BOX I The Implications of Degrowth Scenarios for the Plausibility of Climate Futures

Our assessment of deep decarbonization by 2050 shows that the plausibility of this scenario is substantially constrained by the persistent, or in some contexts even increasing, dependence on and profitability of fossil fuels. The climate protection plans and the climate-related regulations of most countries are still based on economic growth scenarios (Section 3.5), revealing that economic growth remains a key societal goal around the world. Despite the unprecedented deployment of renewable energy production and demand, global consumption trends and corporate responses pose fundamental barriers to the plausibility of decarbonization (not to mention deep decarbonization) because they remain very much based on fossil-fuels and are thus responsible for rising greenhouse gas emissions (Sections 3.8 and 3.10). Unlike previously assessed (Engels et al., 2023), the dynamics of fossil-fuel divestment now even point away from deep decarbonization. Recent geopolitical events, such as new military conflicts, and the lack of restrictions for subsidies or investments in fossil fuels have significantly hindered fossil-fuel divestment while increasing the sector's profitability and therefore the financial engagements with it (Section 3.9).

These driver assessments all indicate that growth is still a very strong organizing principle of social dynamics and that there is no observable empirical evidence for a path departure that would effectively lead away from a universal growth pattern. Therefore, a growing number of studies critically analyze political programs that are legitimized as green growth or green capitalism (Fox, 2023), which promise a decoupling of economic growth from emission intensities or even volumes, as well as from other environmental and resource-oriented indicators. Degrowth scholars and advocates contest these assumptions central to conceptualizations of green growth (Vogel and Hickel, 2023), or they point out how pathways to decarbonization, for example via sweeping electrification, may paradoxically lead to new dependencies on raw materials and lock-in investments in fossil fuel infrastructure if there is no departure from the growth model (Vezzoni, 2023).

Parallel to the increasing recognition of limits to green growth, there is ever more research (Kallis et al., 2018), recognition, and political relevance of degrowth as a concept and as a new development approach (Kallis et al., 2024). Degrowth is both a normative and an analytical concept that refers to "a planned reduction of energy and resource use designed to bring the economy back into balance with the living world in a way that reduces inequality and improves human well-being" (Hickel, 2020, p. 1). Degrowth scholars therefore not only contest the prevalent focus on GDP growth as a measure of human and economic development, but also advocate for a planned, equitable reduction in production and consumption. They do so by referring to concepts such as conviviality and sufficiency as proposals to shifts in consumption and production patterns that couple human development with environmental sustainability while promoting climate justice (see also Abi Deivanayagam et al., 2023; Sandberg, 2021; Wiedmann et al., 2020). The concept of degrowth rejects the assumption that economic growth is a universal precondition for societal development and advocates for alternative ways of organizing the economy based on a preferred path where societies consume fewer natural resources and prioritize norms and practices such as sharing, simplicity, conviviality, and care (Kothari et al., 2014). Sufficiency, in turn, regards a "set of measures and daily practices that avoid demand for energy, materials, land, and water while delivering human well-being for all within planetary boundaries" (IPCC, 2023, p. 31). For the first time since the IPCC was established, degrowth was recently included both in its key climate adaptation and mitigation assessments as a perspective on development and as an alternative to growth-based models as well as carbon-intensive consumption and production patterns (IPCC, 2022a; 2022b). This indicates an incipient broadening of perspectives on pathways of transformation and climate futures within the key context of knowledge production shaping climate governance dynamics (see Section 3.11). The IPCC has been criticized for limiting assumptions about possible mitigation pathways (Beck and Oomen, 2021; Pielke and Ritchie, 2021) and for not accounting for the multiplicity of visions about desirable pathways (Braunreiter et al., 2021). The example of excluding degrowth from previous mitigation scenarios, as Cointe and Pottier (2023) show for the IPCC's Fifth Assessment Report (AR5), highlights the responsibility of involved researchers to reflect not only on their own underlying assumptions, but also to account for diverse visions of climate futures. This does not mean to take other visions, such as degrowth, as a new default. It rather highlights the necessity to not assume the growth model as naturally given or as a universal truth, but to acknowledge that it is a socially constructed paradigm (Schmelzer, 2016).

Degrowth scenarios involve climate mitigation options that question the feasibility of green capitalism, green growth, and circular economy (Hickel, 2020; Hickel et al., 2021). Some are also based on the principle of "private sufficiency, public luxury," which refers to promoting social equity, sustainable consumption, and increased access to high-quality public services, such as education, health and mobility (Wilson, 2023). Amongst the concrete proposals of degrowth advocates are the implementation and

diffusion of sufficiency strategies as well as the transformation of modes of production and consumption through regulation (e.g., the end of planned obsolescence) and modes of governance (toward more participatory arrangements and inclusive international organizations) (e.g., Hartl et al., 2023; Bodirsky et al., 2022; Hickel, 2020). Coined in the Global North and influenced by Global South perspectives (Demaria et al., 2013; Hickel, 2020; see also Eastwood and Heron, 2024, Part V), degrowth, its diffusion, and increasing political influence are also relevant to and have implications for the Global South. While degrowth is comparable to Global South principles such as Buen Vivir (from Latin America), Swaraj (from India), and Ubuntu (from South Africa), its approach and concrete measures have been mostly developed for Global North countries (Kothari et al., 2014; Hickel et al., 2021). Global South activists and scholars advocate for more participation in the international debates and establishment of concepts alike (Rodríguez-Labajos et al., 2019) while also recognizing opportunities for positive impacts on socio-environmental issues and challenges in terms of societal legitimation and for policy-making processes (Oboro, 2023; Joseph et al., 2023; Salman et al., 2023).

In light of our plausibility assessments and drawing on the observed densification of resources for climate action, it is imaginable that degrowth scenarios can become resources for climate action, for instance if they are used by social movements or other social actors as parts of packaged knowledge (see Section 3.12). If and to the degree that this happens, degrowth scenarios can enlarge the plausibility range of deep decarbonization. So far, however, degrowth as a concept and new development approach has not gained enough traction to affect the direction of any driver. Currently, our plausibility assessment of the social drivers inhibiting the pathways toward deep decarbonization (such as corporate responses, fossil-fuel divestment, consumption trends) rather underlines how the prevailing belief in economic growth shapes all social driver dynamics. The Outlook assessment updates will remain inclusive as to how diverse ways of envisioning climate futures affect decarbonization dynamics. This encompasses exploring degrowth scenarios, particularly if empirical evidence indicates their influence on social dynamics.

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