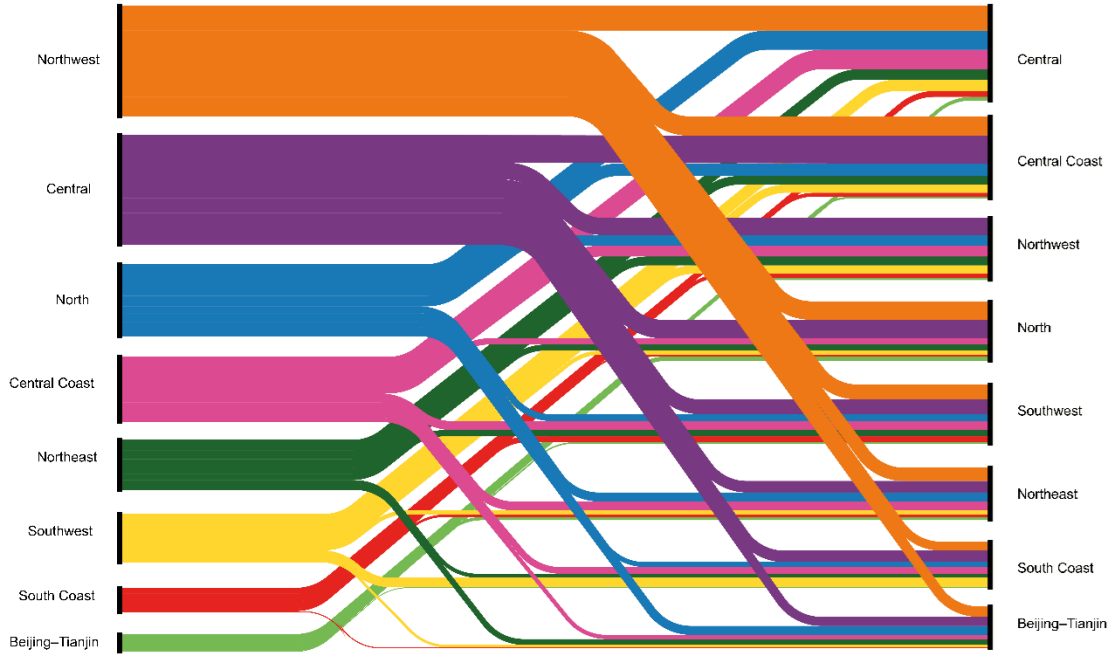
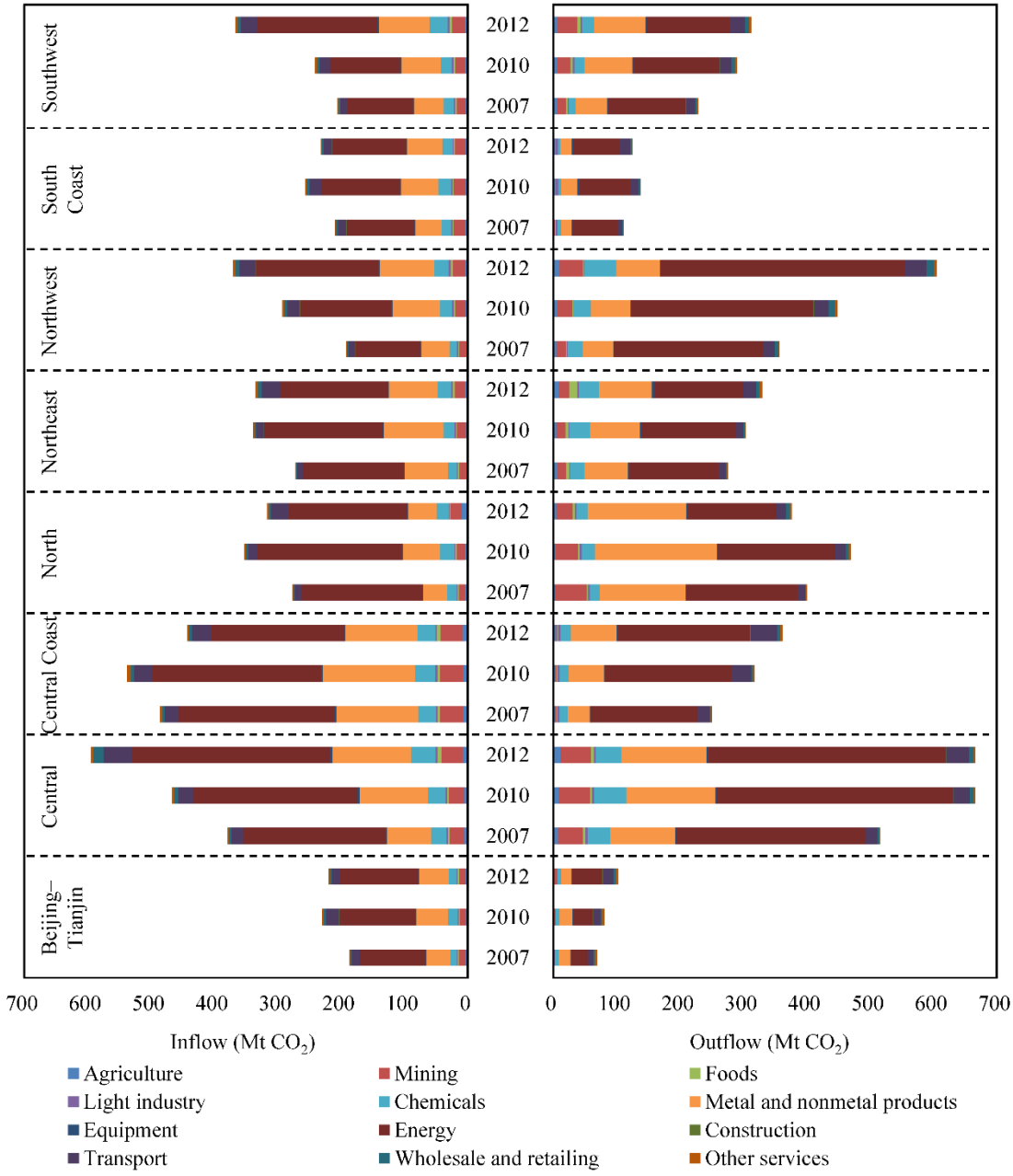
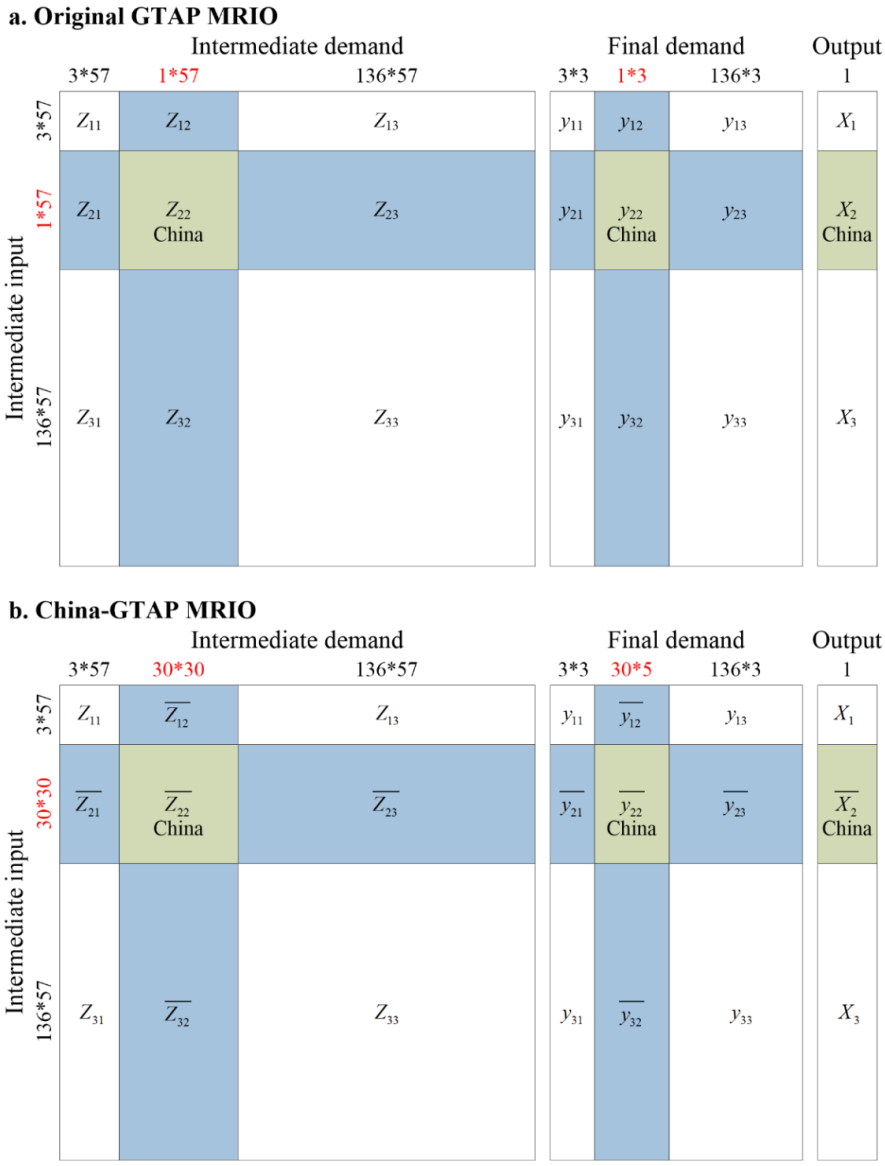



**Supplementary Figure 1** Interregional carbon emission flows within China in 2012. Northwest had the largest emission outflows, while Central and Central Coast had the largest emission inflows. Large $CO_2$ emissions related to goods and services consumed in highly developed eastern coastal provinces are imported from less developed provinces in central and western China.




**Supplementary Figure 2** Emission outflows and inflows of eight Chinese regions in 2007, 2010 and 2012.




**Supplementary Figure 3** The structure of original GTAP MRIO and China-MRIO. The figures demonstrate the dimensions for the matrices. Matrices in green are China's domestic structure, matrices in blue are China's imports and exports, and matrices in white do not change. In this study, we build a new China-MRIO by combing Chinese MRIO for 30 provinces and 30 sectors with GTAP MRIO for 140 countries and 57 sectors. First of all, matrices for China's domestic structure in GTAP are replaced by Chinese MRIO directly (in green). $Z_{22}$ is China's domestic production structure, $y_{22}$ is China's domestic final demand, and $X_2$ is China's output. Second, matrices for China's international exports and imports are calculated under the assumption that international exports (or imports) of a sector in a province are distributed among all foreign countries in the same proportion as China's exports (or imports) of the sector (in blue). $Z_{12}$ and $Z_{32}$ are China's imports for intermediate use, $Z_{21}$ and $Z_{23}$ are China's exports for intermediate use, $y_{12}$ and $y_{32}$ are China's imports for final use, and $y_{21}$ and $y_{23}$ are China's exports for final use. Third, matrices for other countries do not change (in white).

**Supplementary Table 1** Territory- and consumption-based $CO_2$ emissions for Chinese 30 provinces (Unit: Mt $CO_2$).

| No. | Provinces | Territory-based emissions | | | Consumption-based emissions | | |
|---|---|---|---|---|---|---|---|
| | | 2007 | 2010 | 2012 | 2007 | 2010 | 2012 |
| 1 | Beijing | 88 | 86 | 80 | 159 | 171 | 159 |
| 2 | Tianjin | 98 | 129 | 149 | 108 | 177 | 185 |
| 3 | Hebei | 482 | 584 | 648 | 246 | 389 | 451 |
| 4 | Shanxi | 324 | 378 | 431 | 167 | 224 | 289 |
| 5 | Inner Mongolia | 321 | 441 | 578 | 112 | 243 | 301 |
| 6 | Liaoning | 341 | 421 | 430 | 213 | 325 | 350 |
| 7 | Jilin | 157 | 186 | 214 | 186 | 242 | 232 |
| 8 | Heilongjiang | 174 | 192 | 241 | 160 | 195 | 258 |
| 9 | Shanghai | 165 | 177 | 182 | 216 | 248 | 177 |
| 10 | Jiangsu | 426 | 522 | 592 | 319 | 432 | 481 |
| 11 | Zhejiang | 285 | 312 | 329 | 327 | 342 | 323 |
| 12 | Anhui | 175 | 231 | 279 | 151 | 191 | 203 |
| 13 | Fujian | 143 | 176 | 205 | 122 | 170 | 190 |
| 14 | Jiangxi | 108 | 125 | 137 | 154 | 148 | 144 |
| 15 | Shandong | 602 | 698 | 767 | 472 | 600 | 709 |
| 16 | Henan | 381 | 454 | 452 | 244 | 357 | 437 |
| 17 | Hubei | 221 | 283 | 322 | 179 | 218 | 328 |
| 18 | Hunan | 198 | 220 | 237 | 166 | 204 | 261 |
| 19 | Guangdong | 360 | 414 | 440 | 331 | 421 | 466 |
| 20 | Guangxi | 111 | 144 | 169 | 96 | 148 | 188 |
| 21 | Hainan | 19 | 24 | 31 | 18 | 22 | 40 |
| 22 | Chongqing | 86 | 122 | 139 | 97 | 118 | 172 |
| 23 | Sichuan | 175 | 245 | 266 | 176 | 207 | 274 |
| 24 | Guizhou | 152 | 170 | 197 | 83 | 105 | 140 |
| 25 | Yunnan | 144 | 170 | 179 | 99 | 147 | 188 |
| 26 | Shaanxi | 130 | 190 | 226 | 113 | 191 | 234 |
| 27 | Gansu | 87 | 111 | 134 | 64 | 85 | 107 |
| 28 | Qinghai | 22 | 27 | 38 | 26 | 30 | 41 |
| 29 | Ningxia | 62 | 90 | 129 | 43 | 70 | 72 |
| 30 | Xinjiang | 116 | 155 | 233 | 99 | 141 | 196 |
| | **Total** | **6154** | **7476** | **8454** | **4947** | **6565** | **7600** |

**Supplementary Table 2** Sector classification of pricing data for global MRIO tables.

| No. | Abbreviations | Sectors |
|---|---|---|
| 1 | ISIC A-B | Agriculture, hunting, forestry, fishing |
| 2 | ISIC C-E | Mining, Manufacturing, Utilities |
| 3 | ISIC D | Manufacturing |
| 4 | ISIC F | Construction |
| 5 | ISIC G-H | Wholesale, retail trade, restaurants and hotels |
| 6 | ISIC I | Transport, storage and communication |
| 7 | ISIC J-P | Other Activities |

Note: We deflated all the tables to 2012 prices using the double deflation method[1]. The pricing data for China's IOTs were gotten from the China Statistics Yearbook[2, 3, 4], while the pricing data for China's imports and global MRIO tables were obtained from the National Account Main Aggregates Database[5]. The National Account Main Aggregates Database provides pricing data for seven sectors, which are adapted to 57 sectors of global MRIO. In addition, the import value of China was deflated by the weighted average price deflators of all regions (excluding China). The weight for one region was in proportion to China's imports from the region. It needs to be noted that there are several drawbacks related to double deflation method, although this method is widely accepted. Firstly, by adopting this method, most sectors are assumed to produce one homogeneous product, each sector's gross output and intermediate and final demand are deflated by this sector's price index[6]. However, most sectors consist of more than one good, therefore to use the price index of certain goods to represent the entire sector is not always appropriate[7]. Secondly, value-added is obtained as the difference between the total input and intermediate input in each sector. Consequently, it is not accurate to use value-added to balance the input-output table after the deflation[8].

**Supplementary Table 3** Emission factors for different energy types for calculating $CO_2$ emissions.

| No. | Energy types | Net calorific value (PJ / $10^4\ t, 10^8\ m^3$) | Carbon content (Mt $CO_2$ / PJ) | Oxygenation efficiency (%) |
|---|---|---|---|---|
| 1 | Raw coal | 0.20908 | 0.087464 | 88.535 |
| 2 | Cleaned coal | 0.26344 | 0.087464 | 88.535 |
| 3 | Other washed coal | 0.15393 | 0.087464 | 88.535 |
| 4 | Briquettes | 0.17796 | 0.087464 | 88.535 |
| 5 | Coke | 0.28435 | 0.104292 | 97.000 |
| 6 | Coke oven gas | 1.63080 | 0.071414 | 99.000 |
| 7 | Other gas | 0.84290 | 0.071414 | 99.000 |
| 8 | Other coking products | 0.28435 | 0.091212 | 97.000 |
| 9 | Crude oil | 0.41816 | 0.073284 | 98.000 |
| 10 | Gasoline | 0.43124 | 0.069253 | 98.000 |
| 11 | Kerosene | 0.43124 | 0.071818 | 98.000 |
| 12 | Diesel oil | 0.42652 | 0.074017 | 98.000 |
| 13 | Fuel oil | 0.41816 | 0.077314 | 98.000 |
| 14 | Liquefied petroleum gas (LPG) | 0.50179 | 0.063024 | 99.000 |
| 15 | Refinery gas | 0.46055 | 0.073284 | 99.000 |
| 16 | Other petroleum products | 0.41816 | 0.074017 | 98.000 |
| 17 | Nature gas | 3.89310 | 0.056062 | 99.000 |
| 18 | Non-fossil Heat | 0.01000 | 0.000000 | 0.0000 |
| 19 | Non-fossil Electricity | 0.36000 | 0.000000 | 0.0000 |
| 20 | Other energy | 0.29308 | 0.000000 | 0.0000 |

Note: The Intergovernmental Panel on Climate Change (IPCC) reference approach is used to calculate the $CO_2$ emissions from energy combustion. The emission factors (i.e. net calorific value, carbon content, and oxygenation efficiency) pay a critical role in calculations. Researchers usually use the IPCC default value[9]. However, this default value may overestimate Chinese $CO_2$ emissions[10, 11]. In this study, we use the emission factors from our previous research[10]. The factors are measured based on 602 coal samples from the 100 largest coal-mining areas in China and are assumed to be more accurate than the IPCC default value.

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