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Abstract. This study investigates the structural evolution and projected trajectory of greenhouse gas (GHG) emissions across the EU27 from 1990 to 2030, with a particular focus on their implications for the effectiveness of European climate policy. Empirical findings, based on Markov-switching models and segmented regression analysis, indicate a statistically significant regime change around 2014, marking a transition to a new emissions pattern characterised by a deceleration in reduction rates. The results underscore critical weaknesses in the EU's climate policy architecture and reveal a clear need for transformative recalibration. Without accelerated action and strengthened governance mechanisms, the post-2014 regime risks entrenching a plateau in emissions reductions, jeopardising long-term climate objectives.

Keywords: greenhouse gas emissions; EU climate policy; time series analysis; ARIMA forecasting; machine learning; regime shift; segmented regression; hybrid models