

# ***CO-CREATING SHARED VISIONS FOR A NEUTRAL ECONOMY IN 2050: THE CASE OF PORTUGAL***

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## **Overview**

The Paris agreement (2015) aims to limit the average global temperature increase to well below 2°C and to pursue efforts to limit it to 1.5°C towards a reduction of climate change impacts. This brings significant efforts to the global societies in the transition to low carbon economies capable of fulfilling human needs and creating new opportunities for societies to flourish within the planet's boundaries. In line with this goal, Portugal has committed internationally to reduce its greenhouse gas emissions so that the balance between emissions and removals from the atmosphere (e.g. through the use of forests) will be zero by 2050. The goal of a net-zero carbon footprint has been labelled "carbon neutrality".

This represents a challenge for all the society and the different sectors that have a role to play in this transition. Portuguese national emissions are distributed by sector through 25% in energy production, 25% in transport, 23% in industry, 10% in agriculture, 8% in other energy uses, and 8% in waste. Following the political commitment and the present baseline, the Portuguese Carbon Neutrality Roadmap (RNC2050) was developed to support the political goal of the Portuguese Government. Given the scale of the challenge (zero net emissions by 2050), it was evident that all sectors will need to reduce their emissions or/and increase their carbon sink capacity. However, the potential reduction of each sector is different. This high level of complexity called for a multidisciplinary technical team and a detailed and strong participatory process that engaged a variety of stakeholders from different sectors.

Collaborative and co-creation processes have been developed in different areas of sustainability to support and inform decision making with acknowledged important results (e.g. Lopes and Videira, 2019); however, in major, complex and ambitious contexts, deeply connected with a political commitment is rare. This work contributes to advancing an innovative, collaborative process to co-create shared visions of a neutral economy in 2050.

## **Methods**

Co-creating a long-term carbon neutrality roadmap is a complex exercise that demands alternative and mix-method approaches combining technical methods with a strong collaborative process engaging different stakeholders from all the important sectors.

In that sense, the RNC2050 started with the development of coherent socioeconomic scenarios based on common narratives of possible evolutions of Portuguese society by 2050 based on the evolution of macroeconomic and demographic parameters over this time horizon, allowing to achieve carbon neutrality in 2050. These scenarios were widely discussed with the various stakeholders and had guided all the deep discussions. The technological peer-reviewed model TIMES\_PT (Fortes et al., 2019) was used to evaluate the future penetration of different cost-effective technological options in each of the three storylines/scenarios.

This work focuses on the collaborative process built to inform and support the modelling process. A cycle of collaborative technical workshops was conducted (Figure 1) to co-create shared visions of a neutral economy in 2050. These structured discussions aimed to understand the role of the circular economy in the future of different sectors, as well as informing the emissions modelling work over the time horizon up to 2050 through stakeholders' perceptions regarding the configuration of the sectors' value chain and the evolution of some of the main assumptions and trends. This process was conducted in 2018 and integrated seven sectorial workshops of strategic visioning, including the following sectoral workshops: mobility; forestry activities; agri-food; construction; cities; energy; waste and

wastewater. This selection resulted from the level of criticality for the net balance of GHG emissions and the level of exposition to the circular economy with materiality in GHG emissions, and the objective of carbon neutrality. The collaborative workshops were designed to allow triangulation of results, combine different participatory methods, and foster structured discussions under a *world café* format. To understand if the group discussions had contributed to social learning, we developed an initial and final survey (using the interactive tool Mentimeter) to capture the individual perceptions before and after the discussions.

A comprehensive list of stakeholders from the value chain of different sectors was developed, and a group of 163 participants from 100 entities were engaged in these workshops. The collaborative process of co-creation allows to contribute to a different sector of modelling and understanding the contribution of circular economy as a cross-cutting sector.

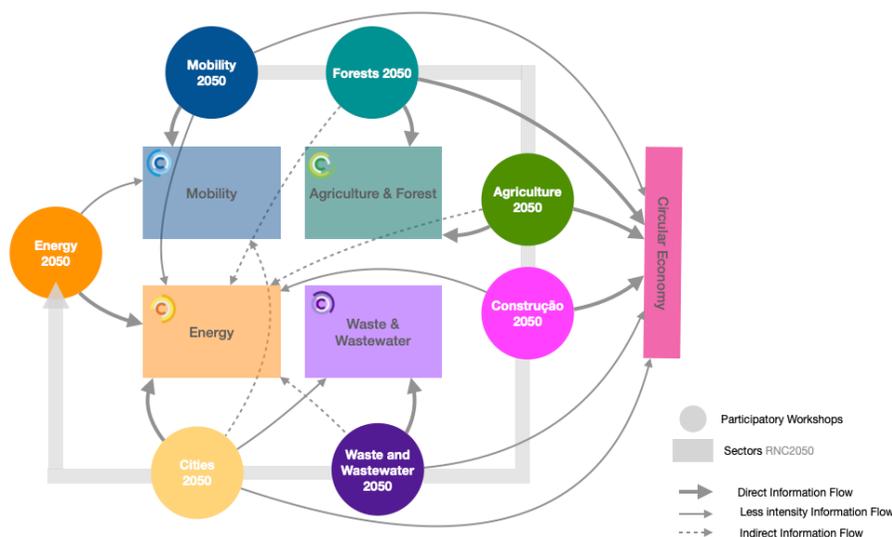


Figure 1 – Collaborative process: combining visioning workshops with the modelling sectors and the generated information flows for the development of national carbon neutrality roadmaps.

## Results

The integrated analysis of the results of the seven workshops reveals a convergence in the vast majority of the contents discussed and in the elements that allow building the socioeconomic portrait of a carbon-neutral Portugal in 2050. These results were considered within the scope of the sectoral work modelling GHG emissions in the horizon 2050, as represented in Figure 1 through the information flows. In specific terms, they allowed, in the context of each modelling sector such as Energy; Transport and Mobility; Agriculture and Forestry and Waste: (i) define, corroborate or refine assumptions concerning key activity variables; (ii) build variants and/or (iii) support the performance of sensitivity analyses. The information generated in the workshops also allowed the incorporation of the Circular Economy in the modelling sectors. The participants were asked to evaluate the collaborative workshops regarding their organization, aims, content and level of engagement. The results were very positive, showing the importance of a process of this nature and how combining different methods and perceptions allows a more integrative and holistic result and the expansion of individual mental models towards visions of a future neutral economy.

## Conclusions

This collaborative process allowed us to understand the importance of engaging stakeholders in a co-design process of shared visions of a neutral economy in 2050, which contributed to finding and understanding potential pathways that could be pursued to achieve this ambitious goal. The process fostered an environment conducive to participation, sharing experiences and co-creating knowledge, mainly in the more unknown areas such as the contribution and the impact of circular economy in reducing GHG emissions. Being a political commitment, the sectors and their main actors were highly motivated to contribute to the process, which promoted a double continuum flow of information between the technical team and the stakeholders and in the other way around.

This process allowed to design a collaborative roadmap for carbon neutrality, identifying the main vectors and technologies that will support the decarbonization trajectory to be achieved supported by a deeply collaborative process that combined stakeholders' perceptions, co-production of knowledge and modelling.

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