

Executive Summary

Austria's updated effort sharing target for 2030 requires a rapid and far-reaching shift in climate policy, aiming at a 48% reduction of national GHG emissions by 2030 (relative to 2005). Comprehensive transitions across sectors, including energy, land, urban areas, infrastructure and industry, are essential for deep emissions reductions, as highlighted by the IPCC (Shukla et al., 2022). While there is extensive research on defossilization within individual sectors in Austria, there is a gap in understanding the interactions between these sectors. Critical areas of research include shared reliance on renewable energy resources, potential synergies (waste from one sector serving as input for another), and the ability of industries to produce climate-neutral materials in line with demand. In addition, the financial mechanisms supporting this transformative process remained largely unexplored. The research in INTEGRATE addressed these interrelated challenges and proposed a holistic policy framework. The project focused on the exploration and assessment of potential pathways for Austria to achieve net-zero emissions by 2050. For sectors that are challenging to decarbonize, such as those with inherent process emissions, strategies like carbon capture and utilization rooted in circular economy principles are suggested.

The project's scope involved contrasting various net-zero emission scenarios, evaluating the implications for energy (particularly renewable), and analyzing the impacts on macroeconomic indicators such as GDP, prices, and sectoral outputs. It also considered potential distributional effects across households and different economic sectors as well as Austria's strengths and weaknesses in relevant technologies in the international market. A further crucial aspect of INTEGRATE was the examination of the financial market, specifically to identify suitable financial tools and investment strategies that can propel Austria towards its climate objectives. Scientists and stakeholders jointly developed a consistent vision of a climate-neutral Austrian economy across all sectors as a basis for a back-casting process to identify the corresponding consistent pathways. Based on the bottom-up sectoral details provided from this process, an Integrative Economic Evaluation Tool (IEET) was employed to analyse the impact on energy structure and production, economic sector output and macroeconomic variables. A coherent policy framework was devised, along with sets of instruments, that not only drive the low-carbon transformation but also garner support and collaboration from stakeholders, thus ensuring wider acceptability.

Results and conclusions of the project

Four different net-zero emission scenarios for Austria in 2050 have been developed. They differ in terms of (i) the level of energy demand of respective sectors (high in the REF(ERENCE) scenario, low in the INT(EGRATE) scenario) and (ii) the degree of integration of the international energy market (full integration versus limited import potential). These scenarios cut across all work packages and areas of analysis. Bottom-up sector models and projections provided energy demand for both scenarios (high and low demand) for the target sectors industry, buildings and transport. For buildings, the results show that efficiency improvements and

the replacement of fossil fuel-based heating systems are a prerequisite for achieving net-zero emissions in 2050. While ambitious electrification is essential for the transport sector, defossilizing industry will require major technology adjustments which in some cases increase energy demand. The IEET modeling results show that Austria's renewable energy production will have to significantly exceed its expansion plan targets or rely heavily on imports in order to meet the requirements without strong energy demand reductions.

Data analysis in the circular economy subsectors reveals that Austria has innovative strengths in several technology fields that are key for the transition to net-zero – both in renewable energy as well as in energy efficiency and recycling technologies – but also some crucial weaknesses. On the financial market side, it becomes clear that there is a large gap between the information that banks need to make decisions about financing sustainable projects and the information that SMEs actually collect and report. Together with stakeholders and experts, policy recommendations were developed for the main sectors and fields of action considered, including industry, energy generation, buildings, the financial sector, innovation and the labour market.