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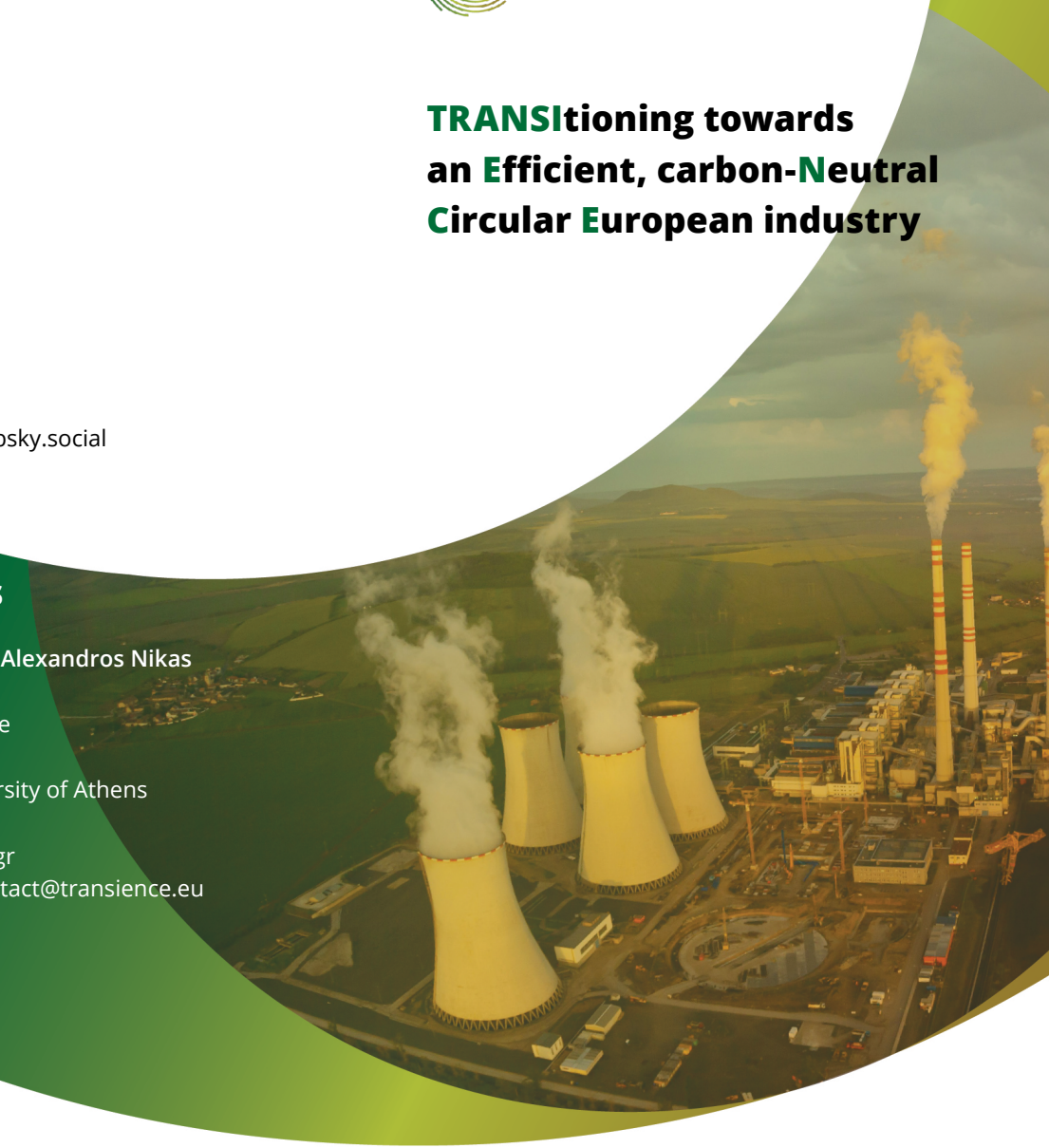
PROCESSES4PLANET

TRANSIENCE

TRANSItioning towards an Efficient, carbon-Neutral Circular European industry



www.transience.eu

The TRANSIENCE project supports the creation of an open, integrated, modular framework to simulate pathways toward achieving the transition of European industries to climate neutrality, also addressing material efficiency, circular economy, and broader sustainability measures. It will develop interfaces among a diverse series of climate, energy, and industrial models along with novel conceptualisations of industrial circularity performance and decarbonisation.

Objectives

TRANSIENCE aims to:

- **Achieve model enhancement and integration to develop a new, fully integrated model, the Model for European Industry Circularity and Climate Change mitigation (MIC3).**
- **Investigate the interplays, co-benefits, and trade-offs between decarbonisation, circularity, and sustainability of European industry.**
- **Provide policy advice and promote best practice in industry.**
- **Promote transparency, openness, and legitimacy, by implementing open science principles and documenting new modelling capacity for expert and non-expert audiences.**
- **Reinforce the role of all stakeholders, co-developing model capabilities, co-designing research questions, legitimising the implementation process, and validating results.**
- **Enhance the exploitation potential of results and recommendations, and build capacity across academia and industry.**

Approach

Conceptualise

This component characterises the diversity of available and prospective decarbonisation and circular economy policies, technologies, opportunities, and risks, before reviewing how current models can represent these, and understand the research capacities needed to develop state-of-the-art typology and databases. Bottom-up analytical techniques are used to capture the costs and potential to reduce energy-and carbon-intensive materials, energy use, and carbon emissions. These insights will be enriched with an analysis of EU industrial competitiveness in the global context and a series of sociotechnical analyses from a systems of innovation perspective, aiming to drive the project's model development and data management strategy.

Engage

Here, a strategy and database are developed for continuous, vivid stakeholder engagement with EU and national policymakers, EU industry associations, representatives of the selected regional industrial clusters, the modelling community, and civil society. Existing capacities are discussed to foster expectations and gain perspectives of technical requirements to develop MIC3, to co-design the most pertinent questions to be mapped onto the developed modules, allowing stakeholders to validate their performance and usability. Finally, industry and policy stakeholder needs will be translated into scenario frameworks to co-produce pathways of European industrial transformation towards net-zero and give stakeholders the chance to validate MIC3 and exploit the new toolbox.

Develop

This component entails the development of standalone modules that correspond to the needs identified in the previous two components, including a socioeconomic module, a service and product database, a series of material flow modules for Europe and the globe, a series of industrial modules for the European Economic Area (EEA), a dedicated energy system module at the national level for the 27-member bloc and associated countries, and an environmental impact assessment module. After their validation, the modules will be fully integrated into the MIC3 framework, also leading to the development of a simplified version to be released online and facilitate non-expert use.

Transform

This component collects and maps stakeholders overarching questions onto the new modules, towards carrying out case study scenario exercises to demonstrate each module's capabilities for stakeholders to validate. Following the finalisation of these individual modules and the development of the new framework, MIC3 will be used to assess the transformation of European industries towards a circular economic net-zero future by 2050 and broader sustainable development.

Expected Results

TRANSIENCE will create a technology-rich, open-source integrated assessment model, MIC3, featuring sectoral and national levels, to simulate pathways towards industrial decarbonisation, high circularity, and overall sustainability in Europe. MIC3 will comprise several interconnected modules drawing on different perspectives, and modelling paradigms, covering a broad time horizon. All models and pathways will be co-created and validated by policymakers, industries, researchers, and civil society, and will be used to develop databases of transformative policies, technologies, services, and products for industrial transition within four industrial clusters (Germany, Spain, the Netherlands, and Poland) and specific sectors in the EU, with a focus on energy-intensive and process industries. The project will also produce reports exploring links between circularity and decarbonisation, including a conceptual framework, examples of such links, and interactions with global competitiveness, innovation, and sustainability.
An open science toolbox for modelling development will also be created to facilitate non-expert use.