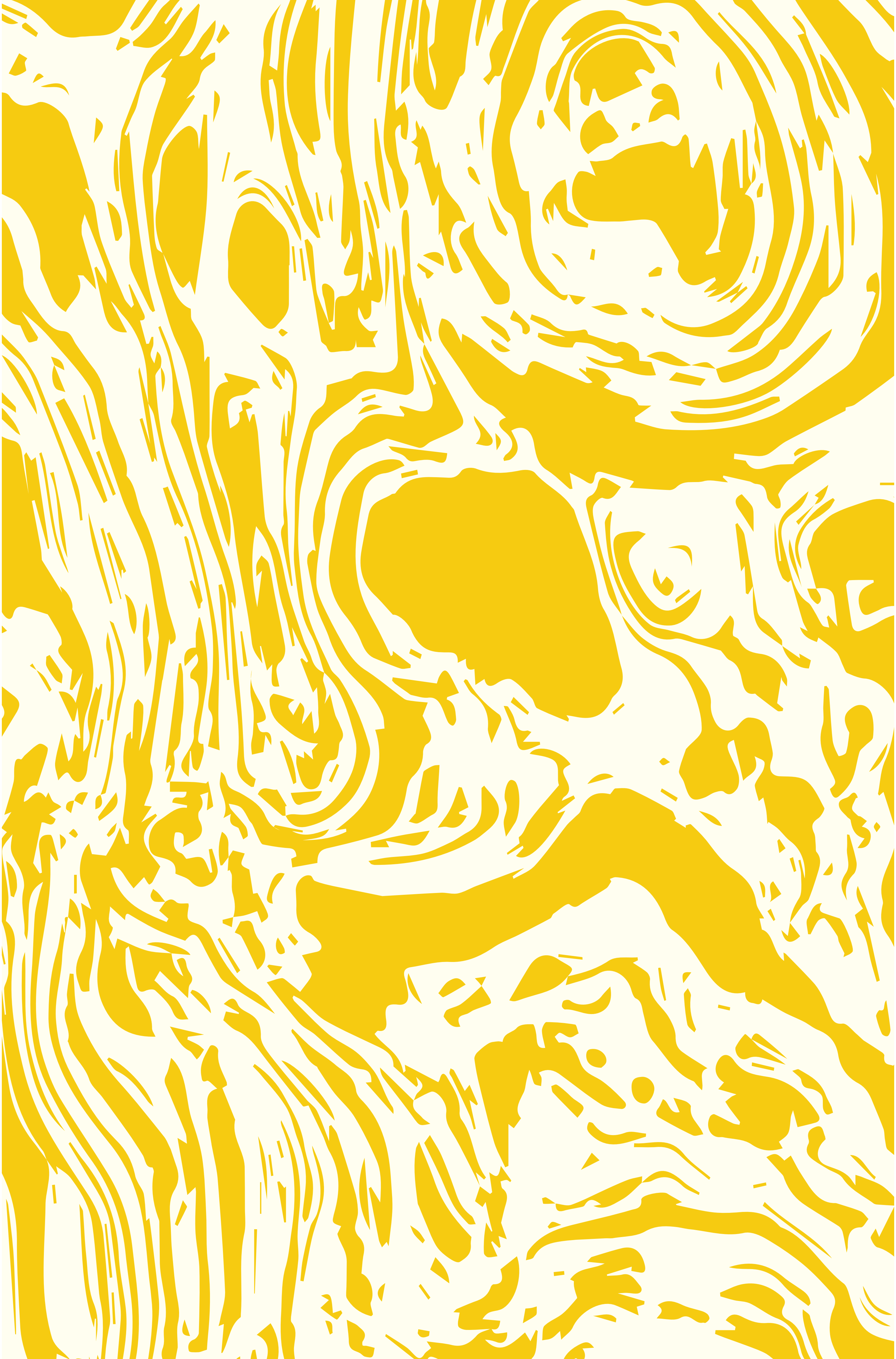


# PLANET B

# MODULE FOR SUSTAINABILITY AND CIVILIZATIONAL ISSUES

***We only have one planet. However, due to human activity, the Earth's ecosystem is changing irreversibly, and everything else will change accordingly: the way we live, produce, move, eat or communicate. How will this process unfold and what will Planet B look like, is (partly) up to us.***

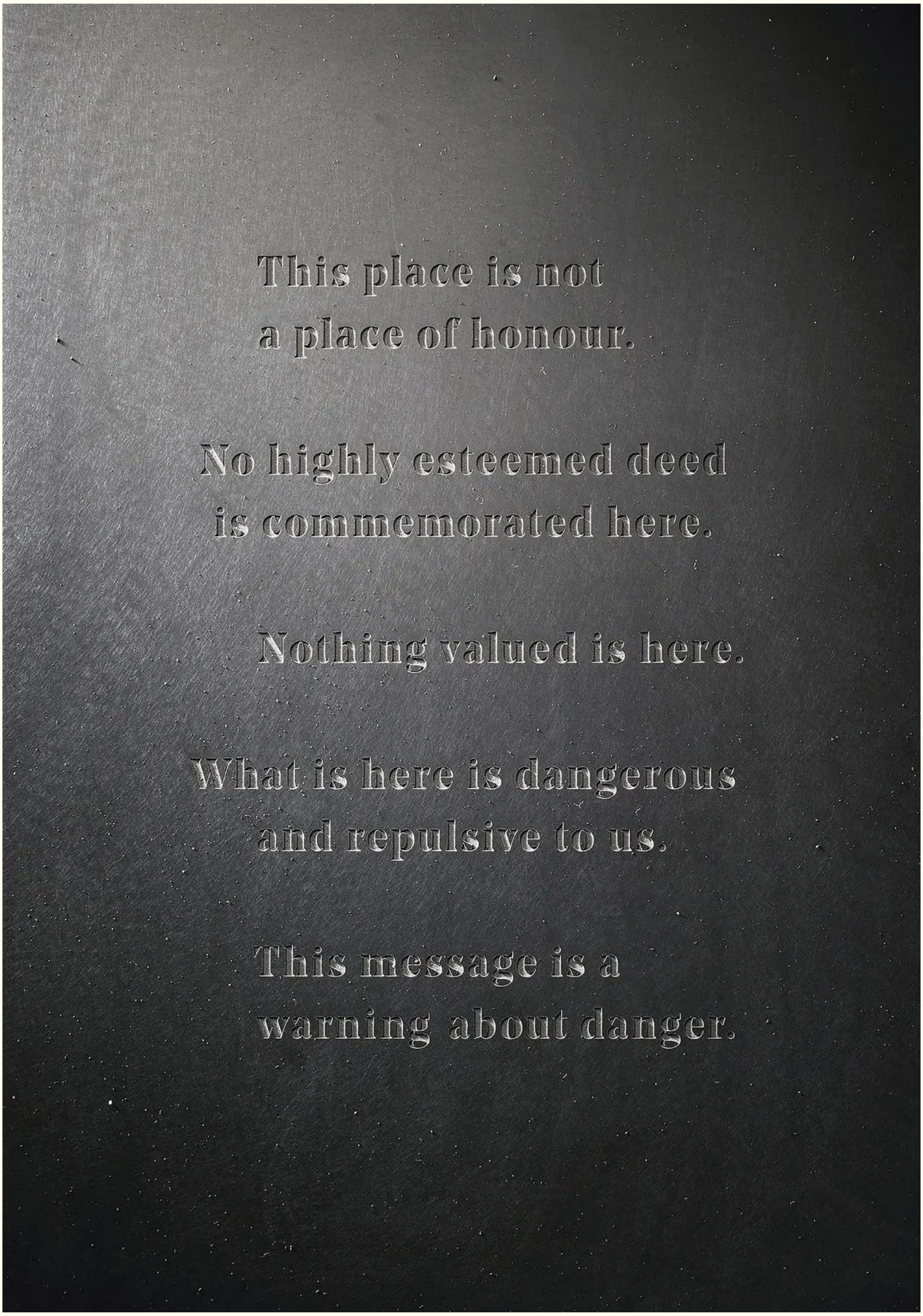
# WINTER SEMESTER 2022: TOXIC FUTURES

**What will future societies discover on and under the Earth's surface? What will the remains of the current civilization look like and what will they cause? How to think in long-term timeframes that exceed us? And how can we communicate with – or warn – those who will live here after us?**

**It is uncertain whether the society will prosper or decline. It is possible that the resources and materials we use today will be exhausted, while toxic substances will circulate in the soil, water and air for thousands of years. These "feral" relicts of human activity will affect the operation of ecosystems and create new, considerably unstable conditions for life on our planet.**

**One of the symbols of modern rationality that evades human control in the permeable space of chemical flows is nuclear energy. As a key geopolitical agent nuclear power enters strategic negotiations in the context of the war as well as the climate. However, radiation ingrained in agricultural products, living organisms or construction materials bears witness to how little we actually know about the slow effects of certain elements. It also shows that from the perspective of the planetary metabolism solid boundaries – material or political – are in fact non-functioning.**

**But, Planet B won't be anything other than toxic and looking into the future, we must count on nuclear energy as well – because its infrastructures, industries or existing waste will remain here with us. We need to ask, then, how we can deal with the fragility of ecosystems and volatility of the future. How can we live and work on a toxic planet?**




A message proposed in 1993 by the US Department of Energy to warn future generations of nuclear-waste sites.
https://www.wired.co.uk/article/olkiluoto-island-finland-nuclear-waste-onkalo
© PETER GUENZEL

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# A. CONCEPTUAL FOUNDATION

## a. INTRODUCTION: LIFE ON PLANET B

One thing is certain – the climate is changing and it's changing faster than we thought. What remains uncertain is how fast exactly this change is, what the scope of its implications will be, and what exactly needs to be done to prevent a collapse of human civilization. We know that the mitigation of climate change requires almost total elimination of anthropogenic greenhouse gas (GHG) emissions and a reduction in material consumption. In its 6th Assessment Report, The UN's Intergovernmental Panel on Climate Change states that in order to limit global warming to 1,5°C compared to pre-industrial era – and thus comply with the political consensus articulated in the Paris Agreement in 2015 –, emissions need to peak within the next three years.

That, however, would practically amount to a complete U-turn for the global economy as with the exception of 2020 (a year significantly hit by the pandemic of COVID–19), GHG emissions have been rising continuously since 2010. And despite ambitious proclamations or policies on the part of particular states, institutions or corporations, in general, global governance structures keep failing at stepping-up their – to date insufficient – commitments (as the agreement reached at the COP 26 in Glasgow in 2016 has shown).

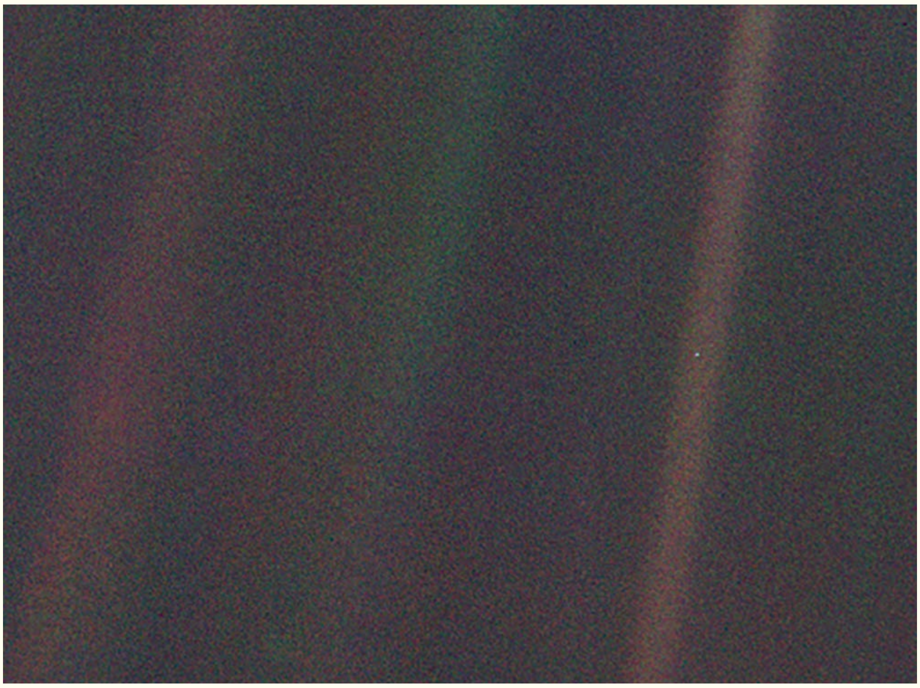
The chances that global temperatures won't rise beyond more or less "safe" levels are therefore fairly slim. However, even if necessary measures in terms of decarbonization are taken, the capacity of the planetary metabolism to sustain humanity depends on material relations far more diverse than just GHG concentrations in the atmosphere. The concept of the so-called planetary boundaries groups these relations into 9 categories including climate change, biogeochemical flows, biodiversity integrity, land-system change, introduction of novel entities (or chemical pollution). It is precisely these 5 domains, then, where the boundaries of the "safe operating space" for humanity have already been transgressed.

Climate change itself, however, may be progressing faster than previously expected and the latest IPCC report has confirmed prominent scientist's warnings that the Earth's system might be dangerously close to irreversible changes causing an acceleration of the warming and a domino effect of catastrophic impacts. Among the major "tipping points" that may be triggered between 1 and 2°C of warming is for example the disintegration of the Greenland or the West Antarctic ice sheets, the decrement of the Amazon rainforest or the thawing of the permafrost. And while there is much uncertainty about how exactly events will unfold after the tipping points are triggered, acclaimed researchers led by the University of Cambridge's Centre for the Study of Existential Risk have recently called for a much closer investigation of the worst-case scenarios that remain largely underexplored.

While the eventuality of a collapse must be taken into account, the fate of humanity has not been decided yet. Many diverse scenarios may play out in the future. What *is* certain, however, is that the complex ecosystems have already been altered to a significant extent and the humans will have to learn to live on a planet they've co-created. In the Anthropocene, humans are the main geological agent. An understanding and a careful (re)design of the way we inhabit the world is our crucial task, however, it is not a task of simply "*un*-doing" and returning to a "more natural" state of being. Such a thing can't be achieved: First of all, vast technological infrastructures we had built have long broken loose from our control and they won't be simply switched off from one day to the next. And second of all, remnants of whatever people had designed and made will stay with us and will continue to metabolize in the soil, oceans and atmosphere for millenia. At the same time, we need to acknowledge that humans have been shaping the planet for a very brief moment in its history. In fact, the Earth has been transforming over millions of years and will go on doing so disregarding human existence on its surface. The climate movement's catchphrase reads: "There is no planet B." But, we have to ask, has there ever been a planet A at all?

An acceptance of the idea that we've always lived on planet B and that it's messy, toxic, volatile and inert to the wellbeing of the human population may be interpreted as an expression of cynicism or defeatism. On the other hand, though, considering anthropogenic geological formation as nothing exceptional in the history of the planet, may help put human civilization into perspective: placing humankind on such a timeline makes us reevaluate what we had previously understood as given, necessary and unchangeable. Seen from afar, our economic or political systems – devised, by the way, by the wealthiest, most powerful and tiniest fraction of the global population – may seem completely arbitrary. This applies equally to the ways we live our everyday lives, design technologies or spaces around us, feed ourselves or communicate with one another. From this perspective, nothing is absolute, nothing is "natural". Everything is up for revision and recreation – a realization that can become a source of unexpected hope and optimism.

For this very reason, we need to be critical of everything that constitutes the civilizational status quo that has brought us to the verge of collapse. This includes not only capitalism or colonialism, but also concepts such as sustainability. Sustainability is tied to the idea of preserving what is, including the existing social order. If it is exactly the social order, though, that is to blame, we may need to move beyond these established notions – and perhaps aim for *habitability* (for both humans and non-humans) instead. Such an endeavor may require a deep adaptation to the unprecedented level of civilizational precarity. And while we need to foster social and ecological resilience, we also need to simply abandon what has proved harmful or what is better off without human involvement. In other cases, more rather than less human initiative will be required, especially when co-designing the infrastructural basis for the decarbonization of energy production – the focus of the next paragraphs.



Pale Blue Dot is a famous photograph of planet Earth taken on February 14, 1990, by the Voyager 1 space probe from a record distance of about 6 billion kilometers.
https://en.wikipedia.org/wiki/Pale_Blue_Dot#/media/File:Pale_Blue_Dot.png
Wikimedia Commons

# b. NUCLEAR ENERGY AND ITS CONTROVERSIES

The way we produce energy is at the core of what constitutes modern human civilization and its economy. Energy production ties deep geological strata and atmospheric heights of the planet together: since the 18th century, coal has been dug out from the ground to fuel the machines that have made some lives more comfortable, but lots of them far more miserable. The arrival of nuclear energy in the 19th century has later become a promise of energetic abundance that may correct this injustice. To produce more (clean!) energy with much less material substance is of course desirable, however, it is not an absolute cure: a wellbeing of human population and its non-human companions depends on the ways resources are extracted, energy is marketed and distributed and the remnants of this process disposed of. All these are essential areas of inquiry – whether we speak of energy production in general, or nuclear energy in particular.

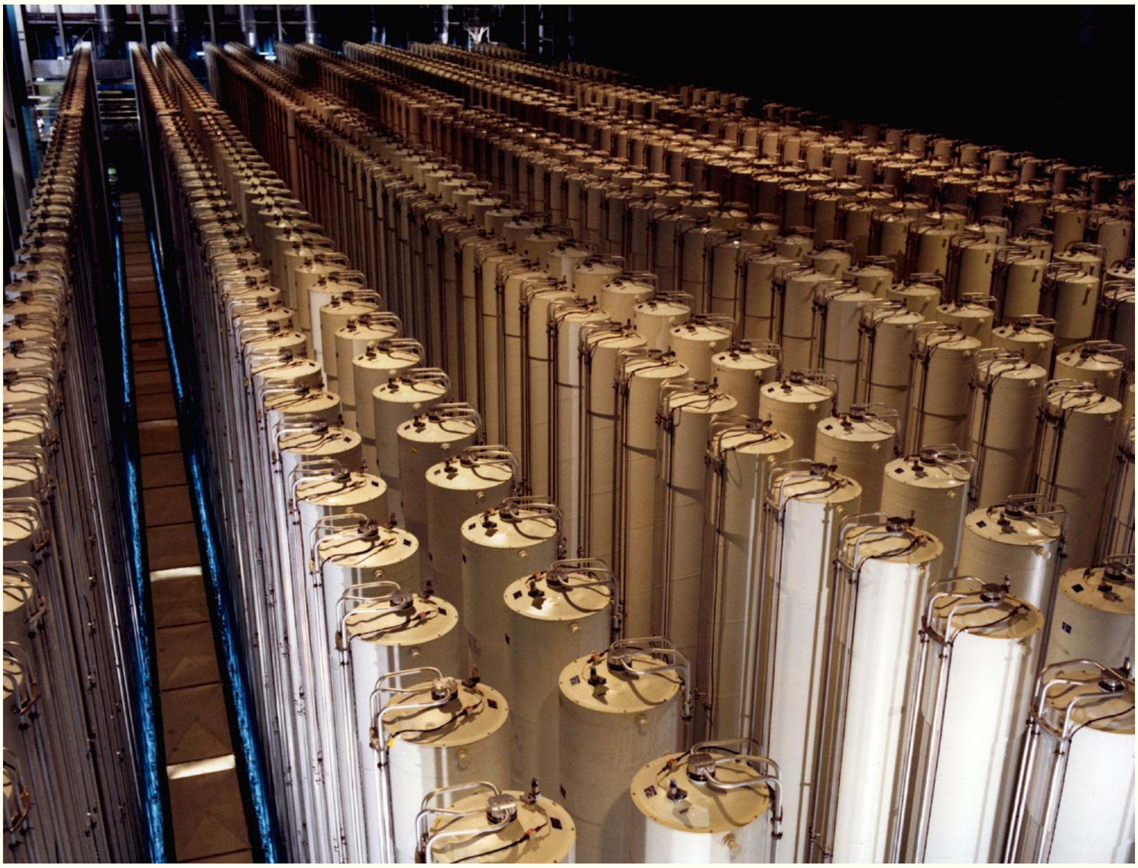
**Nuclear Fuel Cycle**
First of all, though, a couple of paragraphs on the technology of nuclear energy. Its production starts with the mining of uranium ore (*uranová ruda*) that contains about 0,1% of uranium. The ore is then mechanically and chemically processed in order to separate the rock from uranium itself. The process results in the production of the so-called Yellowcake (*žlutý koláč*) containing about 85% of uranium in the form of triuranium octoxide (***oxid triuranitý***). This substance, stored in 200l containers, is then marketed as raw material for the production of nuclear energy. Waste radioactive ore should be securely stored which, however, is often not the case and contamination of soil, air or water may therefore arise at this stage already. Harmful radiation is emitted through the process of mining itself as well, often strongly affecting the miners and their families.

Yellowcake
https://en.wikipedia.org/wiki/Yellowcake#/media/File:Yellowcake_(03010301).jpg
Wikimedia Commons

Uranium Ore
https://en.wikipedia.org/wiki/Uranium_ore
Wikimedia Commons

Subsequently, triuranium octoxide is transmuted into gas, uranium hexafluoride (*fluorid uranový*), at a conversion plant (*konverzní závod*). At an enrichment plant, this gas is entered into centrifuges where two isotopes of uranium, U238 and U235, are separated from each other. The enrichment process results in the production of uranium with higher concentration of the isotope U235 (about 5% of the entire volume) that is used for nuclear fission and the production of electricity at a nuclear power plant. The concentration of U235 declines in time and the nuclear fuel in a reactor needs to be exchanged once every couple of years. Today, 1 kg of nuclear fuel can replace about 100 tons of coal. In order to obtain 1 kg of nuclear fuel, about 2–4 tons of uranium ore need to be mined. Uranium that is enriched to a concentration of about 90% of U235 is used for the production of nuclear bombs. Depleted uranium, consisting mainly of U238, is itself a radioactive, highly dangerous heavy metal that is also used for military purposes.


A billet of highly enriched uranium metal.
https://en.wikipedia.org/wiki/Enriched_uranium
Wikimedia Commons



A cascade of gas centrifuges at a U.S. enrichment plant in Piketon, Ohio, in 1984.
https://commons.wikimedia.org/wiki/File:Gas_centrifuge_cascade.jpg
Wikimedia Commons

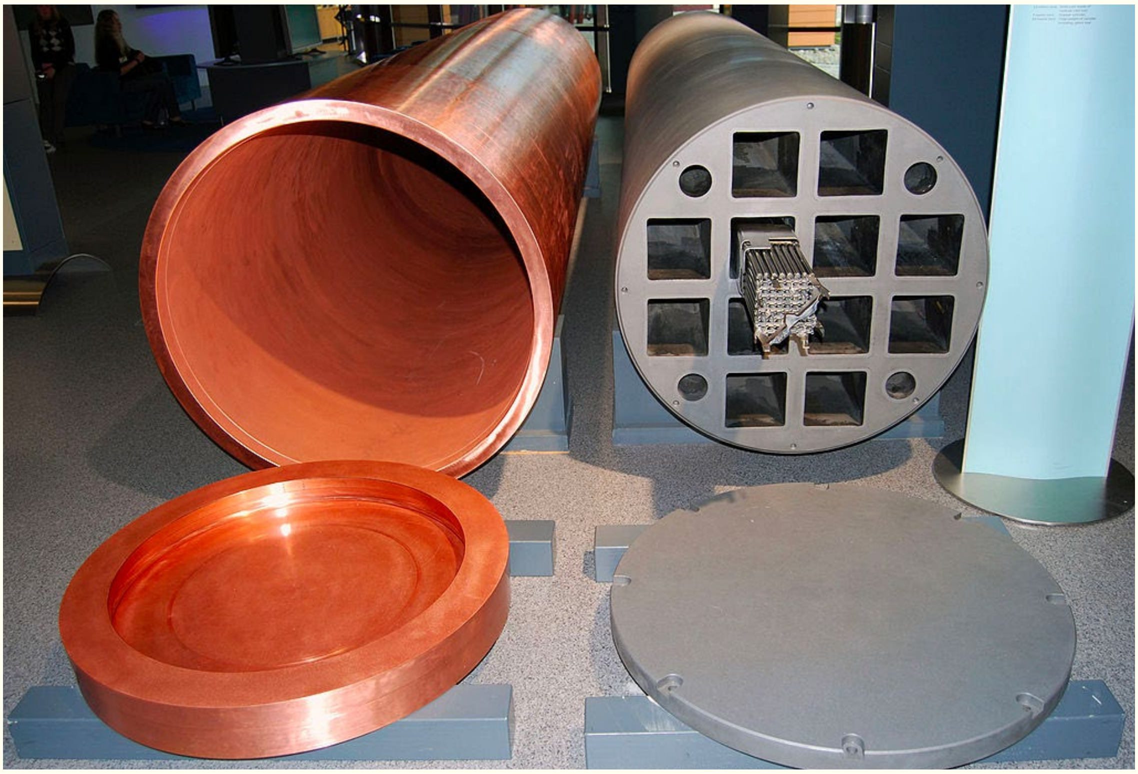
**Spent Nuclear Fuel**

First, used nuclear fuel is stored in spent fuel pools (*bazén pro použité palivo*) near the reactor. Water in the pool blocks radiation and reduces the temperature of the material. After 5–10 years, the fuel is moved to a dry storage on the grounds of the nuclear plant. It stays in this interim storage for about 40–50 years before it is decided whether it should be stored in a permanent nuclear waste repository or "recycled".

The so-called nuclear reprocessing (*přepracování použitého paliva*) lies in a chemical procedure of separating useful U235 isotopes from those that cannot be used anymore. This process is expensive and a subject to legal limitations as it results in the production of plutonium that can be misused for the making of an atomic bomb. On the other hand, nuclear reprocessing reduces significantly the amount of highly radioactive waste and the obtained substance can be transformed into glass panels (see vitrification, *vitrifikace*).

Used fuel that is not reprocessed becomes waste that needs to be stored at a safe permanent burial site. However, to date there is no permanent nuclear waste repository in operation yet – anywhere in the world. Spent nuclear fuel is therefore mainly stored in the compounds of power plants, although until the 1990s, it used to be deposited in the oceans as well. This kind of disposal, though, proved to be largely precarious and dangerous. Nowadays, about 350 000 tons of highly radioactive waste from around the world is awaiting its permanent placement. The radioactive tailings (*hlušina*) left behind by uranium mining remains a problem as well.

In 2015, the construction of a deep geological repository, called Onkalo, began in Finland. The site is expected to be operational by 2023. In the Czech Republic, four locations have been selected as potential sites for a permanent nuclear waste repository: Březový Potok (near Klatovy), Horka (near Třebíč), Hrádek (near Jihlava) and Janoch (near Temelín). The repository itself should be built by 2065.



Swedish KBS–3 capsule for nuclear waste.
https://upload.wikimedia.org/wikipedia/commons/thumb/4/4a/Loppusijoituskapseli.jpg/1024px-Loppusijoituskapseli.jpg
Wikimedia Commons

## HISTORY

**1789**

Discovery of the Uranium element (Heinrich Klaproth)

**1938**

Discovery of nuclear fission and beginning of the Atomic Age (Otto Hahn, Lise Meitner, Fritz Strassman)

**1940s–1960s**

Military use of nuclear power (mainly)

**1945**

Atomic bombings of Hiroshima and Nagasaki

**1946–1993**

Oceans used as a terminal nuclear waste burial site (highly radioactive waste – until 1975)

**1949**

First atomic bomb made in Europe (Russia)

**1957**

Majak nuclear disaster (USSR)

**1959**

First nuclear waste depository in the Czech Rep. (Hostim)

**1963**

Partial Test Ban Treaty (first international treaty limiting nuclear testing; initially signed by the USA, UK and USSR)

## TIMELINE

**1940s–1960s**
"Golden age" of uranium mining in Jáchymov or Příbram

**1942**
First chain nuclear fission (Enrico Fermi)

**1942**
Production of first nuclear waste during the Manhattan Project (creation of the atomic bomb)

**1951**
First use of a nuclear reactor for the production of electricity (USA)

**1956**
First commercial nuclear power plant in operation (Calder Hall, England)

**1957**
Foundation of the European Atomic Energy Community (EURATOM) and the International Atomic Energy Agency (IAEA)

**1968**
Treaty on the Non-Proliferation of Nuclear Weapons

**1970s**
Boom of nuclear energy use for civil purposes

**1971**
Three Mile Island nuclear disaster

## HISTORY

**1976**

Historical maximum of launches of new power plants construction (44)

**1979**

Church Rock nuclear disaster

**1986**

Chernobyl nuclear disaster

**2006**

Official launch of energy production at the Temelín nuclear power plant (trial run since 2002)

**2007**

Launch of the ITER project (construction of a nuclear fusion device in southern France)

**2011**

Fukushima nuclear disaster

**2017**

Treaty on the Prohibition of Nuclear Weapons

**2019**

USA's withdrawal from the Intermediate-Range Nuclear Forces Treaty

**2020**

Governmental approval of the selection of 4 locations for a permanent nuclear waste repository in the Czech Rep. (Březový Potok, Horka, Hrádek, Janoch)

## TIMELINE

**1987**
Intermediate-Range Nuclear Forces Treaty

**1989**
Historical maximum of nuclear reactors active in Europe (61)

**2002**
Historical maximum of nuclear reactors worldwide (438)

**2015**
Construction of the Onkalo permanent nuclear waste repository (the first one in the world)

**2017**
Closure of the last uranium mine in central Europe (Rožná in the Czech Rep.)

**2017**
Bankruptcy of the Westinghouse company (the prominent nuclear plants construction company)

uranium as a chemical element was discovered (by Heinrich Klaproth). Before it was used as a source of uranium itself, the discovery of uranium ore may have signaled an exhaustion of silver deposits at a given location – that is why the rock was called a "bad luck mineral" (*smolinec, Pechblende*).

Bad luck, however, could be associated with the uranium ore as well. Since the nuclear fission was discovered in 1938, uranium ore was mined mainly in colonies and on the territories of indigenous peoples, often with no safety regulations in place. Uranium mined in such precarious conditions was then used for military purposes by the wealthiest world powers. For example, uranium used for the construction of the very first atomic bomb in the 1940s (the Manhattan Project) had been imported from belgic Congo where ore with very high concentrations of uranium (65%) could be found.

During the 1940s and all the way through the 1960s, nuclear fission was indeed in service of the military mainly. The Manhattan Project saw the first successful deployment of chain nuclear fission, first nuclear waste ever was produced and threatening radiation emitted. After WWII ended and the world entered the Cold War, uranium mines such as the ones in the former Czechoslovakia (Jáchymov, Příbram and others) became strategic sites of nuclear arms race (and political opponents'elimination). Only after the Cuban Missile Crisis in the early 1960s negotiations on nuclear testing and numbers of atomic weapons between the USA and USSR began and the first bi- or multilateral treaties were signed in the next decades. Nuclear weaponry has never ceased to pose a threat to global peace, though, the war in Ukraine being the latest instance of heightened safety concerns.

For civil purposes, i. e. for electricity production, nuclear fission was first used in the 1950s. Mass commercial proliferation of nuclear power, however, only occured in the 1970s. In Europe, nuclear energy production peaked towards the end of the 1980s, outside of Europe in the early 2000s. Its popularity faded away mainly due to tragic accidents at the Three Mile Island (USA, 1971), Chernobyl (USSR, 1986) and Fukushima (Japan, 2011) power plants. Many countries such as Germany, Italy or Belgium have opted to phase out nuclear energy, however, these decisions have been interwoven with controversies spanning energetic independence of other countries (such as Russia) or fossil fuels.

**Present-day situation**

Today, nuclear energy amounts to about 10% of global energy supply. With the exception of 2020, global energy demand has been rising continuously, in recent years mainly due to economic growth in developing countries and emerging markets. China's energy production and consumption in particular has been surging. And even though renewable energy sources have been on the rise, covering a half of increase in energy demand in 2021 and accounting to about 28% of total electricity supply, coal and gas continue to grow as well. Last year, fossil fuels generated about 62% of electricity. Renewables play a prominent role in decarbonization scenarios – as they should. However, the International Energy Agency expects that a transition to clean energy will require a growth of nuclear energy as well – a growth of about 43% by 2030 (if the threshold of 1,5°of warming is not to be trespassed). It is important to note, though, that these estimates assume a conservation of the existing economic system with its reliance on continuous growth.

However, even though the production capacity of the world's 409 nuclear reactors is at its all-time high, generally speaking, the industry has been stagnating over the past two to three decades and the share of nuclear power among other energy sources has been declining. If the industry was to maintain the status quo, the construction rate of new power plants would have to double in this decade compared to the 2010s. Existing reactors are getting old (average age being 31 years), while the construction of new ones tends to suffer from delays and excessive costs. Under the current economic system, Investments are increasingly lucrative in the domain of renewables which makes electricity generation from these sources cheaper and cheaper. Concurrently, it is getting very difficult for slow-paced nuclear – but also fossil fuels – projects to compete.

Geographically, nuclear energy is now thriving mainly in China, overtaking France in total numbers in 2021 and becoming the second largest nuclear power producer in the world after the USA (together, these countries generate about 58% of global nuclear energy). Even the USA, however, is struggling to keep the industry profitable with power plants aging fast and companies going bankrupt.

In the Czech Republic, two nuclear power plants are in operation: Dukovany (since 1985) and Temelín (since 2002). They generate about 36% of electricity produced in the Czech Rep. The Czech State Energy Policy (2015) expects an enlargement of existing nuclear plants and estimates an increase in the amount of nuclear energy to about 50% of local electricity production – which would allow for a decrease in the use of coal. Traditionally, both the Czech political representation and the general public are in favor of nuclear energy (as opposed to Germany or Austria, for example). Controversies arise, however, when it comes to the role of the state in relation to private companies or safety concerns about the involvement of countries such as China or Russia in the construction of nuclear facilities.

As for uranium mining, there remains one last uranium mine in operation in the EU (in Romania). The last mine in Central Europe, the one in Rožná in the Czech Rep., was closed in 2017. Globally, not more than 10 large conglomerates are responsible for the production of the majority of uranium and while they are mostly located in the wealthy Global North where most of it is consumed, the material itself is imported from poorer areas of the Global South. The only large company operating strictly locally is Kazatomprom in Kazakhstan (although, it does grant access to foreing firms to Kazakh resources). Besides the colonial aspect of such uneven arrangements, the fact that almost all uranium comes from areas outside of the EU also undermines the idea that nuclear energy can make European countries self-sufficient and independent of foreign agents.

There has been some hope for the nuclear sector in the development of the so-called Small Modular Reactors (SMR) – that would help to gradually replace giant, costly and inflexible plants with smaller modules used individually or stacked within larger complexes. For decades now, another dreamy goal of nuclear research has been nuclear fusion. In southern France, as part of the ITER project, the world's largest *tokamak* is being built: a magnetic fusion device that has been designed to prove the feasibility of nuclear fusion at a large-scale. If successful, the experiment would lead to the formation of a limitless carbon-free source of energy based on the same principle that powers the Sun and other stars. To date, neither SMRs nor nuclear fusion have become technologies the industry (or global population) could rely on. Nevertheless, it is these areas that hold promise for the future of nuclear energy indeed.

**Nuclear Energy and the Climate**

In relation to the environment and the climate, nuclear power is considered "clean" and efficient in terms of the volume of resources needed for its production. It cannot be considered a renewable energy source, however, as global reserves of uranium are not limitless. Even so, the European Commission has classified nuclear power generation as an environmentally sustainable economic activity in a new EU Taxonomy approved in early 2022. It is believed that nuclear energy should play an important role in the decarbonization process and a transition to "green" energetics. However, the EU's support for nuclear is not unconstrained and only applies to investments that will materialize in the next two decades approximately.

The negotiations concerning the EU's list of sustainable economic activities have been marked by stark disagreements between nuclear superpowers such as France and anti-nuclear opponents such as Germany. The main arguments of those against the taxonomy concern safety: the problem of nuclear waste disposal, the threat of nuclear disasters, the harms of uranium mining, but also a lack of resilience of nuclear facilities in relation to climate change. For example, the rising temperature and reduced streamflow of rivers makes it impossible to use them for the power plants'cooling while coastal energy infrastructure is becoming more and more vulnerable to sea level rise and tidal waves. These climate-related events and developments present serious physical and economic hazards.

Within the environmental movement and climate science, both pro- and anti-nuclear positions can be found. Most of the ones campaigning against nuclear power argue along the lines of what has been articulated above. In the Czech Rep., for example, the activist front is more or less united in its refusal of nuclear as a sustainable energy source. The most ambitious climate initiatives, such as the New Deal put forward by the platform for social and ecological transformation Re-set, refuse to say that nuclear power is the answer. Instead, they propose to reframe the question: we should not be asking how to replace one source of energy with another, but how to change the economy itself so that we do not need to produce as much energy as we do now, or even more than that in the future. They argue that an economic "degrowth" – going hand in hand with the reduction of energy consumption – is necessary to mitigate and adapt to climate change. In this view, we should aim for a transition from a consumerist, growth-based society to one that is just and the wellbeing of which is based on abundance of free time, flourishing culture and natural environments or affordable social and health services.

Internationally, though, the discourse within the climate movement concerning nuclear energy is a bit more varied and the pro-nuclear voices within this community are not as isolated. For instance, leading climate scientist James Hansen claims that nuclear power (generated in a closed cycle where spent fuel is reprocessed) is a vital component of decarbonization: it is a stable, clean source of energy producing minimum of waste that can solve the problem of intermittency (i. e. the fact that renewable energy cannot always consistently produce energy at all times of the day). He also argues that nuclear helps prevent a reliance on potentially environmentally harmful renewable sources such as biomass or hydro.

Journalist and climate activist George Monbiot, then, shows that pollution resulting from burning fossil fuels exceeds massively any risks connected to nuclear plants operation or even the past nuclear disasters. And it is exactly the rhetoric of fear that he considers a gift to the fossil fuel industry that continues to thrive with nuclear plants closing down. Monbiot says that realistically, we need both nuclear and renewable energy sources as electricity production needs to rise in order to provide enough for heating and transportation (now operating on oil and gas). But most importantly, he claims that support for nuclear as a technology does not mean support for the existing industry and its harmful practices. Indeed, Monbiot himself opposes the idea of unlimited economic growth and sides with those who argue that an in-depth economic restructuralization is vital. Similarly radical, climate activist Zione Lights has left her position as a spokesperson of the Extinction Rebellion as she disagreed with the organization's negative stance on nuclear energy. She has come to the realization that the moral imperative of "living with less" hasn't proved very effective and is in fact very problematic if the unsatisfactory life conditions of the populations in the Global South are taken into account.

This means that nuclear energy itself is not just a technology but also a cultural object interwoven with ideological assumptions *and* an industry fully subordinated to the logic of global capitalism and the politics of strong, independent nation states. The practices of the nuclear industry have been harmful, however, the technology itself may be deployed in many different ways if we try and look beyond the horizon of the present economic and governance system. For instance, the fact that nuclear energy is expensive at the moment does not mean it is expensive in essence – the market mechanisms that determine the value of things are not neutral or immutable. In terms of political governance, it may seem that nuclear energy itself necessarily implies a certain organizational structure: it seems to require centralization of power in order to secure both electricity distribution and safety. This may change with a dissemination of Small Modular Reactors, but more importantly, centralization of equipment or resources does not necessarily mean that it can't be governed in a more democratic and just way. And yes, the question of nuclear waste disposal hasn't been fully resolved yet, but there already *is* much radioactive material that needs to be safely stored or reprocessed and a solution therefore necessarily needs to be found.

This does not mean that nuclear energy is an ultimate answer to the decarbonization of energy production, far from that. Listing the arguments of both the advocates and the opponents of nuclear energy simply serves as a reminder that the entanglements between technologies and social organization are very complex and that the way we talk about such issues depends on the point of view of the person speaking – be it a scientist, a climate activist, a politician or a citizen living in an area selected for the construction of a nuclear waste depository. All these positions are valid and so is the position of an artist, designer or architect able to disentangle, confront or bridge these opinions and look at the problem from unexpected perspectives.

American stamp of 1955 in allusion to the program Atoms for Peace.

https://en.wikipedia.org/wiki/File:Atoms_for_Peace_stamp.jpg
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# B. METHODO-LOGICAL FOUNDATION

The complexity of issues such as permanent toxicity of the environment or the geopolitics of clean energy production call for unconventional ideas reflecting the cacophony of voices involved and the uncertainty of future developments. Art, architecture and design are among the disciplines that have traditionally addressed the unknown and continue to do so while boldly crossing the boundaries of other fields of research and practice. Planet B builds on this tradition and is based on principles that support the kind of critical, unorthodox and open-ended creative work we need.

## a. Operational Mode of Planet B

As an institutional platform, Planet B broadens the existing studio system of the academy.

**Interdisciplinarity**: Planet B interconnects creative disciplines developed at UMPRUM as well as other scientific fields or domains of human activity. Theory and contextual knowledge will merge with practical work organically.
**Emphasis on research and process**: Project work will result in concrete outcomes, however, the process of research and practice is considered more important than the formal and technical execution of the final object.
**Teamwork**: Everyone involved will use the knowledge and skills specific to their specialization, however, the aim is to foster collaboration and to temporarily “dissolve” these specifics into a new collective creative entity.

**“Diffused” leadership**: The coordinators of the project work will involve a variety of mentors from both artistic and non-artistic fields. The coordinators themselves will take on the role of “leading learners” rather than teachers.

## b. Methodological Essentials

**Milking Productive Naivety**
A school is a place to learn and to experiment. We do not need to save the world – instead, we are here to ask relevant, difficult questions and to make bold, provocative propositions. In order to do so, it is useful to explore our own standpoints, experiences and understanding of a given problem – we all have a stake in it and therefore our views matter. Experts in different domains may find the ideas that we put forward naive or far-fetched, however, this may be a sign that our inquiries are insightful and our ideas brave and ambitious, reaching beyond the status quo of the present.

**Dealing with Complexity**
Complexity of the civilizational issues may be crippling. Problems we’re facing are often “wicked”, meaning they are constantly evolving, they imply and affect way too many stakeholders and therefore they can’t be precisely defined and fixed by one-dimensional solutions. Not everything can be solved by technology, although most likely, technology has to be part of a multi-layered response to ill-defined challenges. In order to design and deploy any intervention, systemic thinking needs to be applied – and in order to map a system, we may need to ask relevant actors relevant questions. Generally, though, art and design allow for indeterminacy and uncertainty to be acknowledged in the scenarios of the future and are able to navigate complexity with curiosity and unorthodoxy rather alien to standardized industrial or even scientific practices.

**Keeping an Eye on Long-Term Horizons and the Scale of the Planet**
Both the past and the future of Planet B transcend us greatly. When thinking about what is ahead of us, we need to take the unknown of long-term horizons into account and always keep them in mind – because regardless of the urgency of such a perspective, only few actually take it on, and because imagination and prefigurative thinking is what characterizes the kind of practices we develop.

This goes hand in hand with thinking at a planetary scale as – for the time being – the planet represents the ultimate spatial limit of humanity and is already implied in all global projects (be it the market or the technological infrastructures). Large temporal and spatial scales should not be overlooked even in projects that primarily address the local or even the microscopic. Everything is connected and every intervention has a relevance for the whole.

**The Symbolic and the Speculative Marries the Utilitarian and the Pragmatic**

Art and design act strongly in both material (concrete) and symbolic (abstract) domains. As such, they are apt to address civilizational issues that usually span across physical realities, cultural representations or political discourses. As creative practitioners we need to be mindful of the interconnectedness of these realms and of the fact that any symbolic gesture or speculative idea is politically charged and ultimately has material consequences. Whatever we speculate about is real and powerful and ideas can therefore be deployed as utilitarian and pragmatic. Thus, artists and designers can become relevant public servants and political agents.

**Prototyping a Methodology "On the Go"**

Entering a multidisciplinary space and aiming for research-based projects is an endeavor that in itself requires a lot of experimentation. The project work on Planet B therefore has a meta-level of a collective methodological reflection leading to a creation of a methodological prototype. Such a prototype can't be designed differently than on the go, through trials and errors, and will require further testing in the next cycles of Planet B.

# c. Possible Outcomes of Research and Practice

Both the specific areas of research and project outcomes will reflect the approach and interests of a given team.

**Generally, a desirable outcome of the project work is a RECOMPOSITION.**

**Such a product can be characterized as a creative reframing and restructuring of information collected throughout the research. While the acquired knowledge and data don't necessarily need to be "original", their recomposition will result in an articulation of a critical, innovative and convincing message that can inspire further reflection, discussion and action.**

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In order to arrive at a forceful recomposition, it is important to…

1) **Ponder our own standpoints, experiences and understanding of the problem.**

2) **Frame the problem and articulate the question we'll be trying to answer by means of researching the matter and structuring the information.** (For instance, it is useful to position the project on a spatio-temporal scale and map out the affected agents.)

3) **Commit to a specific genre and form of the outcome soon enough.**

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A recomposition can acquire a form of a…

**1. Cartographic Exploration**

Mapping is not a strictly descriptive, but a rather prefigurative activity. The kinds of objects, forces and flows that are represented in a map constitute a reality of this territory – and by mapping, we are able to assign meaning and create realities that diverge from an established norm.

EXAMPLES

**Environmental Racism in Death Valley, Louisiana, USA**
by Forensic Architecture
2021
**See:** https://forensic-architecture.org/investigation/environmental-racism-in-death-alley-louisiana

**Borders of ZATO**
by Liu Bauer, Evgeny Bykov, Dana Molzhigit and Xena Poleshuk
The Terraforming
2021
**See:** https://www.youtube.com/watch?v=O6JniBZh0rw

## 2. Aesthetic Amplification

The aesthetics of objects and images can make perceivable what we cannot see. Visual or spatial artifacts can shape our understanding of processes or impacts at a scale that is usually inaccessible to individuals. They can also make us aware of connections and interdependencies that have been systematically concealed by those in power.

EXAMPLES

**Salmon: A Red Herring**
by Cooking Sections
2020
**See:** http://www.cooking-sections.com/Salmon-A-Red-Herring

**Trace Evidence**
by Susan Schuppli
2016
**See:** https://susanschuppli.com/TRACE-EVIDENCE

## 3. Narrative Scenario

Drafting stories and scenarios can be a useful tool for an exploration of possible futures and the logics of who they come about. They enable us to lay out the events and interventions that may lead up to distinct (un)desirable realities. Speculative fiction may help us understand the conflicts and ambiguities of the present and enable us to imagine worlds beyond the status quo.

EXAMPLES

**Backcasting Kardashev One**
by Yevheniia Berchul, Yulya Besplemennova,
Stuart Turner, Iani Zeigerman
The Terraforming, 2020
**See:** https://www.backcasting-kardashev.one/

**Occupied**
Norwegian TV series
2015
**See for example:** https://www.politico.eu/article/occupied-norwegian-tv-series-thats-enraged-the-kremlin-norway-russia-occupation/

**Image sources:** https://providencemag.com/2016/03/bear-lurking-fjords-review-tv2-occupied-okkupert/, https://www.amazon.de/Occupied-Die-Besatzung/dp/B083F5KTPR

## 4. Spatial Intervention

Built environment and (urban) landscapes are the sites where what has been previously classified as “natural” or “artificial” merges entirely. Even though spatial interventions are still deployed for both protection and damage control (e. g. decontamination), architecture may also serve as a means of adaptation to the condition of permanent and unavoidable toxicity.

EXAMPLES

**Dustyrelief / B_mu**
by R&Sie(n) (François Roche, Stephanie Lavaux,
Jean Navarro, Pascal Bertholio)
Bangkok, Thailand (model)
2002
**See:** https://new-territories.com/roche2002bis.html

**Blue Zone**
by Stefane Perraud and Aram Kebabdjian
2015–2021
**See:** http://www.stefane-perraud.fr/en/portfolio/zone-bleue/

**Strategy of reduction of radioactivity for Chernobyl**
by Fernando Cremades
2019
**See:** https://futurearchitectureplatform.org/projects/edeee757-ae02–4ede-b1ba-b08cb09b417a/

## 5. (Not-So-)Speculative Innovation

Small-scale objects and technologies can also help us navigate the ambiguities of the present and the future. Artifacts make dilemmas and uncomfortable facts tangible and force us to face the messy and toxic reality as individuals. Beyond critique, however, they can offer ideas that may be taken further as pragmatic innovations.

EXAMPLES

**Fertiliser Rehab**
by Hana Komanová and Karolína Žižková
2022
**See:** https://fertiliser.rehab/

**Inheritance Project**
by Erich Berger and Mari Keto
2016
**See:** http://inheritance-project.net/

## 6. Information Vehicle

A forward-looking recomposition can also aim to inform the public or empower specific communities. Such an involvement can consist of the design of visual campaigns or other sensorial devices, facilitation of discussion with policymakers and experts or technical innovations enabling people to take on the role of active citizens intervening in systems sustaining their everyday lives.

EXAMPLES

**Yellow Dust**
by C+arquitectos / In The Air (Nerea Calvillo with Raúl Nieves, Pep Tornabell, Yee Thong Chai, Emma Garnett, Marina Fernandez)
Seoul, 2017
**See:** http://yellowdust.intheair.es/, **photos by Nerea Calvillo and Daniel Ruiz**

**Trash Isles**
by AMV BBDO London and LADbible in partnership with
The Plastic Oceans Foundation
2018

**See:** https://www.typeroom.eu/pollution-campaign-trash-isles-wins-this-years-beazley-graphic-design-award

**Flux**
by Oliver Burgess
2018

**See:** http://oliverburgess.uk/flux

# C. DELIVERABLES

To a significant extent, the form of the outcomes will emerge from collective deliberation and creative process within the assigned teams. The final deliverables will therefore be specified later in the semester for each team.

However, complementary deliverables will be the same for each team. These deliverables are to be submitted by **January 17, 2023**.

**1. A team report documenting the creative process (a text of 1000 words).** The report should answer the following questions:

- *How did you proceed with the project and what were the decisive moments that led you to the final outcome?*
- *What kind of "recomposition" have you created and what does it say do?*
- *How did contextual research and theory inform your project?*
- *How would you describe the dynamic of collaboration within your team?*
- *What were the most challenging parts of the process and what would you do differently next time?*

**2. Digital visual documentation of the process (min. 10 pcs of high-res images or a video)** intended for online presentation. Over the course of the semester, teams shall collect:

- *daily screenshots documenting the research and creative process*
- *weekly diary entries (text or visual) documenting the main findings, decisions, problems or achievements*

**Digital visual documentation of the outcome (min. 10 pcs of high-res images or a video)** intended for online presentation

Final presentations (*klauzury*) will have the format of a symposium. The students will be asked to prepare a slideshow presentation documenting both the process and the outcome of their team project. If a physical object is created, it will be presented at the studio as well.

# D. PROGRAM

## September 2022

**Sept 19–23**
**Ignored Technology Workshop**
A workshop with architects Veronika Miškovičová (UMPRUM) and Adam Hejduk (Academy of Fine Arts in Vienna)
More information HERE.

## October 2022

**Oct 3, 9am – 1pm**
**Kick-Off Session**
A lecture covering the thematic, conceptual and methodological foundation of the semester

**Oct 3, 6.30pm**
**Zuzana Harmáčková** (environmental researcher, Global Change Research Institute, CAS / Stockholm Resilience Center)
A lecture about the way environmental studies deal with uncertainty and distant time horizons

**Oct 6, 10am – 12pm**
**Edvard Sequens** (environmentalist and activist, Calla), **Lenka Frýbortová** (nuclear physics researcher, Czech Technical University), **Lukáš Vondrovič** (geologist, Radioactive Waste Repository Authority)
A discussion about the current issues of nuclear energy (as part of the speculative design festival Uroboros)

**Oct 6, 1–3pm**
**Kirsi Hakio** and **Tuuli Mattelmäki** (designers, Aalto University)
A workshop exploring the personal dimension of a transformation towards eco-social sustainability (as part of the speculative design festival Uroboros)

**Oct 10, 11pm – 2pm**
**MC Abbott** (designer and urban planner, Harvard Graduate School of Design)
A workshop dedicated to teamwork, exploration of individual strengths and standpoints, and to the structuring of a creative process (online)

**Oct 13 + Oct 17, 2 – 4pm**
**Nicolay Boyadjiev** (architect, IAAC Barcelona / IKEA / formerly Strelka Institute)
A workshop on transdisciplinary research in artistic and design practice (online)

**Oct 17, 6.30pm**
**Guest Lecture (TBA)**

**Oct 18–20**
A field trip to the former uranium mine and research center for nuclear energy in Rožná and to the area of Horka where a permanent depository of nuclear waste may be constructed in the future

**Oct 27, 9am – 4pm**
A symposium with artists and designers on the topic of transdisciplinary research in art and design in relation to the theme “Toxic Futures”(TBA)

## November 2022

**Nov 2, 6.30pm**
**Eduardo Castillo Vinuesa + Fernando Cremades** (researchers and architects, MediaLab Matadero Madrid)
A lecture on toxicity and the possibilities of decontamination beyond confinement

**Nov 3–4**
**Eduardo Castillo Vinuesa + Fernando Cremades** (researchers and architects, MediaLab Matadero Madrid)
A workshop on the deployment of radiotrophic fungi in the environments affected by radiation

**Nov 14, 9am – 4pm**
**Internal Presentations of Research Trajectories**

**Nov 28, 6.30pm**
**John Palmesino** (architect, Territorial Agency / Architectural Association – School of Architecture)
A lecture on the “Sensible Zone”, a dramatically evolving thin layer of 200m below and 200m above sea level where complex processes regulating life on land take place

## December 2022

**Dec 2, 9am – 4pm**
A symposium with artists and designers on the application of sustainability principles in various scales, from products to cities and landscapes (or from material research to public administration) (TBA)

**Dec 15, 9am – 4pm**
**Roundtable Presentations of Work in Progress** (with invited guests)

Additional activities and events will be announced.
When not specified, Mondays and Thursdays (9–4pm) are dedicated to teamwork, peer reviews, consultations with coordinators or guests and other impromptu activities.

Students are advised to sign up for related classes at UMPRUM such as:
- Mikrobiopolitické občanství (Michaela Pixová)
- Produktová ekologie (Vladimír Kočí)
- Současná teorie a metodologie designu (Klára Peloušková)

# About Planet B

Planet B: Module for Sustainability and Civilizational Issues is a space for experimental practice and teamwork at the Academy of Arts, Architecture and Design in Prague. It invites students of various artistic or design disciplines to engage with pressing challenges of today in a multidisciplinary setting.

In the winter semester 2022, Planet B is coordinated by Klára Peloušková (Department of Design / Department of Art History and Theory) and Eduard Herrmann (Department of Design).

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