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A sustainable level of material footprint – Benchmark for designing one-planet lifestyles

Lectio praecursoria

This spring, I was going to get crazy when I noticed, that nearly a whole nation is raising plastics in the center of our environmental concerns. This reminded me so much of the idea of the weekly hazardous substance. The weekly hazardous substance means an even weekly changing focus of media or politics on one single substance or environmental problem. 25 years ago, prof. Bio Schmidt-Bleek and his team at the newly-founded Wuppertal Institute realized, that raising weekly hazardous substances into the spotlight of public discussion is an efficient way of preventing systemic and effective approaches for decreasing environmental pressure.

When I read Schmidt-Bleek's first MIPS book in the 1990ies, I noticed immediately: Now, someone has been able to pronounce something, that had been going around my mind, but I had never been able to catch it into words. Professor Schmidt-Bleek, a chemist and former head of chemical politics in Germany and the OECD, claimed that, in addition to tackling environmental problems substance by substance, we need a more holistic approach. An approach that enables us to reduce human pressure on the environment on a systemic basis. He called his approach MIPS – the Material Input per unit of Service.

The MIPS concept was revolutionary in at least three ways: First, by tackling material flows as a whole, it showed us a way out of the substance by substance and problem by problem approaches. Radically decreasing material input into our production and consumption system will also radically decrease hazardous outputs and the related environmental problems.

Second, looking at the service products provide instead of just the products themselves, Schmidt-Bleek was a pioneer in product-service system thinking. Product-service systems are nowadays a central approach in design and business development: And it has been interesting to follow, for example with Mobility as a Service, how we have concepts spreading, that we called a future consumption pattern in our presentations 20 years ago.

The third revolutionary message of Schmidt-Bleek was the factor 10. This means that sustainability requires a reduction of material flows in the industrialized countries to one tenth, that is by 90%, in order to provide all humans on Earth decent access to natural resources, so that they can cover at least their basic needs.

With his concepts of MIPS and factor 10, Schmidt-Bleek laid one important foundation for the scientific field of social metabolism.

Around 15 years ago, when I worked with the MIPS concept in different research and development projects, I noticed the strength of the concept as an indicator. It can be applied on different levels, from single products and companies, to national economies. So, it can also link activities on these different levels to each other. In addition, MIPS indeed turned the focus from single

substances and single environmental problems to natural resource use as a whole, including its global implications.

However, I gradually noticed that by improving product by product, and company by company, it might take long, too long, to change the world. That's why I started to shift my focus, from production and product-orientation to consumption. For example, office paper consumption can be reduced by even factor 4, when we print or copy double sided, and zoom 2 pages on 1 page. If we, in addition, were able to get along with half of the present paper amount, we would achieve a factor of 8 already. Yet, from a mere production perspective, even a factor 4 paper would be hard to develop. That's why I turned to consider consumption as a relevant field to look at.

In our first household project, called FIN-MIPS Household, we calculated the Lifestyle Material Footprint of 27 Finnish households. And we noticed an up to 9-fold difference in the footprints, from 13 to almost 120 tonnes of material resources per person per year. But when the households asked us, to which level they should reduce their footprints, we were just able to make quite vague statements on factor 10 or factor 4, because a sustainable level of Lifestyle Material Footprint was not yet known, and the quantitative discussion on planetary boundaries by Rockström and colleagues had not yet arrived us.

A couple of years later, I participated in a workshop on sustainable future lifestyles, organized by the famous designers of Politecnico di Milano. During that workshop, I felt slightly uncomfortable. The designers showed us brilliant pictures of different aspects of sustainable future lifestyles. However, I was missing something, that really could tell us, how far all these bits and pieces of sustainable lifestyles would bring us in terms of sustainability. And I started to make some notes and calculations on the edge of my paper.

Back home, I did some more of research, and noticed that Stefan Bringezu had published calculations on the sustainable level of material resources use as a whole. I utilized these calculations to calculate a households' share of sustainable global resource extraction, and out of that an equal, global per capita consumption. So, I came up with the proposal that, to become sustainable, the Lifestyle Material Footprint of an average Finn would have to decrease from 40 to 8 tonnes per year, by 2050. This is a factor 5 reduction. And this also means, that if all humans on Earth consumed as Finns, we would need the material resources of 5 planets.

We have only one planet. So, we really should achieve these 8 tonnes. And yes, we can achieve 8 tonnes. In my thesis, there are 3 reality checks for achieving 8 tonnes. Paper 5 concentrates on a sustainable material footprint for nutrition. And it shows that we can drop our average material footprint for nutrition from 6 to 3 tonnes. This is factor 2 only, because we always have to eat. After this, we have left 5 tonnes of sustainable footprint, but 34 tonnes of present footprint. Paper 6 shows that we could be able to bridge this gap. If we manage to build or renovate zero energy houses, that are not more material-intensive than present houses, we can afford 20 square meters of living space per person. Basically possible. And if we manage to decrease the average material intensity of our mobility to 200 grams per kilometer, which is a bit more efficient than present public transportation or cycling, each of us can afford 10 000 kilometers per year. And so on, and so on, for the different components of consumption.

After proposing the 8 tonnes target, I got the lovely opportunity to try out, with real households in real life, how low we can go. This is paper 7 of the thesis. We chose 5 households out of

40 applicants in Jyväskylä, Central Finland, to live one month in the future. First, they monitored their consumption and we assessed their footprints. Results as usual: 20 to 70 tonnes per person. Average plus or minus something, but far away from 8 tonnes. Then, we proceeded a step further: Each household developed their own vision for the future, a roadmap till 2030, reducing footprints by roughly half.

And after this, the households got the opportunity to live one month in the future. They re-designed their lifestyles, by choosing measures out of their roadmaps they wanted to try out. And they chose really relevant measures, including options like vegan nutrition, giving up the second car in a 3-child family living 16 km outside the city, or moving from a big house outside to a 2-room apartment in the city center.

The results were surprising: Their footprints dropped more than expected, even relatively close to their targets for 2030. And, several households reported an increasing quality of life.

So, what does this all mean? What does my dissertation tell us?

First of all, we are able to say what a sustainable lifestyle could look like. We have an indicator that is telling this in an understandable way.

Second, the footprint of households can drop, even considerably, and even in the short term. This means, that we should strongly consider households and lifestyles, when talking about options for decreasing environmental pressure. For example, in relation to the climate targets of the Paris Agreement, the household's perspective could play a much bigger role than so far.

Third: Although I am writing and talking about households and their footprints, this does not mean, that the footprints should be dropped just by means of households. On the contrary: When even low-income households have footprints well above 8 tonnes, as paper 4 shows, then there must be a tremendous need for change in supply, infrastructure, and political framework conditions.

And here is, where design comes in. Designers have huge opportunities. They work at the interface of production and consumption. They know the consumers, and they have the creativity to develop sustainable solutions.

Paper 8 of my thesis suggests a new direction for design: Design for One Planet. Papanek argued decades ago, that only very few professions were more harmful than industrial design. Fortunately, many researchers also have pointed out, that design can be a leverage point for developing and spreading sustainable solutions. Therefore, I have presented an orientation framework for Design for One Planet. The idea of the framework is to point out, which kind of solutions designers could provide for decreasing Lifestyle Material Footprints in a relevant way, on the basis of priority areas for action, and in different domains of design: product design, service design, infrastructure planning, and communication design. I hope, this framework can be a start for inspiring the design community to integrate and develop ways to accelerate the transition to sustainable lifestyles.

And after all, I have to say that I am actually optimistic. Although big ships are turning slowly, as we use to say in Finland, I can already recognize so many sustainable solutions emerging, that I see tremendous opportunities. Turning the focus to the footprints of consumption opens new ways and opportunities for tackling the challenges we are facing. I hope, my dissertation can help designers and other professionals, as well as politicians and consumers in being part of the solution towards a sustainable future.