3 Understanding transformational change

This chapter introduces the concept of transformational change in the context of climate change mitigation and sustainable development. It builds on the scientific literature on sustainability transitions[9] and defines transformational change for the purposes of this methodology.

3.1 Transformational change in the literature

In social science, many scholars have sought to understand how technological and societal changes occur, and conceptualize how political, social and technical paradigms transform from one state to another. This has led to a number of observations on historical change processes and analysis of their drivers, to distil common characteristics of how these changes occurred. It has also led to several attempts to define what constitutes transformational change in general. Table 3.1 shows some recent definitions of transformational change.[10]

TABLE **3.1**

Examples of definitions of transformational change

Definition	Source
A transition is a radical, structural change of a societal (sub)system that is the result of a coevolution of economic, cultural, technological, ecological and institutional developments at different scale levels.	Rotmans and Loorbach (2009)
Transitions are non-linear processes that can result from the interplay of multiple developments at three analytical levels: niches (the locus for radical innovations), socio-technical regimes (the locus of established practices and associated rules), and an exogenous socio-technical landscape.	Geels (2012)
The altering of fundamental attributes of a system (including value systems; regulatory, legislative or bureaucratic regimes; financial institutions; and technological or biological systems).	IPCC (2012)
A structural change that alters the interplay of institutional, cultural, technological, economic and ecological dimensions of a given system. It will unlock new development paths, including social practices and worldviews.	Mersmann et al. (2014a)
Projects are considered as conducive to transformational change if they: • contribute to enabling either a significant evolution in terms of scope (e.g. scaling-up or replication), or enabling a faster and/or a significant shift from one state to another; • have a catalytic effect and include mechanisms to ensure the sustainability of the impacts, local ownership and political will, the involvement of the private sector and the use of innovative technologies and approaches; and • allow for systematic learning processes.	NAMA Facility (2014)

[9] The literature tends to use "transition" and "transformation" interchangeably to describe processes that are referred to as "transformational change" in this methodology.

[10] This list was prepared as part of discussions with the TWG and was later updated to include other examples from climate finance institutions.

TABLE **3.1,** continued

Examples of definitions of transformational change

Definition	Source
Paradigm shift potential, one of the investment criteria for the Green Climate Fund, is defined as the degree to which the proposed activity can catalyse (mitigation) impact beyond a one-off project or programme investment. It talks about the project/programme's potential for scaling up and replication, and its overall contribution to global low-carbon development pathways being consistent with a temperature increase of less than 2 degrees C.	Green Climate Fund (2015)
Transformational change through Nationally Appropriate Mitigation Actions (NAMAs) is a change that: • Disrupts established high-carbon pathways, contributes to sustainable development and sustains the impacts of the change (goal criteria). • Is triggered by interventions of actors who innovate low carbon development models and actions, connect the innovation to day-to-day practice of economies and societies, and convince other actors to apply the innovation to actively influence the multi-level system to adopt the innovation process (process criteria). • Overcomes persistent barriers toward the innovated low carbon development model and/or creates new barriers which hinder the transformed system to relapse into the former state ('low-carbon lock-in' criteria).	Olsen and Fenhann (2016)
A transformation is a long-term fundamental shift in a system, whether political, economic, social or biological. Transformations are typically viewed as multi-actor, multi-scale processes, where the change is highly non-linear. Low-carbon energy transformations have three characteristics: large magnitude impact; non-linear change; sustained and long-term.	Westphal and Thwaites (2016)
Irreversible, persistent adjustment in societal values, outlooks and behaviours of sufficient width and depth to alter any preceding situation.	TRANSIT (2017)
Strategic changes in targeted markets and other systems with large-scale, sustainable impacts that accelerate or shift the trajectory toward low-carbon and climate-resilient development.	Climate Investment Funds (2018)

Some general attributes of transformational change processes can be distilled from these definitions:

- Transformational change is a change of **systems**, not just singular developments, and involves multiple actors at multiple levels.
- Transformational change constitutes deep, **fundamental change** that **disrupts** the status quo, and sustains that change over a long period.
- Transformational change by itself has **no normative connotation**; values are added by **defining a transformation goal**.

Throughout this methodology, the term "system" is used to describe the part of society that is targeted by a particular policy. A system generally refers to a set of interconnected elements working together with some degree of harmony to fulfil various functions. These elements can be physical entities (e.g. humans or machines); legislative, institutional, political or fiscal structures; or financial rules and regulations organized to achieve a set of objectives and functions.

Box 3.1 further distinguishes transformational change from other types of change.

BOX **3.1**

Types of change

Policies are about planned interventions for change; this has always been the case. What is new and different about transformational change compared with other types of change? One way to answer this is to distinguish between incremental change, reform and transformation, as shown in Table 3.2. Incremental change often entails adjustments that allow the usual state of affairs to continue (e.g. increasing awareness about water conservation). Reform involves addressing a problem, which may alter business as usual but does not fundamentally change the system (e.g. charging higher rates to encourage consumers to reduce their water use). Transformational change explicitly leads to a new system – that is, a new paradigm or regime, and new attitudes and values – while questioning the old ones (e.g. cities and their residents investing in sustainably landscaped outdoor spaces). These are not mutually exclusive types of change; rather, the difference lies in the degree of change. For instance, incremental change and reform can contribute to an enabling environment for transformative change.

TABLE **3.2**

Types of change

	Type of change		
Example	Incremental	Reform	Transformation
Waste	Less waste (waste regime)	Waste recycling (waste regime)	Cradle to cradle (no-waste regime)
Energy	Increasing energy efficiency (low-carbon regime)	Promoting renewable energy while continuing to use fossil fuels (low-carbon regime)	Abandoning fossil energy, using 100% renewables (zero-carbon regime)

Source: GIZ (2020)

Societal systems are complex – they exhibit dynamic, non-linear as well as linear, and sometimes unpredictable change. Therefore, it may not always be possible to identify a complete chain of causal processes. However, even a partial understanding of the dynamics of change can help develop policy interventions that are more likely to lead to transformation. Processes that aim at transformational change are less likely to be effective if they target issues in isolation. In such a case, everyone involved could act dutifully and rationally, and with good intent, and still produce unintended side effects that no one wants. Inhibitors to change may be rooted in the internal structure of complex systems, and thus finding a solution in one part of the system may cause unintended problems in another part of the system. Therefore, it is essential that the design of a transformative intervention takes its entire systemic context into consideration.

Transformational change as a systemic process affects different parts of society. Because subsystems typically overlap, even small change processes do not have completely isolated impacts. Taking a systemic view means expecting and planning for transformations at many levels, ranging from the local level up to the national or even international levels. Large policy interventions have impacts at lower levels of governance, and local-level activities can also have impacts at higher levels – for example, through learning about successes, or when local interventions affect other regions or countries. Case studies of ongoing or planned transformations for low-carbon and sustainable development are available in the literature.[11] They include Germany's experience with transformation of parts of the energy system; the role of wind power

[11] Olsen and Fenhann (2015).

in electricity generation in Denmark; the transition to a sustainable transport system at city level in Bogotá, Colombia; and the potential leadership role of state-owned companies in South Africa to lead a transition away from carbon lock-in. There are also various examples that seemed transformational, but the change was reversed over time, underlining the importance of being able to sustain transitions over long periods. For instance, deforestation in Brazil declined by 75% during the decade from 2005 to 2014. However, it has been on the rise since 2014, demonstrating that transformational change experienced for a decade can continue to be vulnerable to political changes in governance.

3.2 Definition of transformational change in this methodology

Transformational change in this methodology is a conceptual framework to describe the impact of a change process. Transformations can lead to a better or a worse state, so the desired direction of change (i.e. to a better state) needs to be defined. Transformational change in relation to climate change is inseparably connected to sustainable development. Therefore, this methodology is problem oriented towards promoting zero-carbon, climate-resilient, resource-efficient and sustainable societies, in line with the goals of the Paris Agreement and the SDGs.

As transformational change as a concept is gaining significant traction among climate change and sustainable development decision makers and practitioners, there is a need for a comprehensive definition specific to climate change mitigation, grounded in both theory and practice.

With this background, transformational change is defined in this methodology as:

> **A fundamental, sustained change of a system that disrupts established high-carbon practices and contributes to a zero-carbon society, in line with the Paris Agreement goal to limit global warming to 1.5–2°C and the United Nations SDGs.**

The terms "carbon" and "CO_2" are used interchangeably in this methodology. Zero carbon refers to zero CO_2 equivalent (CO_2e) emissions, which takes into account other GHG emissions. Zero carbon means "net zero carbon", which implies that some remaining CO_2 emissions can be compensated by the same amount of CO_2 uptake, provided that the net emissions to the atmosphere are zero. The global temperature goal and the SDGs indicate the desired direction and magnitude of change needed. Alignment with the global goals should inform the assessment, particularly the vision of the policy towards enhanced ambition for NDC implementation and the global stocktake of collective NDC efforts to meet the Paris Agreement goal.

Assessment of a policy's alignment with global goals and planetary boundaries can be assessed through absolute, quantitative approaches that downscale the global goals to a country, sector, company or other level. Box 3.2 explains this approach and provides an example from Uganda. However, absolute quantitative approaches to determine alignment with planetary boundaries are an emerging field of research. Currently, there is no political consensus on what constitutes a fair and just approach to share the global carbon budget. Therefore, this methodology takes a *qualitative* approach to define transformational change and assess alignment with the global goals.

Transformational change as defined above is characterized by:

- **large-scale outcomes or a multitude of smaller-scale changes leading to large-scale, system-wide impacts**
- **sustained, long-term outcomes that reinforce zero-carbon practices while avoiding carbon lock-in and dependence on fossil fuels.**

Transformational change as considered in this methodology is not an organic or incremental evolution in line with the self-organizing dynamics of a system. Instead, transformational change means that the general paradigm and existing standards of how to do things are challenged, and old path dependencies are disrupted. The kind of transformational change that this methodology focuses on is the "planned" transformation – that is, the transformation that is intended through the adoption of purposeful policy and regulation that aim to shift emissions trends towards zero-carbon and sustainable development goals. This requires an intentional, long-term change strategy for how the system can transform and what the outcome of transformation should be.

The methodology identifies four main drivers (or processes) of system change based on the existing literature:

- **technology change** – processes, skills and practices that drive research and

development, early adoption and widespread scale-up of clean technologies

- **agents of change** – governments, entrepreneurs, the private sector and civil society, as well as cross-cutting coalitions and networks as agents of transformational change

- **incentives for change** – economic and non-economic incentives, along with disincentives, which play a critical role in shifting technology and societal change

- **norms and behavioural change** – include processes that influence awareness and behaviour of people to drive a long-lasting change in societal norms and practices.

Although transformational change is context dependent, if change is to occur, all four processes listed above are important and interdependent as elements of the system targeted for change. A long-term (e.g. 20 or more years) management strategy is equally necessary. Strategies and implementation modalities should be adapted to technology development, changes in norms and changes in the economy. Effective and adaptive change management strategies, as well as continuous learning, are critical elements.

Figure 3.1 illustrates the logic of this methodology. Assessment of transformational impact consists of assessment of processes and outcomes of change, and is supported by a number of characteristics and indicators.

The layers of the assessment follow the layers of the definition of transformational change:

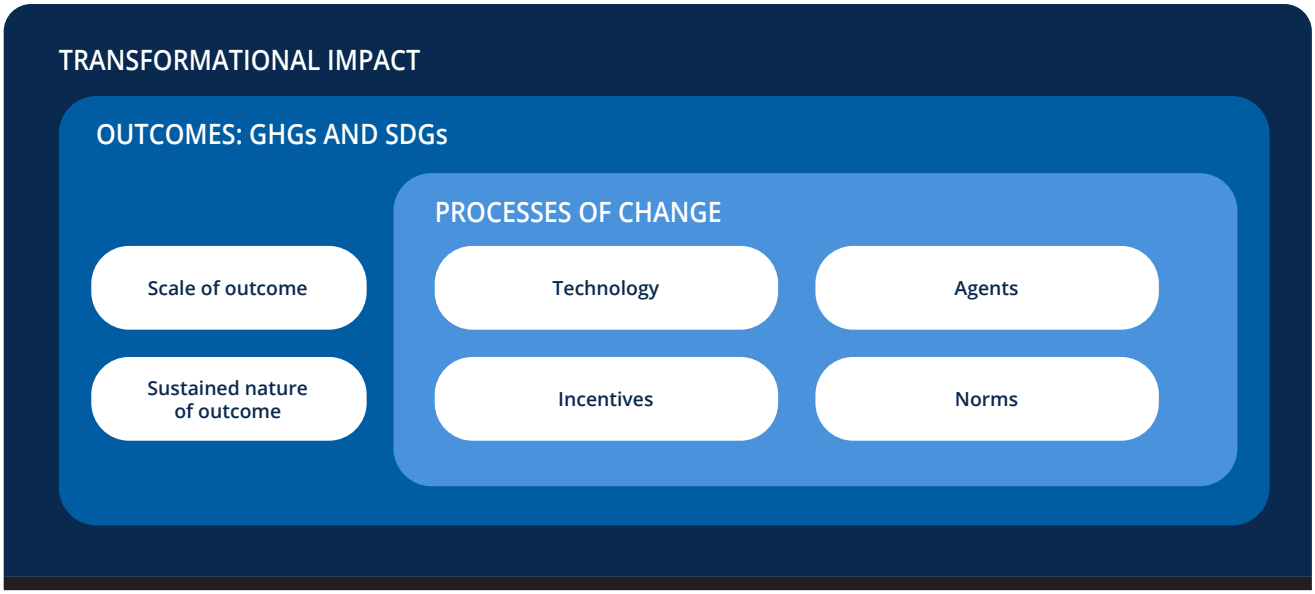
- The extent of the overall transformational impact is assessed through the policy's contribution to a system change towards zero-carbon and sustainable development goals.

- The outcomes of a transformational policy are determined through its contribution to achieving GHG mitigation and sustainable development at a large scale – in terms of the magnitude of change and how widespread it is – and sustained over time.

- The processes of a transformational policy comprise technologies, change agents, economic incentives, and a change in norms and behaviour, as well as effective change management that is open to continuous learning and integration of changing circumstances.

FIGURE **3.1**

Layers of transformational impact assessment



BOX **3.2**

Downscaling global goals for individual policies

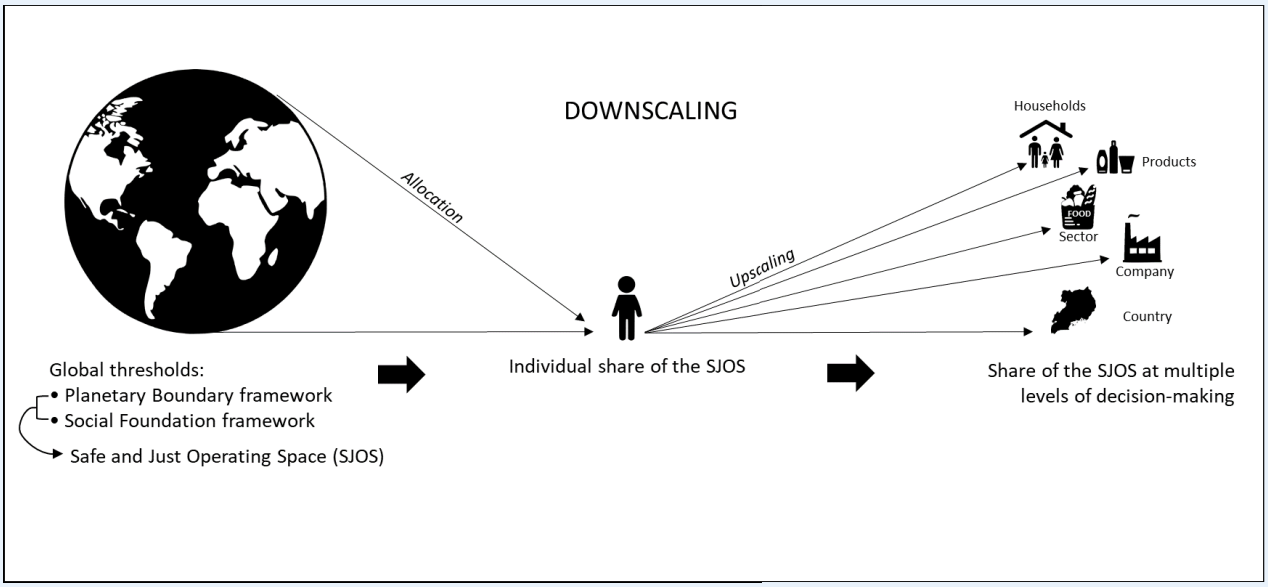
Scientists have proposed a set of nine Planetary Boundaries (climate change, biosphere integrity, land system change, freshwater use, biogeochemical flows, ocean acidification, atmospheric aerosol loading, stratospheric ozone depletion, and novel entities) to assess the environmental stability of the Earth System.[12] For the climate change Planetary Boundary, a prominent example is the IPCC SR1.5 global carbon budget approach to determine how much CO_2 can be emitted globally to limit global warming to 1.5°C.

The Science Based Targets initiative (SBTi)[13] is another example, which provides three methods (sector based, absolute based and economic based) for companies and other non-state actors to set targets in line with what the latest climate science says is necessary to align with the Paris Agreement goal.

To embrace social aspects of sustainability, the Safe and Just Operating Space (SJOS) defines a space for humanity to ensure that humans continue to enjoy a stable and resilient Earth.[14] Several attempts have been made to downscale thresholds for the global goals, so that they can be applied at multiple levels of decision-making, as illustrated in Figure 3.2.

FIGURE **3.2**

Downscaling of global thresholds



[12] Rockström et al. (2009).

[13] The SBTi (https://sciencebasedtargets.org) is a collaboration between CDP, the United Nations Global Compact, the World Resources Institute and the World Wide Fund for Nature (WWF).

[14] Raworth (2012).

BOX **3.2,** continued

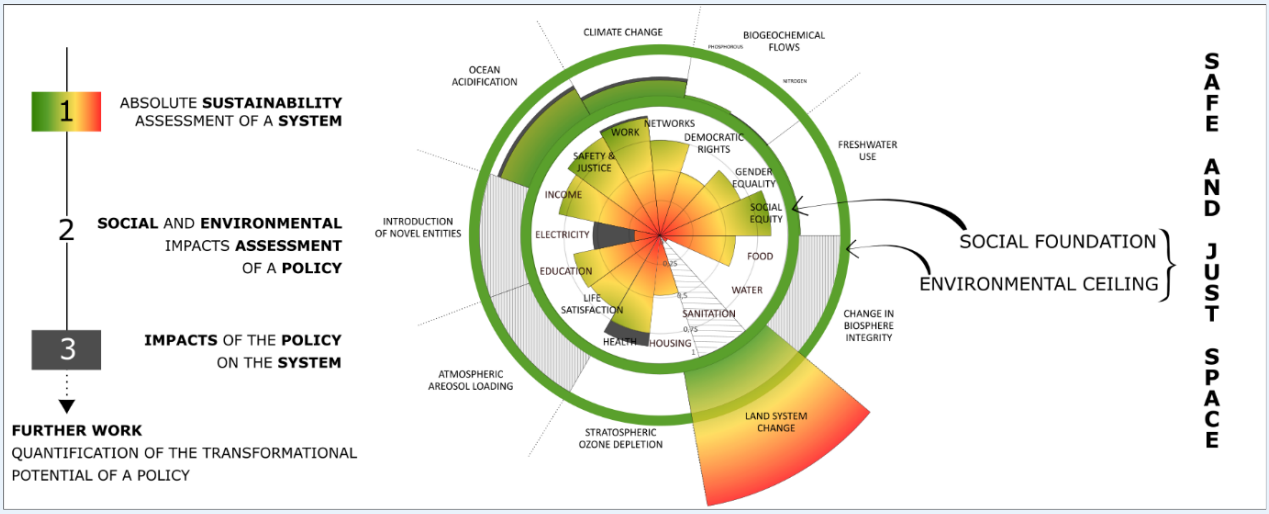
Downscaling global goals for individual policies

Downscaling of the global goals to determine the SJOS for a policy at different levels of decision-making is a normative process that involves considering different ethical principles (e.g. equal per capita shares, grandfathering, historical responsibility). Although there is no consensus yet in the global climate negotiations on the "right way" to allocate and share rights to impact the Earth System, emerging work from science provides a way to translate the Planetary Boundaries and Social Foundation Framework into policy-level targets that are consistent with the global goals for climate and sustainable development. An example is provided below.

To assess the transformational impacts of a Geothermal Energy Development Policy in Uganda using the ICAT *Transformational Change Methodology*, UNEP DTU Partnership, supported by the Clean Technology Centre and Network, applied a Planetary Boundaries approach. Global thresholds expressed by the Planetary Boundaries framework were downscaled to the national level using the egalitarian sharing principle, which allocates an equal share of the SJOS for all Planetary Boundaries to each individual on the planet. In practice, this means downscaling the nine global thresholds to the individual level and then upscaling them to the country level using population data. These territorial allocations serve as a benchmark for assessing goals of policies at the relevant scale. Results of the Ugandan assessment are shown in Figure 3.3.

FIGURE **3.3**

Results of the Ugandan assessment



The figure illustrates the state of Uganda in the baseline scenario (coloured areas) using the allocated share of the SJOS, and the social and environmental impacts (ex-ante assessment) of the policy (grey areas). The inner green circle represents the social foundation to be reached to achieve social sustainability, while the outer circle is the environmental ceiling not to be crossed to stay within the planetary limits.