

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☒ ☐ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- ☒ ☐ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☒ ☐ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☒ ☐ A description of all covariates tested
- ☒ ☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☒ ☐ For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection No software was used for data collection

Data analysis Model was developed using the open-source software R (version 3.6.3). Model behavior and output was analyzed using R and R packages ggplot2 (version 3.3.5), tidyverse (version 1.3.1), randomForest (version 4.6) and randomForestExplainer (version 0.10.1)

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

All data used in the manuscript are publicly available and provided with the model code in the code repository at <https://doi.org/10.24433/CO.5602083.v1>

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Development of a system dynamics model of the coupled climate-social system based on feedback behavior documented in the literature across a range of relevant disciplines
Research sample	Calibration of the opinion and policy component uses data on climate change opinion in seven OECD countries between 2013 and 2020 from the Pew Research Group available at https://www.pewresearch.org/fact-tank/2020/10/16/many-globally-are-as-concerned-about-climate-change-as-about-the-spread-of-infectious-diseases/ . This is the only time-series of public opinion on climate change available for more than 1-2 countries. This is matched with data on carbon pricing for the same set of countries over the same time period from the World Bank Carbon Pricing Dashboard (https://carbonpricingdashboard.worldbank.org/). This gives explicit carbon prices (i.e. emissions trading prices and carbon taxes). Ideally we would also incorporate information on shadow carbon prices arising from climate policies other than market-based approaches, but this information is not available. Parameters in the emissions component was calibrated based on an empirical estimate in Andersson (2019) "Carbon Taxes and CO2 Emissions: Sweden as a Case Study" on the effect of Swedish carbon prices on emissions. Sweden is a useful case for this application because it has had very high carbon prices for several decades, and because an estimate of the cumulative effect of these carbon prices on national emissions is available in the literature, which is required for this calibration.
Sampling strategy	NA
Data collection	Publicly available data sources were used to calibrate the model as described in the research sample. They are provided as part of the code repository.
Timing	Data was collected from the online repositories in November 2021
Data exclusions	No data was excluded from the analysis
Non-participation	NA as no primary data was included in the study
Randomization	NA as this is a modeling study

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Human research participants
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging