

Transformative mechanisms in decarbonization policies: a structured approach

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1. Overview

The transition to a low-carbon society should accelerate to avoid an increase in the temperatures above 1.5° to 2°C, and this is unlikely to occur without policy intervention (IPCC, 2022). Given the complexity of the problem, recent debates have increasingly pointed to the need of adopting a new, broader view on policy intervention (Weber and Rohrer, 2012; Hekkert et al., 2020). This entails a move beyond a single focus on economic competitiveness and growth and towards a focus on societal problems or “grand challenges”, leading to the emergence of the concept of transformative innovation policy (Schot and Steinmueller 2018; Dierks et al., 2019). This new rationale implies the consideration of a much broader range of policy objectives, targets and instruments, as well as the notion that a mix of policies needs to be deployed to achieve the desired goals (Rogge and Reichardt, 2016).

While this policy rationale has started to enter innovation policy agendas (European Parliament, 2022), it remains to be seen to what extent it is reflected in the actual policies being implemented (Casula, 2022; Rohrer et al., 2023).

The innovation policy literature has advanced conceptually at this level, discussing the nature of the problems that need to be addressed and proposing several dimensions along which policy could act in order to induce transformative effects (Weber and Rohrer, 2012; Schot and Steinmueller, 2018; Kuhlmann and Rip, 2018; Dierks et al., 2019). In some cases, this literature has also investigated empirically the case of particular policies, analyzing them in detail and assessing whether these potentially transformative mechanisms are considered, and which forms they assume, as well as which are the missing elements (e.g. Dierks et al., 2019; Casula et al., 2021; Molas-Gallart et al., 2021; Grillitsch et al., 2019; Bugge et al., 2017; Ghosh et al., 2021). These case studies are very relevant, because they provide us with a more in-depth understanding of the nature of policies with transformative potential. However, they do not enable us to have a perception of the extent to which these mechanisms are making their way into a wider set of policies, namely policies explicitly aiming at decarbonization.

This research addresses this gap by proposing literature derived mechanisms that are expected to introduce transformative effects in policies and investigating their presence in a broad set of decarbonization policies, from different world regions. For this, the paper draws on large database of policies compiled from the European Environment Agency (EEA) and the International Energy Agency (IEA) public policy databases, totaling over 3000 policies from Europe, USA, China and Japan. The goal is to understand whether transformative mechanisms are being introduced in current policies, which mechanisms or combinations of mechanisms prevail/are missing, and which sectors emerge as preferential targets, thus contributing to the debate on the formulation and implementation of transformative sustainable policies.

2. Method

2.1 Conceptual framework

In order to assess the transformative potential of current decarbonization policies we started by identifying policy features that are proposed in the literature as inducing transformative effects.

For this, we conducted a review of the stream of literature that introduced the new perspective to policy intervention, based on the awareness that existing policy approaches were insufficient to tackle major contemporary societal problems, such as climate change, that are complex, systemic and urgent (Mowery et al., 2010; Mazzucato, 2018; Schot and Steinmueller, 2018). Several lines of research proposed different approaches, supported by diverse (e.g., narrower or broader) views on innovation and change (Dierks et al., 2019), ranging from the re-adoption and reconfiguration of “mission-oriented policies” (Mazzucato,