being used, constantly passing through the cycle, but never becoming waste by ending up in a landfill, landing in the street, or being tossed into the woods.

**Christof Mauch:** Martin Faulstich emphasized that the waste issue is neither regional nor national; rather, it must be discussed in a global context. As an anthropologist—Eveline Dürr is a social anthropologist whose research has focused on New Zealand, Mexico, and the United States, among others—one has an eye for the local realities. Furthermore, anthropologists have stressed again and again that waste—or more generally “dirt”—is culturally constructed (in the nineteenth century, for example, we see authors such as Charles Dickens talking about “dirt” instead of waste). What's clean to some is dirty to others. Eveline, you have researched prejudices and stigmas of waste in countries of the Global South where it is quite a sensitive topic. A future without waste—is that a vision destined to fail?

**Eveline Dürr:** Yes. Contrary to Martin Faulstich, I approach the topic not from a technical perspective, but as a cultural scientist, so I want to start by explaining how I understand the concept of waste and why this leads to my thesis that there cannot be a future without waste. If you were to define waste as a product of a social practice of classification and organization, then a future without waste is not possible. Humans will always separate between useful and useless, and waste is by definition that which is useless. Interesting to note here, though, is a temporal perspective: what appears to be useless at present can still become something useful through recycling; it can be re-integrated into material cycles, or into completely different life contexts. As a researcher who has studied garbage dumps in Mexico among other places, it's important to me that we integrate a bio-political dimension into the discussion. After all, as Martin Faulstich's example of mines made clear, there are huge imbalances between the countries of the Global South and the countries of the Global North. On the one hand, waste is local, having material reality in the space where it originated. On the other hand, it's also translocal. It's relocated, shipped to other countries, etc. There's a flourishing trade in waste, which is embedded in more than just nonpolitical material cycles—it's also tied to geopolitical power structures. Sure, we could achieve a lot technically and in theory. But I think it's problematic to assume that what we can implement in Germany as far as technology goes is always transferrable into other societal or cultural contexts. Development projects have taught us this very clearly.

**Christof Mauch:** As an anthropologist, one has a very unique view on waste—not only in terms of the wider context, but also at the micro-level: the situation of each individual actor and tangible situations. For example, your work involved people who lived on garbage dumps, as well as the tourists who visited the piles.

**Eveline Dürr:** Right. What interests me is what exactly humans do with waste and how they subsist on it. I also find it important to understand the materiality of waste and the power that is connected to it—and also the ambivalence that goes along with this. This can be made clear through examples: for instance, the fact that heavily polluted water may be viewed as pure or cleansing for ritual ablutions. Of course it's clear to humans that they're dealing with dirty water, but through cultural systems, the dirty water transcends this to have a greater meaning. The ambivalence in the perception of dirtiness and pollution cannot simply be reduced to a technical formula—cultural factors play an important role, too. On the one hand, waste piques people's curiosity; on the other hand, it generates disgust. It's important to understand the power that results from the pure materiality of waste and

the tangible dimension of its odor. It appears that waste not only represents a technical challenge, but also—especially in my field—embodies a materialization of social inequality. I don't think that social inequality can be obliterated. And thus, I don't think that waste can be completely avoided.

**Christof Mauch:** In this discussion, it's interesting not only to obtain differing assessments of whether there can be a “future without waste,” but also to become more familiar with various academic approaches—on the one hand, approaches that are more technical and look for solutions, and on the other hand, culturally oriented approaches that explain why reality often prevents technical solutions from being effective. Both Martin Faulstich and Eveline Dürr spoke to the topic of environmental justice as seen from a global perspective. The topic of justice is crucial to Markus Vogt as an ethicist. Markus Vogt formerly worked for the German Advisory Council on the Environment and was head environmental advisor to the Council of the European Bishops' Conferences. As a professor of Catholic theology and as a social ethicist, he has looked at the ethical questions of waste—urban mining, for example—again and again. We're excited to now hear from the expert on environmental justice.

**Markus Vogt:** Gladly—I can certainly contribute some thoughts on the question of justice. The statements from Martin Faulstich and Eveline Dürr present us with a thesis and antithesis. Martin Faulstich believes that under certain conditions, a future without waste is possible; Eveline Dürr, however, is more skeptical. This discussion is a fortunate situation for an ethicist—on the one hand, it can be established that a future without waste is a worthy goal; on the other hand, it can be assumed that we will not reach it. Yet this does not mean that it is not worthwhile trying. In the realm of technology in particular, advances have already been made regarding how waste is dealt with. In the social sector though, there is still injustice; problems are displaced elsewhere in the world—waste, noise pollution, toxins. For a long time, we have turned a blind eye to the living conditions of those who suffer most from these problems. And if we keep doing so, we will only further distance ourselves from the goal of a world without waste rather than get closer to it. Nevertheless, the goal proclaimed in the title of this event isn't a complete *fata morgana*. In February 2012 with the enactment in Germany of the Closed Cycle Management Act, which requires manufacturers to take responsibility for the disposal of their products, the promise of a society “without waste” was made official. And we actually have made a significant amount of progress towards this goal in many areas.

Landfills today are the resource deposits of the future and are especially important for a country like Germany. According to current estimates, 25–100 million tonnes of iron and scrap steel may be lying unused in Germany’s landfills, and there is certainly a struggle for access to these resources. At the same time though, this promise of “zero waste” is very abstract. This development is obscured by other trends in opposition to it; for example, consumer behavior and the rise of consumer expectations. And of course, waste is the other side of production and consumption. The “rebound effect” is also a problem. The promise of a paperless office was never realized due to the increase in expectations. In affluent cities like Munich, 50 percent of food is thrown away, and that is a problem that cannot be solved technically. On the contrary.

**Christof Mauch:** So from a socio-ethical perspective, the waste issue is marked by a great deal of ambivalence.

**Markus Vogt:** Yes, exactly. I can illustrate and analyze that point using these eight theses:

**First:** Viewed from an ecological, political, and ethical perspective, the waste problem is no less controversial than the scarcity of resources is. But because waste is such an awkward topic and burdened by taboos, we are still far from being able to give it the serious attention that it demands. We won’t be rid of waste very quickly—the existence of nuclear power plants alone means that waste will continue to be a concern for several thousands of years to come.

**Second:** Cultural patterns shape how people deal with waste, but this is an area that has not yet been extensively researched in academia. Without an analysis of cultural behavior, for example, we only scrape the surface, treating only the symptoms and not the causes. And yet the causes are usually cultural factors.

**Third:** Waste and trash are the flip side of ideas of social order. As Eveline Dürr so cogently explained already, there can never be a society without waste, since there will always be the idea of the useless. In a way, it’s a result of limited concepts of usefulness, and because of that, definitions of waste vary. We often have very narrow definitions of waste, and so we don’t perceive things that are actually waste as waste. That’s why we always need to consider the various cultural perspectives.



**Fourth:** A significant part of what we consider to be waste disposal is covering it up and sending it to other places for other people to process, and because of this, waste is always connected to social hierarchies and segregations. Today, waste displacement occurs on a global scale—this includes the masses of Germany’s electronic waste that end up in Ghana, for example. The NIMBY principle—out of sight, out of mind—appears to be true here. Yet in reality, the problem hasn’t actually been solved.

**Fifth:** The most highly charged waste issue, which often isn’t interpreted as an issue at all, is CO<sub>2</sub> and climate change. For many years, the atmosphere has served as a dumping ground for emissions; free of charge, or so it seemed. The environmental and financial implications, however, are clear today. The issue of cost could be seen as an opportunity though, if certificate trading worked. Unfortunately, the European certificate trading system has not been adequately reformed.

**Sixth:** Living in and around trash is tied to social exclusion and discrimination. Those who are involved with trash are often the socially disadvantaged. At present, about one billion people live in slums and are surrounded by trash. While this is partially tied to opportunity, since the value of trash is increasing, it is also problematic due to the toxins in trash. This issue, by the way, is a main focus of the work of church-based charities.

**Seventh:** A constructive way to reduce waste in our affluent society is through shared use: the sharing economy. The sharing of goods as a new social movement could give rise to many opportunities.

**Eighth:** Urban mining, i.e., digging for raw materials in dumps, is a new form of mining. Through this, some resource problems could be reduced. Interestingly enough, there are connections between the technical discovery of waste as a raw material and the use of it for artistic purposes. It’s not unusual for art to have a subversive view—a view from below—of waste and, through that, break down taboos.

**Christof Mauch:** Thank you for this fascinating list of topics and perspectives. We’re very pleased that Heide Rieke is able to join us here today as a representative of the city of Munich—even in our small working group, the city of Munich is highly important. We want to involve the city (we have Günther Langer here today, as well as Helmut Schmidt, the

director of waste management). Heide Rieke is our expert in the political sphere; she has been interested in the topic of the environment for a long time, since her time in Hamburg in fact, where she was the first environmental affairs spokesperson for the city. She was also the one who had to report on the radio every morning how many becquerel had been recorded in Hamburg after the 1986 Chernobyl disaster. She has worked as a lawyer in Hamburg, and in Munich she has been a council member and SPD environmental affairs spokeswoman for many years. Yet she is not only involved in environmental questions, but also in municipal planning. And you could say that these areas are all related. After all, many environmental issues can often be dealt with more effectively in the planning process than in the environmental committee.

So how does Munich measure up in terms of waste management? Markus Vogt reminded us that in Munich some 50 percent of food is thrown away. However, at the same time we often hear how Munich is in the vanguard in terms of its waste recycling and management programs, as well as in the production of biogas from organic waste using dry fermentation plants. Would it be accurate to say that Munich is moving closer to a “future without waste”? Or are we moving away from this ideal?

**Heide Rieke:** I’m going to suggest something that may surprise you: in my opinion, the beginnings of a future without waste in Munich go back 120 years. In 1891 the city administration passed a waste law that required all citizens to put out their garbage for collection. Special horse-drawn carts known as “Harritschwagen” were built for this purpose. They drove through the streets and collected the garbage, which was initially buried in trenches, until it became evident that the resulting stench would be quite unpleasant for the residents in the vicinity. Subsequently, a location outside Munich, in Puchheim, was selected for depositing and sorting the waste. Thus, even before the turn of the century all kinds of garbage were already being recycled in Munich. Small organic particles, for example, were spread on fields or on the moors as fertilizer. Larger pieces of waste, for example leather, paper, and bones, were sorted out by hand and reused. This was of course a very labor-intensive process that we can scarcely imagine doing today. In any case, only a small portion of the waste remained after the sorting. Much as today, this waste was then burned. This waste-management concept, as we might call it, continued through approximately the end of the Second World War. In terms of household waste, then, one could say that Munich reutilized nearly 100 percent of its waste up until the immediate post-war period, and thus came very close to achieving the ideal of an economy without waste. With

the development of an affluent, consumer society after the war, the situation changed. Up through the 1970s about two-thirds of the waste was landfilled and one-third was burned; since then the proportion has gradually reversed.

**Christof Mauch:** Recently Munich has begun to develop an ecological waste-management concept again...

**Heide Rieke:** Correct. The first ecological waste-management plan was proposed in 1989. Sorting garbage and reducing waste were already important elements in it. As it has continued to develop, a “future without waste” has surely been one goal. I don’t believe that it can be achieved 100 percent, but after all this is the case for many environmental goals that we set for ourselves, even though we know perfectly well that they cannot be reached so quickly or easily. Nevertheless, it is important to have these goals so that we can motivate people to join the cause.

**Christof Mauch:** This is connected with the question of our attitudes towards waste.

**Heide Rieke:** Markus Vogt mentioned that it is a taboo topic. However, I think that the situation is slowly starting to change. The commercial sector is a different matter. But in individual households, sorting garbage seems to me to be a commonly accepted and practiced behavior. In Munich, the recycling rate is 58 percent, which is quite high. The federal government is aiming for 65 percent by 2020; I think that in Munich we will reach this goal significantly sooner. One reason for this of course is the fact that we have a good basis already—in principle we have already been recycling for 25 years. This type of waste-management system is carried by three main principles. First: it must always be cost-effective, since ultimately everything is paid out of funds that come from fees charged to residents. Second and third: we want to protect the climate and conserve resources, and at the same time remain socially responsible—this includes both the working conditions of the people who are employed with the local waste-management companies, as well as the working and living conditions of people abroad where waste is exported to. Therefore it is particularly important for the municipal governments to assume responsibility for the city’s waste. Of course, municipal waste departments often work closely with private service providers, but they continue to be monitored by the municipal authorities.

**Christof Mauch:** You also mentioned the question of cost-effectiveness. Can you say a bit more about the specific fees and services in Munich?

**Heide Rieke:** Since 2007 the fees for waste have steadily dropped, even though the fees are actually only charged for non-recyclable garbage. Bins for paper and organic waste are provided free of charge. Every building has these three bins on site. There are also 12 collection points for large or difficult to dispose of materials. Previously they were called “bulky-waste disposal centers”; the new name is intended to indicate that society has changed and we are now capable of valuing items that do not seem useful to us at present, but may have some use in the future. We have more than one thousand containers for recyclable items, such as glass. Our current focus is on collecting used clothing. Currently (in 2015) there are approximately 600 containers for depositing clothing; these replaced the commercial containers that had been used until 2013. The commercial containers did not offer sufficient control over what happens to the clothing that is deposited, and we would like to ensure that it is put to good use. Charitable organizations are, of course, an exception, as we are well informed about what they do with the collected items.

**Christof Mauch:** But plastic and synthetic materials are also problematic.

**Heide Rieke:** We have carried out a study on this topic. We were curious what happens to all the synthetic waste—whether it is a rubber duck or a broken plastic flower pot. Our study showed that 90 percent of the plastic waste produced by households cannot be recycled. Our recovery rate here is extremely low. However, Munich makes use of a number of other ways to extract value from various types of household garbage. Waste-to-energy plants, for example. For organic waste, the dry fermentation biogas facilities that you mentioned earlier are particularly important. We have become a producer of soil. The quality soil that we produce is composted using the Munich dry fermentation plants, which, in addition to creating excellent soil, also capture a large amount of biogas that can then be converted into electricity.

**Christof Mauch:** Thank you very much for your interesting and detailed explanations. Eveline Dürr and Markus Vogt suggested that there will always be things that are useless. In addition, Markus Vogt mentioned the problem of the rebound effect. I would like to return to this issue and direct my question to Martin Faulstich—what can you tell us about the rebound effect?

**Martin Faulstich:** Basically the rebound effect describes what happens when a product is made very efficient and inexpensive: as a rule this results in greater total consumption rather than less, because people use more. A typical example is energy use. We require 20 percent less energy to heat one square meter of living space in comparison with 20 years ago. This sounds like progress. However, in these 20 years, the average living space per individual has increased by 20 percent. This means that in reality the absolute use of energy for heating has not been reduced at all. It is similar with automobiles: although cars have become heavier and their motors larger, the average gas usage at a speed of 100 km/h has dropped. But we drive a lot more. Since 1960 the average number of kilometers driven per person has quadrupled. I had a discussion once with the US industrial researcher Amory Lovins, who is a promoter of the ultra-fuel-efficient vehicle. I told him “if we had cars in Germany that required only a liter of fuel to drive 100 km in an hour, and if fuel cost only €1 per liter, which would indubitably be a tremendous engineering accomplishment, there would be no public transportation anymore because everyone would be driving instead.” This, too, is an example of the rebound effect. The only way to suppress it would be to set absolute limits. The cell phone is another typical example. If you receive a letter, say, every two years from Telekom or Vodafone offering you the chance to purchase a new phone for only €1, it is very difficult to be a moral hero and most likely you will happily accept the offer. However, if the phone were to cost €1,000, which is a more accurate reflection of the value of the materials, people would probably use the phone for five, six, seven, even eight years, and perhaps it would be constructed to last that long as well. These are all examples of the rebound effect. It has to be admitted: 40 years of talking about environmental protection, 20 years talking about climate change—ultimately, all our efforts have only made things worse. In the past year the CO<sub>2</sub> emissions were the highest ever in the history of humankind, even though we have been taking climate protection measures for 20 years. In all areas—raw material consumption, water usage, the number of McDonald’s branches—everywhere the rate of increase has risen dramatically, creating the famous “hockey-stick curve.”

**Christof Mauch:** Those are quite discouraging conclusions.

**Martin Faulstich:** They are indeed. We have these amazing technical systems. But the anthropogenic factors that are causing so much harm to nature have not declined globally. They continue to increase every year. Part of this is due to the fact that people in many other parts of the world are striving for our material standard of living. This is under-

standable and we cannot refuse them the opportunity. Modern media technology makes many things possible. A television powered by a car battery brings CNN and its images of modern consumer society to people everywhere in the world. And the fact that we have come to see that our lifestyle was the wrong path to take doesn't give us the right to refuse people in other parts of the world a chance to enjoy material comforts. I am very worried indeed about the continuing increase in the amount of environmental pollution. Even though our education levels, our knowledge, and our insight into the problems we are causing have increased, the trends continue to be negative.

**Christof Mauch:** Can I return the discussion to the subject of plastic? Isn't it necessary to distinguish between natural resources, which are finite and can be depleted, and artificial substances which we can always synthesize more of?

**Martin Faulstich:** Yes. The Earth is a ball of matter, after all, and as such its resources are limited. The atmosphere that we are polluting is also limited. Metals, and in particular rare earth metals, are only available in fixed quantities. Plastics are a different matter: we can always develop and manufacture synthetic or bioplastic alternatives. But once copper, iron, or phosphorus reserves are used up, they have been used up forever. Unless—as some US scientists have suggested—we were to capture asteroids from space to mine them for materials. But even as an engineer I can't imagine that we will be technologically capable of such a task in the next hundred years.

**Eveline Dürr:** I'd like to add a comment to this. Sorting garbage and the vision of a "city without waste," that we are close to being able to achieve sounds like a success story. We are recycling more waste all the time and citizens have grasped the idea that waste can be capitalized and turned into something economically valuable. And so waste is a good thing, because henceforth we can recycle it. But I wonder what it is that we are actually sorting. Of course it gives me a good feeling to sort my garbage, and afterwards I don't have to think about it anymore because I've given someone else responsibility for what happens to it. The municipal waste management of Munich reinforces this attitude with their posters proclaiming "Your Waste—Our Responsibility." That means, I don't assume any responsibility—in fact, I'm emphatically handing over my responsibility. However, I think that the correct thing would be for us to accept responsibility for our waste instead of giving it to someone else. Seen as a whole, one might suggest provocatively that this whole business of sorting garbage is only a minor improvement at the local level. Considered in a global context, we're actually taking a step backwards.

**Christof Mauch:** Perhaps this should be a message for a new poster: “Your Waste—Your Responsibility”?

**Eveline Dürr:** (laughs) It is interesting how there are such widely divergent ways of looking at the situation.

**Heide Rieke:** Of course this is true. The waste problem has a global dimension. We must keep this in mind and accept responsibility for our waste. But the only way to solve anything is to start by realizing it at the local level. If we only look at the wider, global perspective, it won't help us move towards solutions. In the context of the entire world the contributions of individuals disappear from view. Therefore we need local responsibility. And here, in Munich, in Germany, it is particularly important for us to assume responsibility, for we are relatively rich. We can afford to take the lead, and we can afford to develop new technologies to deal with the problem.

**Christof Mauch:** But shouldn't we be doing even more to prevent things from being thrown out in the first place?

**Heide Rieke:** The Munich waste department provides residents with information about where items can be repaired instead of throwing them away. In addition to our own second-hand shop with still-usable items that have been brought to our waste collection points, we also publish a list of local second-hand shops and host an online flea market. The service life of manufactured goods is an important factor in this context: Why, for example, does my electric toothbrush have a built-in battery instead of a removable one, making it necessary to replace it after three years? Shouldn't there be regulations concerning the quality of manufactured products? Cell phones, cheap t-shirts, shoes? Is this really the only way we can achieve economic growth—by selling as many new products as possible in rapid succession? Is this why so many products have such a short lifespan? In this light, are initiatives that are supposedly designed to reduce pollution—such as the German scrappage scheme, which incentivized giving up older, high-emission vehicles and buying a new model—really such a good idea? Does it make sense to dispose of old refrigerators in order to replace them with energy-saving refrigerators? There are many such trade-offs, cases where efforts to improve the environment in one area cause problems in other areas. The important thing, I think, is to develop an awareness of reusable materials and their value.

**Christof Mauch:** The challenges are tremendous. It seems that we have to be active at a local level and simultaneously not lose sight of the global perspective. We must develop an awareness of the environmental consequences of our consumption, and in the future we should perhaps, as Martin Faulstich noted, pay prices which more accurately reflect the damage that is caused by throwing away products. Have we really made no progress at all in environmental protection?

**Martin Faulstich:** Actually there have been some big successes. Germany can boast a number of major accomplishments in the last 50 years. I am a child of the Ruhr industrial region, which in the 1960s was so notoriously polluted that the houses had to be repainted white every year. And you couldn't hang up your laundry outside to dry either. It's rather sobering to note that the first environmental protection measure undertaken in the steel mills in the 1960s was to put a roof over the parking lot because employees had complained that by evening their vehicles were covered with a layer of dust. No one was particularly concerned about the health effects of this dust. In 1968, German Chancellor Willy Brandt declared that "the sky over the Ruhr must become blue again"; today it is in fact blue. We also see this progress in the fact that today, nearly everywhere in Germany—with very few exceptions—the water is safe to drink and the air is clean. Practically all lakes and rivers are okay to swim in. And trash isn't left lying around in the streets. In other words, we have gotten very good at end-of-pipe measures, i.e., finding ways to manage the waste after it has been produced. All the same, if we direct our attention to the beginning of the chain instead—to production processes—and ask ourselves about the amount of raw materials and energy that we are using...well, not much has changed. And therefore it is important to start turning our attention to the products we consume.

The mention of refrigerators reminds me of an anecdote that illustrates the "rebound effect." It goes something like this: A woman says to her husband, "Why don't we buy a new refrigerator? The new model is so wonderful, look at its efficiency rating," and so forth. The man replies: "But it would really be a shame to throw away the old one. We'll put it in the garage and I can use it to cool my beer." This is the rebound effect.

**Christof Mauch:** But what can each of us as individuals do? Buy more durable shoes?

**Martin Faulstich:** This is going to sound a bit vain and arrogant: the suit I am wearing was made by a tailor; the shoes are handmade. But of course all of this costs a pretty packet.



If one were to go to people and say, “Here’s the deal: we’ll give you an interest-free loan if you pay to have your furniture made by a carpenter,” many people would probably be happy to accept, rather than have to make ten trips to Ikea instead. This would reduce waste, and it would still be financially beneficial by helping the economy grow: hand-made furniture is expensive, and the carpenter earns money from it. I think it would really be possible to set our sights on quality, long-lasting products, if only we could find a solution for the expense of the initial investment. When a young family starts furnishing their new house, usually they cannot afford to buy sturdy handmade furniture, so they end up at Ikea. We really need financing methods to enable people to go to the carpenter or the tailor from the very beginning—not out of conceitedness, but because such products really do last forever. Why isn’t this done? Interestingly enough, if we look at industry, this is exactly what they do: a manufacturer would never buy a lathe or other machine that will only last 10 years. Their machines last 50 years and are constantly upgraded: a replacement control board, a new regulator, a fresh coat of paint, etc. It’s only consumer products that don’t last; often, they’re even designed not to last. Therefore I advocate expensive but high-quality and durable products instead.

**Christof Mauch:** It is clear that awareness of the problem of waste and even ideas about how to reduce it are not at all new. Since we know what we should be doing, why don’t we, in fact, do it? What can the study of ethics tell us about this phenomenon?

**Markus Vogt:** This is a really fascinating matter, where we have successes coinciding with failures. Success and failure are ideas conveyed through moral communication. In this context, I think that it can be productive to tell success stories, such as that of Munich, for example. Success stories motivate us. Here we see how garbage can be a valuable material. These stories cause us to reflect on how else we might contribute to further successes. It is a huge motivation. At the same time, it is important not to forget the flip side: the fact that we displace or hide many things. For example, a large part of our e-waste is dumped in other countries, where it has immense health and environmental effects. In other words, it is crucial to maintain the right balance between stories of success and failure. And of course, because people’s expectations are constantly becoming higher, we also need to talk about exercising more moderation.

For the ancient Greeks, moderation or frugality was the most important virtue—not in the sense of “doing without,” but rather as something that improved one’s quality of life. It

has to do with creativity, with communication, and it permeates deep into our ideas about lifestyle and affluence. It is precisely these deeper dimensions that we must discuss.

**Christof Mauch:** What does this mean for us in practice?

**Markus Vogt:** It is important that we focus our activities on clearly defined problems and set priorities. The potential to motivate people is also significant: collecting garbage has a ritual quality. It is attractive because it offers us a way to purify our guilty conscience, as it were. By contrast, it is much more difficult to develop a concept or model in which everything could be reused. And it would make little sense to do so.

**Christof Mauch:** Let's go back a bit and look again at the economic aspects. What role is played by capitalism, the state, and businesses?

**Eveline Dürr:** I don't think there is necessarily a conflict between waste avoidance and capitalism. The power of social discourses should not be discounted, particularly in connection with these topics. Businesses that are known to be big polluters create negative publicity for themselves. Likewise, companies can increase sales by being committed to environmental protection.

**Christof Mauch:** And how much should the state be involved?

**Martin Faulstich:** I think we need a very intelligent relationship between businesses and the state. The state needs to impose strong and strict parameters. It must also ensure that pollution and environmental damages are factored in. In other words, if I may use a sports analogy, the state determines the boundaries of the playing field and establishes the rules. But on the field what matters is creativity and mobility; the players can move about freely and their gameplay is not predetermined. In the same way, I wish for a diversity of products and a free market economy, but there must be penalties for causing environmental damage.

**Christof Mauch:** And how about growth? Where does the state come in?

**Martin Faulstich:** The state has the ultimate responsibility for guaranteeing services; thus, it should determine which sectors should grow and which should shrink. If public transit is

growing, if recycling is growing, if waste reduction is growing—this is a wonderful type of growth. But for this to happen, other sectors have to shrink. As a society, we must be more active in determining which sectors we want to grow. After all, we want positive things like the cultural sector to grow. And taking charge of this is a collective task.

**Christof Mauch:** I hear an objection from the audience...

**Audience member:** Garbage, or what is considered garbage, is a purely human problem. But we could use the example of biological cycles as a model for more intelligent material research and usage. I believe that we should look more critically in general at the technical cycles and the demands of industry. Wouldn't it be possible to approach our production more like a biological cycle? Couldn't we dramatically reduce our waste by orienting ourselves more towards nature, where waste doesn't exist?

**Markus Vogt:** From a philosophical perspective I agree with the audience member. Nature provides us with a tremendous number of examples of amazing creativity in finding ways to reuse materials. Petroleum-based products such as plastics cause the most problems since they are not biodegradable. Here we must actively develop new technologies: ways to create plastics that are biodegradable and easily recyclable so that we don't cause so much harm to nature. Indeed, it makes sense here to think in terms of life cycles and to investigate more closely the nuances of how nature functions, how it is structured. We could think of this as a sort of social biomimicry. This is a fascinating topic, but we should be careful not to proceed according to the idea of having only closed cycles; rather, it will be a development that profits from variety and tensions. There will always be waste, but if we are creative, we will be able to keep embedding it into new cycles.

**Heide Rieke:** Of course we can talk about all the things that we can reinvent with new technology. But in the end we will have to be more frugal. I am convinced that we can still live very comfortably even while reducing our demands. But above all, as Markus Vogt has noted, it requires a certain amount of fantasy. That's precisely it, fantasy. I am convinced that creativity and fantasy will allow us to move forward. It is not enough to simply urge people to "be green and think about the environment"; we need to generate the right attitudes that will set us on the path to the future.

**Christof Mauch:** This makes me curious and I would love to know what each of you thinks the situation will look like a hundred years from now. But perhaps we can discuss this together during the reception after this talk. Your comments have made it clearer to me than ever how important it is to look at the problem of waste from a variety of perspectives. We looked at some of the successes and failures on the path towards a “future without waste”; we saw some of the instruments for adjusting our lifestyles and economy to bring us closer to this ideal. Please give a big round of applause to our four panelists for their interesting and informative contributions. And to all of you in the audience, for spending this beautiful day inside learning about what may seem to be a rather unpleasant topic. I hope this panel has changed your outlook!

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This text is condensed from a roundtable discussion organized by the Rachel Carson Center and the Center for Advanced Studies at LMU Munich on 8 May 2013. The talk was transcribed by Nora Taleb and translated from the German by Laurianne Posch and Brenda Black.

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**Jutta Gutberlet** is a professor in the geography department of the University of Victoria, with recent appointments as visiting scholar at the University of São Paulo and Sorbonne, Paris. Her work and praxis is inscribed in political ecology theory and applies participatory, community-based action methods, addressing the multiple challenges of waste picking and cooperative recycling. Her research examines informal and formal waste management and underlying power relations in the Global South. She is involved in collaborative research with international and interdisciplinary scholars and has widely published both academic books and articles and educational materials.

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Today, in an era of consumerism and cheap, throwaway products, we are producing more waste than ever. In response, many are calling for radical changes in our habits and lifestyles; companies and municipalities are embarking on ambitious plans to become “zero waste.” But is a world without waste truly achievable? The essays in this volume of *RCC Perspectives* discuss zero waste as a vision, as a historical concept, and as an international practice. Going beyond the motto of “reduce, reuse, recycle,” they reflect on the feasibility of creating closed material cycles and explore real-world examples of challenges and successes on the way to zero waste.

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