Description of the dataset

Overview

This dataset includes the GCAM-USA scenario outputs that were used in: *Peng et al. The Surprisingly Inexpensive Cost of State-Driven Emission Control Strategies. Nature Climate Change (2021).*

To view and export the results, please download the Model Interface developed to view and visualize GCAM model output. Download from: https://github.com/JGCRI/modelinterface

For any questions regarding this dataset, please contact Dr. Wei Peng at weipeng@psu.edu.

Scenario Names

The scenarios in this dataset are named as: "National mitigation efforts"_ "Subnational policy approach"_ "Key assumption as sensitivity analysis". For instance, the scenario "80perc_uni_LowBiomass" means to achieve 80% decarbonization nationally with a uniform approach, coupled with low biomass availability as the technology assumption.

Specifically:

The main scenarios in the paper are named as:
- Uniform: 80perc_uni, 60perc_uni, 40perc_uni, 20perc_uni
- Hybrid: 80perc_hyb, 60perc_hyb, 40perc_hyb, 20perc_hyb
- Heterogeneous: 80perc_het, 60perc_het, 40perc_het, 20perc_het

The sensitivity scenarios presented in the main text Figure 6 are named as:
- Key technology assumptions
  - Low electricity infrastructure: *_LowELE
  - No CCS: *_noCCS
  - Low biomass availability: *_LowBiomass
- Alternative formations for policy heterogeneity
  - Het (Linear): *het_linear*
  - Het (+range): *het_AddRange*
  - Het (3 zero): *het_3zero*
  - Het (5 zero): *het_5zero*
  - Het (Gov): *het_gov*
  - Het(AP): *het_AP*

Additional sensitivity scenarios that are discussed in the Supplementary Information include:
- 95% decarbonization: 95perc*
- No biomass constraint: *noBioCon

In this dataset, we also include additional scenarios that were not presented in the paper but were performed during our research process to understand the model dynamics, including:
- Using the survey question results on "Do you think your *Governor* should do more to address global warming?", coupled with a linear relationship between public support and carbon pricing: *het_gov_linear*
- An extreme scenario of achieving 100% decarbonization nationally: 100perc*
- Fixing the state-level carbon price levels: *FixCP. Here we set the highest state-level carbon price in Washington D.C. to be the price level in the main "unform" scenario, and then scale down the carbon prices in other states following "heterogeneous" assumption, and finally test the level of nationwide GHG mitigation that can be achieved.

Scenarios in each datafile

We include the abovementioned scenarios into 6 separate zipped files. Each file includes the following scenarios:

Data_1:
*perc_uni_noBioCon
*perc_uni
*perc_het_gov_noBioCon
*perc_het_gov
*perc_het_gov_linear
100perc_uni
95perc_uni
95perc_het_gov
80perc_het_gov_FixCP
60perc_het_gov_FixCP

Data_2:
*perc_het
95perc_het
*perc_het_noCCS
*perc_noBioCon
*perc_het_Linear
*perc_het_AP

Data_3:
*perc_uni_lowELE
*perc_hyb_lowELE
*perc_het_lowELE

Data_4:
*perc_uni_lowBioMass
*perc_hyb_lowBioMass
*perc_het_lowBioMass

Data_5:
*perc_uni_noCCS
*perc_het_gov_noCCS

Data_6:
*perc_het_AddRange

Data_7:
*perc_het_5zero
*perc_het_3zero