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Edited by the Heinrich Böll Foundation

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INTRODUCTION

You and I are not disinterested bystanders in the 6th massive planetary extinction on the only habitable planet we have access to. Modern civilization will not be a self-destructive blip in the history of life on Earth, nor a coldblooded destroyer of the majority of the world's people in an attempt to bring a handful of high-impact lifestyles within the planetary boundaries. We are fed and have food to share, and can be reflective and informed. For these reasons we are able to see how degrowth and limiting global warming to 1.5°C are intrinsically connected. Our fortunate vantage point of thinking through and discussing planetary climate stability provides us with the tools to see beyond the blinding size of global inequalities and abrupt climate destabilization, by reshaping the myths through which we connect ourselves to the world. The myths tell us humanity created the fossil economy for all to thrive and had to end in this global climatic predicament, locked-in now into drastic natural degradation and further destructive struggles over insufficient life supplies.[1]

Beyond the myths lies the century that came about from a global understanding of the role that fossil fuels played in the driving of climate change and the social organization of everyday life's reproduction up to now. In this future people understand that there is excess energy available in the Earth system from the incoming sunshine, even after it is shared with the other living beings and geological processes. Our descendants strive to collectively better understand how that excess energy can be harnessed through technologies that maintain stability and power flourishing of their communities with minimal disruption to the non-human ecosystems already destabilized by global environmental change in 21st century. And they repeatedly renegotiate where to direct the excess energy after their basic needs have been met. Excess energy that they do not treat as a scarce resource, but as a supply of frugal abundance. They know that globalized capitalism and the periodic «catch-up socialist productivism» were not by-products of technological development, but a social organization of production and consumption of things motivated by the cultural imperative to expand the accumulation of profits after sale. And they choose to organize differently.

They work in democratically self-managed productive open collectives and care units when they are not in need of solitary creative autonomous expressions. Collectives are nested in larger collectives that eventually provide the complex goods and services that their society uses and exchanges with others. They read from libraries and study in freely available schools and universities. They change professions

1 Klare, M. T. (2012). *The Race for What's Left*. New York: Metropolitan Books. See also: Welzer, H. (2012). *Climate Wars: why people will be killed in the twenty-first century* (Tr. P. Camiller). London: Polity Press.

throughout lifetime and communicate with like-minded professionals around the world. They extract nourishment from a broad variety of living organisms, but are not at every period able to choose everything any one of them might have a taste for. Most of their food comes from a variety of farming patches no more than 100km away. They largely live in urban cohabitation and travel by ground-based energy efficient public transport. The cyclists among them prize the beauty of their legs at any age. Conviviality, a shared use of abstract and material tools and knowledge, rather than individual striving for domination of the commodified social and natural environment guide their personal choices and development. The material form of their freedom is care for each other and their environment.

They burn next to no fossil fuels, by relocalizing most of production and consumption and deliberating on the material global outreach of their different cultures around the globe. No community knowingly uses material or cultural power to dominate other communities, but communities live very different lives. All are considerate travellers, reflecting collectively on the costs and benefits of their aggregate people and goods movements.

Our descendants at the end of 21st century know they live in the shadow of the Great Thermocene,[2] a rapid capital-driven expansion of the fossil fuel based productive infrastructure and competition for explosive accumulation of the collective surplus of the fossil energy transformation.[3] Their climate and the ecosystems dependent on it will for a thousand years carefully balance the tipping points of catastrophic climate change and ecosystems' collapse induced by the global inflation of structural competition for domination, the pre-degrowth.

In their book and film clubs they will long continue to discuss the pros and cons of being born close to that historic epoch, studying the culture of growth so as to distinguish it from diversification and flourishing at many levels of natural, individual and community existence. They will study how the degrowth transition came about in the nick of time to spare the billions in the Global South the misery of violent and unalterable destruction and to spare a billion in the Global North the spirit-crushing drudgery of «bullshit jobs» within an economic grinder machine moving liberation from scarcity forever just out of reach.[4]

They identify our inaction, our paralysis before the necessary social change, in the cultural lock-in of the myths of technological progress and private bearers of all «capital» necessary for progress (natural, material, intellectual). We face scarcities despite mass overproduction of commodities of all kinds through hearty attachment to private property at every level of life, from simplest of tools to whole ecosystems. These illusory scarcities, socially created chimera for sorting who is «better» among us, keep us feeling short-served and submissive to persistent wage-slavery to gain more access and diminish the pain of scarcity a little. At the same time, 2 billion of our fellow humans are hungry whilst enough food is produced to nourish the whole 7 billion

2 Following Thierry Sallantin, see: Bonneuil, C. and Fressoz, J-B. (2016). *The Shock of the Anthropocene (tr. David Fernbach)*. London: Verso.

3 Morton, T. (2017). *Humankind: solidarity with non-human people*. London: Verso.

4 Graeber, D. (2011). *Debt: The First 5000 Years*. New York: Melville House.

and leave some over for the forthcoming 3 billion more in this century.[5] Hunger is a material scarcity of the first degree and we fear lest it should befall us (again), committing to more work and more throughput to gain a little more capital.[6] Yet many are out of job or in insufficiently paid precarious temporary work placements that offer little security and emancipation, but don't trust those in similar positions to be equally concerned about global unsustainability.

The sober vision of the degrowth future is still obscured by the myth of rational technological transformation necessarily driving the social organization that provides the present day material comforts. Eventually, the myth promises, work and accumulation will eliminate wants for all, along with the waste by fully conserving processing energy and materials. It is purely inadvertently that this social organization and production power (energy and technology) landed us in the climate catastrophe and the greatest inequality between human individuals that the world has ever seen. For the selected few the myth is a reality today, they see no waste and struggle to select wants that will identify them, at the expense of over 7 billion others.

This myth of technology-as-development does not allow us to see the existing low-carbon lifestyle practices as anything but misery in need of more investment and technology to overcome scarcity.

The world of precariously balanced cooler climate and bright degrowth self-aware humanity starts in our world today. It begins when we finally turn away from the paralysing myths:

I) that growth driven mitigation of climate change can finally become just,
II) that current social organization and climate crisis were inadvertently produced by the rational technological improvements of individual lives around the globe,[7] and
III) that new technology within the same social organization will neutralize («sequester and store»; GCCSI, 2015) the causes of climate catastrophe.

It is a cultural change followed by a material transformation, in the nick of time to avoid crossing the 1.5°C of planetary warming and experimenting with ecological and geological tipping points. This is followed by an honest look at environmental and cultural impacts of our collective practices and infrastructures. Finally, an honest empathy with distant fellow humans, a solidarity across the one and only planet is acknowledged. But first, we realize that distrust of other humans on the same planet, wage-slavery, scarcity of fashionable novelties and disgust at manual farming do not give us flourishing fulfilment. *We've had enough!, we say.*

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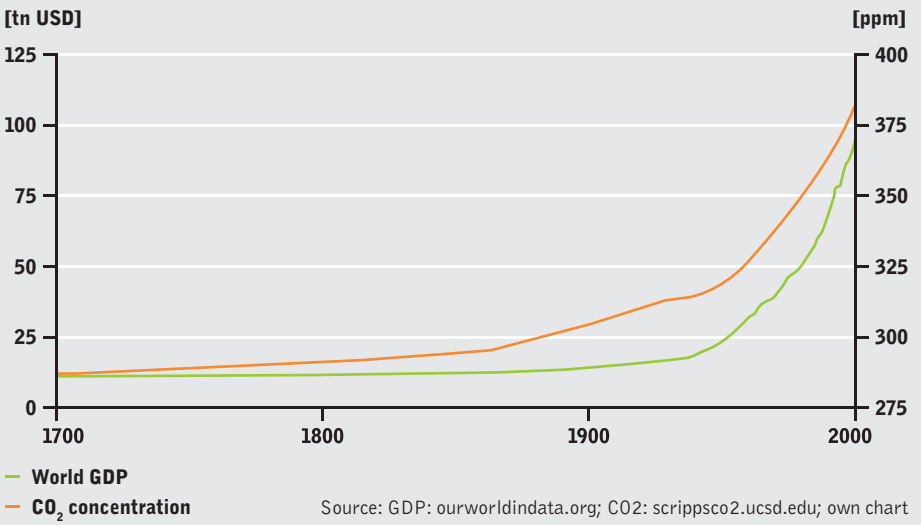
5 Hickel, J. (2017). *The Divide: a brief guide to global inequality and its solutions*. London: William Heinemann.

6 Lewis, S. L. and Maslin, M. A. (2018). *The Human Planet: how we created the Anthropocene*. London: Penguin.

7 Mokyr, J. (2017). *A Culture of Growth*. Princeton, NJ: Princeton University Press. See also: Bonneuil and Fressoz, 2016, op. cit.

Figure 1: World GDP and CO_2 concentration
Total output of the world economy and ice-core CO_2 concentration from 1700-2015



Source: GDP: ourworldindata.org; CO2: scrippsco2.ucsd.edu; own chart

Growth, as a motive and icon, was supposed to produce greater wealth to be used as an instrument with which to increase the reach and range of human choice, of freedom from drudgery, of flourishing. But historically the link between the dominant growth trend and the flourishing of choices has not been the case for most of the human population, even with the increasing rate of aggregate growth over the last two centuries. When we look around, we see that the benefits of growth have been unequally distributed, to the level of different orders of magnitude (10x, 100x and more) and not just two-fold or three-fold. Colossal inequality of attainment, what I get, paired with equality of ambition, what I know I could have, has frustrated most freedoms materially attained. And the greenhouse gas concentration has risen from the long-term «stable» range of the last 100 centuries to the critical threshold today mostly within one century. What makes the growth focus a desirable aim for the human population living with climate instability, whilst its benefits barely reach them at all? What makes the focus on growth the strategic imperative for those of us who understand climate justice to be inseparable from climate stability eked out through limiting warming to 1.5°C?

We shall initiate and they, the next generation, will maintain the preservation of average global temperature below 1.5°C of warming relative to the preindustrial average, through societies organized differently. They will be using fewer resources and structuring production, consumption, use and reproduction differently. Crucially this will include a reduction in emission of climate change driving greenhouse gases, primarily from energy production, transport and land-use (change).

Whatever emissions pathway, whatever carbon budget we focus on and distribute among people in this century, we must and will reach net zero emissions in less than

40 years, half a lifetime. Degrowth, cultural change and human solidarity are the surefire way to start achieving that vision now.[8]

Recognizing the difference between the contributions to the problem by the poorer countries and their suffering of current climate change costs shows how unjust the growth imperative is in the joint global fight against climate change. Climate Vulnerability Monitor points out that poorer countries contributed around 30% of cumulative carbon emissions, but will suffer around 90% of the economic costs of climate change impacts by 2030.[9] 99% of the human death toll associated with these impacts happens to the poorer people in poorer countries. All this time growth and development are to go on globally. Let's be honest about climate justice.

8 Millar, R. J. et al. (2017). Emission budgets and pathways consistent with limiting warming to 1.5 °C. *Nature Geoscience* 10: 741-747. See also: Peters, G. P. (2018). Beyond carbon budgets. *Nature Geoscience* 11: 378-380.

9 DARA and the Climate Vulnerable Forum [DARA]. (2010). *Climate Vulnerability Monitor 2010 – «The State of the Climate Crisis»*. Fundacion DARA Internacional. See also: Hickel, 2017, op. cit.

Mythbuster I

Perpetual exponential growth will not alleviate climate inequality and historic injustices.

A demand for limiting global warming to 1.5°C is part of a demand for justice, as that warming limit is expected to be the one that keeps the global South habitable. Geographically and infrastructurally it includes the regions most exposed to both the sudden and insidious impacts of climate change – violent storms and landslides on the one hand, and extended drought and sea-level rise on the other. These regions are where the majority of the global population lives, and the population that has on the whole contributed next to nothing to the catastrophic climate change trend.[10] Contemporary commitments from socialized profit to help the people of the global South to adapt to the impacts of climate change are much lower than even the amounts promised by global consensus.[11]

Degrowth in globalized resource and waste circulation is required both materially and culturally to achieve the climate justice of staying below 1.5°C average global warming. Materially, a smaller global metabolism overall, and especially among the overdeveloped social strata in the Global North, is the only way to reduce the greenhouse gas emissions driving climate change.

Historically, only a reduced economic output has produced lasting regional emissions reductions. Within the current global market and with much of the world's people in need of finances to alleviate scarcities, dematerializing economies is achieved by eventually shifting emissions to the South.[12] Without a cultural change of aspirations and emancipation, the growth imperative commits the capital sunk in the technological extraction and processing infrastructure to not only shift, but to overall expand the harmful emissions through a rebound effect.[13] Eventually, some responsibility for

10 den Elzen, M., et al. (2013). Countries' Contribution to Climate Change: Effect of Accounting for All Greenhouse Gasses, Recent Trends, Basic Needs and Technological Progress. *Climatic Change* 121: 397-412.

11 Guimaraes, R., et al. (2009). *Earth System Governance: people, places, and the planet understanding Earth system governance after the financial crisis*. Paper presented at the Amsterdam Conference on the Human Dimensions of Global Environmental Change (HDGEC). Amsterdam. See also: Oxfam. (2018). *Climate Finance Shadow Report 2018: assessing progress towards the USD 100 billion commitment*. Oxford: Oxfam GB.

12 Giljum, S., et al. (2014). Global Patterns of Material Flows and their Socio-Economic and Environmental Implications: A MFA Study on All Countries World-Wide from 1980 to 2009. *Resources* 3: 319-339. See also: Schaffartzik, A., et al. (2014). The global metabolic transition: regional patterns and trends of global material flows, 1950–2010. *Global Environmental Change* 26: 87–97.

13 Giljum et al. (2009). *Overconsumption: our use of the world's natural resources*. SERI, GLOBAL 2000, Friends of the Earth Europe.

contemporary emissions changes hands, but the planetary atmospheric carbon concentration rises just the same – and the 1.5°C warming limit is breached.

The cultural transformation is therefore a crucial component of degrowth, driving the material reduction of extraction, throughput and emissions. First, consider the historical injustice inscribed into the climate change problem globally, where the historic populations of the Global North benefited from 80% of the greenhouse gases since the industrial revolution, despite being only 20% of the historic global population.[14] Without the rich Global North addressing the climate challenge, it is unfair to expect the South to do so. Second, the poorer countries are where most of the climate-restorative practices like subsistence agroecology and agroforestry are already practiced, and their political commitments through mitigation pledges already exceed their fair share of climate stabilization burden.[15] With the South's right to basic human rights aspirations this requires change leadership, in visible transformation not just words, from the globally rich in North and South. Finally, the potential of the developing countries of the South to assist with mitigation can be further increased by satisfying aspirations through redistributing benefits from the North, wherever countries are materially unable to fulfil their fair share of emissions reduction exclusively within their borders because of the large historic «climate debt».[16]

Climate change contains a historic injustice which can be corrected through universal empathy, solidarity and inter-societal coordination, a broad principle of climate justice. Our economies currently force the growth through newly created value which overcompensates the initial investments and pushes up extraction and emissions dumping externalities of growth on the Global South. Climate justice within 1.5°C limit requires fundamentally transforming our economies and understanding the historical path that led to the brink of climate catastrophe. Climate justice means transforming the social metabolism and economic institutions that uphold it, and this in turn requires that broad principles of degrowth inspire the transformation of the world economy. And it means that richer societies materially reduce throughput by redistributing and reusing existing products and services, not offshoring production of new ones. They can learn from degrowth practices in many cultures of the South which have for long been misrepresented as technologically lacking (Buen Vivir, Swaraj, Ubuntu and the like).

Perpetual striving for economic growth under current conditions aggravates the climate breakdown through increased output of greenhouse gas emissions, *simultaneously aggravating the historic injustices in responsibility and impacts of climate change* by focusing benefits of growth extremely disproportionately onto the rich strata of the overdeveloped North. The impossible (see Mythbuster III) decarbonized growth under the same paradigm leaves all the other environmental load shifting in place and the inequalities of benefits and impacts intact. Overcompensating for the injustice by forcing growth under the current economic paradigm in the South is committed to

14 den Elzen, 2013, op. cit.

15 Climate Equity Reference Project [CERP]. (2015). *Fair Shares: A Civil Society Equity Review of INDCS*. http://climateequityreference.org

16 Climate Equity Reference Project, 2015, op. cit.

increasing most of the same environmental burdens that make up the unjust historic legacy of the North, breaching the 1.5°C boundary several times over, whilst leaving most inequality and injustice in suffering the impacts of climate change in place.

Climate justice and climate stability require a global transformation that abandons the growth fetishizing paradigm and redresses the past injustices, so that North and South can face imminent rapid climate change together.

Mythbuster II

Power struggles in society drive technological choices.
Hopes for radical emissions reduction without addressing changes in social organization of production and cultural choices, the emissions reduction coupled with continued economic growth, rely heavily on expectations of technological innovation. This is based on a myth about historical development that led to contemporary climate change: that discovery of productive forces based on energy from fossil fuels drove the rise of late modernity in the West, eventually spreading across the globe. Climate change is supposedly the unexpected side-effect of this striving for progress and emancipation. Historical cultural and social changes concurrent with expansion of fossil-based industrialization are seen as a consequence, not a driver of the spread of technological infrastructure that locks-in the current social organization of production and the associated emissions. Therefore, it is assumed, only further commitment to technological innovation that will secure this organization, but without the carbon emissions, will achieve progress and mitigate catastrophic global climate change.

The myth about how we got to the brink of climate catastrophe, the broadly outlined Anthropocene story, starts with the production revolution, the invention of the steam engine and the shift to coal as the primary energy source at the end of 18th century in Britain. An energy shortage coupled with a culture of growth based on free-thinking technological exploration,[17] supposedly pushed the early industrial capitalists to turn to fossil-powered technologies. The actual historic transition to fossil-fuel driven technology, including extraction, transport, combustion and disposal of residual waste, was different. The fossil fuel and much of the technological know-how had been available for a long time around the world without producing the specific shift in power source, social organization, and scale and means of production. Renewable energy sources, water and wind, were cheap and abundant in late modern British industry. A change in social organization, a novel organization of property and expanding market exchange coupled with increasing power over workers was the dominant influence for the establishment of fossil power infrastructure. Factory workers' struggle for broader economic and political democracy resulted in a reaction from the capital owners to prefer coal over water and wind, introducing the great global Thermocene exponential acceleration in emissions.[18]

Capitalist industrial production, the largest base of global historic emissions and a major source of current emissions, eventually became a system of self-perpetuating

17 Mokyr, 2017, op. cit.
18 Malm, A. (2016). *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. London: Verso.

economic growth once coal and steam engine systematically replaced production organized around renewable energies. In the second half of the 20th century, workers' demands for greater involvement returned at the nexus of extraction and transport of the increasing amounts of coal to the urban industrial centres. Strike action disruption of coal-based energy infrastructure forced the owners of capital to turn to oil, a globally extracted energy source beyond the reach of industrial workers' solidarity and subject to greater automation in extraction and production processes.[19] Social organization supporting a perpetually growing capitalist industrial production came to be seen as an organic offspring of a development of productive capacities and technological innovation, the latter two expected as primary drivers of its future modifications. Historic material development resting on access to mass produced commodities fitting all purposes became equated with human flourishing. Along such inverted historical causality it becomes automatic to expect that today new technologies will provide negative emissions and global temperature geoengineering, funded by surpluses produced by economic growth and leaving the material development and social organization of production largely undisturbed.

From a global perspective it is apparent that the spread and normalization of the fossil fuel industrial infrastructure was not driven by technological determinism of the better or more efficient energy source, but by social strategies for displacing workloads and environmental loads to the societies where work and nature afforded greater accumulation through lower costs.[20] Current debates about the role of technology are largely building on the narrow idea that technology is something neutral, merely a means to an end. But technology always transforms non-human-made objects into human-made objects resulting in a greater matter-energy throughput and associated waste and emissions overall,[21] as well as greater dependence of all aspects of our lives on corporate concentrated industrial production. The present organization of social life with production growing continuously as a scarcity-quenching necessity for the majority of the global population cannot avoid soon breaching the 1.5°C warming limit. *Degrowth hinges on a change of perspective,* a liberation from the apparent historical necessity of exponentially expanding carbon emissions from extraction and waste to provide commodities as realization of a good life. Extraction and d*istribution of useful energy is not a technically determined process* led by discoveries of «better» energy sources, *but a socially negotiated historic choice of what defines a good life.*

19 Mitchell, T. (2011). *Carbon Democracy: Political Power in the Age of Oil*. London: Verso.

20 Hornborg, A. (2016). *Global Magic: Technologies of Appropriation from Ancient Rome to Wall Street*. Berlin: Springer. See also: Moore, J. W. (2015). *Capitalism in the Web of Life*. London: Verso.

21 Heikkurinen, P. (2016). Degrowth by means of technology? A treatise for an ethos of releasement. *Journal of Cleaner Production* n.d. https://doi.org/10.1016/j.jclepro.2016.07.070

Mythbuster III

There is no technology that can reduce emissions and leave the economic system as it has been – there is no straightforward engineering solution to the climate crisis.

Without addressing the growth fetish we are left with a false hope of rapid efficiency improvements in current economic activity that would rapidly decouple economic growth from greenhouse gas emissions. Historically, the growing capitalist economy has only achieved partial and slow energy transitions, primarily due to infrastructural lock-ins and associated social conditions. It took 60 years for coal to reach 50% of global energy consumption, another 60 years for oil to reach 40% and almost another 50 years for natural gas to reach 25%.[22] Coal is still the most widely used industrial energy source today. Social conditions that created its utility, corporate concentration and state subsidies secured by fossil industry's lobbying power help to maintain its use. Social organization of production oriented to profit accumulation and the cultural imposition of the growth imperative culturally lock in this carbon-intensive energy base for the next generation. Growth decoupling generating surplus value without emissions is achieved in parts of the North by technological offshoring of environmental loads to the global South.[23]

Techno-optimism promises to keep the global temperature rise below 1.5°C by a profitable shift to renewable energies and use of «negative-emissions» technology to pull the excess carbon out of the atmosphere. «Negative emissions» technologies, largely a hypothetical concept, don't have more than a few realistic-scale demonstration plants, and in most cases only exist only in small-scale demonstration or just as theoretical studies.[24] Even at the concept level, the environmental and social side-effects of their use are left unknown and unaccounted for, whilst the large uncertainty in efficacy of their implementation to drive down the atmospheric CO_2 concentration in time is mired by gross uncertainties. If we are to commit our climate stabilization strategy to these technologies performing the desired task in the future, ignoring the other available options now under the myth of technology driving social productive choices, we would calamitously constrict the range of strategies available in the future when desired technologies don't materialize or bring about too burdensome side-effects.[25]

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22 Smil, V. (2016). *Energy Transitions: Global and National Perspectives, 2nd Edition*. Santa Barbara: ABC-CLIO.

23 Hardt, L. et al. (2018). Untangling the drivers of energy reduction in the UK productive sectors: Efficiency or offshoring?. *Applied Energy* 223: 124-133.

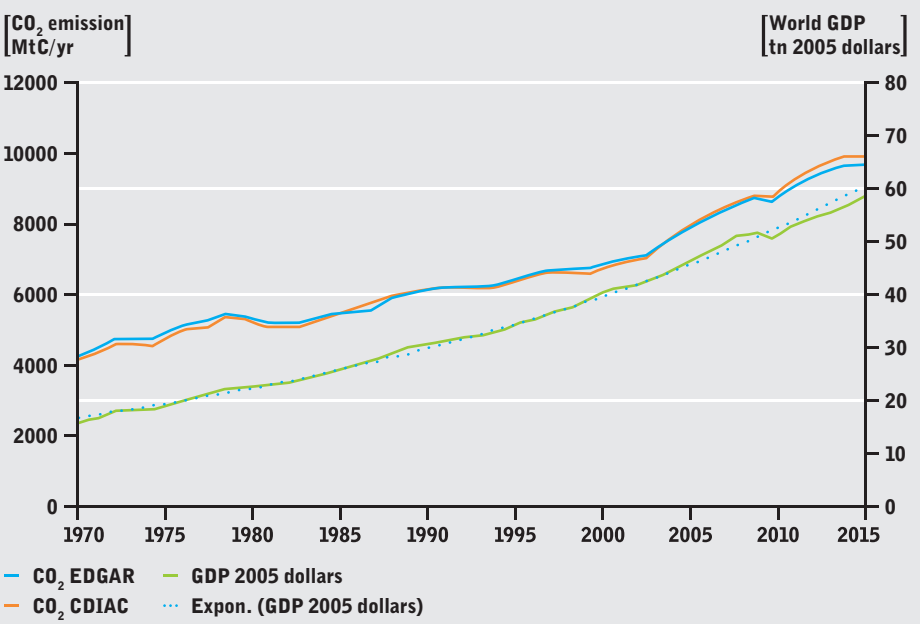
24 Anderson, K. and Peters, G. (2016). The trouble with negative emissions. *Science* 354: 182-183.

25 ETC Group, Biofuelwatch & Heinrich Böll Foundation. (2017). *The Big Bad Fix: The Case Against Climate Geoengineering*. Nairobi/Berlin/Ottawa.

By avoiding culturally and socially hard choices now, we would be materially locking in the technology with unpalatable social and cultural necessities tomorrow, ignoring the lesson of the mythbuster above.

To stay in line with expectations of economic growth, scientific assessments that rely on global scale implementation of «negative emissions» production plants assume that the future costs of global-scale implementation of the associated technologies are lower than present day cultural transformation to move away from production organized around fossil technology. Such accounting privileges immediate growth of surplus today by discounting the projections of expected costs tomorrow. Under global capitalist organization of production these technologies will also have to deliver cumulative return on investment by charging human societies for climate stabilization for thousands of years. In contrast, in our vision, the degrowth society of our descendants will employ all available approaches to extract existing excessive CO_2 in the atmosphere through restoration of stable ecosystems, primarily forests, restorative agricultural practices and enhanced weathering of minerals, not to provide an insurance policy for growth but to direct any social surplus of work and energy to maintenance of ecological stability on a single available planet.

Figure 2: Late industrialism GDP and CO_2 emissions output



Source: Andy Skuce (https://goo.gl/M3aWU4); own chart

The future begins today …

Cap and phase out fossil pollution

The known reserves of fossil fuels are already so large that if they were to be burnt they would blow through the 1.5°C limit several times over.

Growing our economies based on the existing investments into exploration and exploitation of fossil fuels is already incompatible with staying below the dangerous level of climate change.[26] In other words, given our foundation of economic activity in fossil-fuel-driven energy production, economic degrowth is a favourable strategy for limiting global warming below 1.5°C. We know that globally we need to leave the fossil fuels in the ground, the *coal in the hole* and the *oil under the soil*.

The immediately available regulatory and financial instruments to address this target are caps[27] and taxes on emissions, caps on fossil fuel extraction, and the abolishment of subsidies for fossil fuel exploration and extraction (see *A Managed Decline of Fossil Fuel Production* in this publication). Caps should be adopted on the best known order of magnitude estimates of the carbon budgets and emissions pathways[28] distributed on per capita basis, and in a way that reliably commits to almost net zero carbon by 2050. This per capita allocation should be further enhanced so as to account for current infrastructure development and basic services inequalities, and then shared among the respective national populations. National allocations should be shared based on solidarity and justice.[29] Meaningful quantitative accounting of a spectrum of social and environmental costs against economic benefits need to be developed alongside close monitoring of carbon concentrations in the atmosphere.[30]

Current subsidies from governments for research, extraction, transport and exploitation of fossil fuels should be abolished and directed into expanding knowledge, infrastructure and jobs in community-led energy efficiency and renewable energy generation (see *Another Energy is Possible* in this publication).

As energy of the flow and not stock, renewables organize the social control and utilization of energy sources differently and limit the appropriation for fully private use and market trading of energy. So we must revive the knowledge how to organize

26 Mercure, J-F., et al. (2018). Macroeconomic impact of stranded fossil fuel assets. *Nature Climate Change* n.d. https://doi.org/10.1038/s41558-018-0182-1

27 Davey, B. (Ed.) (2012). *Sharing for Survival: Restoring the Climate, the Commons and Society*. Dublin: Feasta.

28 Geden, O. (2016). An actionable target. *Nature Geoscience* 9: 340-342.

29 Cf. Climate Equity Reference Project [CERP], 2015, op. cit.

30 Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist.* White River Junction, VT: Chelsea Green Publishing.

production in different communities, from villages, through municipalities of different sizes to whole regions and states, to maintain democratic control over aims and volumes of production. It is no longer a matter of simply stockpiling the fuels or securing ever expanding energy supply through the market. As the technological utilization of renewables, primarily for electricity generation, is closely tied with appropriate materials and infrastructure for extraction and use, further caps on materials extraction and effects on the forests, land and water must be taken into account.

Restorative agroecology and wilderness safehavens

Communities that are long resident in a certain area and dependent on its natural cycles for reproduction and regeneration are best placed to deliberate the balance between extraction and energy generation practices and habitat protection and regeneration.[31] It would be a mistake (as well as physically and technologically impossible) to focus *exclusively* on replacing the current energy demand with the same amount generated from renewables, increasing extraction and habitat destruction in the process. The latter would lead to negative consequences of global warming such as biodiversity loss, destruction of natural carbon sinks and jeopardy to food security, ultimately leading to a much higher rise than 1.5°C.[32]

Using the best available knowledge, combining indigenous experience and scientific modelling, we should seek the available balance between renewable energy generation, and protection of natural carbon sequestration and low-impact peasant agroecology (see *La Via Campesina in Action for Climate Justice* and *Re-Greening the Earth: Protecting the Climate through Ecosystem Restoration* in this publication).

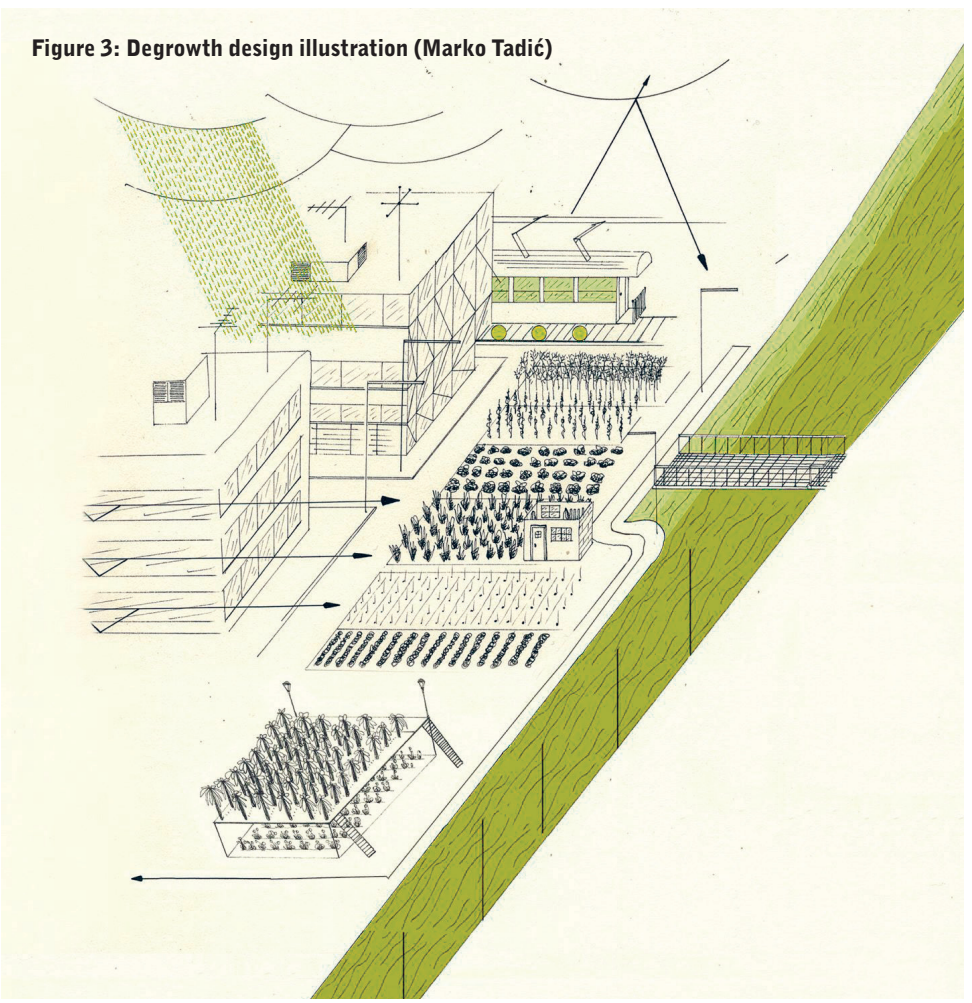
This includes just compensation for such agroecological practices concurrent with the abolishment of public subsidies for intensive industrial fossil-fuel based agriculture, and abolishment of subsidies for land-use change from forests to monoculture carbon bubbles and for intensive marine aquaculture that reduces the biodiversity and carbon storage capacity of the global seas. Peasant agroecology is labour intensive and will be increasingly precarious under climate change in the centuries to come, so greater social recognition and distribution of risks in food production is needed. Food is the most important driver of human health and flourishing in the current and future degrowth worlds, and a just compensation for those who tend for the soils and food supply on behalf of those who play other social roles is an essential ingredient of the degrowth social contract. Market valuation is the least significant form of this compensation, though plays a role, whilst rights-based resource conservation that recognizes indigenous land rights and promotes locals' sovereignty over forests, fields and water, and promotion of farming and fishing practices that preserve food stability and sovereignty should be accentuated.

31 Lews and Maslin, 2018, op. cit.

32 Williamson, P. (2016). Emissions reduction: Scrutinize CO_2 removal methods. *Nature* 530: 153-155.

Perishables such as foodstuffs will be transported over shorter distances, practically abolishing the global market in basic foodstuffs, and rooting different communities in the locally grown staples. To reduce the climate impact of global goods transport, especially of high-impact air cargo, transport of all perishables over long distances should be eventually phased out, along with shifting from airplanes to continental railways and sailships where needed. The car and truck transport between cities and between farm producers and city consumers will also be rapidly phased out and replaced by renewably powered rail transport, which is based on network durability and efficiency rather than high speed. The fossil intensity of the highways infrastructure and of haulage and private car transport is not significantly reduced with a shift to new electric vehicles. Less driving overall is the degrowth way to reduce emissions from transport and long-distance goods distribution. In densely populated zones like the municipal regions and cities, low-hanging fruit of public transport and cycling is already being picked, with healthier lifestyles and less clogged-up cities.

Figure 3: Degrowth design illustration (Marko Tadić)



Production for life, not profit

Economies currently produce commodities under the profit imperative for the states and private owners, mostly externalizing negative impacts of such production to distant people and future generations in order to boost immediate financial profit.

Climate change is the loudest warning sign that the natural endowment of the planet is not limitless, that the (humanly co-created) nature upon which all economic activity is eventually based will run out.

With that awareness human societies should take democratic control over production of commodities needed for the reproduction and stability of societies and the direct them towards achievement of shared social progress goals. Factories, farms, service hubs and cooperatives should be producing output required by human flourishing and wellbeing under the constrictions of available energy and minimum harm to stable habitats. This is where circular economy principles (see *Zero Waste Circular Economy: A Systemic Game-Changer to Climate Change* in this publication) merge with degrowth, as to stay well and flourish humans of the 21st century will need to keep making products not readily found in nature, but will have to throw away and waste almost none of them. Those products that cannot be reused, composted or recycled should be redesigned in order to be produced with lower impact, repairable and reusable – or simply not produced in the first place. Enhancing low-tech repair through education across different communities will contribute to re-use potential, whilst decentralized sharing of products and tools will reduce their overall material footprint. Regulation of advertising and incentivizing production aimed at durability are some of the social instruments for transition to this different organization of production. Our current production practices are drowning the world in greenhouse gas emissions and waste, we must take back control and produce to live rather than live to produce.

The distribution of the social product required for a good life will have to change under these conditions, from the generation of concentrated abstract wealth to provision of the basic material provisions for all. Freshwater and adequate sanitation, electricity and cogeneration heating are life's necessities that we know how to technologically bring about and must shift away from fossil fuels. Providing universal access to education and healthcare is something we know how to do and have to some extent provided in the past; the economies driven by profit generation through growth are preventing us from delivering it even further. Shorter working time will help distribute meaningful employment more broadly, and help distribute the benefits of the economic practices of a non-growing economy to those people currently left with low income and wealth. Most importantly, care work and all those activities that help society regenerate from day to day outside market valuation have to be properly recognized in economic reproduction of societies.

The money required to kickstart this change languishes in tax havens and financial instruments securing future returns through the accountancy of economic growth. Whilst the global South is lacking funds with which to provide healthcare, sanitation education and adaptation to climate change including low-carbon reconstruction, its

current economic output is eaten up by debt repayments. To stay below 1.5°C within new arrangements of production and distribution, a new economy will require immediate sizeable financial transfers from North to South, raising people from poverty and providing instruments of emancipation and inclusion in the global society. This is a just repayment of the climate debt. Debt cancelation and abandonment of the debt-based money system (fractional reserve banking) should be the first obvious structural steps of transition to a new kind of economy that does not necessitate all (re) productive work to increase year after year so as to repay the compound interest on the initial capital downpayment.

Abandoning the dominant growth obsession will collapse the over-financialized globalized economy, whilst breaking into catastrophic climate change over 1.5°C global warming will collapse the natural reproduction base of all economies, the complex living planet.

It is in the interest of the haves and have-nots, the elites and the struggling together to avoid the latter collapse. It is fair and democratic to mitigate it by strategically guiding the degrowth of the global economy.

CONCLUSION

People living at the end of this century will embody in their culture, their material infrastructure and the throughput of their societies a worldwide understanding of the role that fossil fuels played in the driving of climate change and the social organization of everyday life in our world. Knowing the injustices and the universal peril that is catastrophic climate change over 1.5°C, they will nurture the degrowth world relative to what we inherited from the last century. The transformation following the sobering vision starts with us today, realizing that myths of self-propelled technological progress are false, that many scarcities are illusory and that injustices are created through mutual distrust. Myths can be abandoned, replaced and improved on to better explain what is happening to us. We hear today and they remember for a long time the call of 15,000 studious women and men warning that humanity is on a collision course with the limits of our planet. «To prevent widespread misery, humanity must practice a more environmentally sustainable alternative to business as usual,» including «reassess[ing]… the role of an economy rooted in growth.»[33] *Degrowth is a sobering vision with which we start the transformation to stay below 1.5°C global warming.*

33 Ripple, W. J., et al., 15,364 scientist signatories from 184 countries. (2017). World Scientists' Warning to Humanity: A Second Notice, *BioScience* 67 (12): 1026–1028. https://doi.org/10.1093/biosci/bix125

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