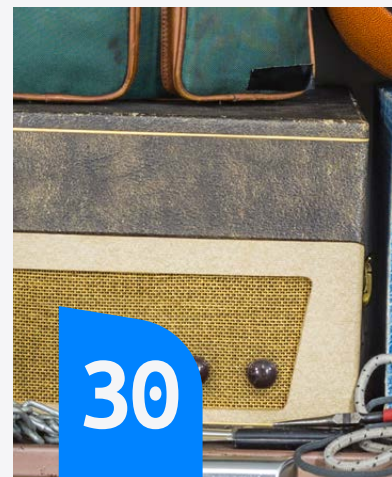
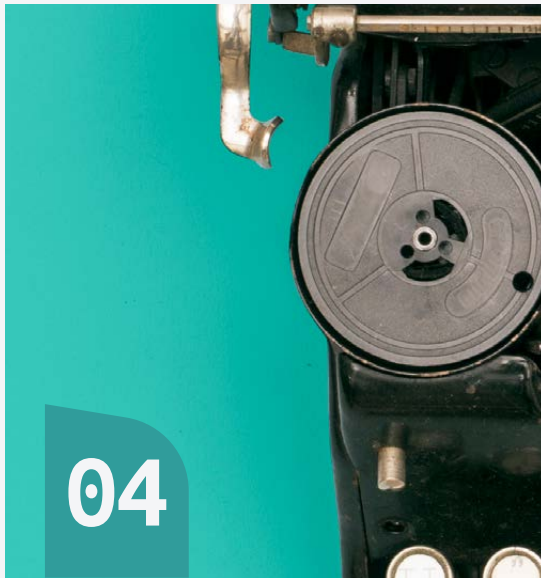


The Rise of the Experience Ecology



Scarcity in **Abundance**

Table of Contents

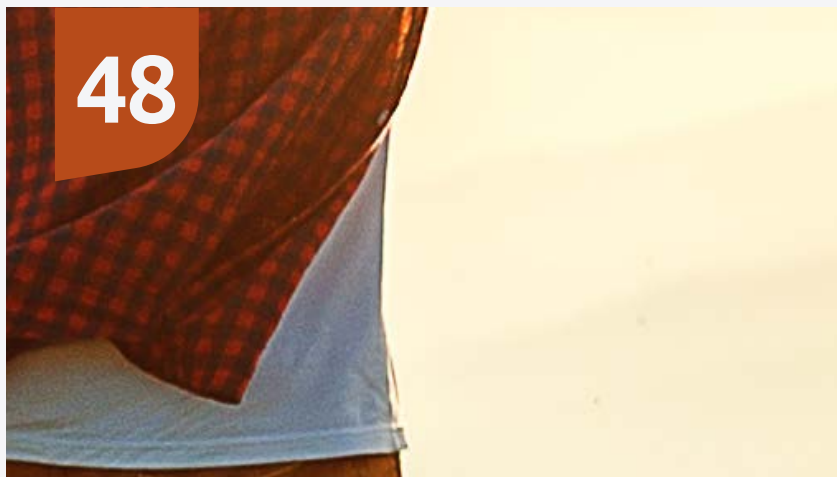
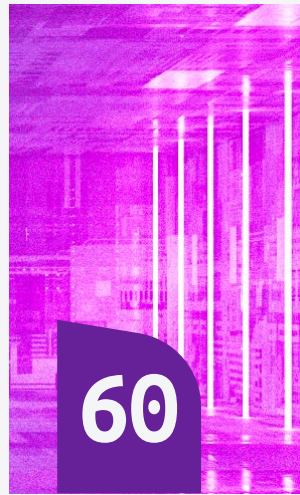
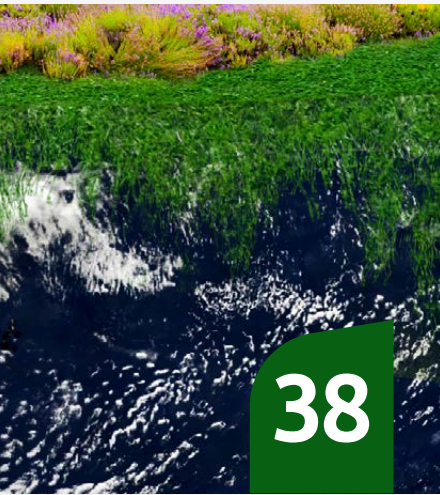


04 – Foreword

11 – The Netherlands as a proverbial ‘canary in the coal mine’

18 – The experience ecology

30 – Can we break our desire for more stuff?



38 – The Techno Revolution of Ecomodernism

48 – The Social Revolution: A Post-Growth Society

60 – The Experience Technology

70 – Epilogue: The Netherlands in 2121

74 – Afterword

Foreword

Two great experiments



The main challenges we face today are the result of two major experiments. One experiment started quite recently, when OpenAI at the end of 2022 decided to release a new form of artificial intelligence (AI) to the general public. At stellar pace, people all over the world flocked to it. The creators of ChatGPT are fascinatingly observing us from their laboratory as their unknowing guinea pigs.

The second experiment started some seventy years ago with the great acceleration of the economy. Unprecedented year-on-year growth, based on the technological breakthroughs of the industrial revolution, set the tone for today's expectations. Products, technology and services came in abundance. Inventors and organizations alike, watched with fascination as this growth experiment dramatically changed our lives.

Scarcity in Abundance is an exploration of where these two experiments can lead to. For example, an abundance of artificial intelligence in combination with a scarcity of products, resources and nature. Connecting the two is an appealing thought. Could the one offer the solution of the other? After all, super technology such as AI is capable of a lot. But what about culture and nature, that evolve according to their own rules?

Both nature and culture are creating turmoil. Nature is making itself increasingly heard. We used to watch the weather reports after the news, but now the situation is reversed. Weather reports are dominating the news. Culture is also changing, manifesting in, among other things, the crisis of confidence and the ever increasing polarization in society, the cancel culture and woke-ism. People start questioning the systems that run our society.

For both experiments, we now have arrived in a phase where stagnation looms. Italy has temporarily banned ChatGPT and leading AI experts are calling for a pause to rethink. Europe has never passed a technology law, the so-called EU AI act, so quickly. First, it were the tech philosophers who warned us, now it's the technicians themselves. The fact that Google's CEO, Sundar Pichai, argues for tough government intervention with strict laws and harsh punishments is significant in this context¹. Sam Altman, the leader of OpenAI, says he is "a little scared" that GPT4 might wreak havoc on the world, clearly intending it as an understatement and urging the government to intervene². Elon Musk, who has been very vocal about the dangers of AI, even comparing it to the atomic bomb is in response setting up his own AI company – xAI – that, in contrast to ChatGPT will be maximal truth seeking, guaranteeing a safe path to AI. In the case of the economic experiment - the year

¹Elias, J. (2023, April 17). Google CEO Sundar Pichai warns society to brace for impact of A.I. acceleration, says 'it's not for a company to decide'. CNBC. <https://www.cnbc.com/2023/04/17/google-ceo-sundar-pichai-warns-society-to-brace-for-impact-of-ai-acceleration.html>

²Helmore, E. (2023, March 17). 'We are a little bit scared': OpenAI CEO warns of risks of artificial intelligence. The Guardian. <https://www.theguardian.com/technology/2023/mar/17/openai-sam-altman-artificial-intelligence-warning-gpt4>

on year growth of the economy - the stop button is slowly being pressed. Due to abundant scarcity everywhere, increasingly difficult choices have to be made. We suddenly experience scarcity in many areas - from expensive energy, lack of clean drinking water, rare metals, shortage of construction materials and scarcity of nature, to shortage of talent on the labor market.

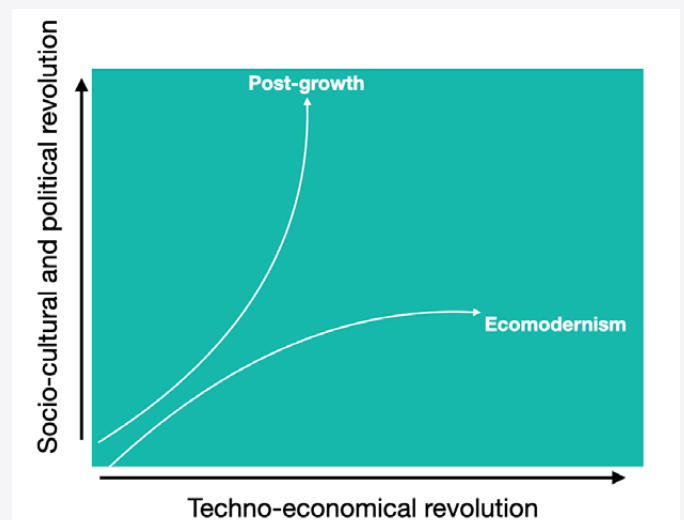
It is becoming increasingly clear to organization's leadership that these two existential issues set the agenda for twin transformation: towards a digital economy and towards a sustainable economy. What is the future growth perspective in a world defined by scarcer resources? And how do I successfully steer my organization through an AI transformation whose scale and impact will be unprecedented?

In this first report, we look at the options for future economic growth. Two scenarios (and the schools they represent) are discussed. Green growth and the school of 'Ecomodernist' that belief that being green is compatible with continued economic growth. And post-growth and the school of 'Degrowthers' that belief that a profound transformation is required.

The green growth scenario is more in line with existing frames of mind, because it does not require fundamental change of 'the system' we grew up in and are so familiar with. The second scenario of degrowth is much more challenging to get our heads around because it requires profound change and violently clashes with conventional wisdom. This is illustrated by economist Kenneth Boulding that famously said, when giving evidence to the US Congress in 1973, in the wake of the Club of Rome's influential report 'The Limits to Growth':

“Anyone who believes that exponential growth can go on forever in a finite world is either a madman or an economist”

In this respect, we are at the crossroads of two competing narratives: to continue growth with scarcer resources, or to stop growing with scarcer resources. If we put it very black and white: the post-growers advocate a social revolution and the ecomodernists advocate a technological revolution.





In this report

We are writing this report for executives, company boards, politicians, and technology decision makers. And furthermore, for anyone who wants to prepare for the two competing stories about the future of our society.

A better understanding of the future is an important tool for making strategic decisions. Both for your organization and for society as a whole. However, this report is not a recipe for your future, nor does it contain an action plan or recommendations for your organization. That would be too simplistic. It is a description of social, ecological and technological phenomena that will undoubtedly leave an important mark on society (regardless of the opinion of you as a reader or us as the authors). The beckoning perspective is formed by the two, partly contradictory, partly overlapping, stories of a social and a technological revolution.

We hope that after reading this, you will be able and willing to ask yourself the question “How do I feel about these stories?” Perhaps you dare to go a step further and measure your own principles and convictions against the yardstick of the developments outlined here.

Does your worldview hold up?

Does your own story and that of your organization still make sense?

What do you stand for?

Technology choices will be seen in a different, moral, light. Prepare for the legal frameworks for your “license to operate” to shift. New social contracts for wealth distribution will be established and there is a good chance that sentiments in society will rise (even) higher. Unprecedented changes in an elusive world are sometimes summarized under the acronym ‘VUCA’. But recently a new term ‘BANI’ has replaced it. The VUCA world, which is much talked about within organizations, will become a BANI world.

1990s – Fall of the Soviet Union

V – Volatile

U – Uncertain

C – Complex

A – Ambiguous

As of 2020 – Climate and system crisis

B – Brittle

A – Anxious

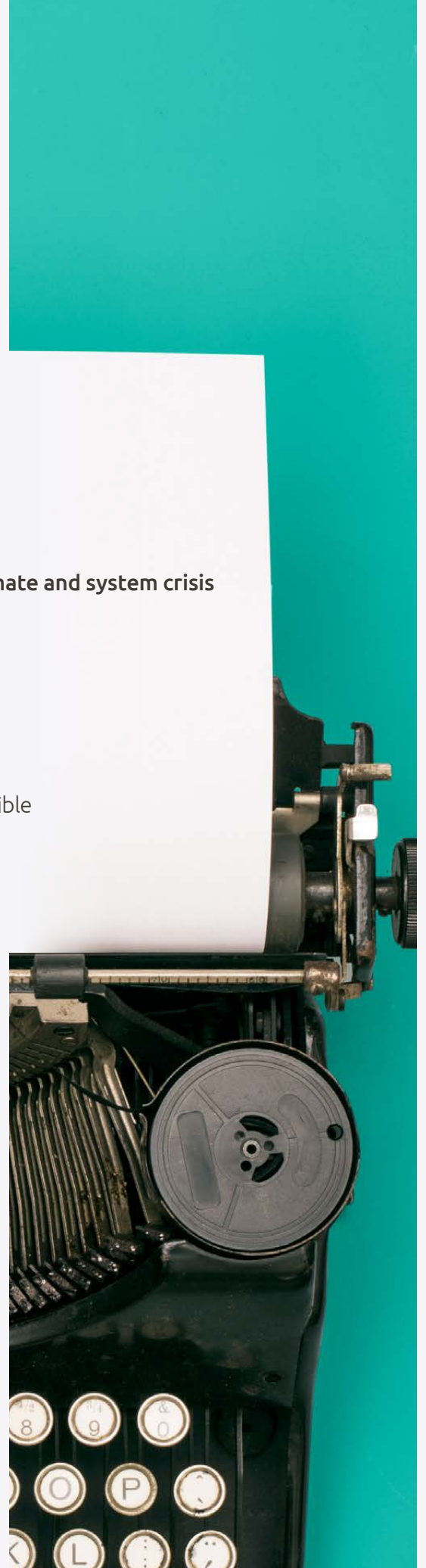
N – Non-linear

I – Incomprehensible

The concept of VUCA has been around for a long time in the business world and is the product of the uncertain times after the fall of the Berlin wall. Originally, it is a term used by the US military. BANI was coined in 2020 by the authoritative American anthropologist and political scientist Jamais Cascio³. He outlines a delicate future where climate change plays a significant role. Fear and emotion play a more important role in the formation of the future, while understanding the world itself becomes increasingly difficult⁴.

³Cascio, J. (2020, April 29). Facing the Age of Chaos. Medium. <https://medium.com/@cascio/facing-the-age-of-chaos-b00687b1f51d>

⁴Een meer gedetailleerde beschrijving van VUCA versus BANI vindt u in: Grabmeier, S. (2020, July 28). BANI versus VUCA: a new acronym to describe the world. <https://stephangrabmeier.de/bani-versus-vuca/>



The Netherlands and the experience ecology

To outline the context in which the heated (BANI) discussions about 'scarcity in abundance' take place, we start with the story of the Netherlands, which is one of the first 'overdeveloped' countries to be confronted with an abundance of scarcity. We outline the dynamics within which this takes place, as a harbinger and signal for other countries.

In the second chapter we introduce a new concept, the experience ecology: the era in which the cold predictions of science are increasingly felt in 'real' life. A new phase of the human-dominated planet: the Anthropocene. How the earth experiences this dominance and how we respond to it - from climate panic to nitrogen politics - will determine the further course.

To put the desire to grow the economy into perspective, in Chapter Three we go back in time: to the period when consumerism was not accepted and the fear dominated that individual wealth would lead to social scarcity. That period, it seems, is far behind us. This genesis of the consumer automatically brings us to the hyper-consumer society where IT rules.

We position the two options for a way out (Chapters Four and Five) as a titanic battle, but it might not feel that way. The conflict between Green Growth and Post Growth appears to have been decisively favoring Green Growth, as current systems and institutions remain heavily oriented towards growth. However, an increasing number of those who are awake to these issues, a 'woke' group that continues to expand, perceive greater advantages in post-growth principles and the accompanying social revolution.

Schematically, this report is as follows:



In Chapter 6, The Experience Technology, we derive insights for the future of technology. We do not necessarily look at the differences between the two scenarios, but rather see them arise in combination at the same time. One of the future directions is that of Techno-sobriety, in which more economical use of technology is key. Another direction is that of Deep Technology, which revolves around breakthrough technologies that have yet to come to fruition. Here, we also introduce the concept of 'Conscious Technology': technology that brings transparency to the ecological impact of consumption and initiates other production and taxation systems.

At the end of this report we return to the Netherlands in an epilogue, and present a future vision elaborated by transition professor Jan Rotmans. He is a mathematician and calculated what the Netherlands would have to do to be in a good shape in 2121. The plan will require an unprecedented tour de force for our small country.

“The only way of finding the limits of the possible is by going beyond them into the impossible”

Arthur C Clarke



Chapter 1

The Netherlands as a proverbial ‘canary in the coal mine’





The enduring memory of the container ship ‘Ever Given’ is etched in our minds – a sudden obstruction of the Suez Canal on March 23rd, 2021. Buffeted by a sandstorm of force eight, the ship faced conflicting guidance from the Egyptian pilots as they struggled to steer the colossal 1300-foot vessel. Despite its 79,500 horsepower engines, the ship’s bow became ensnared in the mud.

Ten tugs stationed along the Suez Canal couldn’t muster the strength to dislodge the ship. To the rescue came two additional tugboats boasting immense ‘bollard pull’ capabilities⁵. An extra cutter suction dredger joined the effort to clear the accumulated mud and sand beneath the vessel. In the end, patience for the impeding spring tide provided the solution.

Finally, on March 29th, 2021 – six days after the blockage – the ship navigated out of the Suez Canal. Then ensued the debate over who should bear the weight of the \$600 million claim.

1.1 Ship Happens

The image from above of the ship across the Suez Canal looks like a clogged coronary artery and the cutter suction dredger and tugs look like the surgeon’s instruments with which the operation was performed. The patient is now doing well. After repairs in November 2021, the ship was returned to service. But quite a bit of damage had been done. According to Lloyd’s List calculations, the blockage was obstructing \$400 million in trade per hour. Roughly 10% of world trade passes through the Suez Canal every day. The containers were filled with goods on their way from Malaysia to the port of Rotterdam. The four hundred container ships that were backed up carried a lot more stuff on board. “What stuff?” you ask⁶. Amongst many other goods, Ikea furniture, sheep, oil, cement, cars, tea, coffee beans to make instant coffee, sports equipment, coconut milk, and numerous car parts.

Yes indeed, “Ship Happens”, as one of the articles headlined after the event. Mother Nature got



⁵Wikipedia (2023, July 27). Ever Given (schip, 2018). [https://nl.wikipedia.org/wiki/Ever_Given_\(schip,_2018\)](https://nl.wikipedia.org/wiki/Ever_Given_(schip,_2018))

⁶Domonoske, C. (2021, March 29). Ship Happens: Coffee, Livestock, Ikea Furniture Among The Objects Stuck At The Suez. NPR. <https://www.npr.org/2021/03/29/982233995/ship-happens-coffee-cars-ikea-furniture-among-the-objects-stuck-at-the-suez>

hold of a container ship. A sandstorm was just what we needed in addition to the other problems we were faced with at the time. All of Europe was in lock-down, due to the Covid virus. Companies already had to contend with serious delivery problems. And apart from the stuff that was stuck in shipping containers in Egypt, the containers themselves were also needed (empty) for the subsequent transport of all kinds of other goods: a catalyst within a catalyst. It confronted us once more with the facts: the fragility of globalized systems and our dependence on nature.

With the assistance of Dutch dredgers and pull boats the Ever Given was afloat again. Not without self-interest because the Netherlands is the world champion of globalization⁷. The country is also the world record holder for continuous economic growth. Until the financial crisis of 2008, the Dutch economy grew for 26 years straight, an unprecedented achievement. And the Netherlands is the second largest food exporter in the world.

In an article the Financial Times analyzes that overdeveloped countries are reaching the limits of growth⁸ and the Netherlands is mentioned in particular. The newspaper headline article opens with:

“The Netherlands may be the first country to hit the limits of growth.”

The Netherlands has long seen itself as an example for the rest of the world. ‘The Netherlands as a guide country’ is an important concept for the Dutch. For instance, The International Court of Justice in The Hague has become the icon of our desire to demonstrate to other countries the right way to go. But setting an example in this context is completely new.

⁷KOFF Globalisation Index, Globalisation Index de facto 2020.

⁸Kuper, S. (2022, October 27). The Netherlands may be the first country to hit the limits of growth. Financial Times. <https://www.ft.com/content/4c56c9b2-f4ad-4956-9216-655acebd845d>

1.2 The experience ecology descends on the Netherlands

With our 17.5 million inhabitants, we are most famous for our tulips, bicycles, cheeses, and our eternal battle with the higher sea. More than 50% of the Dutch live below sea level. The land is shaped like a bathtub, with dikes canals and pumps to keep the water at bay and a sinking soil in the middle. While the sea water rises, the Netherlands slowly sinks. We are a country of reclaimed land (from the water) and polder residents, architects of our own future. A future that is now threatened on all sides by limitations of possibilities to build, expand, farm; scarcity roars its tail.

Expansion has reached its limit. The (inter) national nitrogen and CO₂ treaties that need to be complied with impose such stringent limits that nothing seems possible anymore. Residents, while constantly aware of the existential threat of rising sea levels also see the Netherlands, because of rising average temperatures, turning into a wine producing country. Formerly known as a 'cold little country' it now boasts a steadily growing number of



about 200 commercial vineyards. So, you can enjoy a Dutch Pinot Noir, the Regent, and the Rondo.

We see the Netherlands changing towards a country where the environment and nature increasingly matter, dilemmas are deepening and societal tensions are rising. Step into a fresh iteration of the experience economy, particularly delving into its ecological interpretation. How we experience growth and its direct ecological impact is key and is stirring up strong emotions.

The emotions easily rise to the surface because different groups actually have something at stake. Farmers, whose families have sometimes worked the land for generations, suddenly are confronted with an uncertain future. And organizations sometimes find it difficult to position themselves in this changing Dutch landscape. Sustainability is increasingly intertwined with consumption, production, provided services, behavior and culture. From protests to boycotting talk shows, activist shareholders raising their voices and the risk to become the next victim of a growing cancel culture.

Meanwhile, organizations are trying to adapt to this tornado of feelings, values and statistics. The culture is changing, governments are introducing increasingly strict legislation, and data models provide new conclusions every day. Organizations must strengthen their ability to adapt and learn to navigate a constantly changing world in which



emotions run high. So, what matters now is being flexible and responsive, open to multiple future scenarios, constantly, discovering and experimenting with new ideas and concepts.

In this new Dutch landscape, we must realize that chaos and change are inevitable. A control panel⁹ full of complicated measurements and new terms such as 'nitrogen deposition' and the 'aerius calculator' determines when and where economic activities can or can no longer take place.

its 800 years history and can't do anything right that pleases all.

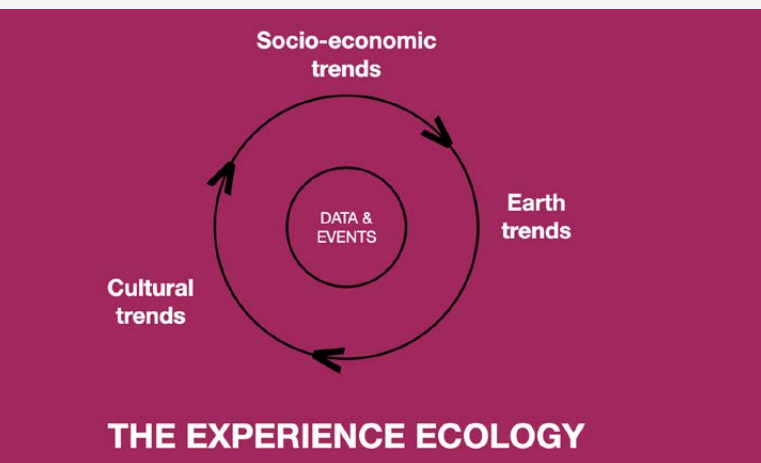
Escalating tensions and mounting pressures are bringing about swift changes in the Netherlands, but not everyone agrees. A telling tale of the resistance and dissatisfaction of Dutch farmers is evident when traveling through the polders and tulip fields that are now marked by the emblematic inverted Dutch flag – a poignant representation of their discontent.

Navigating Dutch highways in recent times might place you amidst a convoy of tractors from the Farmers Defense Fore (FDF). Since October 1, 2019, numerous farmers have routinely traveled from all corners of the country with their massive albeit slow vehicles, converging in The Hague to protest against the nitrogen restrictions. These protests, while causing substantial irritation, have also garnered an unprecedented level of support. This groundswell of backing eventually led to a triumph for the Boeren Burger Beweging (Farmer's Citizen's Movement) in the provincial elections of 2023. To them, change is happening way too fast.

If there is one thing that is characteristic of the Netherlands, it is our relationship with the countryside. It is a dynamic environment that is constantly under increasing pressure. Now that the wolf is reappearing again in the wild, it is quickly crossing man-made boundaries between 'wild nature' and cultured farmland where sheep are kept. The owners of sheep are not pleased and demand that something be done while others argue that we should cherish the fact that our biosphere is finally recovering after centuries of abuse.

Water management has become a political issue because droughts are occurring more frequently. As a consequence, the Dutch system of water boards is under more scrutiny than ever before in

If you tried to temporarily escape from this chaos by watching TV, you might just witness a protest by Extinction Rebellion. In several Dutch TV talk shows protesters glued themselves to the discussion table in a live broadcast, emphasizing that time was running out and imploring politicians, government and organizations to take swift action against climate change. For them change is happening way too slow.



⁹<https://www.aerius.nl/nl>

All this chaos does not mean that we are totally in the dark about how things will play out. Certain things are known. For example, we know that many resources to sustain continued growth are increasingly scarce. We also know that some of those scarce resources are required for the green transition (solar panels, wind turbines and batteries). The demand for those scarce resources will therefore grow faster. We are aware of the scientists' climate models and we understand that the 1.5°C degrees lower limit for global warming will be exceeded and even the 2°C degrees limit will be difficult to achieve. We understand that this global warming will lead to weather extremes becoming more frequent. And we can imagine what effect that will have.

Scarcity of growth, scarcity of confidence

The Netherlands is the first overdeveloped nation to so evidently hit its boundaries for growth. It is experiencing the future a bit earlier than other countries and is therefore an interesting test-case - you might call it an experiment - for the rest of the world to observe. It is confronted with diabolical dilemmas. International treaties set limits for nitrogen emission for each country because of the negative environmental effects. The jointly agreed climate goals create limits on carbon emissions and the European Commission has imposed requirements for the conservation of biodiversity. Since the Netherlands has hit the boundaries, continuing with construction of roads and houses immediately means that other sectors have to shrink. As a consequence, everything is at a standstill. Young people are demanding affordable housing, refugees need a place to live, farmers want

to continue farming. The newly completed Lelystad airport, looks like a ghost town and likely will be never opened. Holiday flights are canceled due to a shortage of aircraft. ASML, the beating heart of the IT sector, can't continue to grow because of a lack of homes for new employees. Out of necessity, the company has started buying houses in the wider neighborhood at a premium price¹⁰.

The obviousness of unlimited growth is being questioned; Sandra Philippen, chief economist at ABN AMRO and one of the opinion leaders in this debate, says emphatically: "If we continue on this course, there will be no economy left". She adds that people will be "discontent" and "get angry" when the economy stagnates.

There is also a scarcity of trust. Trust in the government, trust in economists who did not warn us (or did not warn us sufficiently), is at an all-time low. PR agency Edelman, that has been studying the level of trust in the world for decades, signals that, as an effect of the fading trust, we are becoming increasingly polarized.

¹⁰RTL Z (2023, February 16). Techbedrijf ASML op huizenjacht in Veldhoven: 'Alsof je de loterij hebt gewonnen'. RTL Nieuws. <https://www.rtlnieuws.nl/economie/artikel/5366059/techbedrijf-asml-op-huizenjacht-veldhoven>



“A lack of faith in societal institutions triggered by economic anxiety, disinformation, mass-class divide and a failure of leadership has brought us to where we are today – deeply and dangerously polarized.”

Edelman Trust Barometer 2023

In order to regain confidence, a “credible vision of the future” must be built, says Edelman. Trust in the old stories is gone, or the old stories are “used up” as we put it in our own book ‘Real Fake’. According to Edelman, it is up to the institutions, the politicians, the leaders of organizations to restore the trust. But what should we be trying to accomplish? What could be that credible vision now that we feel, see and experience that the economy is crippling the ecology?



Chapter 2 The experience ecology

Since its inception around 4.5 billion years ago, Earth has managed to deal with periods of scarcity and abundance in various forms and magnitudes. Once upon a time, dinosaurs abounded our earth. We've known periods of abundant land ice, and long before that, earth knew an abundance of toxic gases. The fact that earth is so rich in metals is due to meteorites hitting the earth 3.4 billion years ago. Nothing is as changeable as nature, you could say, especially when the perspective is tens of thousands or even billions of years.

Thanks to the meteorites, we now have cell phones. Fun fact: there is more gold in a ton of old smartphones than in a ton of gold ore. Thanks to the trees we have an atmosphere supportive of human life. About 360 million years ago, they started extracting CO₂ from the air, transforming it into breathable oxygen and storing the carbon. And these trees over a period of millions of years and under enormous pressure were transformed in an unimaginable amount of fossil fuels that allowed us to make anything we imagined. In just a few generations, much of the world as we now know it is "man-made" using technology. That could never have happened if we hadn't turned the carbon sinks formed by trees and plants into carbon sources.

It is easy to understand that with the growth of the economy as a whole, as a consequence certain economic facets also grow, such as the population, the world's GDP, foreign direct investment, urbanization, energy use, use of fertilizers (to increase food production for a growing population), building of large dams, use of fresh water, production of paper, transportation, telecommunications and international tourism. Twelve of these growth facets are considered part of the so called 'Great Acceleration'. Future Earth, a global network of scientists, researchers and innovators measure these socio-economic growth facets to determine the overall acceleration of the economy.

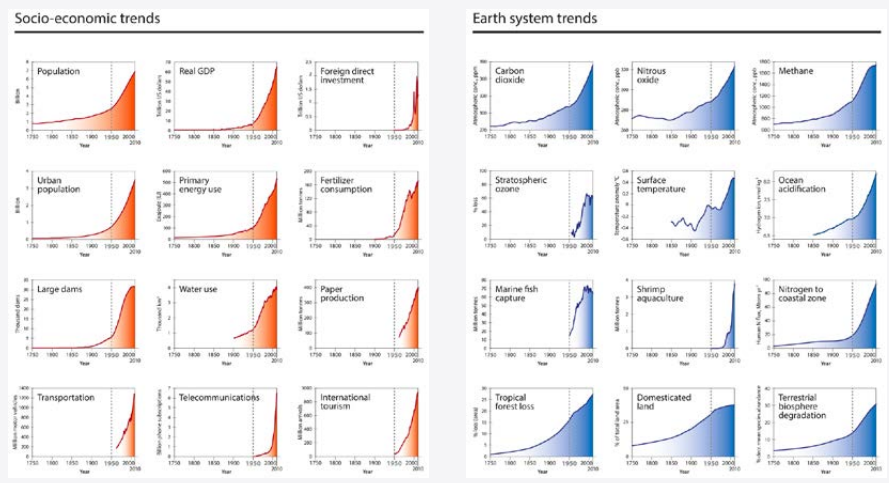
Parallel to the socio-economic developments, we can observe changes in the earth's systems. Carbon sinks became carbon sources and wild animals became livestock. The changes to this system can be measured by considering carbon dioxide, nitrous oxide, methane and stratospheric



ozone in the atmosphere, earth’s surface temperature, ocean’s acidity, marine fish capture, shrimp aquaculture, nitrogen to coastal zone, tropical forest loss, domesticated land and terrestrial biosphere degradation.

2.1 The acceleration index

To the twelve socio economic trends Future Earth has added twelve of these earth’s systems trends, creating an acceleration index. These 24 trends together are also referred to as the trends of the Anthropocene.



On the left the twelve socio-economic trends, on the right the ecological trends of the earth. Together, they form the 24 trends of the Anthropocene.

It is a term coined by chemist and Nobel Prize winner Paul Crutzen (he received his Nobel Prize for his research on CFCs and their effect on the ozone layer). According to Crutzen, the starting point of this acceleration lies around 1950. That is when the era ‘Anthropocene’

(Anthropos - man: Cene - new) begins. An era in which the human impact on the earth is so great that man should be reflected in the name of the new era¹¹.

¹¹Environment & Society Portal (2002). Paul Crutzen popularizes the concept of the Anthropocene. <https://www.environmentandsociety.org/tools/keywords/paul-crutzen-popularizes-concept-anthropocene>



On July 11, 2023, Crawford Lake in Canada became designated as an official benchmark for measurements towards a start date for the Anthropocene¹². Evidence is gathered here for the human impact on the condition of Earth. Measurements in the sediment of this 29-meter-deep lake record the history of the planet over thousands of years. The remains of plutonium in this sediment (testing the atomic bomb) and the fallout from the surrounding metal industry, point to a start date of the Anthropocene somewhere between 1950 and 1954. A conference in 2024 will vote on whether the Anthropocene should get an official status and if so, what year is the start.

It is in the interaction between socio-economic and earth trends that ecology can be increasingly experienced. For example, since May 10, 2023, the inhabitants of the southern French department of Pyrénées-Orientales have been experiencing the consequences of

¹²Head, M.J., Klingan, K., McCarthy, F.M.G. et al. (2023). Press Material GSSP Candidate Site Announcement. <https://www.anthropocene-curriculum.org/project/press-material-gssp-candidate-site-announcement>

not having a full day of rain for a year. The drought forced Ecology Minister, Christophe Béchu to ban the use, the sale and the filling of inflatable baths from that date onwards¹³. Washing the car and watering the garden is also banned. Whether the experiential ecology means that people will become law-abiding citizens remains to be seen. In Catalonia, a similar ban on filling swimming pools was lifted earlier this year after strong opposition from the population. The French decision was reinforced by the minister's statement that due to global warming we should be much more cautious in the use of available resources, adding:

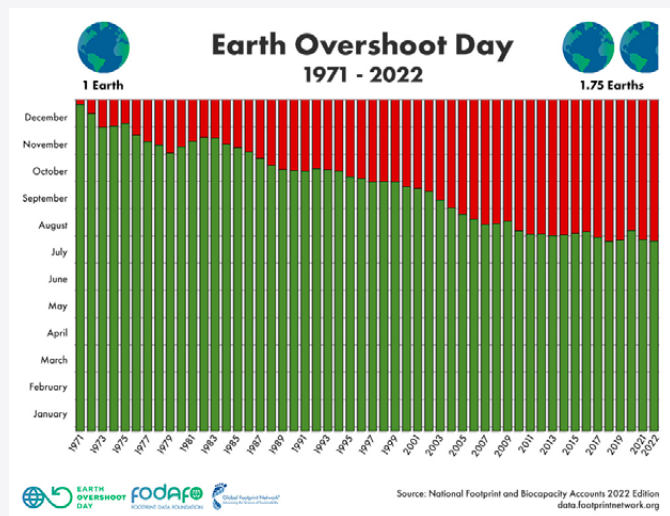
“We have to get rid of our culture of abundance.”

Christophe Béchu, French Minister of Ecology

The minister expects that 36,000 municipalities in France will be confronted with drinking water problems this year. Due to continuing climate change, Prime Minister Macron expects that France will have 30-40% less fresh water by 2050.

Incidentally, ICT is missing from the graphs of the economic facets of Future Earth. Whether this will continue for long, however, remains to be seen. Researchers at McMaster University in Canada found that in 2007 the ICT sector could still remain under the radar. The sector was responsible for 1% - 1.5% of total greenhouse gas emissions. By 2040 that percentage could grow to 14%, large enough to be no longer overlooked.

¹³Bolle, J. (2023, May 5). Nog geen hele dag regen het afgelopen jaar – nu mogen Fransen in de Pyreneeën geen zwembad meer kopen. De Volkskrant. <https://www.volkskrant.nl/nieuws-achtergrond/nog-geen-hele-dag-regen-het-afgelopen-jaar-nu-mogen-fransen-in-de-pyreneeen-geen-zwembad-meer-kopen~bc7dbe30>



What all 24 trends together clearly tell us, is illustrated by the simple chart above. The chart above shows by what date we have used up the earth’s biocapacity during a year. In 1971, where the chart begins, that date was at the end of December. Fifty years later, that date falls in the middle of summer. From 1970 onwards we use more capacity than Earth can support. Hence the name ‘Earth Overshoot Day’. In 2022, this day fell on July 26. By that date, we had exhausted the capacity of exactly one earth.

Making choices: Green growth in a pinch

The explosive growth of the digital and green economy in recent decades is now leading to shortages of critical metals such as magnesium, cobalt, graphite and lithium, and in its wake rare earth metals such as dysprosium, gadolinium, and lanthanum. They are required for the server farms, mobile phones, windmills and batteries (for electric cars, amongst others). The expected worldwide demand for rare earth metals will grow more than tenfold in the next ten years. China owns more than half of the reserves of scarce metals and is effectively the sole producer of these with 97% of the total world production¹⁴. The relationship between the ‘ordinary’ economy, the green economy and ‘scarcity’ is complex. For example, we read the report that there is a threat of a shortage of ships for the construction of wind farms at sea. The Bloomberg news agency reports that this will now delay planning for more wind turbines off the coast of China and that this will also become a bottleneck in Europe by 2027¹⁵. The message once again forces us to face the facts. How do we use the scarce resources? How are those decisions made? By whom? For whom?



¹⁴Rotmans, J. & Verheijden, M. (2021). Omarm de chaos (p. 153). De Geus.

¹⁵Saul, J. (2023, February 27). Offshore Wind’s Carbon-Cutting Promise Imperiled by Scarce Ships. Bloomberg. <https://www.bloomberg.com/news/articles/2023-02-27/offshore-wind-s-carbon-cutting-promise-imperiled-by-scarce-ships>

2.2 The acceleration of fear

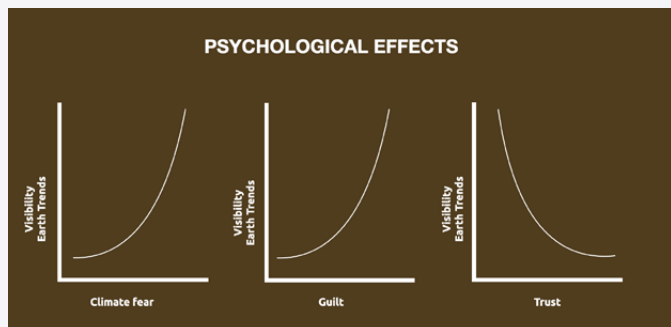
The scientists behind Earth Overshoot Day are aware that the fact that we are consuming Earth at an increasingly rapid pace can hit rather hard. In their disclaimer they say:

“We know that thinking about overshoot can be overwhelming – we’re right there with you. First, we should mention that we’re not ecological resource, or climate ‘doom and gloom’ people. We’re also not over optimistic, ‘change your lightbulbs and we’ll be OK’ types either. We’re realists. Somewhere in the middle”.

Although the creators of the overshoot chart are convinced that we must be somewhere in the middle between “hell and damnation” and “every little bit helps”, the unrest, especially among young people, is hitting harder and harder. We see this in the results of studies into the mental effects of global warming. In a study published in *The Lancet* of 10,000 children worldwide, 45% say that global warming has a negative effect on their daily functioning. While 84% say they are at least moderately disturbed and 59% say they are extremely disturbed¹⁶. Three-quarters think the future is frightening and 83% say humans have failed to care for the planet. Another study links global warming to insomnia and poor mental health¹⁷. The unrest among young people is fueled by the fact that the climate goals are constantly not being achieved. Scientists show graphs that plot global warming against climate conferences that have been held.

¹⁶Hickman †, C., Marks, E., Pihkala, P. et al. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *The Lancet Planetary Health*, 5(12), E863-E873. [https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(21\)00278-3/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(21)00278-3/fulltext)

¹⁷Ogunbode, C., Pallesen, S., Böhm, G. et al. (2021, February 16). Negative emotions about climate change are related to insomnia symptoms and mental health: Cross-sectional evidence from 25 countries. *Current Psychology*. <https://link.springer.com/article/10.1007/s12144-021-01385-4>



New trends alongside socio-economic and environmental trends: The socio-psychological effects: Fear, loss of trust and shaming and blaming.

2.3 Experience ecology feedback loops

It is relatively easy to establish the relationship between economic and ecological trends. Ascending curves on the one side, ascending curves on the other. What is much more difficult to understand is that there are certain tipping points in the interplay of lines that we see. As a result, you have to think and calculate in a different way

– non-linearly. That does not make it any easier for the ordinary man and woman to translate the consequences of the way we live to how the earth reacts. The cause of this are the feedback loops ingrained in nature. There are many of those. Let's look at three examples of how that works.

The ice albedo effect

Climate warming in the Alps and other mountain ranges is twice as high as in lower altitude areas¹⁹. This is because when snow reflects the light, the temperature rises less quickly. However, when the snow disappears, the surface darkens and absorbs heat more easily. The more snow disappears, the faster it warms up. Albedo is a technical term for an object's reflectivity, literally its 'whiteness'. According to Linda Lundmark, associate professor at the geography department of Umea University, the warming of the mountains in Sweden is even four times faster due to this effect²⁰.

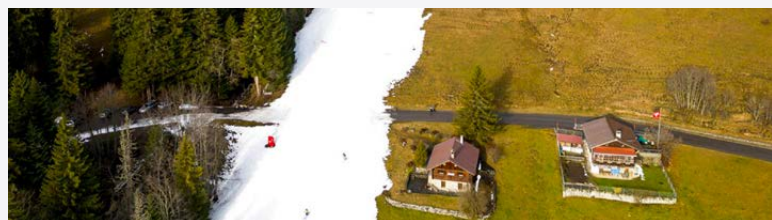


Image: Artificial snow keeps Switzerland's Villars-sur-Ollon ski resort operating during 2022 weather conditions that meteorologists called "hard to understand"²¹.

¹⁹Jackson, G. (Host). (2023, February 26). Can the ski industry survive climate change? [Podcastfleaving]. In The Climate Question. BBC. <https://open.spotify.com/episode/1vuZ9cquFq4Vb7YCuLy9WD>

²⁰bid.

²¹Keaten, J. & Leicester, J. (2023, January 2). Grassy slopes in the Alps? European slopes facing snow shortage in record warm winter. Los Angeles Times. <https://www.latimes.com/world-nation/story/2023-01-02/grassy-slopes-in-the-alps-european-slopes-facing-snow-shortage-in-record-warm-winter>

The ice albedo effect is painful for the entrepreneurs in the ski areas and a dent in the ski economy of the winter sports countries. Maybe we can dismiss it as a luxury problem. But the glaciers of the Himalayas, also known as the third pole, suffer from the same problem. The ice disappears like snow in the sun. In Asia, 2 billion people depend on these glaciers for their drinking water supply and farms need the water for irrigation of the land to supply food²².

Big monk effect

There is a plant that provides snow. We introduce you to the *Espeletia Grandiflora*, a plant depicted on the Colombian 100 pesos coin. It grows at altitudes between 3,000 and 4,000 meters. This plant is popularly called frailejón, because the upright trunk with a cover of brown leaves is reminiscent of monks (frailes in Spanish). The frailejón (big monk) has an exceptional ability to store water. The hairs on the leaves capture the vapor from the clouds and release it through their roots to the ground. They form the source of rivers in the Andes. During long periods of drought, they release extra water and thus feed the ecosystem on the mountain tops. The tropical glaciers of the Andes (yes, they exist), the plants and the rivers are part of the ecosystem that is now out of balance. Potato fields are created above 3,000 meters and the existing vegetation must be cleared from the field. The result: less frost, less water storage, less water, less water evaporation, less snow. Colombian environmental activist Marcela Fernandez has started a project of

replanting to whiten the peaks of the Andes and solve the scarcity of water²³.



The aerosol effect

The good news is that soot particles in the air, aerosols, dampen global warming. They form, as it were, a protective filtering layer against the heating of the sun. It has been calculated that if we did not have air pollution, global warming would be half a degree higher. By then we would have already passed the limit of the Paris climate agreement. The bad news is that dirty air is bad for your health. Countries want to get rid of this as soon as possible. If they succeed, we will have to content with this feedback loop of nature and an additional half a degree of global warming.

²²Thunberg, G. (Red.). (2022). Het Klimaatboek. De Bezige Bij.

²³BBC (2022, December 12). How much does biodiversity matter to climate change? [Podcastaflevering]. In The Climate Question. BBC. <https://www.bbc.co.uk/sounds/play/w3ct3kjz>

²⁴Schilderij Frailejones (*Espeletia Grandiflora*) van Philip Juras, <https://www.philipjuras.com/artwork/2016052802frailejones>

2.4 Finally: the economics of the climate experience

The Great Acceleration is entering a new phase; the experience economy in which everything was focused on the ultimate buying experience is transitioning into an experience ecology. At the end of this incredible economic growth spurt, the consequences start to be felt. Experience ecology transcends scientific reports and their cold numbers. Drought and global warming suddenly make it very visible. Governments are tightening the reins with laws and restrictions.

The emotional side of the coin is manifesting itself more and more clearly. We see that happening in the Netherlands, among others, through the story with which we started this report. And although it is all becoming more visible and palpable, it remains difficult and complex to absorb all the information. Do we understand all the calculations of the scientists, and how can something as complex as feedback loops of nature be fully understood? The economic and ecological trends may go hand-in-hand, but the socio-psychological trends jump in all directions. We saw this, for example, with the simple example of Spain.

The population successfully resisted the decision that you are no longer allowed to fill your swimming pool. And at the same time, 26 people were arrested in Spain for illegally drilling for water and building 250 illegal water wells for agriculture.

Tamsin Edwards, lead author of the IPCC and a climate scientist at King's College London, gives us options to think about. If we achieve the lower limit of the Paris agreement, 1.5°C degrees of warming, then extreme heat will occur four times more often, the chance of heavy rainfall will increase by 50% and we will have to deal with drought twice as often. In short, we are dealing with climate madness. (For example, anyone who went into the sea in Florida in June 2023 for a refreshing dip came out sweaty, because the water temperature reached a sweltering 36°C degrees.)



Another possibility is that we break through the limits and we end up with a not imaginary four or five degrees of warming. If you are interested in what that means you should read his chapter in 'The Climate Book'²⁵. But as complex as earth's feedback loop systems are, the solution is surprisingly simple. We must stop emitting greenhouse gases. Two of them are the biggest culprits, CO₂ and methane. The problem with fossil fuels (CO₂) is that they cause permanent damage. Once in the air, they warm the earth for 10,000 years. Quitting is the only remedy, burning carbon fuels more efficiently has the same consequences as burning inefficiently. The problem with methane is that it is a very powerful warming agent, eighty-three times more powerful than CO₂. The advantage of methane is that forty years later it will have disappeared from the air thanks to chemical reactions.

Although the solution seems simple, implementing it will be far from easy and the facts are confrontational. Perhaps the Air France-KLM initiative is worth adopting. Thousands of Air France employees have already completed the 'Fresque du Climate' workshops. It is part of the organization's 'flight plan'. All information in the workshops is based on IPCC data. It is now also being rolled out for the Dutch branch of the company. The workshop lasts three hours and is built up in steps. After the confrontation with the scientific facts, there is room for emotion. Participants reflect on their feelings and discuss how they relate to the facts and discuss individual and collective solutions²⁶.

The numbers of science, which deal with the time we have left, the limits on emissions, etc. remain abstract. But behind a simple fact, like that methane is a powerful warming agent, are livestock farmers hoarding their cattle and people enjoying their steak. If we were to do a sober analysis based on all the available knowledge, we would know what to do. But man is not guided by facts. Our search for

how we relate to facts and fiction, fake and reality, has led to the conclusion that stories, not facts, are leading (see also our book 'Real Fake - Playing with reality'). The world is too complex to comprehend.

The competing stories to steer the experience ecology in the right direction are therefore extremely important. Even more important than the underlying facts and figures. But before presenting those two stories, let's take a step back. There is a certain moment in history that we started to (over)consume. Before that moment it used to be very different. We were thinking differently, which makes you wonder if we can go back in time. Will we be able to break the trend of consumerism and drop our desire for more stuff?

²⁵Edwards, T. (2022, 27 oktober). What happens at 1.5, 2 and 4°C of global warming? Penguin. <https://www.penguin.co.uk/articles/2022/10/global-warming-facts-greta-thunberg-climate-book>

²⁶Wikipedia (2023, 13 juli). The Climate Fresk. https://en.wikipedia.org/wiki/The_Climate_Fresk

Chapter 3

Can we break our desire for more stuff?

You sometimes wonder how it could have come to this. How did it get this far. When we open kitchen cabinets, drawers, the wardrobe or the garage, it is often overflowing with stuff. Sometimes, you don't even remember how you got something, or you completely forgot you owned it. This excess marks this day and age. We get rid of our stuff online thanks to apps like marketplace, eBay and Vinted and for design stuff we now have Whoppa. Those who do not get rid of their clutter in time, drown in it and not seldom need help. We relish in television programs where this is the main event. We can't get enough of TV-shows like 'Sort your life out'²⁷, 'Space Invaders'²⁸, 'Hoarders'²⁹, 'Extreme Clutter'³⁰, 'Hot Mess House'³¹, 'Clean House'³², 'Kim's Rude Awakening'³³, where people are de-cluttered under professional supervision. (After watching some episodes, we conclude that someone else's mess is much worse than our own and quickly place a few online orders for more stuff).

We did not yet mention the most important program of them all which is called 'Tidying up with Marie Kondo'³⁴. The Japanese de-clutter guru has become famous for her advice to ask yourself

²⁷Carson, S. (2021, November 5). Stacey Solomon's BBC1 show Sort Your Life Out forced me to confront why I cling onto clutter. I News. <https://inews.co.uk/culture/television/stacey-solomons-sort-your-life-out-bbc1-clutter-mrs-hinch-1285998>

²⁸Julie (2022, February 14). The Decluttering Co. Space Invaders TV Show Review – Season 2. <https://thedeclutteringco.com.au/space-invaders-tv-show-season-2/>

²⁹SBS (2019, May 15). 'Hoarders': the TV show to cure your Marie Kondo-inspired guilt. <https://www.sbs.com.au/guide/article/2019/05/09/hoarders-tv-show-cure-your-marie-kondo-inspired-guilt>

³⁰Wikipedia (2023, April 25). Extreme Clutter with Peter Walsh. https://en.wikipedia.org/wiki/Extreme_Clutter_with_Peter_Walsh

³¹IMDb (z.j.). Hot Mess House. <https://www.imdb.com/title/tt13179304/>

³²NBC (z.j.). Clean House. <https://www.nbc.com/clean-house>

³³Amazon (z.j.). Kim's Rude Awakenings. https://www.amazon.com/Kims-Rude-Awakenings/dp/B07FX1DWGQ?tag=pur0e4-20&asc_source=purewow_web&asc_refurl=https%3A%2F%2Fwww.purewow.com%2Fentertainment%2Fshows-like-get-organized-with-the-home-edit

³⁴Hepworth, A. (2020, July 3). Marie Kondo Is Taking Her KonMari Consultant Certification Courses Online Starting This July. PureWow. <https://www.purewow.com/home/marie-kondo-virtual-konmari-consultant-certification>

if it gives you a 'spark of joy' when handling your things. If not, it can go. The emergence of a stuff economy was described in detail by Harvard economist Kenneth Galbraith in his 1958 book 'The Affluent Society'. Galbraith points to the role of advertising, which he calls the 'machinery for consumer desire creation'. Buying so much stuff, according to Galbraith, does not come naturally, but is fueled by the marketers. Galbraith sees consumers as hamsters caught in a mill propelling themselves forward, while advertisers stand by, applauding, encouraging them. He constantly insisted that we need better education to make this clear to us, but also to highlight the downside of consumption - the depletion of natural resources.

The question is whether 'stuff' really make us happy, and if not, why we bought it in the first place? These are contemporary questions that we need to ask in our hyperconsumption society: why do we buy (too much) and how did it come to this?

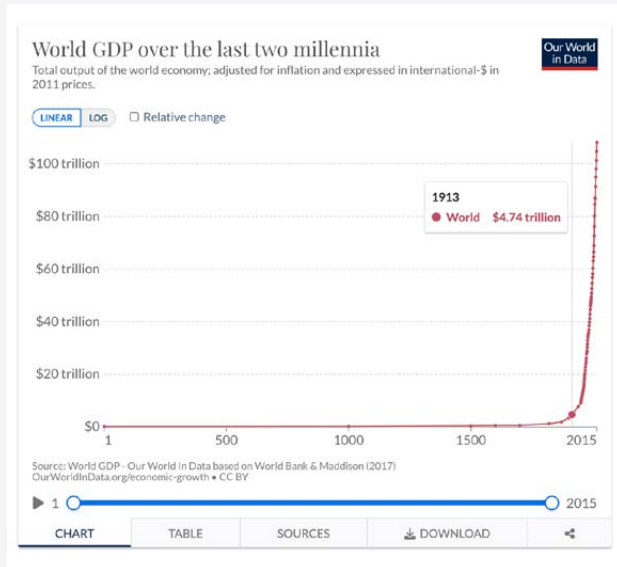
In the documentary 'A Cluttered Life: middle class abundance'³⁵ we see how the doors of 32 homes in Los Angeles are opened to capture every 'thing' in the house with extreme precision. The study, led by anthropologists and archaeologists, found that there has never been a time in history when people had so much stuff. One of the researchers talks about mountains of 'junk' (clutter) that they find in the houses. More importantly, the stress level of especially the mothers of the families was extremely high because of all that stuff. They felt a sense of responsibility for it. And more than male family members, they feel the need to clear away all that stuff. According to the researchers, we lack processes and rituals to get rid of stuff. The 'spark of joy'³⁶ is one such ritual, but Marie Kondo only appeared on the scene a few years after the investigation.

One of the mothers in the documentary says that the stuff 'comes in from all directions' and that there is no stopping to it. Gifts for the children, for example. Sobering fact is that the US represents only 3.1% of the world's population while it consumes 40% of the world's toys.

Stuff doesn't just emerge; it is of course frequently purchased by people. What we know is that it hasn't been like that forever. In the past, before the Middle Ages, economic growth did not really exist. For millennia world's GDP grew barely with 0.04% per century. Then suddenly, with the industrial revolution, growth exploded, illustrated by the hockey stick in the graph. From 1913 to 2015 world's GDP grew from \$4.74 trillion at a dizzying rate to \$108 trillion in 2015.

³⁵University of California Television (UCTV) (2013). A Cluttered Life: Middle-Class Abundance [Video]. YouTube. <https://www.youtube.com/watch?v=3AhSNsBs2Y0>





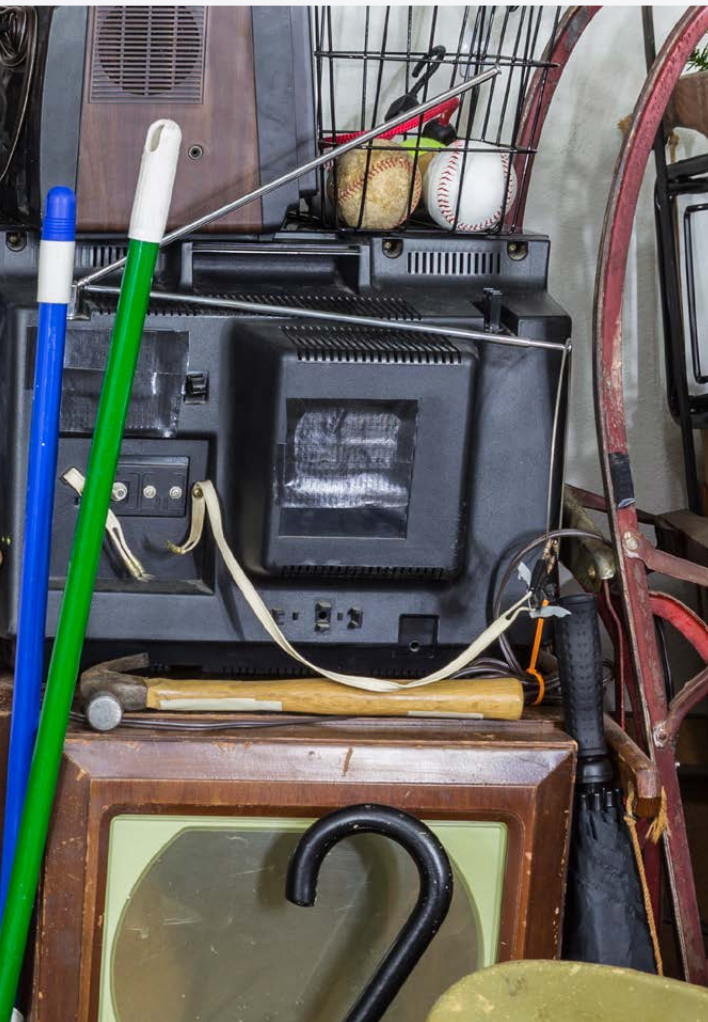
De-clutter coaches all over the world earn a good living from the excessively consuming middle class. Yet we have known other times, times when having things was much less accepted. How did the image we have of the consumer turned from pariah - the consumer was looked down upon - to hero in the story of incredible prosperity and wealth?

Historian Frank Trentmann asked himself exactly that question. How have we become a consumer society in a span of time from the fifteenth century to the present. The book he wrote about this is called 'The Empire of Things' and deals with the history of consumerism, or in Trentmann's words, the history of stuff and our material metabolism. Trentmann proposes an alternative to the clichéd image that advertising created the consumer, that we all buy products because we are persuaded to do so. According to his views the consumer is a product of social change, of group values, a game in which the state and the church also play an important role.

3.1 More stuff makes us lose control

Trentmann paints a disconcerting picture of how in western society our relationship with things and our 'material self' has evolved through the ages. It goes back to the ancient Greeks who already warned in their time about the possibility that we would become addicted to stuff. Plato said of things that they are "the saddles that ride us"; in other words, things take control and we lose control of our actions. If Plato would watch the documentary 'A cluttered life' he undoubtedly would have said "See, I told you so!"

The fear that things would take us over is rooted in religious faith. Having things and the desire for them distracts us from the spiritual matters we should be preoccupied with. Trentmann refers to 'The City of God' from the Christian philosophy of St. Augustine, in which the expulsion of Adam from paradise can be traced back to lust and desire. The desire for things is considered as a mortal sin.





Artwork by Jenny Holzer, “Protect me from what I want”, shown in New York’s Times Square in 1982.

In the later Middle Ages we see also more practical reasons why there is resistance to having too much property. Individual property would be at the expense of social welfare. If society went along with the whims of fashion (furniture and clothing) it could start a chain reaction and undermine the existing value and hierarchy. Moreover, money intended for the community would be extracted by the pursuit of individual luxury.

There was a fear that individual abundance would lead to social scarcity.

The picture that Trentmann paints is that historically private property was not immediately seen as

valuable. Whether stemming from concerns about dehumanization or enslavement, as articulated by eminent thinkers like Plato, Rousseau, and Karl Marx - each in their own way - ; whether it would corrupt us as imparted by Confucius, or entailing potential compromises to social welfare: the role of humans as mere consumers does not bring much good.

Also, during Italy’s Renaissance, it was suspicious and frowned upon when people excessively consumed. Venice, like other cities, had a rich tradition of legislation prohibiting displaying extravagant possessions, such as wearing fur or limiting the dowry to six knives and six forks. Extravagant bed linen was banned, tapestry could not be more than 1.5 meters high and only small pieces of ‘ordinary’ pastries could be served during a banquet. Yet the comfort of possessions slowly but surely seeped into society. Even though the things people bought were initially aimed at social activities, such as crockery and teapots, comfortable chairs for drinking tea, curtains on the windows or a beautifully designed fireplace were soon added as an extension. And people who moved from the countryside to the city bought urban things because they didn’t want to be perceived as simple rural people. Urbanization plays an important role in the development of the consumer.

We are our stuff

The tipping point, according to Trentmann, came when we came to see things as something of ourselves and not of something outside ourselves. The well-known philosopher and psychologist, William James, made an important contribution to this. We all have a ‘material self’³⁶ he said, material

³⁶Green, C.D. (z.j.). Classics in the History of Psychology. <https://psychclassics.yorku.ca/James/Principles/prin10.htm>

is part of our identity. Starting with our own body, then the bodies of relatives, the clothing as an extension of our body, the house we live in and so on. We lose something of ourselves when the house burns down, the pictures are gone, the teddy bear of our childhood perishes, or our belongings are stolen. Stuff is an important part of ourselves and our identity.



The pioneers to a different view of consumerism: Adam Smith, David Hume, Robert Boyle and William James (left to right).

This step in thinking about consumerism is important because it leads us to accept that owning things is important to us. Robert Boyle, the Irish 17th century scientist, added a new, religiously inspired argument: everything is ultimately created by God. So, instead of just reading the Bible and contemplate our sins, we must hunt for new objects in which we can recognize the hand of the master himself (God). This explains how consuming and possessing luxury items became increasingly accepted. Adam Smith even called consumption the sole purpose of production in his 'Wealth of Nations'. Consumption was seen as the sponsor

of productivity rather than the cause of scarcity. Enlightenment thinker David Hume saw in the desire for novelties more production, more renewal and innovation. Consumerism accelerated.

3.2 The consumer appears and production disappears

When people identified themselves with their buying behavior, they changed from customers into consumers. This identity emerged in the late 19th century when consumer groups began to form. Consumers had common interests, began to speak out about consumer rights and had responsibilities as consumers. They started their own co-operative stores with items that better met their wishes and tastes and were also cheaper thanks to the joint purchasing power. The consumer also started to get politically involved, through the Consumer Defense Association in London. There were protest actions where shops got blacklisted because their products were made with the help of child labor. Long before the advent of social media, consumers already invented the cancel culture.



After inspection by the members of the National Consumer League, products could be labeled as proof that the working conditions under which they were being made were approved³⁷.

³⁶Goldmark, J., Jay, P., McLean, F. et al. (1910). The Work of the National Consumers' League. During the Year Ending March 1, 1910. The Annals of the American Academy of Political and Social Science, 36, Supplement (Sep., 1910), 1-3, 5, 7-75. <https://www.jstor.org/stable/pdf/1011480.pdf>

While consumers fought to put an end to exploitative sweat shops and ban child labor, the era of neo-colonialism dawned. Production disappeared from our shores and moved to other countries, where it continued under often deplorable circumstances out of sight of the consumer. Remarkable enough, exotic products like cacao that only grows in tropical areas, were marketed as a European long-established tradition. Tasty “good old English cacao from the good old English days”, coffee from the Black Forest or from Finland. The advertising industry clearly had an interest in further increasing the distance between consumer and producer.



Exotic products rebranded: Want to drink delicious Finnish coffee? The Paulig girl (left) was the poster girl of the Finnish coffee industry. Cadbury cocoa (right) presents the chocolate drink as “the good old English cocoa”.

3.3 Finally: and the rest is history

From an era in which clothes were threadbare to the ‘cluttered life’ in which we don’t even know what clothes we own: roughly five centuries of history have passed in between. Centuries in which being a consumer step by step became more accepted and celebrated. We have seen social values shift in

those centuries. The fear that we would become collectively poorer when we got individually richer has turned into win-win thinking: we need to keep consuming in order to become collectively richer. Behold, the birth of the consumer.

That we once lived in fear that individual wealth would lead to social scarcity seems but an echo from a distant past. That ‘products are the saddles that ride us’ as Plato claimed, and that we lose control because material possessions dominate our lives, can be dismissed as philosophical ‘poppycock’. But it is precisely those voices from the past that cast a fresh eye on today’s society. The fact that we must make an effort to relax and that behavioral coaches need to be involved to achieve that is significant in this context. And that technology has played an all-determining role in where we are now is evident: a throwaway society of hyper-consumers who celebrate consumerism on China’s Singles Day or the Western equivalent of Black Friday.

Our material selves have come to full maturity in the last seventy years. We are the consumer. We live in a consumer society where everything is permeated with messages to remind us of just that. If it’s not the Kardashians showing us their lavish lifestyle, then it’s your smartphone’s notifications. Holiday parks we’ve once visited haunt us through email with their discount coupons, advertisements appear in your searches, what you’ve ever clicked on is eternally stored as a purchase intention. We click, swipe and buy without walking, because ordered today will be already delivered tomorrow. There is always a package from the neighbors in the hallway that has been delivered to you in their absence. When the bell rings in the evening to pick

³⁶Green, C.D. (z.j.). Classics in the History of Psychology. <https://psychclassics.yorku.ca/James/Principles/prin10.htm>



up that package, a consumer, not your neighbor, is at the door.

We work overtime to keep everything going and running smoothly. The whole world is the platform of the consumer. At the front everything is optimized to make it convenient and easy. After all, in the experience economy, the customer is king. But in the back things start to creak. 'Ship Happens' we saw before. The delivery's possibilities appear to have limits. The big question is whether we should let go or at least ease of our material hunger? Can we, as seasoned consumers, handle such an identity crisis and is it really necessary to do so?


This is what the next two leading stories are all about. Although they are quite different in terms of content, they overlap in one thing: nothing less than a revolution is required to get out of the deadlock. The first revolution is technological in nature, and that's where we start. The story of the ecomodernists will be met as reassuring news to consumers because we can just keep buying. The second revolution is socio-cultural in nature. It is the story of the post-growth movement. It sees the identity crisis of us as consumer as an opportunity to prevent an ecological crisis and to save humanity

from the mistaken belief that we are first and foremost consumers. Of course, we are first and foremost human. Susan Paulson, professor of Anthropology, reminded us of the fact that there are many traditional communities around the world today, that are not on the same consumerization track as 'us'. There are many alternative ways to live our lives. Paulson has been a great inspiration for us to understand post-growth at a more profound level. When we look at the past, human beings have a whole history of conviviality and other ways to shape well-being than through consumerism and capitalism. Paulson emphasizes that both capitalism and consumerism are recent inventions in human history. To those who can't imagine that the future will be anything else than what we have today she advises to zoom out. Try to see the whole picture. So much for a small teaser on post-growth. We'll start with the first group: the ecomodernists.

³⁶Goldmark, J., Jay, P., McLean, F. et al. (1910). The Work of the National Consumers' League. During the Year Ending March 1, 1910. The Annals of the American Academy of Political and Social Science, 36, Supplement (Sep., 1910), 1-3, 5, 7-75. <https://www.jstor.org/stable/pdf/1011480.pdf>



Chapter 4 The Techno Revolution of Ecomodernism



Everything must be green, so much is clear. There is no longer any doubt about that, but the question is whether that green economy should continue or stop to grow. The most vocal opinion on green growth comes from California. A group of scientists who call themselves the ‘bad boys’ of environmental activism predict that a new era of abundance is upon us. They accuse the environmental activists of taking away all hope of a bright future. The bad boys see the continued growth of the economy as the only way forward and have organized themselves in the ‘Breakthrough Institute’. Two of the founders of this Breakthrough Institute published controversial articles in 2004 and 2007 from which the message immediately becomes clear:

- (1) Environmental activism is dead because it doesn’t come up with solutions.
- (2) The activists get in the way of the real solutions that must come from technological advances.
- (3) A new politics is needed, without the environmentalists, to create a politics of possibilities.

“The Death of Environmentalism: Global Warming in a Post-Environmental World”

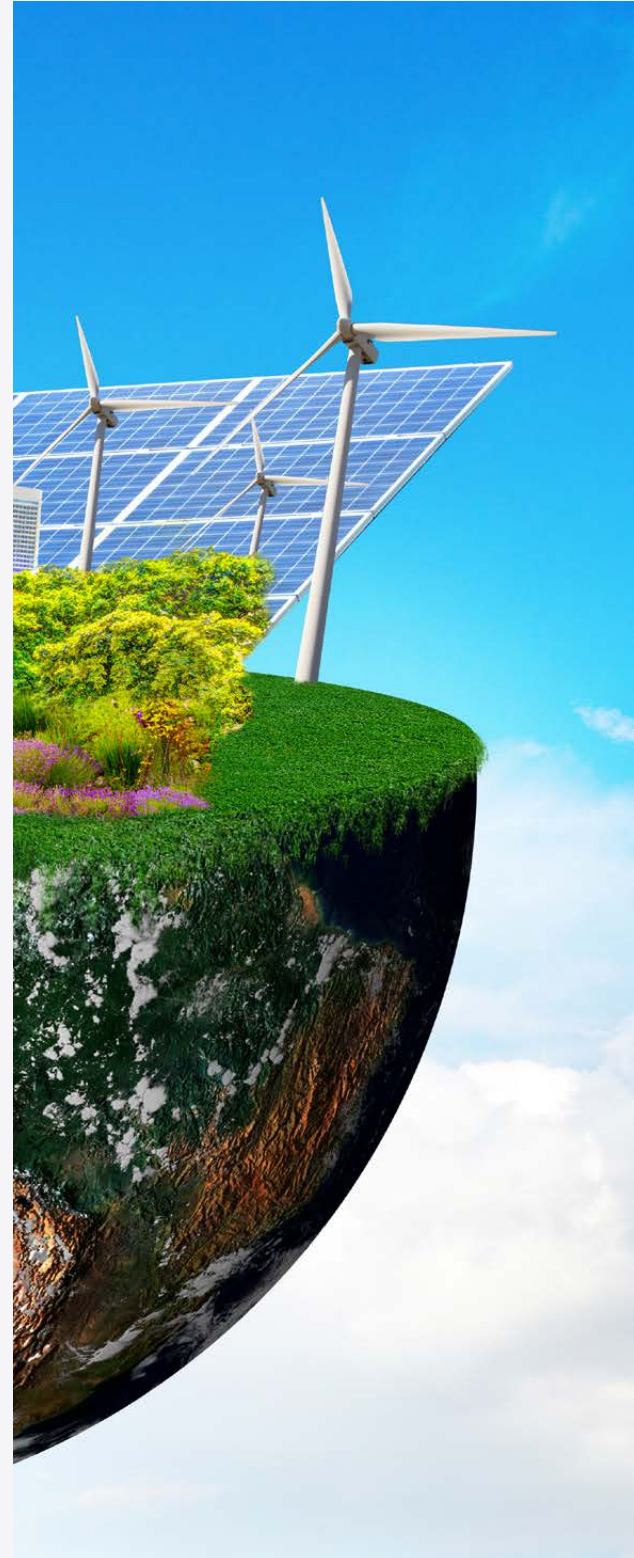
“Break Through: From the Death of Environmentalism to the Politics of Possibility”

Ted Nordhaus and Michael Shellenbergen

The two articles are the prelude to the “Ecomodernist Manifesto”, which is signed by eighteen scientists in 2015. The manifesto outlines what the ‘Post-environmental world’, as mentioned in the 2004 and 2007 articles, should look like.

The idea that technology has made us less and less dependent on ecosystems (even though this has led to enormous environmental damage) gives the compilers of the manifesto hope. To further decouple economic growth from the impact on the environment, more intensive agriculture and forestry are needed, we need to live more in cities to relieve nature, we need more synthetic technology and synthetic food. It is essential that growth and damage to nature are decoupled. According to the ecomodernists, this can be fixed through technological intervention. The authors do realize that “even if fully synthetic life were possible”, people will still choose nature, even if it is not necessary to meet our material needs.

“Even if a fully synthetic world were possible, many of us might still choose to continue to live more coupled with nature than human sustenance and technologies require. What decoupling offers is the possibility that humanity’s material dependence upon nature might be less destructive.”



4.1 The Long Boom

“The world isn’t ending!
But we are likely at the
beginning of a profound
transformation.”

Peter Leyden

Much has been said and written about this ecomodernism. The French philosopher Bruno Latour called this form of modernity a myth, others also emphasized that it goes against human nature. The New York Times responded with delight³⁷, writing: “At last something for environmentalists to fight for.” And the newspaper sees the end of “people are bad” activism.

It is no coincidence that techno-optimism comes to us precisely from the technological heart of America, California. It is the place from which Elon Musk starts his moonshot projects, the place from where Mark - “Move fast and break things” - Zuckerberg runs his digital empire. It’s also the place where the California dream keeps popping up in different guises: from the gold rush of the mid-nineteenth century to the silicon rush that started some fifty years ago. The California way of thinking – ‘dream big’ – ‘big tech’ - and the ‘big challenges’ we face come together in ecomodernism. These new dreams are manifesting in startups getting into ‘climate tech’, part of what is also called ‘Deep Tech’.

³⁷Porter, E. (2015, April 14). A Call to Look Past Sustainable Development. The New York Times. https://www.nytimes.com/2015/04/15/business/an-environmentalist-call-to-look-past-sustainable-development.html?_r=1

“Deep Tech can be described as innovations that have the potential to push technological boundaries beyond what is considered possible right now.”

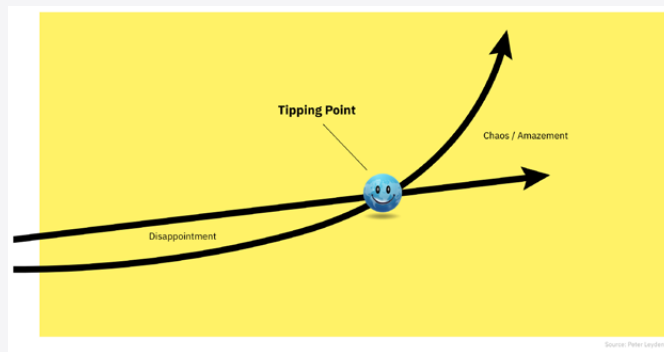
Somebody who also believes in the Californian dream is Peter Leyden. He is a journalist, futurologist, who lives and works in California, and became known for his Wired Magazine article “The Long Boom” (1997).

“Long booms often create the conditions for progress. They are usually driven by the introduction of fundamentally new technologies, which create new industries, which create new kinds of jobs, which create new wealth. If the new technologies are transformative enough, then they can take decades to scale and fully build out.”

Peter Leyden



The Long Boom, like ecomodernism, is optimistic about the future role of technology and the economic growth that comes with it. A quarter of a century ago, the Long Boom predicted a long period of economic growth thanks to new technology. And Leyden recently repeated that message in a new publication: “The Great Progression 2025-2050”.



Like the Ecomodernist Manifesto, Leyden predicts a new era of abundance. Leyden is a man of hyperbole and uses the term ‘squared’ when he compares the Long Boom to ‘The Great Progression’. “Progressives want more of everything for everyone”, says Leyden, inviting us to reflect on how we can experience even more abundance in the next 25 years. He signals that a tipping point has been reached that makes it more likely than not that we will enter this era. We are now seeing a lot of changes on a social level, as well as economically, technologically and ecologically. All these changes together ensure that we are now reaching this tipping point. Important in his argument is that people, especially the youngest generations, no longer accept the status quo. Disappointments about the past and wonder about the possibilities in the future ensure that we overcome the chaos.

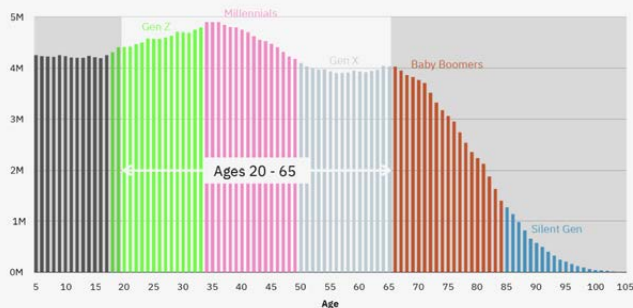


“This world that older people spent their entire careers and lives mastering is coming to an end. This world that younger people were taught is ‘just the way things are’ increasingly does not make sense. This world that politicians proudly had policies for, and that the media confidently analyzed and explained, is soon going to be over”

Peter Leyden

An important point of Leyden is that he involves the 'woke' culture of the young people in his analysis that we are going to realize such a new period of abundance. As older generations retire, he says, new generations are taking over, and they're fed up with the way things are now. It is interesting that Leyden takes this shift into account in his argument, because the post-growth movement is entirely based on this woke culture.

The millennials & gen-z vs. boomers in 2030



Source: US Census Data 2018; Pew Research Center

GenZ and the Millennials will take over in America in 2030 from the Baby Boomers who will retire by then.

4.2 Technology in times of ecomodernism

The Ecomodernist Manifesto and Peter Leyden's progression vision assume a new era of abundance. They are clear where that must come from. Technology - an important part of which has yet to be invented - must fulfill the growth ambitions.

Given plentiful land and unlimited energy, substitutes for other material inputs to human well-being can easily be found if those inputs become scarce or expensive.

Ecomodernist Manifesto

We describe some of those technologies here, but will not be exhaustive. It is also mainly about the tone of voice, the underlying argumentation. Much of it is based on a 'yes-we-can' mentality. There's something to be said for that when we look back through history at the technological breakthroughs we've seen. Much of which we once thought impossible, has become possible. At the same time, there is a feeling that we are advancing human ingenuity, that we are living on the credit of the hope that this will succeed. So just a few examples, drawing on ecomodernist ideas.

Energy: the Holy Grail of abundance

An infinite amount of energy is the Holy Grail of the Age of Abundance. The growth in solar and wind energy is spectacular, but not yet enough for a fossil-free society by 2050. We will experiment by trial and error to arrive at a smart infrastructure for energy generation. An important contribution can be expected from small nuclear power plants. They exist in variants of medium, small and very small. The very small 'nukes' can provide energy for

10,000 households³⁸. And when nuclear fusion will soon take over, we then, will have much cleaner nuclear energy.

The ethical and pragmatic path toward a just and sustainable global energy economy requires that human beings transition as rapidly as possible to energy sources that are cheap, clean, dense, and abundant.

Ecomodernist Manifesto

Energy from space, or Space Based Solar, is another application that could provide an infinite supply of energy. The idea stems from a story from 1941 by science fiction author Isaac Asimov, but there are now organizations that are serious about getting this off the ground. The most serious plans come from China, which has an official program running. In 2028, China will conduct a proof-of-concept study from space. The US defense is also working on it, as is the European Space Agency. The latter hopes to test a concept sometime in the 2030's, before the Chinese have everything operational. The idea is to build solar parks kilometers into space and have them send the energy back to earth.

Not with microwaves, as in our ovens, that would be too dangerous, but with other frequencies that are not harmful to airplanes and birds. The dishes

to collect the energy will have a diameter of two to five kilometers. The energy can be supplied 24/7 because the sun is always shining in space. The proof of concepts must show whether the energy efficiency will be sufficient. Some say over 90% will be lost along the way, others are more optimistic and estimate a loss of 40%. Another condition is that autonomous robots still have to be developed to assemble the parks in space and that the rockets with which they are transported with; (a) reusable and therefore land on earth again and (b) large enough to carry the panels. If not, the project is economically not feasible. Elon Musk's SpaceX has already succeeded in the first challenge and is working on the second³⁹.

Biotech: synthetic production

Biotechnology will fundamentally change the way we will produce. Unraveling human DNA has cost \$2 billion and we started it 20 years ago. Soon everyone will be able to have their own DNA sampled for \$100. But breakthroughs in the field of proteomics, the science that deals with proteins, will also ensure that we will make great progress with synthetic biology. We will be able to put together new products. We're going to get faster-growing trees and synthetic plastic that can break down on its own. Genetic manipulation of crops will ensure that our food needs much less water and the meat industry will soon stop emitting methane because we will switch to artificially manufactured meat.

³⁸World Nuclear Association (2023, July). Small Nuclear Power Reactors. <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/small-nuclear-power-reactors.aspx>

³⁹BBC (2023, April 16). Could Solar Farms in Space Power Earth? [Podcastaflevering]. In The Climate Question. BBC. <https://www.bbc.co.uk/programmes/w3ct5bjt>

Information technology: AI as gold vein for innovation

Information technology will enable the 8 billion people on this planet to shop and study completely digitally. A 3D internet, metaverse technology, allows people to do more and experience more. Artificial intelligence as a “general purpose technology” will give a huge push to our innovative capacity and be a huge vein of gold for all developments in the progressive era.

The most important short-term tech solution is called decarbonization. A whole history precedes the carbonization of the atmosphere, as we have discussed in the previous chapter. The capital injections into this technology are still disappointing to date. A recently published work charting the history of carbonization argues for a radical halt to CO₂ emissions⁴⁰. But that is at odds with the ambitions and conviction of the ecomodernists that this problem will be solved.

4.3 Ecomodernism as the new capitalism

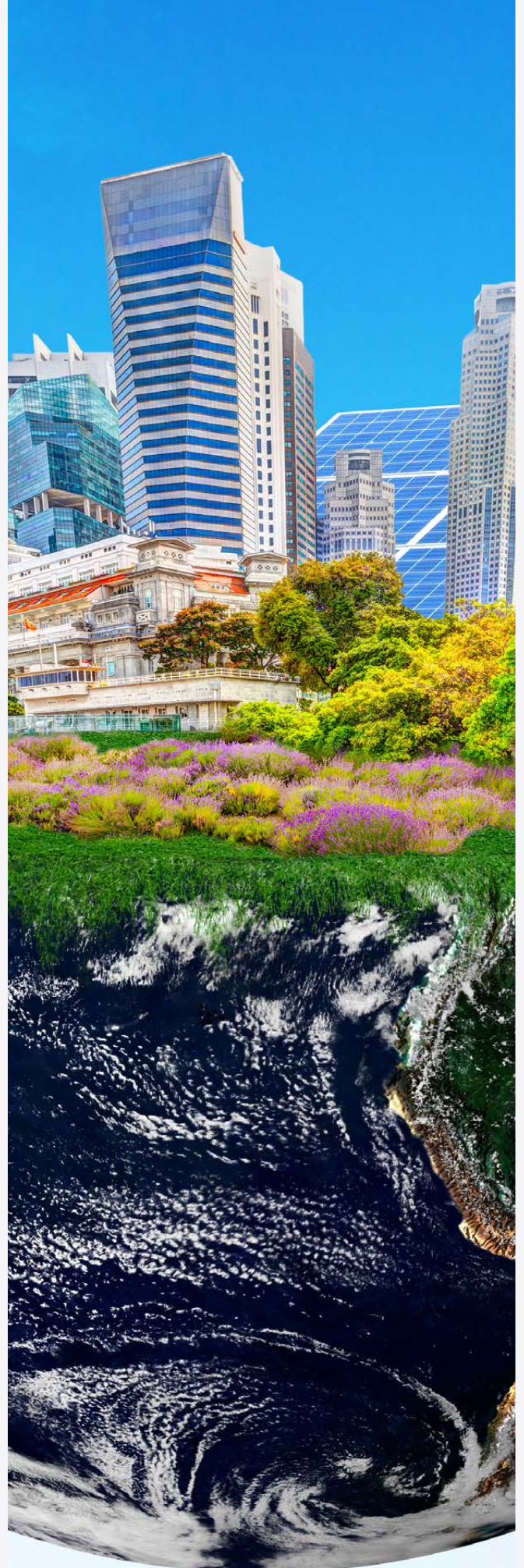
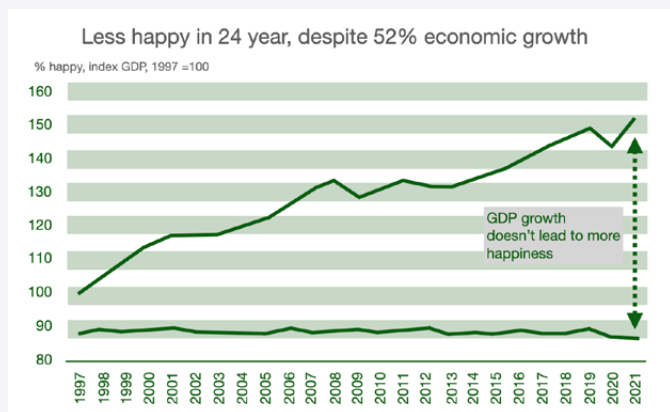
Ecomodernists assume that the economy that continues to grow can be decoupled from the harmful effects that are now associated with it. There is no doubt that new technology is needed to achieve this. If we want to grow, we need more (clean) energy, more synthetic alternatives, and more investments in green solutions. Thus defined, ecomodernism is becoming de facto everyday practice. This decoupling is laid down in the climate agreements. According to the Paris agreement, this must be achieved by 2050.

That the green economy must also be a growth economy is, for example, explicitly mentioned in the United Nations’ seventeen goals for sustainable development. A look at the investments of the governments, shows that they also have the intention to grow the economy itself. The US government’s ‘Inflation Reduction Act’ is a good example. Although the name suggests otherwise, it is in practice a \$370 billion investment in the transformation to green energy and transport. So not only is greening the objective but greening is also

⁴⁰Dolman, H. (2023). Carbon Dioxide Through the Ages: From wild spirit to climate culprit. Oxford University Press.

growth itself. Europe reacted nervously to this US initiative and wants to speed up their own green agenda as quickly as possible. Europe sees the American Green Deal as protectionism, undermining its competitive position. One of Europe's countermeasures considered is to give countries more freedom to subsidize their own industries in order to create a level playing field.

Ecomodernism is a new guise of continued capitalism. The post-growth movement certainly agrees with this statement and warn us about it. Some of them call the green growth of the ecomodernists a form of 'growthism', a morbid urge to want to grow. An urge that cannot be sustained, does not lead to a good life, and ultimately leads to a major humanitarian and ecological disaster. Moreover, they claim, money does not bring happiness. At least, more money and more growth does not make people happier. To illustrate this fact let's once again look at the Netherlands where the Gross Domestic Product has grown by 52% over the past 24 years while the percentage of people who say that they are happy has fallen slightly in that same time period.



Chapter 5

The Social Revolution: A Post-Growth Society



Not quantitative but qualitative growth. More clean air, more quality time, less work, more income, less pollution, less climate stress, more nature, more equality, more at one with nature than against nature, more well-being, more happiness, a fairer planet. A list that will make most people happy. It is also the list of an ever-growing movement that we call *post-growth*, because its supporters are convinced that economic growth, as we measure it in the Gross Domestic Product, is impossible to reconcile with a sustainable existence on our planet. While the ecomodernists run one last round of anthropocentric illusion, they say, we are going to take a different tack.

How exactly should we interpret the post-growth movement? As people who want to save the climate and solve the scarcity issue? Certainly, but they want much more. First, a fairer society. A society in which no one is excluded, a society without neo-colonialism and imperialism. A society in the literal sense of the word: living together. “Conviviality” is a concept that you see a lot in the pieces about post-growth. The boogeyman in the eyes of the post-growers is capitalism, which has ensured that 50% of CO₂ emissions are caused by the 10% richest people in the world. The 50% poorest are responsible for only 10% of CO₂ emissions. The 62 richest people in the world have as much wealth as the poorest half of the world’s population.

The post-growth movement is for a two-speed economy. Growth, especially in the global south and contraction in the north. Downsize the most polluting industries, such as fast fashion for example, and stop advertising products that are extremely harmful to the environment.

One of the representatives of that post-growth movement is Rebecca Solnit. A Washington Post article interviewing her opens with the question “What if climate change meant not doom - but abundance?” Solnit, like many like-minded people, sees global warming as the reason to change and improve the world. It should all lead to an abundance of (personal) growth, happiness in life, things that are important for a rich life and that will be abundantly available. Check the whole list with which we opened this chapter.



Solnit is a historian and co-editor of the book 'Not too late: Changing the climate Story From Despair to Possibility'⁴¹, to which more than twenty activists and climate experts contributed. The title already gives away the message. We can turn a story of despair into a story of possibilities. It's not too late.

5.1 There is life after growth

Paul Schenderling is a post-growth economist. He gave his book about post-growth the hopeful title 'There is life after growth'. A post-growth era sounds much better than a shrinking economy, or the title we hear more and more: De-growth. According to the strict formulation, when an economy shrinks for two consecutive quarters, it is in a recession. That life after growth is possible, even a good life, seems incompatible with the negative connotation of recession. But the response you hear a lot from the post-growth and degrowth corner is that we've been indoctrinated and conditioned. This growth propaganda is what has actually got us into trouble. Jason Hickel, author of the book 'Less is More: How Degrowth Will Save the World' puts it this way:

“The growth economists say that a stable economy is a growing economy. That's like a pilot of an airplane saying that he has to keep escalating the speed of the plane to keep it in the air”⁴²

Jason Hickel

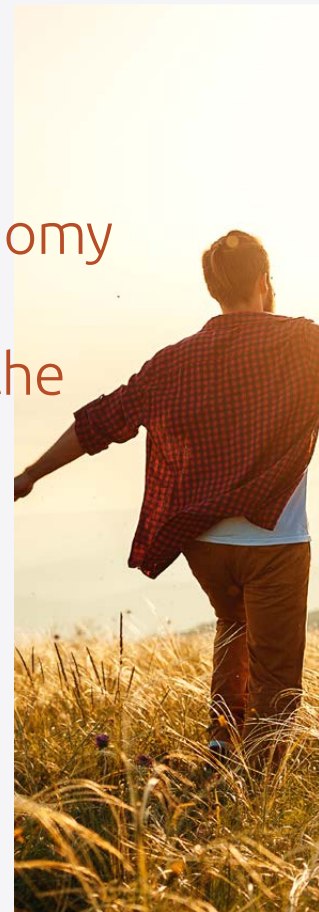
The curse of Kuznets

It has been called the curse of Kuznets; that economic growth and wellbeing have become synonymous. In our thinking and acting this seems

to be true; most of us believe that economic growth will automatically lead to growth in wellbeing. Simon Kuznets is the economist and statistician who pioneered the measurement of Gross Domestic Product, but inadvertently helped us see economic growth as a measure of a country's well-being. But he has always insisted that you can hardly deduce from GDP the state of a country's wellbeing.

⁴¹<https://www.nottoolateclimate.com/>

⁴² Hickel, J. (2022, July 19). How Degrowth Will Save the World [Podcast/levering]. In Upstream. <https://podcasts.apple.com/us/podcast/how-degrowth-will-save-the-world-with-jason-hickel/id1082594532?i=1000570407757>



“The welfare of a nation can scarcely be inferred from a measure of national income.”⁴³

Simon Kuznets

According to the post-growth movement, it is better to measure wealth in completely different ways, such as the happiness measurements in the World Happiness Report. An important reason to look for a new kind of measurement was the fall of the Lehmann Brothers in 2009⁴⁴. Former French Prime Minister Nicolas Sarkozy then took the initiative to ask two Nobel Prize winners for help. Joseph Stiglitz and Armatya Sen laid the foundations for measuring

happiness and wellbeing by looking at additional factors next to financial revenue. This includes looking at for instance the level of corruption in a country - which leads to a lot of stress and wrong decisions - and at the social support network that people have. When you can fall back on friends, acquaintances and family when in trouble, it results in more happiness in life. But Stiglitz and Sen also looked at overproduction in an economy, which, when nature suffers too much, reduces wellbeing. The financial crisis in 2009 was the trigger to look for completely different models, and this will still be the case in 2023.

“The crisis doesn’t only make us free to imagine other models, another future, another world. It obliges us to do so.”

Former President of France, Nicolas Sarkozy

According to Diane Coyle, a professor at the University of Cambridge, ideas for measuring value differently have become mainstream among statisticians and economists. It is no longer the



⁴³Hood, L. (2021, October 13). Beyond GDP: here’s a better way to measure people’s prosperity. The Conversation. <https://theconversation.com/beyond-gdp-heres-a-better-way-to-measure-peoples-prosperity-168023>

⁴⁴Het IMF schat het risico op een nieuwe bankencrisis op 15%. Bron: NOS Nieuws (2023, April 11). Risico op nieuwe bankencrisis zo’n 15 procent, schrijft IMF. <https://nos.nl/artikel/2471015-risico-op-nieuwe-bankencrisis-zo-n-15-procent-schrijft-imf>

question that we will move away from GDP measurement as it is now, the question is only when this will happen. The United Nations will hold a conference in 2025 to make decisions to move to other value measurements. One of the most important items on the agenda is to proceed to a value measurement of nature. For example, forests should be included in value production. So, a country like Gabon, which consists of 88% forest, is a major 'producer' of decarbonization. Ironically, their GDP goes up if they cut down trees and sell them. That is why exclusively measuring GDP actually promotes deforestation. A dead tree is worth more than a living one. A 'Green GDP' would change that. Instead of just pricing CO₂ emissions, the opposite decarbonization would be rewarded. There are already countries, such as France and Norway, that pay Gabon for maintaining the forest. But that is not enough to compensate the poor population. Countries with a lot of forests could therefore grow their economy by preserving nature. A payment arrangement must therefore be linked to the value measurement.⁴⁵

Such a decoupling of economic growth and economic activity would have pleased the godfather degrowth, the French philosopher André Gorz. He already wrote in 1980 about the impossibility of continuing to use the scarce resources of the earth.

"Even at zero growth, the continued consumption of scarce resources will inevitably result in exhausting them completely. The point is not to refrain from consuming more and more, but to consume less and less – there is no other way of conserving the available reserves for future generations".

If Ecomodernism is an American invention, then degrowth is a French invention. Susan Paulson, who charted the history of degrowth in her article 'Degrowth, culture and power'⁴⁶, refers to another Frenchman, the political economist Serge Latouche, who brought degrowth to the following eight denominators:

⁴⁵Jackson, G. (Host). (2023, April 30). Is there a greener way to rank successful economies? [Podcast]flivering]. In The Climate Question. BBC. <https://www.bbc.co.uk/programmes/w3ct5bjw>

⁴⁶ Gezon, L.L. & Paulson, S. (Eds.). (2017). Degrowth, culture and power. Special Section of the Journal of Political Ecology, 24(1), 425-666.

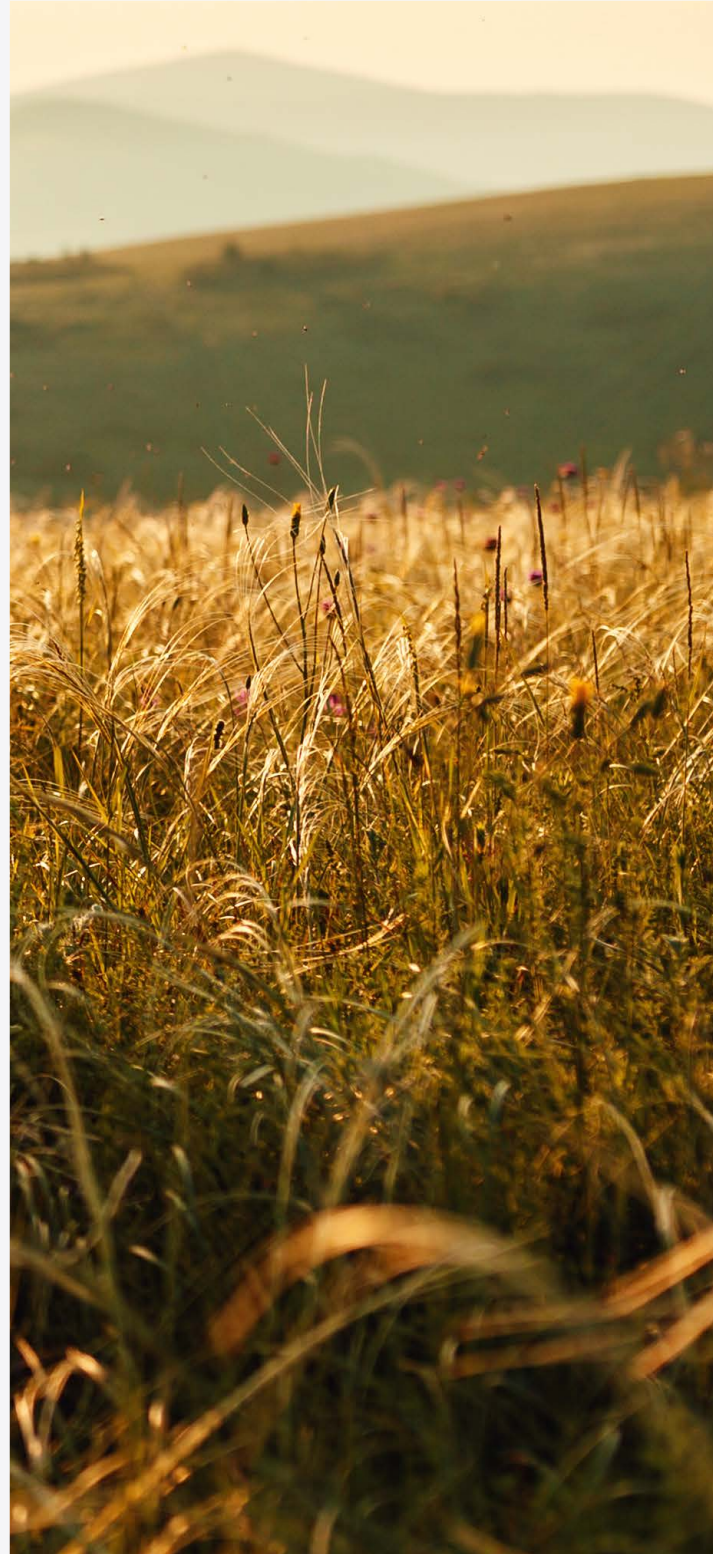
Re-evaluate,
reconceptualize,
restructure, redistribute,
relocalize, reduce, reuse
and recycle.

So simply put, degrowth is to think about what economic growth is based on and evaluate that, come up with new concepts, restructure and redistribute (such as money to countries with tropical rainforests), relocate (operate more locally), reduce, reuse and recycle.

5.2 Post-growth is woke

The eight post-growth denominators represent a profound rethink. Nowadays we call this 'woke'. In this context Post-growth should not be isolated from the Me Too movement, from protecting LGBTQ interests, from demanding non-biased artificial intelligence, from standing up against neo-colonial practices, corruption, oil industry lobbying, the power of asset management companies and media manipulation.

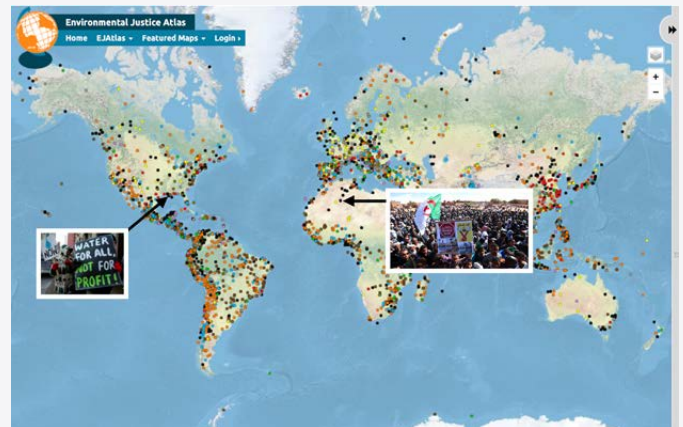
Woke literally stands for 'awake'. Whoever is woke has opened their eyes to how unjust the world is, and sees that injustice also lurks in places where you didn't suspect it before.





Post-growth is a bottom-up or ‘grassroots’ movement. Small projects accomplishing hopeful improvements are often key: how a plot of land has come back to life thanks to regenerative projects, how the precarious existence of people who work in cobalt mines is being addressed. It exposes abuses and looks for ways to change the system.

The Environmental Justice Atlas (ESJ) initiative is a good example of this. It plots the world’s injustices done to living- and natural-environments. For example, the anti-fracking uprisings in Ain Salah (Algeria), where protests have been organized since 2015, sometimes for five months in a row. Protests that were brutally suppressed by the authorities. Or the ‘Water for all, not for profit’ protests by the residents of New Orleans. The water supply was planned to be privatized and sold to two of the largest players, Veolia and Suez, for \$1.5 billion. Ninety organizations objected, organized protests and filed lawsuits, that ultimately led to reversal of the plans.



Environmental Justice Atlas: Resistance to Abuses and Civil Revolts in Algeria and America Reported by the ESJ.

5.3 Are you ready for shareholder activism?

So post-growth is woke and activist. Extinction Rebellion is a good and well-known example of this. Protesters of this group occupy highways, glue themselves to famous, priceless works of art or spray-paint the storefronts of clothing retailers to denounce 'fast fashion' Another form of resistance is the shareholder activism that organizations can face.

Shareholders took the initiative to accomplish a change in strategic direction at two oil and gas behemoths. At Exxon Mobile, it was a startling 'boardroom maneuver' that did put things into action. A San Francisco-based hedge fund, Engine No. 1, acquired \$14 million worth of stock in November 2020 to get a vote on Exxon Mobile's board. Hedge fund founder Chris James calls it "an act of strategic activism". Because of the lack of a clear "low carbon" strategy, he argued for the inclusion of someone on the board with experience in energy transition and got a majority of shareholders to support the initiative. They have now joined the board of directors with three people. In November 2021, Exxon Mobile announced that they will invest \$15 billion over the next six years in a newly created carbon solution business division.

Client Earth, a British environmental law charity has been a Shell shareholder since 2016. Like Engine No. 1, Client Earth approached other shareholders to join them in an exceptional lawsuit against the individual board members. The reason for this was a previous court case in the Netherlands, where Shell was ordered to reduce CO₂ emissions by up to 45% before the end of 2030. Shell then announced that it would reduce its own CO₂ emissions by 50%, but that it wouldn't achieve a CO₂ reduction from

the products they presently sold. In addition, the company is appealing the court's judgement. In February 2023, Client Earth launched a lawsuit against the eleven individual board members because, in their opinion, the board is not managing climate risks properly.

5.4 Technology in times of degrowth

In a political sense, technology has never been neutral in the eyes of the post-growth movement but has been serving the socio-economic interests of the one at the expense of the other. In other words, the global north benefits and the global south pays the price⁴⁷. One of the main agenda points of the degrowth movement is that technology should be neutralized and should not lead to disproportionate gain but should be based on a fair distribution of resources.

A second essential argument of this movement is that more efficient use of technology (electric cars, energy-efficient data centers, etc.) will, by itself, not lead to less global warming or conservation of biodiversity. All this because of the so-called 'Jevons effect'.

The Jevons effect

In economics, the Jevons paradox (also known as the 'Jevons effect') describes the phenomenon where technological efficiency improvements that lead to reduced resource consumption can paradoxically result in increased overall consumption of those resources due to lower costs,

⁴⁷Special Section for Environmental Values: The Political Ecology of Technology. On the Non-neutrality of Technology. Guest Editor, Luis I. Prádanos (Iñaki).

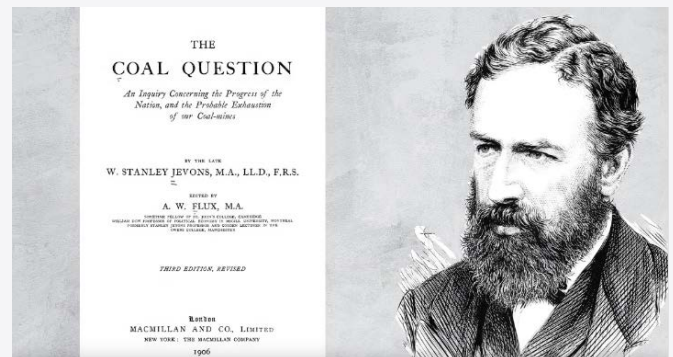
increased demand, or other factors. Named after the English economist William Stanley Jevons, this effect highlights the intricate relationship between efficiency gains, resource use, and environmental impact.

He applied his calculations to the coal efficiency of steam engines. In 1865 he published about this in his book 'The coal question'. His conclusion was that technological improvements, which increased the efficiency of coal use, paradoxically lead to increased consumption of coal. He stated that, contrary to what one might expect, technological improvements cannot be counted on to reduce overall fuel consumption.

The paradox can be explained using well-known economic principles such as the fall in prices and the income effect. A more economical driving car saves money. With that money saved you can go on holiday to the Fiji Islands. The net effect is that more CO₂ is released into the air. Or a more economical car ensures that you drive more because it costs less. In practice we see that over the years cars have not become more economical because they subsequently became larger. The presence of so many SUVs is seen as an example of the Jevons paradox: we have not started to drive more efficiently, but more luxuriously.

On average, today's cars are just as economical as they were decades ago. The only difference is that they are much larger. More efficient energy consumption can therefore not simply be booked as a benefit for the planet, because part of the efficiency gain is lost due to the growth of the economy. We only speak of the Jevons effect if the efficiency gain is completely lost to increased growth or even leads to more energy consumption ($\geq 100\%$). So, a real paradox. People often speak of the rebound effect instead of the Jevons effect.

These are almost identical. For example, a rebound effect of 55% means that 55% of the energy efficiency is lost due to the increase in growth and associated energy consumption. The rebound effect therefore already exists at $< 100\%$. Post-growth expert Paul Schenderling did a literature study, and he concludes that the average rebound effect is 55%. But it remains difficult to maintain an average, because the context in which these effects occur can differ greatly.



The Coal Question: “An Inquiry Concerning the Progress of the Nation and the Probable Exhaustion of our Coal-mines”. Third edition of the original 1865 book, in which Stanley and Jevons explains his paradox.

Contrary to ecomodernism, there is no consensus about the role of technology in a post-growth society. But if the two schools had an icon for their vision of technology, one would be a self-driving car and the other would be a bicycle⁴⁸. There is certainly skepticism about the role of technology in society within the degrowth movement. Not least because Big Tech possesses a lot of lobbying power and is perceived as undemocratic. In addition, many of the big tech companies are mostly advertising-driven companies that want us to consume things, which makes them polluting. Banning the advertising of the most polluting products and services is a popular theme among degrowthers. Broader technology, that of the industrial revolution fueled by the big oil corporations, is met with even more skepticism.

Another clear technological agenda for the post-growth society is that we must implement technologies in a way that it creates a regenerative, recyclable recovery economy. Like the right to be forgotten on the internet, products come with the right to be repaired. This has major consequences for the technology sector because the current logistics and repair systems are not designed for regeneration and repair at scale.

And last but not least, post-growth regards natural ecosystems as a technology' that must be used to save the climate, combat drought and restore biodiversity. Numerous studies have been performed that demonstrate that ecological projects are a very effective way to combat global warming.

Finally: the illusion of green capitalism

The post-growth movement sees the system as the cause of the problem and green growth as an

illusion. They consider the current measures to save nature and combat global warming as 'flawed by design'. The reason for this is that they focus on profits for certain groups of people and not the planet with its associated ecosystems.

Someone who articulates these post-growth views very sharply is Adrienne Buller. She is a senior fellow at the progressive think tank Common Wealth. She calls green growth "the superlative of greenwashing". She calls Environmental Social Governance, which is the way for many organizations to meet the goals of the Paris climate agreement, a hoax and counterproductive. Even though ESG investors are obliged to include environmental aspects and social impact in their investment decisions, we do not see any effect on fossil energy production. It is an economic success, but an ecological disaster.

A comparative value study, in which two investment portfolios are compared, painfully exposes how a stock can achieve a positive ESG value. The basket of the ESG investment portfolio contained a striking number of companies that hardly had any employees. A logical consequence of how the ESG score is calculated. The risk of mistreatment of staff is reduced if you have hardly any staff⁴⁹. According to Buller, the fact that asset management companies in America and Europe are sitting around the table to forge green deals, shows that it is to

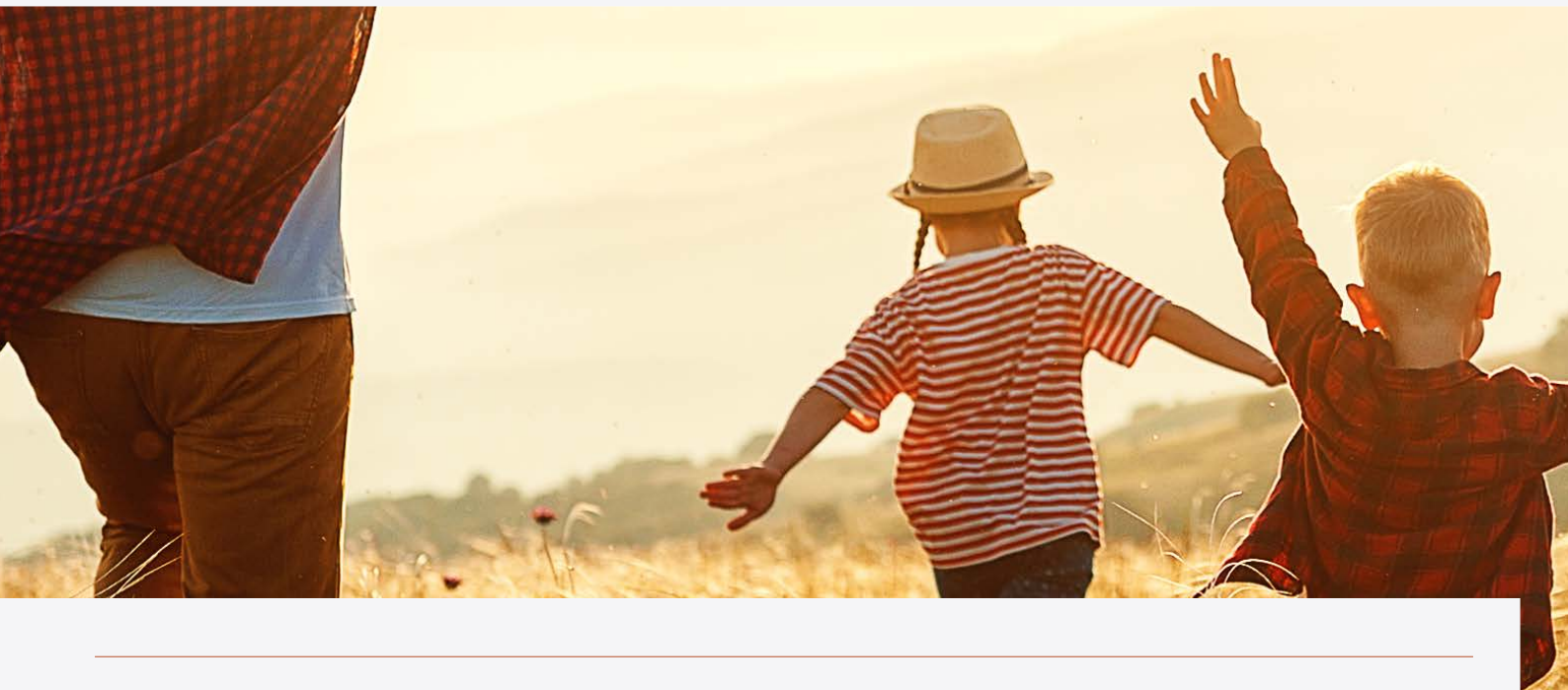
⁴⁸Kerschner, C., Wächter, P., Nierling, L. & Ehlers, M.-H. (2018). Degrowth and Technology: Towards feasible, viable, appropriate and convivial imaginaries. *Journal of Cleaner Production*, 197(Part 2), 1619-1636. <https://www.sciencedirect.com/science/article/abs/pii/S095965261832136X>

⁴⁹The Climate Pod (2022, July 11). The Problems with Green Finance (w/ Adrienne Buller) [Video]. YouTube. <https://www.youtube.com/watch?v=QrkWExk1aRg>

manage the risks in investment portfolios, and not to save the climate.

In her book 'The value of a whale: on the illusions of green capitalism' Buller lists her arguments. Her main target (and that of many post-growth proponents) is William Nordhaus⁵⁰, widely regarded as the foremost, most influential green economist. He calculated an ideal GDP maximum based on his economic model and concludes that an optimum for maximum GDP growth will be reached at 3.5°C to 4°C degrees of global warming. Climate scientists worldwide agree that with those values there won't remain an economy to talk about (read viable society) at all. Clearly things go wrong when economists and asset management companies start interfering with the ecologists, geographers and environmentalists.

The title of Buller's book refers to an IMF study that calculated that a whale is worth \$2 million. That value is based on what the animal can bring to people. In this case, the value is in eco-tourism and in decarbonization⁵¹. Humans are central to this value calculation and the whale has no intrinsic value of its own. She points out where that can go wrong. In the United States, for example, values are given to nature. Calculations for this are in turn based on what nature provides for people. Beach and dunes are highly valued, because that's where people want to live and go on vacation, while wetlands and corals are rated low. But ecosystems cannot be captured in numbers. The consequence of the quantification is that policymakers start looking at a number instead of an ecosystem, with all the consequences that entails.



⁵⁰William Nordhaus is de oom van Ted Nordhaus van het eerdergenoemde Breakthrough Institute.

⁵¹<https://www.downtoearth.org.in/blog/young/how-much-is-a-whale-worth--72784#:~:text=We%20are%20aware%20of%20the,the%20job%20of%201%2C500%20trees.>

And so, we outlined the developments through the eyes of two different schools. When we zoom out again, we see the stories fit into a clear 1-2-3. We are moving from the Experience Economy that accelerated the economy to the Experience Ecology of the Anthropocene. The impact of that growth has inadvertently become an experience - from climate madness to supply issues to experiencing a BANI society. We then see the technological tools through the lens of the Experience Technology. The latter is both a potential solution to the problems ahead and an enhancer of awareness of what we are doing to the planet' as we consume and produce. Making the ecological impact transparent with supporting ICT systems, is good news for the technology sector, since there is a lot of work to be done. But at the bottom-line, only one thing applies, and that is not the quarterly figures of the listed companies, but that are the earth trends we introduced in Chapter Two. If we don't change that quickly, there will be no more quarterly figures to look at in the future, but only the experience ecology that concerns us.

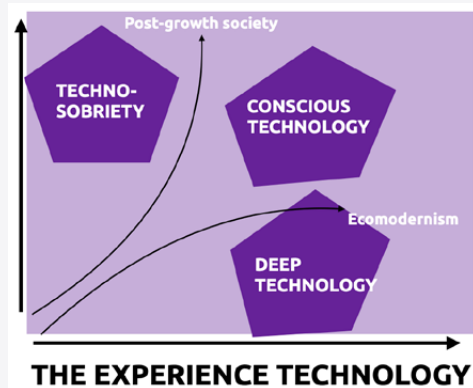




Chapter 6 The Experience Technology

Much has already been said in this report about the role of technology. We presented technology as both the solution and the source of the problem. The two schools – Ecomodernism and Post-growth – look at the role of technology differently. One sees the solution in austerity – Techno-sobriety – the other in extreme acceleration and the development of deep technology. Rather than seeing it as a choice for one or the other, it's much more likely that both will happen. More pressure on technology choices and more investment in technology. In particular, more investments in deep technology to realize breakthroughs for the problems for which we do not yet have a solution.

We would like to call a third technological development conscious technology: technology that makes the ecological impact transparent. Until now, technology has mainly been used to optimize the buying experience – the experience economy – and information about ecological impact has been largely ignored. New legislation will be introduced to better inform consumers about this. And with the building of new information systems to make consumers more aware, there is also the opportunity to factor that information into the price of products and to recycle products better.



The three flavors of technology in the Experience Ecology: Deep Technology, Conscious Technology and Techno-Sobriety.

6.1 Conscious Technology

We read earlier that production has largely disappeared from view due to globalization. There are no information systems that inform consumers about the ecological or social consequences of their purchase. The customer journey is fully supported by ICT, but the product journey is shrouded in mystery. Technology should bring back transparency, but until now it has primarily made buying easier. With a few clicks you can get everything your heart desires.

Once unpacked at home, it turns out that it is not what you wanted. Then just return it. Roughly speaking, one third of consumers return their purchase. And even though the majority of consumers love to keep their stuff in their homes, an incredible amount of stuff still ends up on the garbage heap. Studies by Lund University show that in Europe alone, €21.7 billion worth of⁵² returned consumer goods was disposed of by 2022.

“The blunt reality is that throwing things away is the lesser of two evils for the company from a financial perspective.”

Carl Dalhammar, University of Lund



New clothing collections are launched almost weekly by large fast fashion companies. The textiles that remain unsold end up in the Atacama Desert in northern Chile. Experts estimate that there are more than 100,000 tons of never worn clothing there. Carl Dalhammar is involved in the investigation and sees fast fashion and electronic products in particular as the culprits. Clothing, electronics and batteries are exactly the products for which the European Union is now going to introduce a Digital Products Passport. With this passport, the EU wants to make consumers more aware of the ecological impact of purchasing products. Ultimately, every unique product must be given such a passport and such a passport is required to be admitted to the European market. The DPP functions as a digital twin of the real product, following the journey from start to finish, with the ultimate goal of being able to recycle all products. Organizations need to prepare for the new future of value chains, which will allow consumers to see what is being hidden, which is the



⁵²Roberts, H., Milos, L., Mont, O. et al. (2023). Product destruction: Exploring unsustainable production-consumption systems and appropriate policy responses. *Sustainable Production and Consumption*, 35(Jan), 300-312. <https://www.sciencedirect.com/science/article/pii/S2352550922003050?via%3Dihub%2%A0>

beginning of a recycling economy. (The EU Digital Product Passport shapes the future of value chains: What it is and how to prepare now⁵³).

It is significant that we can track exactly where our purchases are in the logistics process via track & trace, but we do not know what happens after we return it or which journey has been made before it became a product. France has already introduced a ban on the destruction of returned products. A ban on free returns is coming. But even then, according to Dalhammer, we are still on the wrong track. After all, hyper consumption is part of a throwaway society, in which much that is not returned is not or hardly used. He expects more from new legislation from the European Union targeted at increasing the quality of products.

New balls please

There is a lot that consumers are not informed about. Let's give a simple example for clarification: a tennis ball. We all have some at home, if only for the dog to play with. But how many of the 87 million tennis players on this planet know how such a ball is produced, what the carbon footprint is and what the impact on the environment is? The answer is: probably very few. Let's start with the facts:

A tennis ball has traveled more than 80,000 kilometers before it can be played at Wimbledon. The British Warwick Business School mapped out the entire journey⁵⁴. To produce the ball, sheep's wool from New Zealand, clay from America,



sulphate from South Korea, rubber from Malaysia, zinc from Thailand and many other materials from various countries, including Japan, are used. The tennis ball itself is produced in the Philippines because of the low wages. The consumer has no idea where the ball comes from, how many kilometers it has traveled, what it contains or under what circumstances it was made. He sees only a logo and a slogan, such as the Paulig girl who praises the Finnish coffee from Chapter 3. A consumer does not know that one tennis ball represents 0.58 kg of CO₂, that 325 million are made annually, that they are not biodegradable, are not recycled because the rubber inside and the plastic outside are difficult to separate, that they spread microplastics with every tennis stroke, and that they are produced in sweatshops in the Philippines. (To get an idea of what working in the factories is like, read 'Follow The Things', 'New Balls Please' report⁵⁵.) So, there's a lot wrong with this situation, but the main thing that's wrong is that we do have marketing systems to sell stuff but do not have information systems that tell you the ins and outs.

⁵³Damen, M.A., Stepke-Müller, M., Meyer zum Felde, A. et al. (z.j.). The EU Digital Product Passport shapes the future of value chains: What it is and how to prepare now. WBCSD / BCG. <https://www.wbcd.org/contentwbc/download/15584/226479/1>

⁵⁴Warwick Business School (2017, July 3). The 50,000 mile journey of Wimbledon's tennis balls. <https://www.wbs.ac.uk/news/the-50-000-mile-journey-of-wimbledon-s-tennis-balls/>

⁵⁵Abrams, F. (2002, June 24). New balls please. The Guardian. <https://www.theguardian.com/sport/2002/jun/24/tennis.wimbledon20027>

The informed consumer

The informed consumer is step one. Post-growth economist Paul Schenderling goes one step further. He has worked out a plan to include this environmental impact in the price of the product. The informed consumer therefore feels it in his wallet. Schenderling wants to initiate a change in behavior by including the environmental burden in the costs. His plan is based on the ideas of the French economist Thomas Pickety. Schenderling sees Pickety's proposals for tax reform working as follows.

The money banker becomes an environmental banker

All products will eventually receive a Digital Product Passport, not just the most polluting ones. When purchasing these products, the consumer receives an environmental voucher in addition to an ordinary receipt. That is literally a printout of the product passport in combination with the quantity of the product the consumer purchases. The party from whom the consumer purchased the product, shares the information with the bank. It keeps track of the burden on the planet and sends your total environmental balance to the tax authorities at the end of the year. As people consume more, the percentage of tax also increases, just as it applies to income in existing progressive tax systems. The consumption tax goes up with these plans and the income tax comes down. The Dutch Rabobank has already developed something similar. The bank gives an indication of the impact of your purchases, but without the exact information from such a passport and without financial consequences.

A change in social media

We also see developments in the soft sides of the information society that point to greater awareness. The jet set of influencers with private jets and extravagant lifestyles is being scrutinized. Pop culture expert and trend watcher Rabia Sitabi points out that celebrities are increasingly being given the opportunity to show off their possessions. The hashtag 'climate terrorist' is not what they expect as comment under their posting of their private jet. While young people are becoming increasingly stressed about global warming, they are also aware that they cannot afford what was within reach of previous generations: an affordable home and a luxurious life.

"Hard reality has sunk in," says Sitabi. "There is a crisis going on". Influencers with a tailwind are those who speak out about human rights, rights for LGBT youth, climate, inclusivity and accessibility for the disabled⁵⁶.



Climate and anti-consumption influencers are doing well on social media. From Greta Thunberg with millions of followers to a few hundred thousand from Lauren Singer and Leah Thomas and one and a half million from Shabaz Ali. The latter is on a rapid rise with his few million followers of @shabazsays.

⁵⁶KNieuwsweekend (2023, April 1). Celebrities moeten meer in huis hebben dan alleen maar beroemd zijn. NPO Radio 1. <https://www.nporadio1.nl/fragmenten/nieuwsweekend/b1e52ace-d4d5-4a23-8fe4-bce03dba7989/2023-04-01-celebrities-moeten-meer-in-huis-hebben-dan-alleen-maar-beroemd-zijn>

The English teacher, wrapped in a weird blanket, makes fun of people who show off their wealth with his hilarious commentary that invariably starts with “I’m rich, you’re poor”.

Finally: the new future of IT

Many of the purchased items end up on the rubbish heap. How surprisingly little ICT has so far contributed to understanding the products we consume is as shocking as it is hopeful. After all, every change starts with insight, every insight starts with information. But from buying a tennis ball to binge-watching a Netflix series, consumers are innocently ignorant, unfamiliar, and perhaps disinterested when it comes to the environmental aspects of their buying behavior. The end of this era of ‘innocent’ consumerism is as necessary as it is inevitable. We see a change on social media. Showing the luxurious life is less cool. New laws to make the impact of consumer behavior more transparent will continue to emerge. New laws to make production more sustainable and to establish a regenerative economy will continue to emerge. See here a new golden future for IT: Measuring, informing and steering a sustainable consumer society.

6.2 Techno-Sobriety

Capgemini’s technological outlook ‘Technovision’ provides an annual update on where the information society is heading. The 2023 edition focuses on the scarcity of resources.

“We make a call to action to be respectful of the increasingly scarce resources we have at our disposal. We believe the challenge is in selecting the right technology solutions and innovation initiatives that not only contribute best to the organizational future but also have a clear, positive societal impact.”

Technovision 2023⁵⁷

The report is riddled with terms such as “Less with less” and offers advice to look at IT systems through the eyes of Japanese decluttering guru, Marie Kondo. The call is “Kondo your portfolio”. The plea for more techno-sobriety is a clear signal. After all, the IT sector is on track to account for 14% of greenhouse gas emissions, by 2040.

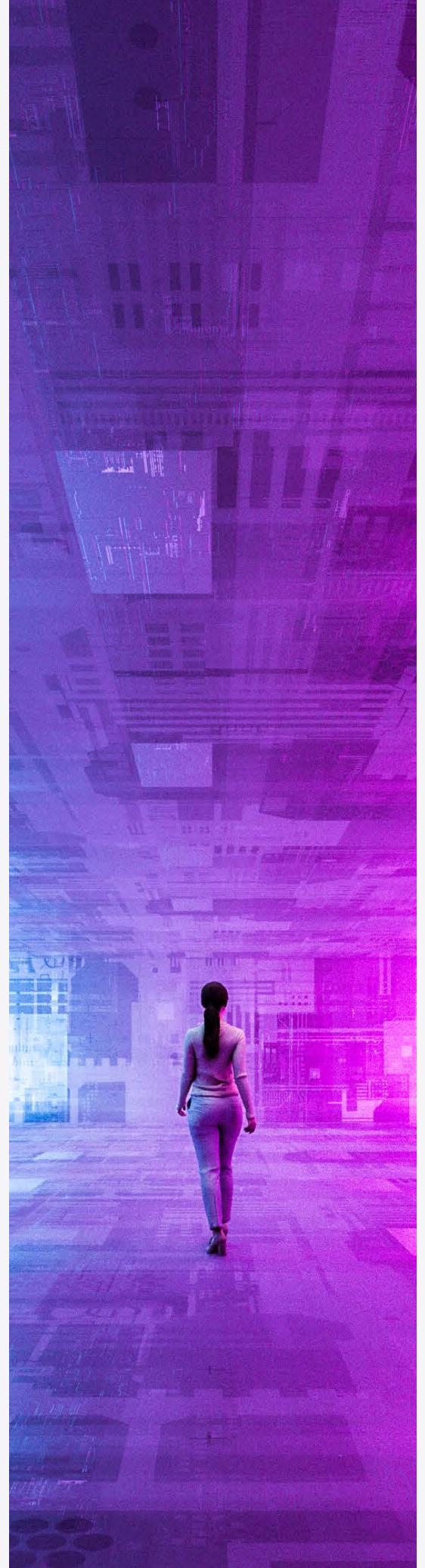
⁵⁷Capgemini (2023). TechnoVision 2023: Right the Technology, Write the Future. <https://prod.ucwe.capgemini.com/nl-nl/wp-content/uploads/sites/19/2023/01/TechnoVision-2023-Right-The-Technology-Write-The-Future.pdf>

A good and up-to-date overview of the energy and resource use of the IT sector is given in “The Cloud Is Material: On the Environmental Impacts of Computation and Data Storage”⁵⁸. It is the title of the research by Steven Gonzalez Monserrate, who obtained his PhD on this subject as an anthropologist at MIT. His research shows that the digital infrastructure has overtaken the aviation sector when it comes to CO₂ emissions and that it is expected that it will also surpass the CO₂ emissions of car traffic within a few years. The French think tank ‘The Shift Project’ has therefore been campaigning for digital sobriety - data sobriety - as they call it, for a few years now. They published three reports on this. ‘Lean ICT – Towards Digital Sobriety’ (2018), ‘Climate: the unsustainable impact of online video’ (2019), and ‘Implementing digital sufficiency’ (2020). According to the think tank, both organizations and individuals should make more conscious use of digital opportunities. A message that is in line with that of Capgemini’s Technovision.

The advice of the French think tank to organizations and governments to introduce digital austerity are:

1. Governments and organizations must embrace digital sobriety. The acquisition and use of digital objects and services must be constantly questioned in the light of their social and economic benefits.
2. Create awareness of the impact the digital consumer behavior has on the ecology. These are: the energy consumption, the greenhouse effect, the use of critical metals and the volume of land used for the mining of those materials.
3. Extending the life of hardware such as laptops and smartphones and therefore replacing them later.
4. Stimulate BYOD and allow smartphones with two SIM cards (private and business) to be used.

⁵⁷<https://mit-serc.pubpub.org/pub/the-cloud-is-material/release/1>



5. Include the environmental impact standard as a criterion in the decision-making process regarding digital products and services.
6. Providing the tools to achieve the digital transformation of organizations in an environmentally responsible manner.
7. Create a public register in which everyone can see the impact of the purchase and use of digital resources.
8. Carrying out carbon audits for ICT systems.
9. Build expertise on the specific digital system impact in sectors such as construction, transport, energy and agriculture.
10. Carrying out actions at European and global level.

The former director of the Shift Project, Cédric Ringenbach, later founded 'Climate Freske' which organizes workshops for organizations to learn more about ecosystems and global warming. We mentioned Climate Freske earlier in the report when we referred to Air France-KLM sending its employees to these workshops.

6.3 Deep technology

In section 5.2 (Technology in times of Ecomodernism) we discussed some examples of technologies that should enable green growth. It is to be expected that the European Green Deal and the US Inflation Reduction Act are only the beginning of the rise of deep technology. Europe is investing €1 trillion in the transition and America \$370 billion. The investments of American Venture Capital companies in climate tech are in stark contrast. In 2021, that was \$56 billion. But that's still a lot of money.

For the IT market, deep technology mainly means more money. More money to pioneer, explore and experiment. After all, many of these technologies depend on ICT. In the example we gave about solar parks in space, we saw that autonomous robots are indispensable for the success of the project.

We will see more start-ups coming, more conferences on deep technologies being organized. New technologies will slowly be added to the hype cycle, others will fall off. New discoveries will be celebrated big and wild and it will all fuel the feeling of excitement and thrills we know from previous hypes in information technology. But others, like the post-growth proponents, are more likely to feel the negative sensation of a parachutist jumping down knowing that the rope to open the parachute has yet to be invented.

There are many questions to be asked about these new technologies, the most important of which is whether it will all come in time. Suppose technology can save the world, protect us from a climate catastrophe and everything that follows... Will this happen in time, or have Earth's systems escalated so far out of control that the tide can no longer be turned?

Welcome to the Novacene

We can't answer that question here but want to leave you with a thought from James Lovelock, the man you may know from the Gaia theory. At the age of 100 he published his last book: *Welcome to the Novacene: "Hyperintelligence, Gaia and Man"*. Technology is going to save the earth. Lovelock is also the one who was able to measure CFCs in the atmosphere for the first time. Thanks to his discovery, he has already saved the earth from a previous disaster, because since then much work has been done to ban propellants in aerosol cans, refrigerators and other appliances. As a scientist and futurist, Lovelock was one of the most important mouthpieces of Earth's ecosystems.

Lovelock has campaigned for years to deploy nuclear power on a large scale because of the effect of CO₂ in the atmosphere. At a certain point, according to Lovelock, we have passed the point where we could still combat global warming. Simply because building nuclear power plants has a long





lead time. If we were to decide now, we would only have more nuclear energy in thirty years' time. So too late. He exchanged his pessimism about the future for optimism just before his death.

Lovelock has always maintained that man cannot comprehend the earth. He saw the complex systems of the earth as a living organism. That's what his Gaia theory is based on. But "the new scientists" could do it. He sees artificial intelligence as "the understander of the future". He refers to the new AI era as the Novacene. We are leaving the Anthropocene and entering an era of the "superhumans" and "under the watchful eye of merciful AI" we know how to avert the dangers. A twist in the story is characteristic of Lovelock. Stopping global warming now is a piece of cake compared to what will hang over our heads when the sun continues to warm up. Because that's what's going to happen as the sun gets older. The superhumans are then needed to invent the heat shields that prevent the earth from warming excessively.

ChatGPT is getting pretty close to Lovelock's prophecy of a superhuman society. Inventing a string to open the parachute has to be done quickly. And that's what Lovelock points out to us. Not only are we too limited to understand the earth, but we are also far too slow with our solutions.

Epilogue: The Netherlands in 2121



Just as unimaginable as the lockdown of the Netherlands, with which we started the report, is the idea that the Netherlands will soon have all these problems behind it. And not only that, but that we also inspire other countries to do the same. Because for decades the Netherlands has had the urge to act as a guiding country in numerous world affairs. The plan “The Netherlands in 2121” can be a spectacular follow-up to this.

If it is up to transition professor Jan Rotmans, the Netherlands will become a spatial laboratory for the rest of the world. Together with architectural firm ‘Kuiper Compagnons’, he developed a plan to overhaul every square meter of the land. All this for the benefit of a multiple task: the energy-water-climate-nature-agriculture-housing-transport task. In the spatial plan, the Netherlands will change more in a hundred years than in the past thousand years. Rotmans calls for the Netherlands to become a country with a plan and for this to be implemented within a period of 2030 - 2131.

Jan Rotmans is a mathematician and one of the founders of the first IPCC climate models. As a scientist, he set to work depicting the transition to the year 2121. With the calculator in hand, calculating how many rare metals are needed to build solar collectors and wind turbines and making calculations for the future CO₂ emissions of the various sectors. One of his main points is that we should use the scarce resources for the transition and not for the production of goods and services that do not contribute to it. The same goes for energy. We need more energy to make all this happen. In addition to being a scientist, Rotmans is also an activist. He is one of the two founders of Urgenda, an organization that won an important climate lawsuit against the Dutch state.

Rotmans is aware that the mega-spatial transition he envisages requires an equally large mental transition. Rotmans: “We need a leap in scale in our thinking.” After all, we must be able to move along with nature. In response to those accelerations, the country must accelerate with it. But in his scenario, disaster first follows. That disaster makes it more likely that we will actually make that mental leap in scale. Due to an unfortunate combination of circumstances, something that also happened seventy years ago will be repeated: the water could no longer be stopped.

The flood

In February 1953, a 1,000 kilometer long storm field came straight at the Dutch coast. In combination with an unfavorable coincidental high tide and spring tide, the storm caused the dikes to breach in 150 places in the Netherlands. Entire islands and regions including towns and villages were flooded. During this flood

disaster, 72,000 people were evacuated, 1,836 people perished and 47,000 livestock and 140,000 poultry drowned. To arm the country, the Netherlands built new storm surge barriers, dams and locks for more than four decades (1954-1997). The total cost was €5 billion. All these projects are grouped together under the name “Delta Works”. These Delta Works have been declared one of the Seven Wonders of the Modern World by the American Society of Civil Engineers.

The original Delta Works were calculated for a sea level rise of 40 centimeters, and existing plans assume a rise of one meter. The worst-case scenario predicts a rise in sea level of 2.92 meters over the next 75 years⁵⁸. The KNMI assumes an increase of 1.2 meters by 2100 and adds that 2 meters is also possible if climate agreements are not met. After 2100, the sea water rises further. Experts argue for a plan B for the Netherlands that is based on a “controlled return to the sea⁵⁹”. Due to the subsidence of the soil and the rise in the sea water level, parts of the Randstad will lie eight to ten meters below sea level. Pumping the land dry becomes impossible and too expensive. There is no more reclaiming of land. The mills have been given rest. How do you compete with a sea level that continues to rise and the land that slowly settles?

⁵⁸Schuttenhelm, R. (2019, February 5). De zeespiegelstijging is een groter probleem dan we denken. En Nederland heeft geen plan B. Vrij Nederland. <https://www.vn.nl/zeespiegelstijging-plan-b/>

⁵⁹Verheggen, B. (2023, February 3). Delen van Nederland teruggeven aan zee is realistisch toekomstscenario. RTL Nieuws. <https://www.rtlnieuws.nl/klimaat/artikel/5363015/klimaatverandering-overstromingen-zeespiegel-klimaat-water-zee-nederland>





The Netherlands in 2121, measuring a lace city, floating cities, Wadden islands off the coast, saline agriculture and a bio-based economy.

In the new modern wonder of the world that Rotmans sketches, the Randstad has become a lagoon city. The farmland between the urbanized areas known as the Green Heart of the Netherlands becomes the Blue Heart. People live and work on the water. There are floating neighborhoods and floating medium-sized cities. A lot of land has been returned to the sea. The former coast has been raised and forms a long winding city called Duinstad. The entire coastline changes into the structure that we presently see at the Wadden Islands at the northern tip of the Netherlands. In the Randstad there is saline agriculture, with products such as samphire, sea kale and sea broccoli. Seaweed and algae farms provide a new source of food off the coast. Greenhouse horticulture specializes in high-quality and healthy products such as herbs, cresses, sea lavender and seaweed.

The third urbanized area is called the Kantstad (Side city). Unlike the Randstad, there is also a lot of green nature here. The Kantstad starts with the higher areas in the east of the country. In addition to food, raw materials for the bio-based economy are mainly grown here (hemp, cattail, humus, miscanthus and flax). It produces high-quality bioproducts such

as building materials, biopolymers, clothing and pharmaceutical products. Circular agriculture is nature-intensive, allowing plants, animals and vital ecosystems to flourish.

Much agricultural area is used for nature development, including production forest for housing construction. Cement and concrete are being replaced by wood. To tackle environmental and climate problems, there is much more nature and the banks of the rivers are much wider. There are many water storage areas to ensure drinking water supply during the increasingly longer periods of drought. By building with nature instead of against nature, we are much better able to deal with extremely dry and hot weather.

Energy generation and air purification takes place on the 2.5 billion m² roof and facade surface. Noise barriers along highways and railways are also used for this purpose. Rainwater is retained longer on green roofs. There are energy islands off the coast in which energy is stored using hydrogen. Hydrogen is the replacement for oil and gas, but we import most of it from Africa, the Middle East, South America and Australia.



Afterword



Already while working on this report, we started giving presentations on “Scarcity in abundance”. We always do that during the writing process; think of it as try-outs. We noticed a few things during these encounters. First, and it probably won’t surprise you, that the theme is very much current. We experienced that an open exchange spontaneously arose outside the hall where people vented their hearts. Or we were stopped at the exit and treated to a minute-long monologue in which someone expressed their deepest concerns.

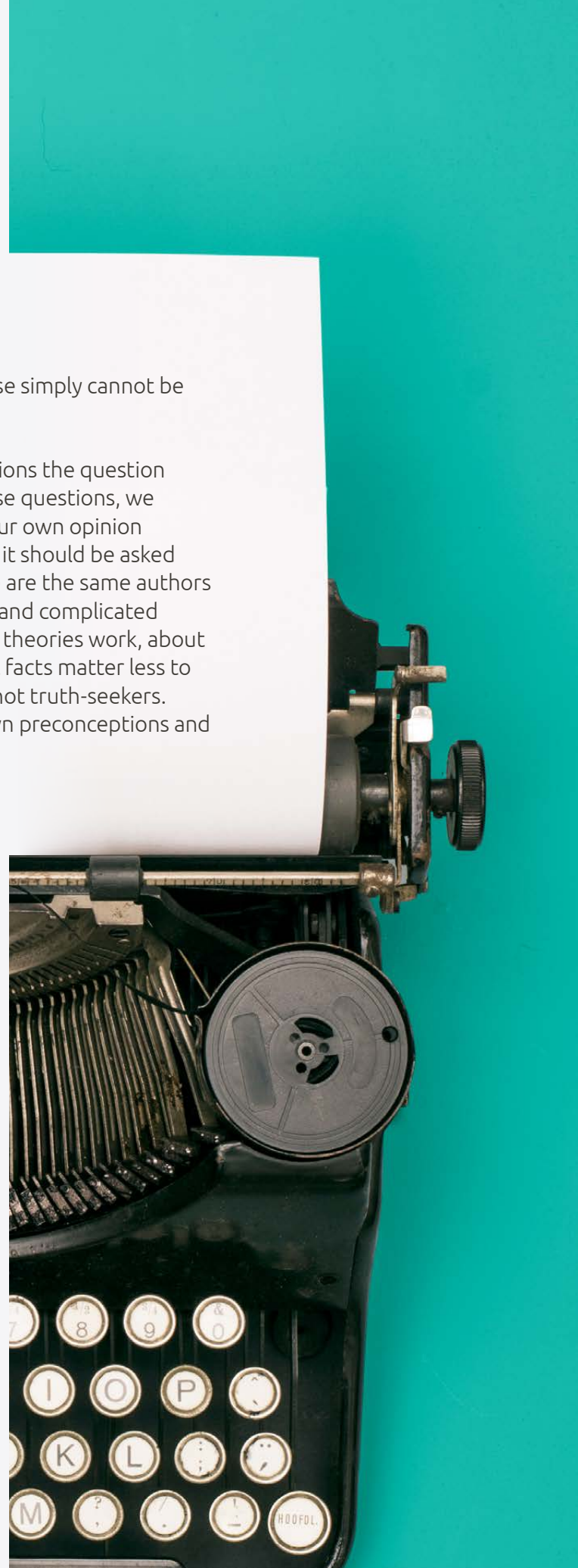
To our surprise, in a business context where we usually present, we were frequently confronted with rather personal confessions. Revelations ranging from “I’m considering joining Extinction Rebellion” to “I don’t want to bring children into this world” sometimes supplemented with “I’ve never shared this with anyone before.”

It has strengthened our belief that the content of this report should become part of a broad open debate within organizations. Anyone who feels the load on their shoulders, because ‘the top’ has to do something with this, we tell: don’t wait but start grassroots, bottom-up. Sustainability, CSR and ESG, are all assigned to people and responsibilities that fit into the organizational matrix. But the theme ‘Scarcity in abundance’ is too broad to be captured in a governance model. We are dealing with feelings created by the experience ecology, which penetrate the holiday destination through television and social media or via the

heightened temperature of the sea water. It has indeed become a brittle, anxious, non-linear and incomprehensible world in which we live. Asking the question what 'the organization' should do in response simply cannot be answered in the existing hierarchy.

The second thing we noticed is that during the presentations the question was often asked "How do you feel about this?" Given those questions, we seem to have been somewhat successful in not putting our own opinion front and center. That question about how we feel about it should be asked multiple times, because the report has three authors. We are the same authors of the book "Real Fake", which is about human's complex and complicated relationship with reality. We wrote about how conspiracy theories work, about the impossibility of perceiving reality, and concluded that facts matter less to people than stories. Humans are in essence storytellers, not truth-seekers. Books and reports are generally read to confirm one's own preconceptions and beliefs by a convincing story.

All three of us have felt the urge to describe the phenomena, to present the facts, and to capture the opinions of the different schools. It is up to the reader to determine whether the ecomodernists or the post-growths have the most convincing story to get out of this deadlock.



We challenge you, as we wrote in our introduction, to a critical self-reflection, just as the authors have done after writing. What does this mean for you as a director, professional, as a parent, as a consumer and as a citizen? What does this mean for you, knowing that the Green Deals and the entire range of sustainability instruments available to organizations have so far had hardly any positive effect on improving the ecology?

Confessions and reflections are wonderful ingredients for starting a conversation. This report may be the catalyst for this. Perhaps even better than a report, organizations could use the Shift Project's Climate Fresque workshops as their starting point.

The latest news reports are now reaching us that this summer, which has only just commenced, will probably beat all heat records on the books. If you would like to know more how the three authors "really" feel about this matter, we would like to invite you for a conversation. We are also curious how you "really" feel about this.



Glossary:

Abundance: A situation in which there is more than enough of something, often referring to resources or goods.

Anthropocene: A proposed era that highlights the human influence on geology and ecosystems, indicating significant global environmental changes resulting from human activity.

Conscious technology: Technology that is designed and used to create awareness of the societal and environmental impact of human behavior, promoting sustainability and well-being.

Deep technology: Innovations that are based on substantial scientific advances or profound engineering challenges, unlike those that are application-oriented or incremental improvements.

Degrowth: A political, economic, and social movement based on ecological economics, anti-consumerist and anti-capitalist ideas. It seeks to address the limits-to-growth dilemma by advocating for a decrease in production and consumption. It requires communities and societies to make a virtue out of necessity by building toward low-impact livelihoods that prioritize well-being and equity.

Ecomodernism: An environmental philosophy which argues that humans can protect nature by using technology to 'decouple' anthropogenic impacts from the natural world.

Ecosystem: A community of living organisms (plants, animals, and microbes) interacting with their physical environment as a system.

Experience ecology: The study of experiences in terms of their relationships and interconnectedness, especially in the context of human interaction with the environment and technology.

Experience economy: An economy in which businesses sell experiences to customers rather than just goods and services.

Great Acceleration: Refers to the period post-World War II, during which human activity started having a significant impact on the Earth's climate and ecosystems.

Green capitalism: A form of capitalism where businesses and industries engage in practices that are environmentally friendly, and economic growth is aligned with sustainable goals.

Growth: An increase in some measured quantity, such as size, number, value, or strength.

Jevons effect: An observation in economics where technological progress that increases the efficiency with which a resource is used tends to increase, rather than decrease, the rate of consumption of that resource.

Material Self: An individual's physical presence, assets, and belongings which are used to define identity in a materialistic context.

Novacene: A proposed era succeeding the Anthropocene, characterized by the rise of artificial intelligence and its impact on Earth.

Overdeveloped: A state or condition where development has exceeded sustainable limits, often causing environmental degradation or societal challenges.

Post-growth: Another term for Degrowth.

Scarcity: The fundamental economic problem of having seemingly unlimited human wants and needs in a world with limited resources.

Techno-sobriety: A conscious approach to technology use, focusing on meaningful and responsible consumption, avoiding excessiveness and wastage.

About the authors:



Menno van Doorn

Menno van Doorn is the director of SogetiLabs' Research Institute, boasting a career spanning a quarter century in future studies. His accolades include being christened the 'IT researcher of the year' by Computable, a distinguished IT magazine. Van Doorn's academic pursuits are deeply rooted in behavioral economics and the science of advertising.



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SogetiLabs is a community of over 150 technology leaders from Sogeti worldwide. SogetiLabs covers a wide range of digital technology expertise: from embedded software, cybersecurity, deep learning, simulation, and cloud to business information management, IoT, mobile apps, analytics, testing, and blockchain technologies. Visit labs.sogeti.com

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Part of the Capgemini Group, Sogeti makes business value through technology for organizations that need to implement innovation at speed and want a local partner with global scale. With a hands-on culture and close proximity to its clients, Sogeti implements solutions that will help organizations work faster, better, and smarter. By combining its agility and speed of implementation through a DevOps approach, Sogeti delivers innovative solutions in quality engineering, cloud and application development, all driven by AI, data and automation. Visit us www.sogeti.com