**Turn of the times: Uncomfortable insights, uncertain outlooks**

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The Russian war of aggression on Ukraine is dominating the political agenda today. The horrific images have eclipsed the threat to humanity posed by pandemic, climate change and biodiversity loss in the priorities and activities of decision-makers and the media - even if the casualty figures are small compared to 15-18 million Corona deaths and the many millions of current and future environmental victims. "Retrofitting" is at least as urgent in climate, biodiversity and resource policy as in military security policy.

In 2022, the grim scenarios climate scientists had outlined for the near future have been [overtaken by events](https://www.theguardian.com/environment/2022/aug/04/climate-breakdown-supercharging-extreme-weather): extreme storms, droughts, floods, arctic wild fires, and [ice-sheet collapses](https://www.theguardian.com/world/2022/mar/25/satellite-data-shows-entire-conger-ice-shelf-has-collapsed-in-antarctica) whose sudden appearances have outstripped researchers’ worst predictions. Although global heating has not accelerated, catastrophic climate impacts are materialising more rapidly and with greater intensity than their grimmest warnings, while ocean acidification, biodiversity loss, plastic and PFAP pollution complement the emerging environmental catastrophe as the “World Scientists’ Warning of a Climate Emergency” shows (Ripple et al. 2022). Human societies suffer as well – not only those affected by floods or wild fires, but globally, human health is “at the mercy of fossil fuels” (Romalello et al. 2022).

In the wake of the pandemic and the resource price crisis, mass starvation has increased in parallel to the wealth of billionaires and the profits of oil majors and pharma multinationals – the war in Ukraine acts mainly as a magnifying glass. Other economic sectors suffer from the collapse of supply chains and the end of just-in-time production. Relocation, diversification and speculation all contribute to rising cost – even when inflation begins fading, prices will probably settle on a much higher level than before the crises struck.

After all, it has now become clear: We are living in a new era. Security cannot be taken for granted, and it does not come for free, but in the 21st century it must be spelled differently than in the second half of the 20th. Governments are repositioning themselves trying to balance the policy imperatives of security, sustainability and competitiveness. But military superiority ultimately requires economic superiority, not reducing environmental impacts and an end to plundering critical raw material stocks (Watari et al. 2020). The risk is that geopolitics absorbs political attention and public investments in the next two decades, which should instead be concentrated on combating the climate and biodiversity catastrophe.

We have indeed reached a turning point, but its multi-dimensionality and sheer magnitude is not yet understood. A fundamental industrial change towards a resource-constrained, involuntarily post-growth economy is under way. Renewable energy plants require a new raw material base - the post-fossil age will be a metal age characterised by resource shortages, not just scarcities (IEA 2022), while at the same time, the struggle for land is intensifying. As physical resources are limited, demand does not create supply, as mainstream economics has it. Even if it is an "inconvenient truth", as scientists we must fully acknowledge and communicate the grim situation: bending the trends will require more time than we have to avert environmental crises due to earth system inertia, and empirically, GHG emissions are still increasing and deforestation is ongoing (FDAP 2022). Effective intervention points can only be identified if physical and empirical facts are acknowledged.

**The turn of the times as a turn into degrowth**

In the turn of time, the age of growth is coming to an end - we are already in the middle of the transition to the post-growth age, without having prepared ourselves for the new framework conditions. The overexploitation of natural capital (now overstepping six out of nine planetary boundaries) will become effective as a brake on growth, even if the models of established economics ignore this, and further intensify the tendency of growth rates to fall. If social stability is to be maintained, the economy and society must politically steered towards growth independency.

**Turn of the times as the end of prosperity growth**

At the same time, defensive costs are rising. This applies not only to massive increases in spending on armament, but also to climate adaptation, biodiversity restoration and strengthening social security as a condition for societal resilience under climate change (IPCC 2022b). Another urgent requirement is the preventive improvement of the health system, which is currently losing qualified specialists due to high workloads with poor pay. All these expenditures are indispensable, but economically speaking, unproductive investments decreasing economic growth.

Because the turn of the times is associated with more tasks and hence higher expenditure of governments, tax and social security contributions increases will be unavoidable. With GDP growth close to or below zero, disposable incomes and thus private household consumption expenditure will almost certainly have to fall, despite a redistribution of wealth of whatever size. Thus, the burdens in the turn of the times enforce involuntary sufficiency, i.e. a "less" in consumption (Spangenberg 2022). If this is not accompanied by social guarantees for vulnerable groups and voluntary sufficiency policy, i.e. state support for changed consumption habits (from home office to cycling to avoiding air travel, especially for business trips), there is a great danger for social stability.

**Turn of the times as living with continuous climate change**

Extreme weather situations and their consequences are still perceived as deviations from the norm instead of recognising that they are the new norm: regular large-scale summer droughts, drinking water shortages, crop failures (too hot for wheat, too dry for maize), hurricanes, floods, heat deaths, tropical pathogens and new pandemics. Decarbonisation today does not change this for the next 30 years, but it is decisive for how large the areas will be that become uninhabitable for humans in the second half of the century. Climate neutrality therefore remains important, but the underestimated task of the day is massive investment in climate adaptation - and a welcoming culture for climate refugees.

**Turn of the times as a resource turnaround**

If the 1.5° degree target is still to be achieved, affluent countries must become climate neutral within less than two decades. Independence from Russian fossil fuel supplies is only a first step, which could lead to new dependencies. A modern photovoltaic plant requires more than twice as many metallic raw materials as a coal-fired power plant of the same capacity. For onshore wind turbines it is almost five times as much metal, for offshore wind turbines more than seven times as much (IEA 2022).

International studies highlight not only a demand surpassing any plausible supply for electric vehicles, stationary electricity storage, seawater desalination plants and large-scale electrolysis plants for the production of green hydrogen (Marscheider-Weidemann et al. 2021)., but also the competition of IT, renewable energy systems, e-mobility and the military for the same scarce resources (Bobba et al. 2020). Hence a massive reduction of primary energy consumption is required - only then can decarbonisation succeed and – even if prioritised – not be the starting signal for new dependencies. Hardly an of the planetary boundaries can be respected succeed if the global overexploitation of raw materials continues.

**Turning the tide on trade**

Global free trade was and is the basis of prosperity of the affluent countries – not least as a result of the unequal exchange relations between North and South. This fundamental prerequisite of the economic model (particularly pronounced in German and China) is now yesterday's news. A redefinition of preferred trading partners is required, no longer oriented solely to the short-term profitability of the exchange, but also reflecting looming larger and longer term macroeconomic risks and losses. As the history of the earth has distributed raw material deposits without taking into account whether they are located in democratic or authoritarian states, state intervention may be required to overrule the business calculus by taking the state and social constitution of the trading partners into account, as the European dependence on Russian oil, gas, coal and uranium has demonstrated. Since in times of populism the democratic status can change quickly (as under Trump, Erdogan, Orban, Bolsonaro etc.), the focus of near-sourcing should be on the EU and trying to manage as much as possible with the available resources. Complementary raw materials should be sourced from a diversified network of reliable contractual partners without becoming dependent on individual suppliers or buyers (countries).

Foreign economic policy has long become a sub-theme of geopolitical power politics anyway - often unnoticed by us: more than half of the world's population, including Europe, was subject to US economic sanctions under President Trump. The world market is not neoliberal, but neo-imperial. Instead of bloc formation under US leadership, the EU's autonomy must be strengthened. This also makes it possible to end the imperial option - today, NATO armed forces secure raw material supply routes, e.g. at the Horn of Africa.

**Turn of the times as a turn of research and technology**

Technology development is still being pursued as if all raw materials were available cheaply at any time in any quantity as resources are plentiful and wages in export nations low. The former is no longer the case and the latter will not be: the window for cheap raw material imports is closing. Instead, the aforementioned fields of application will compete for access to strategic metals and those that fall short may have to cease production - at least that should have been learned from the chip supply crisis.

**What to do?**

* The need to accelerate the expansion of renewable energies and to "save energy" is undisputable. However, the perspective must be broadened considerably. It is not only about (even faster) increasing energy efficiency, but also about reducing the activities that generate energy consumption (from flying to flat size). And it is more generally about buying (new) products that generate more production, energy and raw material consumption. Thus, energy saving leads to the question "how much is enough"? Within planetary limits, "prosperity for all" is only possible if in particular the rich significantly reduce their resource consumption demands.
* All measures that have a negative impact on long-term goals should be refrained from: no general subsidies for fuels, mobility, electricity, heating, food, etc. - prices are indicators of scarcity and have an important message. Instead, targeted relief must be given to needy, vulnerable groups (i.e. lower net income) without paternalistic distortions. The sustainability goals are at risk to be undermined by the growth of the military-industrial complex and the waste of resources in the arms race.
* In the crisis and in the post-growth era, an effective and focused social policy, distributing the transformation burdens and gains fairly, is indispensable. Tax increases, especially in income tax, are unavoidable for this. A basic more or less free supply providing all households with a minimum level of energy (without having to wait for adjustments in transfers) could be paid for not from taxes, but through progressive energy user rates. Financing social expenditures through public debt is no long term sustainable option.
* The path to Russian gas servitude was advantageous and rational for individual companies. The deficit in overall economic strategic planning is obvious. The globalisation of the European economies should be reduced to an "optimal" level that evaluates cost advantages and risks of supply chain disruption not only on an individual economic basis. Re-regionalisation has cost disadvantages but strengthens European value creation.

Morally pathetic and intolerable are the war profiteers who try to reheat their concepts, which rightly ended up on the rubbish heap of history, on the fire of burning cities. Nuclear energy, fracking, coal power, oil and gas drilling in the Wadden Sea, agriculture on protected land and even more use of agrochemicals are only the most prominent examples - all that is missing is more motorway construction for faster troop movements. After all, that was their original purpose.

**References and author information** are accessible at <https://doi.org/10.13140/RG.2.2.12105.62568>