TABLE 1

Summary of social plausibility assessments

Social drivers	If the driver continues its current trajectory, will it support or undermine social dynamics toward deep decarbonization?	Do currently observable enabling or constraining conditions support or undermine driver dynamics toward deep decarbonization?		In relation to the 2021 Outlook assessment, are there signs that the direction of this driver is or will be changing?	Under which conditions (e.g., changes in enabling conditions, interaction with other drivers) would a change in direction toward deep decarbonization be expected?	Does this driver provide global resources that are visible and accessible to other social actors or drivers, and how are these resources changing or showing signs of changing?
Supports deep decarbonization by 2050 Supports decarbonization, insufficient for deep decarbonization by 2050 Ambivalent with regard to deep decarbonization by 2050 Inhibits decarbonization		enabling conditions constraining conditions effect uncertain		➤ or ➤ signs of change in direction toward or away from deep decarbonization ⛔ No signs of change in the directon of the driver		
6.1.1 UN climate governance	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** COP26 relaunched UN climate governance. It facilitated new sectoral initiatives, net-zero pledges, and a call to "phasing down" coal and "phasing out" fossil-fuel subsidies. If implemented, new pledges and initiatives could limit warming to 2.1°C and below in the most optimistic scenarios. But initiatives are non-binding and ambition of NDCs insufficient. The "trust gap" in climate finance delivery constitutes a major obstacle for UNCG's ability to facilitate low-carbon development in the Global South.	Russia's invasion of Ukraine: opportunities for quicker decarbonization, but risks of "securitizing" climate policy and locking in new fossil-fuel dependencies. COVID-19: recovery programs in most countries did not end fossil-fuel lock-in. Climate protests regaining momentum through COP26 after many COVID-19-related restrictions were lifted. Pro-climate legislation in the USA, EU; climate-friendly governments e.g., in Australia, Brazil.		➤ Glasgow COP was an important milestone in the post-Paris process, but NDC ambition levels and implementation efforts are still far from Paris Agreement goals.	A major change in direction can be expected as a result of new geopolitical developments: (i) new international cooperation following an end of Russia's invasion of Ukraine, or (ii) a breakdown of UN multilateralism as a consequence of rising US-China tensions.	This driver provides an arena for public performances, showcases best practices and instruments of soft coordination, orchestrates transnational climate governance. It institutes cycles of country submissions and reporting mechanisms that facilitate and synchronize climate-related regulations. It constitutes media opportunities for climate-related performances, agenda setting, and framings for climate protests.
6.1.2 Transnational initiatives	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** Transnational coordination of cities, regions, businesses, and investors can help reduce global emissions. They contribute to climate governance through advocacy, policy monitoring, best practice exchange, development of voluntary market standards (e.g., ecolabels, emission trading schemes, reporting standards, disclosure platforms). Their effectiveness depends on a high sustainability standard, enforcement mechanisms, and a wide uptake, which is not always the case.	Hightened visibility helped to attract new initiatives, increase ambition, launch new campaigns. While they mostly rely on a market logic, transnational initiatives have struggled to structure viable business cases for sustainability markets in a context of low and fragmented carbon pricing. There is a lack of key institutional arrangements (e.g., ambitious target design, monitoring and reporting obligations, third party auditing, enforcement procedures) and national regulatory frameworks.		➤ The past three years saw substantial increase in the number of transnational initiatives and progressive upgrading of ambitions to align with the 1.5°C temperature goal. Since 2020, the Race to Zero campaign has mobilized thousands of non-state and subnational actors operating in multiple sectors for the adoption of net-zero pledges at the entity level. Transnational initiatives facilite a strategic shift toward the implementation of the net-zero pledge via standard setting and advisory activities.	Transnational initiatives will support deep decarbonization, provided that they attract new members from high emitting sectors and countries in the future. They can also improve transparency on greenhouse gas emissions if they diffuse ambitious reporting standards and solve data gaps to establish credible baselines. Broader participation in decision-making will be key to establish stringent environmental criteria while protecting human rights, nature, and equity. Finally, effective accountability will not happen without favorable regulations and policy incentives.	Transnational initiatives support UN climate governance by advocating more ambitious and participative NDCs, creating supportive global narratives, translating international climate norms for non-state and subnational actors. They formulate policy recommendations and design standards for climate-related regulation and implementation, e.g. policy monitoring. They guide corporate responses through capacity building and best practice sharing, develop standards, offset certifications and ecolabels for the development of sustainability markets. They produce and provide key information, knowledge, and expertise in support of divestment strategies, sustainable consumption patterns, and social movements. They frame political agendas, and influence public opinion.
6.1.3 Climate-related regulation	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** In addition to a residual ambition gap, there is a substantial implementation gap in all major carbon-emitting jurisdictions.	There are promising reforms under way, especially at the EU level. Current reforms face fierce opposition due to structural conflicts and the recent surge in energy prices. Bans of energy imports from Russia are amplifying the problem. Several measures to relieve consumers and industry from rising energy bills effectively take the form of fossil-fuel subsidies.		➤ Given the current trends and conditions, the signs are that a significant implementation gap will persist for several years to come.	Closing the implementation gap under the voluntary architecture of the Paris Agreement requires voters and interest groups to place continuous pressure on governments not only to set and stick to abatement pledges, but rather to put effective climate policy instruments in place. The climate litigation driver might play an important role in keeping governments on track.	Regulatory innovations and stringent implementation can be key material resources for other social drivers if they create enabling conditions for climate litigation and fossil-fuel divestment. The EU Green Deal and the Fit for 55 package can provide scripts as potential role models for decarbonization. If both ambition and implementation gaps were overcome in major economies, this would provide symbolic and material resources for the global opportunity structure.
6.1.4 Climate protests and social movements	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** Climate protests and social movements have become key players in the climate-related political process. Short-term direct effects of the driver appear to be limited; long-term and often indirect effects such as shifts in broader public perceptions suggest a positive effect toward deep decarbonization, supported by a growing importance of the climate justice frame.	General and ongoing public interest in and focus on climate policies. Russia's invasion of Ukraine, the ongoing COVID-19 pandemic, and its consequences. While it is not yet possible to fully assess the scale of impacts, the ability to mobilize and shape public discourse to support decarbonization is challenged in light of growing concerns over energy security.		➤ Social movements' internal struggles and tensions regarding mobilization, repertoires, and justice issues as well as implications of the COVID-19 pandemic and Russia's invasion of Ukraine constrain the driver in the short term. Nevertheless, social movements and climate protests support deep decarbonization in the long term by raising awareness within society and among policymakers.	Addressing the internal and external challenges and constraints could further support and accelerate change toward deep decarbonization. At the same time, it remains an open question whether the process of contestation over strategy and scope of desired changes within movement factions will result in stronger political alliances and broader support.	Climate protests and social movements occupy a central position in many climate debates, and provide ideas, norms, and visions. These can trigger reinterpretations of meaning for societal discourses and for individual lifestyle choices, e.g., the recent trend toward climate justice reframes climate change and associated policy preferences. The driver generates media attention, has an influence on public agendas, and creates public pressure. This provides incentives to divest from fossil fuels. Social movements have often developed into NGOs, which are consulted for specialized knowledge. The driver further provides repertoires and spaces for sustainable practices.

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6.1.5 Climate litigation	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** Climate litigation supports decarbonization in close interaction with climate-related regulation, knowledge production, climate protests and social movements, fossil-fuel divestment, corporate responses, and media. It is plausible that climate litigation will increase further, target more companies of the fossil-fuel industry and beyond, and spread geographically—with the exception of the US where recent developments in the US Supreme Court might have a deterring effect.	We observe a strengthening in "rules of engagement" for climate action (access to justice, fundamental legal norms, scientific evidence, social institutional environments). Legal, scientific, and sociopolitical enabling conditions of climate litigation were also mostly strengthened. With regard to the US, we found negative developments in the "rules of engagement" and legal enabling conditions (conservative majority in the US Supreme Court and its negative ruling on US EPA's lack of authority to regulate greenhouse gas emissions).		▶ We do not observe signs that the direction of the driver is changing on a large scale. Russia's invasion of Ukraine yields new reasons for a fast energy transition that can be used in climate litigation, but the conservative majority in the US Supreme Court and its recent decision on West Virginia v. EPA is likely to slow down climate litigation in the US but not elsewhere.	Accelerating enabling conditions include broader access to courts, new landmark rulings in favor of climate protection (e.g., company liability, change in burden of proof), an enhanced push toward more hybrid movements including contestation of climate politics with the view of taking the adversaries to court, and significant advances in attribution science.	Key global resources: Legal precedents (case law), network capacities (cross-scale litigation networks, enabling circulation of practices, people, frames, and knowledge), expert knowledge (e.g., research conducted to establish causality and attribute emissions), climate-related frames and narratives (e.g., climate justice, corporate responsibility) and agenda-setting (via political discourse and media coverage). We observe a shift from mere visibility toward materiality of climate litigation-related repertoires in the global opportunity structure.
6.1.6 Corporate responses	**Inhibits decarbonization.** Current corporate responses undermine the social dynamics and global efforts toward deep decarbonization. Despite recent trends of net-zero pledges and science-based targets, the majority of companies are still not responding adequately to support decarbonization.	Market-based developments tie closely with investor relations and consumption patterns, which often undervalue decarbonization strategies. Non-market developments include many transnational initiatives supportive of corporate decarbonization, among them the Science Based Targets initiative (SBTi) and the Task Force on Climate-Related Financial Disclosures.		⛔ Two parallel transnational initiatives may indicate that this driver can potentially change in the future: the Science Based Target initiative (SBTi) and the Race to Zero Campaign of the UNFCC. While only a small fraction of all companies is adopting such measures currently, these have great potential to gain traction among the heaviest emitters in all industries.	As corporations conduct business on global levels, two other drivers will support a change of corporate responses toward deep decarbonization: transnational initiatives and consumption patterns. Transnational initiatives as intermediaries between the public and private sectors can strengthen climate-related regulation and pressure from investors and other stakeholders. If consumption patterns move toward deep decarbonization, corporations will follow because of their profit-seeking motivation.	Via reporting and disclosure, corporate responses provide knowledge that can support societal agency in other drivers, such as information for investment or divestment decisions, or reference points for climate litigation and for climate protests and social movements. If net-zero targets are backed by strong corporate mitigation efforts, this would provide climate-neutral goods and services to consumers and could thus change consumption patterns.
6.1.7 Fossil-fuel divestment	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** Fossil-fuel divestments are growing in number and volume, but these are not sufficient to prevent investments in fossil-fuel engagements from being profitable or at least politically necessary. Governments on average continue to plan for massive investments in coal, oil, and natural gas.	There is a growing market for green or fossil-free financial products. Long-term expectations are slowly building up (but not yet widespread) that fossil fuels will eventually become "unburnable" and turn into stranded assets. The profitability of fossil-fuel engagements is expected to remain high, at least in the short term. Subsidies for fossil fuels are continuously granted in many countries.		▶ We register increased attention among investors and attempts to create transparency and engage in rule setting to push for divestment.	Russia's invasion of Ukraine could push governments toward reducing their dependence on fossil fuels. Governments would need to realign their fossil-fuel plans with their climate pledges and reduction targets under the Paris Agreement. We also see a chance that climate litigation is used to push governments in this direction. Some large-scale initiatives tackling fossil path dependency and stranded assets are being introduced.	Divestment decisions serve as both a political and a financial signal to other actors. If divestment grows, it will change market conditions for corporations and thus trigger corporate responses toward decarbonization. At the moment this driver is more dependent on resources coming from other drivers (e.g., climate-related regulations, UN climate governance, transnational initiatives, social protests, and climate movements) than vice versa.
6.1.8 Consumption patterns	**Inhibits decarbonization.** Current worldwide consumption patterns substantially undermine the social dynamics and the global efforts toward deep decarbonization. The limited effects of changes toward low-carbon consumption patterns are expected to be further largely absorbed by the continued growth in the demand and production of (new) carbon-intensive goods and services.	Implementation of climate-friendly infrastructure, increased energy efficiency, replacement of fossil fuels by renewable energy supply, some behavioral changes, increasing lifetime of products, tackling social inequalities. Effects of enabling conditions are nullified by several constraining conditions, e.g., hegemony of growth- and fossil-fuel-based political and economic systems, unequal distribution of wealth, goods, and services, along with the institutionalization of massive (and uneven) high-carbon consumption patterns.		▶ The growing consumption of energy, transport, food, and garments worldwide, and especially among affluent consumers, continues to drive an increase in global emissions, while no enforcement mechanisms requiring low-carbon consumption standards have been observed.	The implementation of ambitious climate-related regulations and a limitation of carbon-intensive luxury consumption might significantly change the ongoing dynamics of this social driver. Knowledge production on the constraining conditions for sustainable production and consumption systems and exploring post-growth climate mitigation scenarios can also shift consumption patterns toward decarbonization, especially if reinforced by fossil-fuel divestment and ambitious corporate responses to climate change.	This driver has an important impact on global emissions and on the dynamics of other social drivers of decarbonization, such as corporate responses and fossil-fuel divestment. The ways in which worldwide consumption patterns evolve provide these and other social drivers such as knowledge production, climate litigation, and climate-related regulation with important insights into what enables or constrains significant shifts in consumers' habits.
6.1.9 Media	**Both supports and inhibits deep decarbonization (ambivalent).** Journalistic attention to climate change reveals volatile behavior. Although journalistic reporting has become more interpretative and evidence-based, a focus on conflict can still allow for climate denial to enter media coverage. The journalistic framing of the topic is only to some degree aligned to what has been deemed a successful framing in media effect studies.	Trends toward transformative journalism and newly established formats and websites. Conservative political leaning of some media organizations, the challenges (science) journalism faces, competition by sources of information not constraint by journalistic norms and values. Social media platforms fulfill different roles in the climate change debate and many fringe media seem to promote an anti-science agenda with regard to climate change.		⛔ The direction of this driver is in constant flux. This direction is dependent on individual patterns of information use, the role journalism plays in society, and the degree to which social media and fringe media are regulated. Pressing issues such as the COVID-19 pandemic or Russia's invasion of Ukraine in 2022 also limit media attention to climate change.	High journalistic attention, an empowering framing, the engagement of individuals and organizations, strong and independent (science) journalism, and effective countermeasures/regulations for social media and fringe media would ensure greater support for deep decarbonization.	This driver provides attention and visibility to all other drivers, and establishes new framings—this is especially true for journalism because of its broader reach. There may be more destabilizing effects of social and fringe media that need to be considered. Furthermore, the driver supports diverse ways of knowing: there are increasingly more actors, voices, and frames represented in diverse media (outlets). These media (e.g., journalistic, social, and fringe) are also interconnected in such a way that they affect each other.
6.1.10 Knowledge production	**Supports decarbonization, but not sufficient for deep decarbonization by 2050.** An increase in packaged knowledge resources supports decarbonization and adaptation. Some global sites of knowledge production provide resources for societal agency toward decarbonization through policy-oriented assessments and increased earth observation capacities. Deep decarbonization requires a greater integration of diverse ways of knowing to produce socially robust knowledge.	Packaged knowledge constitutes an enabling condition in political processes by providing global climate data and research that informs decision-making in envisioning and enacting decarbonization pathways. Packaged knowledge becomes a constraining condition when it fails to integrate contextual knowledge, which is required for socially just transitions.		⛔ In our updated assessment, we do not observe signs that the direction of the driver is changing. The ongoing COVID-19 pandemic and Russia's invasion of Ukraine may shift global attention to other issues. Knowledge production with regard to climate change remains a central dynamic.	Enabling conditions include a more systematic and profound approach to account for diverse ways of knowing and justice, for example in energy transitions, and a broader consideration of social dynamics. The growing tendency to focus on technological fixes excludes required social engagements with conditions for deep decarbonization.	The driver particularly shapes and interacts with media, climate protests and social movements, climate litigation, and UN climate governance. While technological developments can provide additional knowledge resources and thus positively shape the pathways toward deep decarbonization in other drivers, they can also create new barriers and limit the accessibility of knowledge.