**Highlights**

1. A novel methodology for the automated harmonization with a common historical data set of generic emissions trajectories of Integrated Assessment Models (IAMs) is proposed.
2. A framework and open-source software implementation of the methodology is described.
3. Two scenarios from the Shared Socioeconomic Pathways (SSPs) are harmonized and proof-of-concept results are presented.
4. Over 96% of the approximately 2000 emissions trajectories are shown to be successfully harmonized without the need for further review.
5. Common situations in which additional review is required (4% of trajectories in this study) are presented and solutions are suggested.