

CEDS Version Comparison

CEDS_v_2021_4_21 vs CMIP6 Release (v_2016_07_16)

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This document compares emission estimates from the v_2021_4_21 pre-release of the Community Emissions Data System (CEDS) with values from the CMIP6 release (v_2016_07_16).

For a list of changes and updates see the [release notes](#).

Comments are welcome. The best way to comment is through the [CEDS Issues](#) page. Known issues with this data will noted there.

Previous [versions of this set of comparison figures](#) can be used to trace changes through CEDS versions.

For additional information on CEDS and this data system release, please see <https://github.com/JGCRI/CEDS>.

The largest global changes since the CMIP6 release (v_2016_07_16) are:

- Lower BC and OC after about 1990
- Overall lower NMVOC (lower ENE, offset partially after 1985 by higher SLV)
- Lower NO_x (India transport) and SO₂ (China Industry) after 2010
- Higher CH₄ before 1990 (higher from Africa and Middle East, offset after 1990 by lower China)

Some of the major updates:

- Updated IEA energy data
- Use of updated EDGAR, GAINS, and country inventories
- Updated industrial BC/OC/SO₂ emissions for China, particularly BC/OC from coke production
- Improved trends for emissions from petroleum production over time
- Lower assumed biomass consumption in Nigeria and Ethiopia
- Lower emissions from open burning of residential waste in most lower income regions
- Calibration of NO₂, CO, NMVOC (and SO₂) India emissions to GAINS

The newer IEA data has much lower biomass consumption after 2000 in China, lowering BC and OC emissions. Updated assumptions for industrial BC and OC emissions in China also lowered emission estimates in recent years (see [release notes](#)). EDGAR v5 also has lower NMVOC emissions from the energy sector, which are the values used for most of Africa, Middle East, and South America.

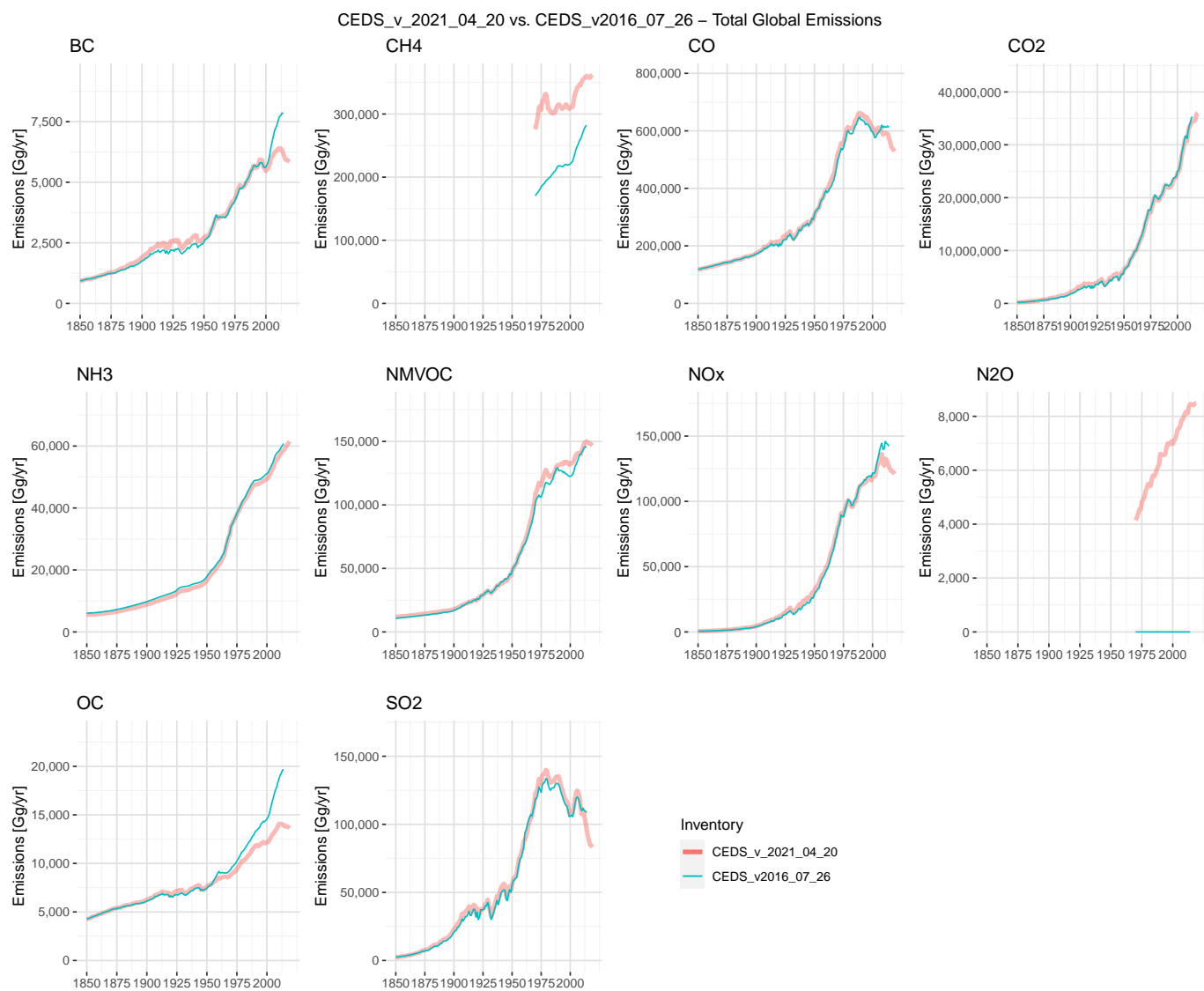


Figure S1: Global historical emissions by emissions species (1850-2019).

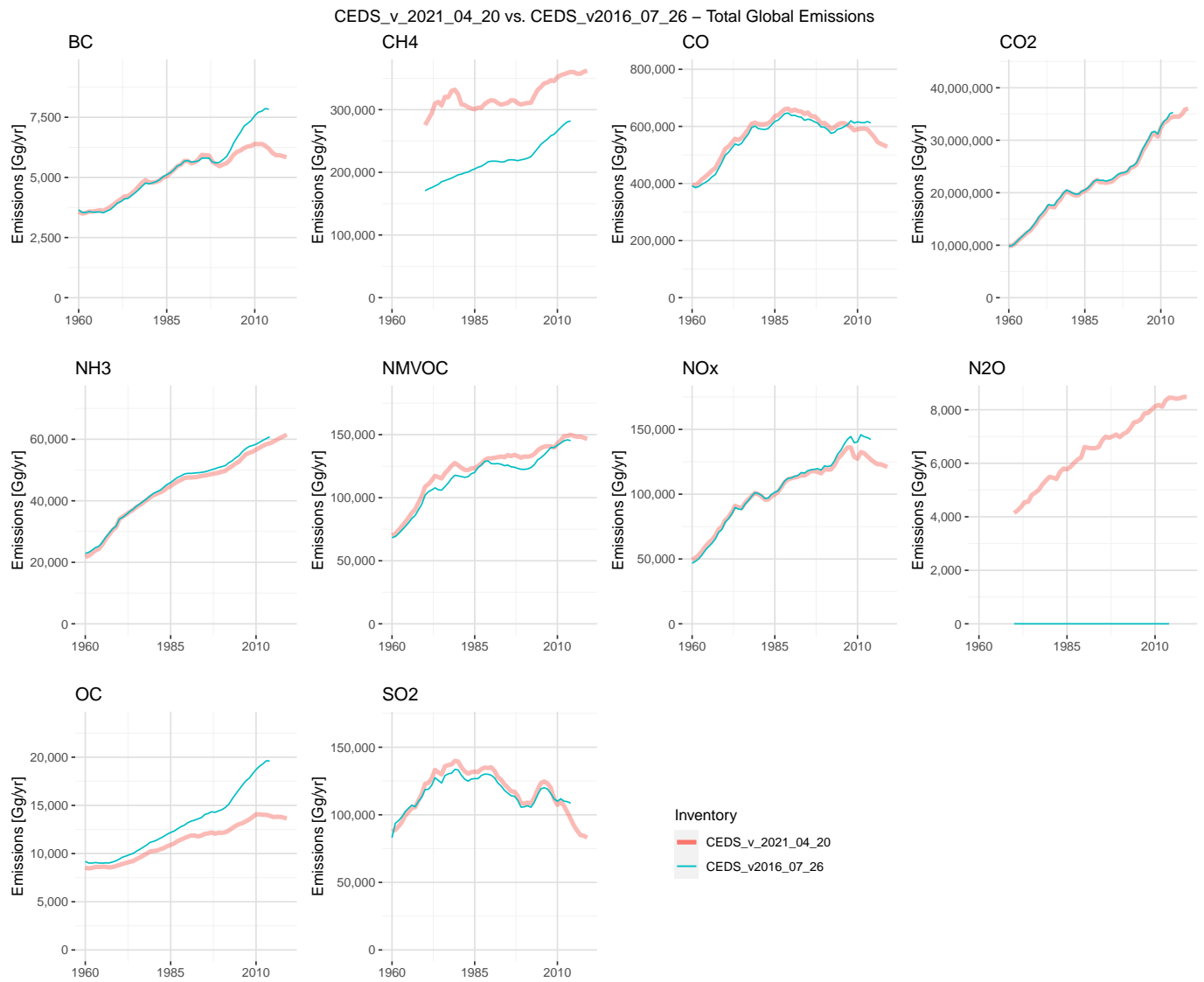


Figure S2: Global historical emissions by emissions species over recent decades (1960-2019).

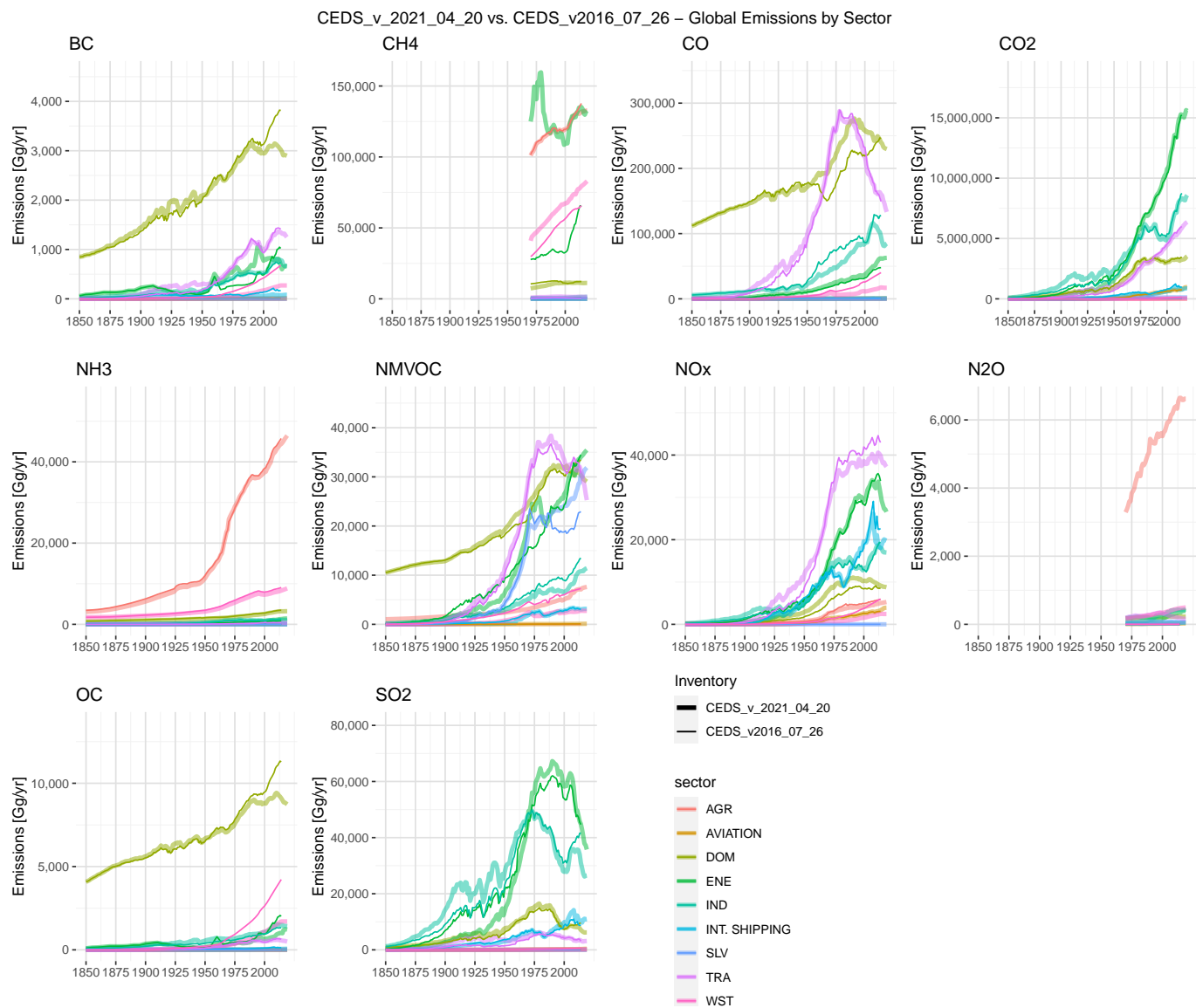


Figure S3: Global historical emissions by aggregate sector (1850-2019).
 Note: See Table S1 for mapping of CEDS working sectors to aggregate sectors graphed here.

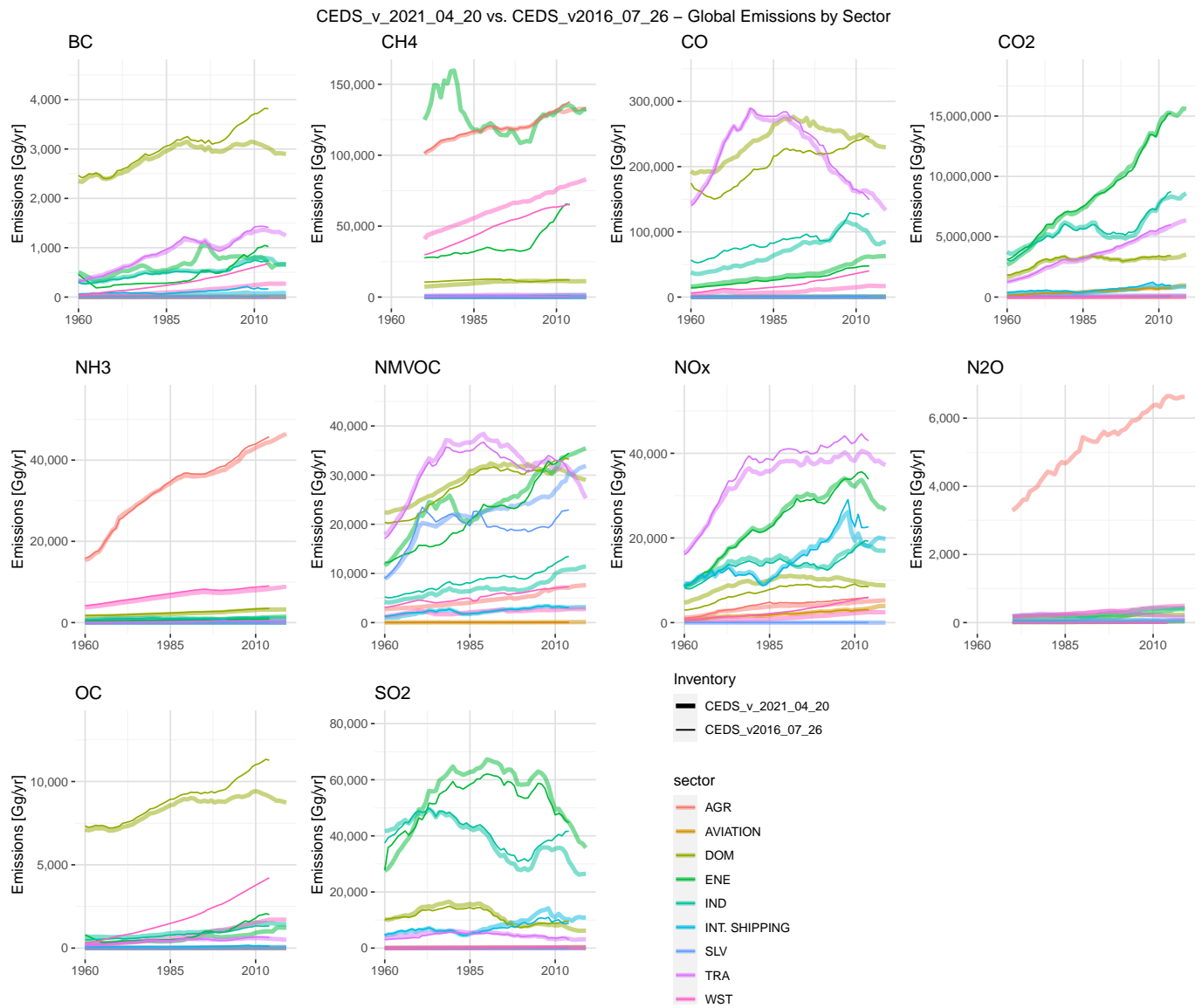


Figure S4: Global historical emissions by aggregate sector over recent decades (1960-2019).
 Note: See Table S1 for mapping of CEDS working sectors to aggregate sectors graphed here.

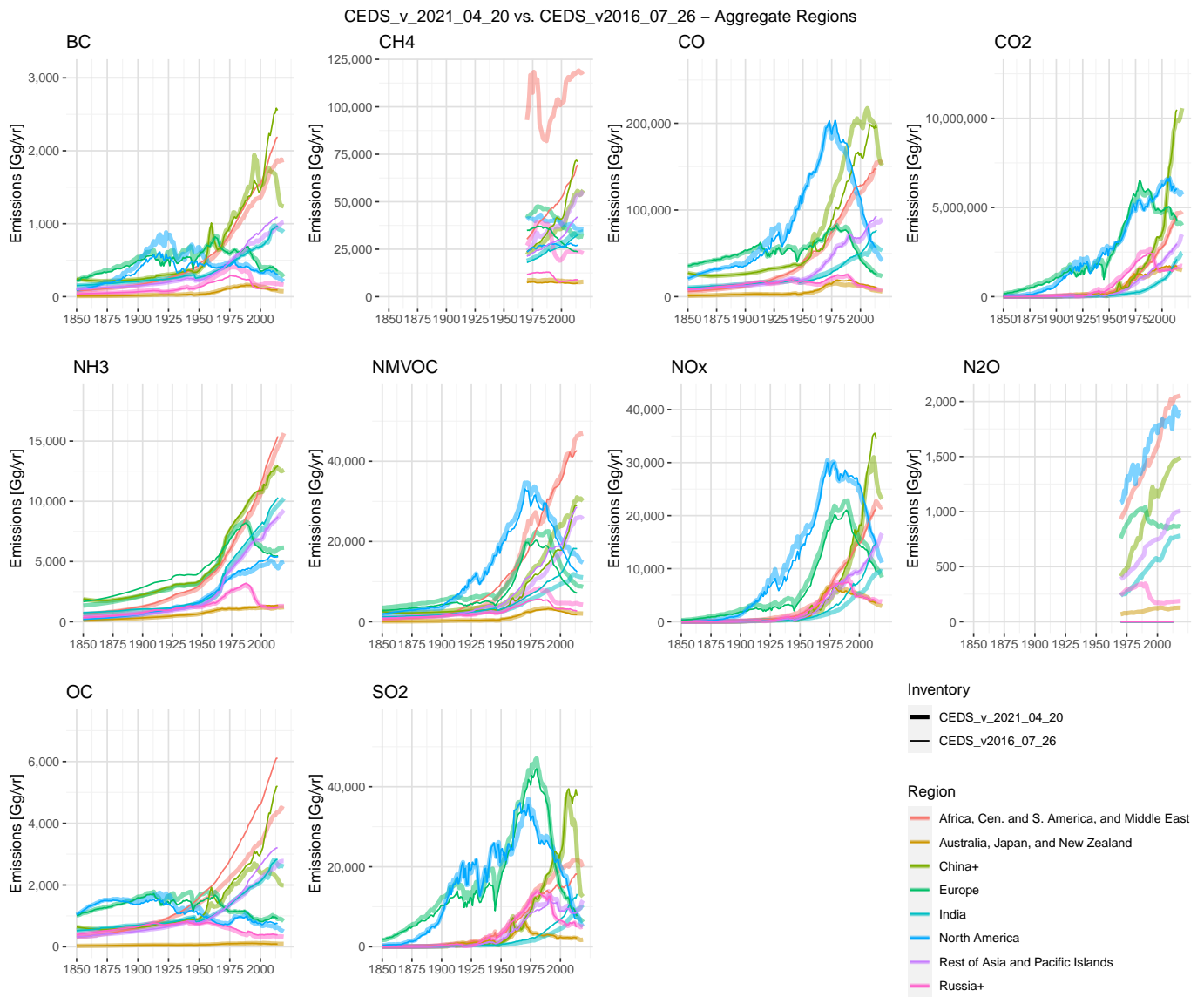


Figure S5: Regional emissions by emissions species (1850-2019).
 Note: See Table S2 for mapping of CEDS regions to aggregate regions graphed here.

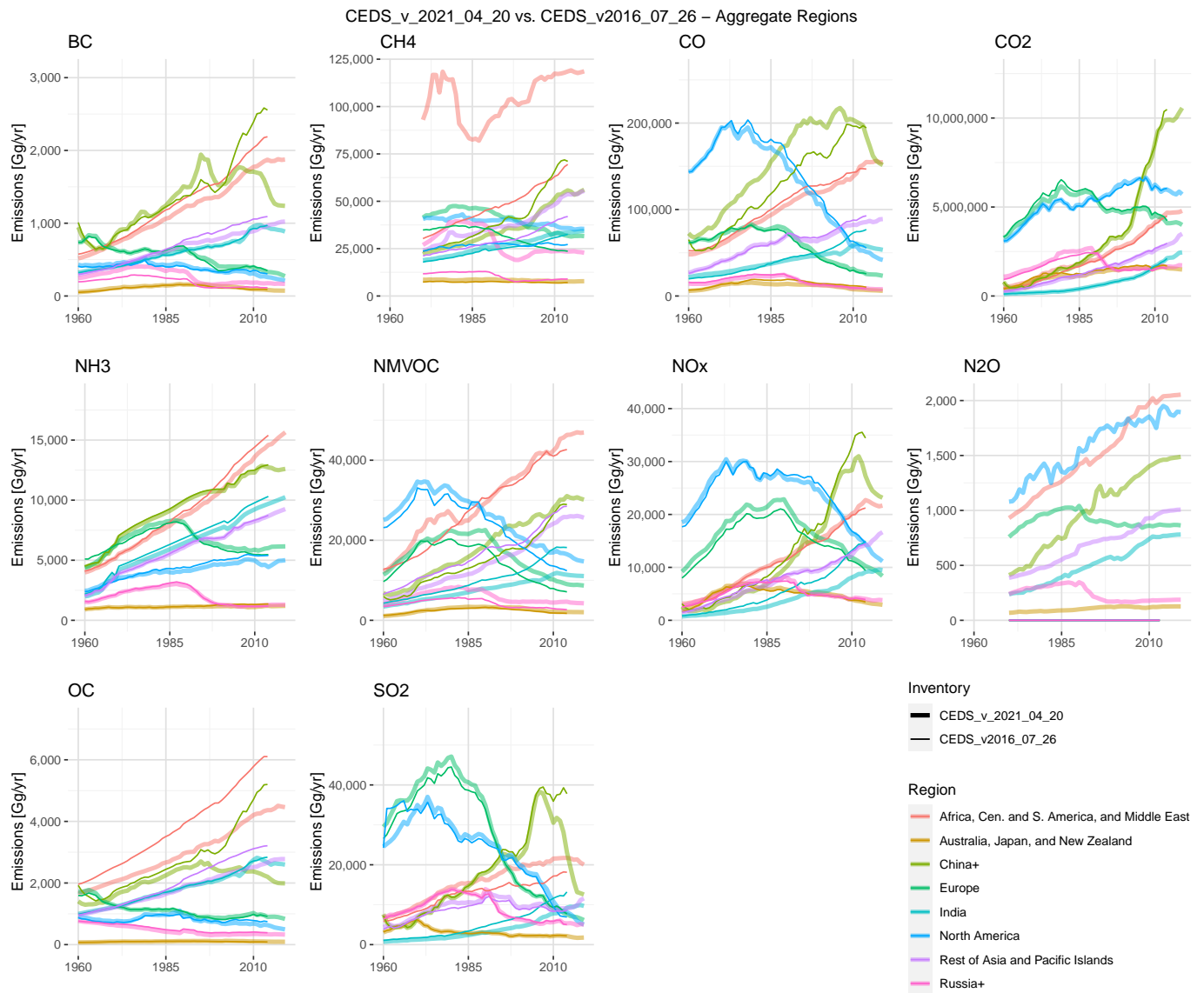


Figure S6: Regional emissions by emissions species over recent decades (1960-2019).
Note: See Table S2 for mapping of CEDS regions to aggregate regions graphed here.

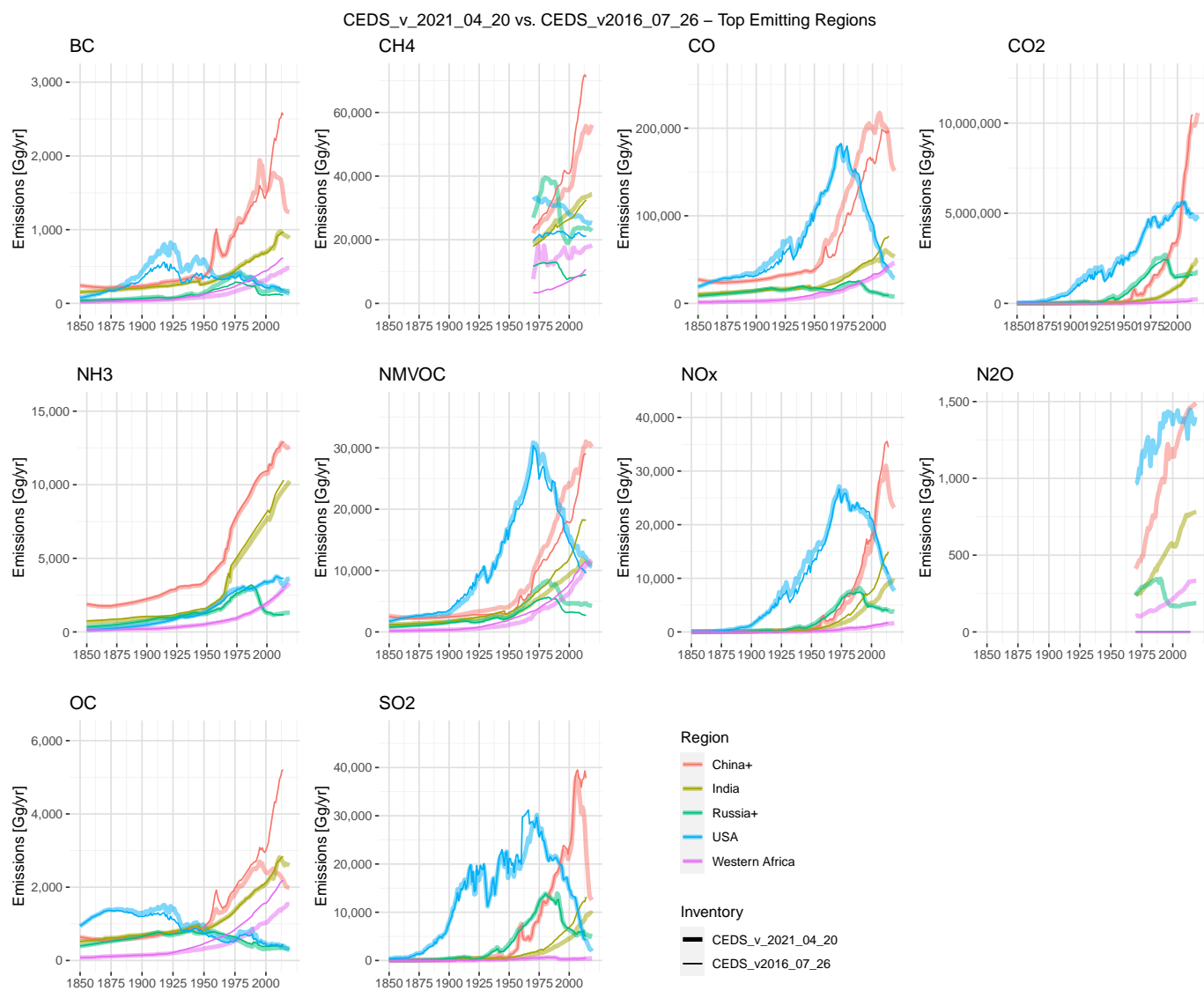


Figure S7: Top emitting regions by emissions species (1850-2019).
 Note: See Table S3 for mapping of CEDS regions to aggregate regions graphed here.

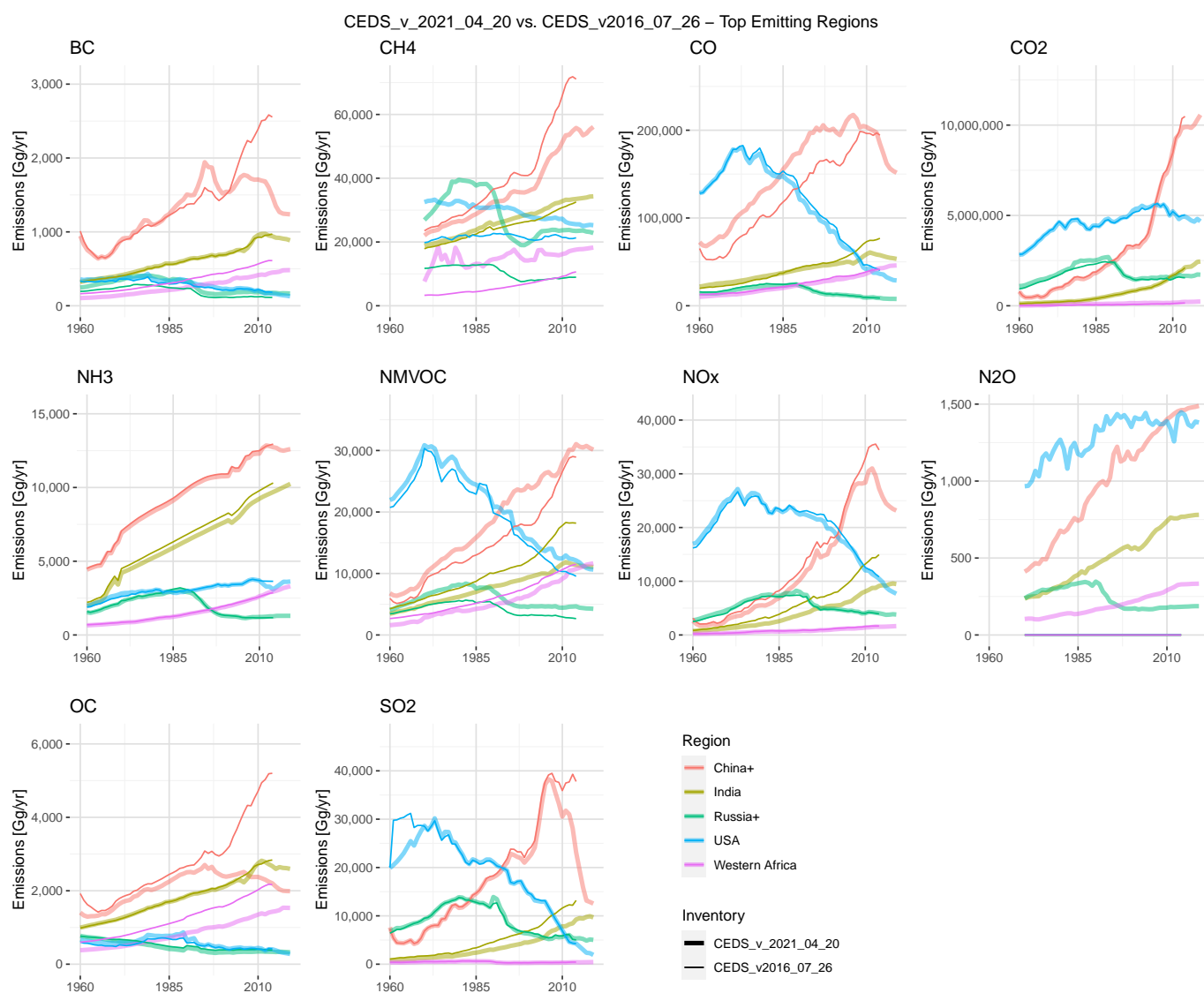


Figure S8: Top emitting regions by emissions species over recent decades (1960-2019).
 Note: See Table S3 for mapping of CEDS regions to aggregate regions graphed here.

Table S1: Mapping of CEDS working sectors to aggregate figure sectors.

Aggregate Sector	CEDS Working Sector
Agriculture (AGR)	3B_Manure-management 3D_Rice-Cultivation 3D_Soil-emissions 3E_Enteric-fermentation 3I_Agriculture-other
Aviation	1A3ai_International-aviation 1A3aii_Domestic-aviation
Residential, Commercial, Other (DOM)	1A4a_Commercial-institutional 1A4b_Residential 1A4c_Agriculture-forestry-fishing 1A5_Other-unspecified
Energy Transformation and Production (ENE)	1A1a_Electricity-autoproducer 1A1a_Electricity-public 1A1a_Heat-production 1A1bc_Other-transformation 1B1_Fugitive-solid-fuels 1B2_Fugitive-petr-and-gas 1B2d_Fugitive-other-energy 7A_Fossil-fuel-fires
Industry (IND)	1A2a_Ind-Comb-Iron-steel 1A2b_Ind-Comb-Non-ferrous-metals 1A2c_Ind-Comb-Chemicals 1A2d_Ind-Comb-Pulp-paper 1A2e_Ind-Comb-Food-tobacco 1A2f_Ind-Comb-Non-metalic-minerals 1A2g_Ind-Comb-Construction 1A2g_Ind-Comb-machinery 1A2g_Ind-Comb-mining-quarrying 1A2g_Ind-Comb-other 1A2g_Ind-Comb-textile-leather 1A2g_Ind-Comb-transpequip 1A2g_Ind-Comb-wood-products 2A1_Cement-production 2A2_Lime-production 2A6_Other-minerals 2B_Chemical-industry 2C_Metal-production 2H_Pulp-and-paper-food-beverage-wood 2H_Pulp-and-paper-food-beverage-wood 2L_Other-process-emissions
Solvents (SLV)	2D_Degreasing-Cleaning 2D_Paint-application 2D3_Chemical-products-manufacture-processing 2D3_Other-product-use
Transportation (TRA)	1A3b_Road 1A3c_Rail 1A3dii_Domestic-navigation 1A3eii_Other-transp
Int. Shipping	1A3di_International-shipping 1A3di_Oil_Tanker_Loading
Waste (WST)	5A_Solid-waste-disposal 5C_Waste-incineration 5D_Wastewater-handling 5E_Other-waste-handling 6A_Other-in-total

Table S2: Mapping of CEDS regions to aggregate figure regions in Section D.

Aggregate Region	CEDS Region
Africa, Central and South America, and Middle East	Algeria, Angola, Antigua and Barbuda, Argentina, Aruba, Bahamas, Bahrain, Barbados, Belize, Benin, Bermuda, Bolivia, Botswana, Brazil, British Virgin Islands, Burkina Faso, Burundi, Cameroon, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, Colombia, Comoros, Congo, Costa Rica, Cote d'Ivoire, Cuba, Curacao, Democratic Republic of Congo, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Falkland Islands, French Guiana, Gabon, Gambia, Ghana, Grenada, Guadeloupe, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Iraq, Islamic Republic of Iran, Israel, Jamaica, Jordan, Kenya, Kuwait, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malawi, Mali, Martinique, Mauritania, Mauritius, Montserrat, Morocco, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Oman, Palestine, Panama, Paraguay, Peru, Puerto Rico, Qatar, Reunion, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Pierre and Miquelon, Saint Vincent And Grenadines, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Sint Maarten, Somalia, South Africa, South Sudan, Sudan, Suriname, Swaziland, Syria, Tanzania, Togo, Trinidad and Tobago, Tunisia, Turks and Caicos Islands, Uganda, United Arab Emirates, United States Virgin Islands, Uruguay, Venezuela, Western Sahara, Yemen, Zambia, Zimbabwe
Australia, Japan, and New Zealand	Australia, Japan, New Zealand
China+	Cambodia, China, Hong Kong, Macao, Mongolia
Europe	Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Faeroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom
India	India
North America	Canada, Mexico, United States
Rest of Asia and Pacific Islands	Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Afghanistan, American Samoa, Bangladesh, Bhutan, Brunei Darussalam, Chinese Taipei, Cook Islands, Democratic Peoples Republic of Korea, Federated States of Micronesia, Fiji, French Polynesia, Guam, Indonesia, Kazakhstan, Kiribati, Kyrgyzstan, Laos, Malaysia, Maldives, Marshall Islands, Myanmar (Burma), Nepal, New Caledonia, Niue, Pakistan, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tokelau, Tonga, Turkmenistan, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna Islands
Russia+	Armenia, Azerbaijan, Georgia, Russia

Table S3: Mapping of CEDS regions to aggregate figure regions in Section E.

Aggregate Region	CEDS Region
China+	Cambodia, China, Hong Kong, Macao, Mongolia
India	India
Russia+	Armenia, Azerbaijan, Georgia, Russia
USA	United States
Western Africa	Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Cote d'Ivoire, Democratic Republic of Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, Togo