

Pathways for a sustainable economy leaving no one behind: the Eurogreen+ model

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Climate change and inequality are deeply interrelated issues, that can only be analyzed through robust models integrating climate policy and socioeconomic household heterogeneity. This paper introduces Eurogreen+, an Integrated Assessment Model that details regional disparities and inequalities in terms of income and carbon footprint for Italy while providing an integrated assessment of energy production and carbon emissions. Eurogreen+ represents a substantial revision of the Eurogreen model (Dâ€™Alessandro et al., 2020), which was among the first group of complex models to explicitly generate Post-Growth scenarios (Lauer et al., 2025). The key insight from this analysis is that a feasible green transition requires compensatory social policies that effectively reverse current inequality trends without increasing emissions, thereby ensuring a just transition. Eurogreen+ strengthens this approach by providing a granular household module that captures regional heterogeneity within Italy, and introduces explicit energy and electricity modules. The model combines system dynamics, an input-output structure, and post-Keynesian macroeconomics, following stock-flow consistency principles. Output is driven by final demand and interindustry trade. Without any spontaneous convergence to full employment, the model scenarios realistically capture persistent involuntary unemployment and spare capacity. Production is characterized by a 21-sector open input-output structure. Technology is not fixed, as each sector average labor input and technical coefficients evolve according to an endogenous cost-driven innovation process. Individuals are grouped according to gender, occupational status, and skill level, then pooled into 100 household types differentiated by 20 Italian regions and each region's 5 income quintiles. The model includes a hybrid input-output framework combining monetary and physical energy flows, which enhances the analysis of interactions between energy-related policies and economic structure. Additionally, Eurogreen+ features more detailed integration with National Accounts through the improvement in the matching with data of government accounts and the refinements in price modelling. Prices follow a dynamic input-output price model. A conversion between basic and purchaser prices allows for an accurate treatment of indirect taxes and evaluating the distributive effects of indirect taxation. Additional methodological refinements of Eurogreen+ are documented in the supplementary materials. This paper examines the main trends for the economy and emissions in the baseline scenario generated by Eurogreen+. Through a sensitivity analysis, we show how key socioeconomic and environmental indicators respond to specific shocks under alternative transition scenarios. Notably, our findings reveal a significant emissions-inequality trade-off in the baseline scenario, which simulates a business-as-usual transition. This trade-off is substantially mitigated in scenarios featuring structural energy transition policies. A final post-growth scenario reveals a faster reduction in emissions.