Supporting information

for

Integration of the Human Development Index into carbon accounting to enhance the equity and efficiency of emission allocations

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The supplementary materials provide supplemental Figures and Tables supporting the main text.

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Text S1. Properties of HBA

Kander et al. (2015) proposed three important and intuitive eye-catching features for credit and penalty schemes, including Sensitivity, Additivity and Monotonicity. In this section, we will show how HBA satisfies these properties.

Conditions 1. Sensitivity

As indicated by Kander et al. (2015), "Sensitivity means that carbon accounting should be responsive to factors that economies can influence, and that affect global emissions". The motivation for the sensitivity condition is direct: unless satisfied, countries will not have sufficient feedback on how some relevant and manageable aspects of their behavior affect global emissions. Among the factors that countries can typically influence and have an impact on global emissions are consumption patterns - including consumption levels and composition - energy systems and production technologies, and trade patterns. However, it is important to note that Sensitivity conditions do not require carbon inventories to reflect only the factors that countries can influence. Although, at least on the surface, this seems to be a morally desirable feature, it is clearly incompatible with additivity. There are many factors that affect global anthropogenic emissions, and no country can affect it. In order to maintain additivity, due to these factors, some countries still have to consider changes in global emissions.

The formalization of sensitivity conditions is complex to some extent, because changes in one factor - such as a country's consumption patterns - almost always mean changes in other factors - such as production patterns or trade flows - also involve other countries. Therefore, we cannot simply invoke the exception clause. What we need is a restriction to ensure that any change in the territorial emissions of countries other than country S is due to changes in trade flows directly or indirectly related to country S. The following two assumptions will impose such a restriction. As mentioned above, HBA represents carbon emissions, and x_i^{RS} is the output of sector i from country S, which is ultimately consumed directly or indirectly in country R.

$$\sum_{R\neq S,T\neq S} \Delta x_i^{RT} = -\Delta x_i^{ST} \quad \text{(S1)}$$

$$\sum_{R\neq S,T\neq S} \Delta HBA_i^{R} = \sum_{R\neq S} e_i^R . \Delta x_i^{RS} + \sum_{R,T\neq S} e_i^R . \Delta x_i^{RT} \ . \quad \text{(S2)}$$

Equation (S1) shows that any change in the export of country *S* will lead to the same big change in the output of other countries or corresponding departments, but the sign is opposite. That is to say, assuming that consumption outside country *S* is constant, any supply reduced from country *S* must be replaced by other suppliers, and vice versa. Equation (S2) indicates that any change in direct emissions outside country *S* is directly related to changes in exports to country *S* or imports from country *S*. The first part on the right side of the equation is the change in production-based emissions outside country *S* due to changes in exports to country *S*, and the last part is the change in production-based emissions outside country S due to changes in imports from country *S*. Equations (S1) and (S2) jointly ensure that any change in global emissions is due to changes in the factors that country *S* can affect. Let $G = \sum_{i,S} HBA_i^S$ is the sum of global anthropogenic emissions, and E^s the sum of emissions attributed to each country through accounting methods. The sensitivity condition means that given hypotheses (S1) and (S2):

If $\Delta G \neq 0$ then $\Delta E^{S} \neq 0$. (S3)

Condition 2. Monotonicity

The second property monotonicity means that economies should not reduce their responsibility by increasing global emissions, and vice versa. (Kander et al., 2015). This is a relatively strict attribute. For example, consumption-based accounting (CBA) cannot satisfy attributes, because trade may involve the export of goods from economies with low emission intensity (Kander et al., 2015). That is to say, national carbon accounting should accurately track the impact of behavioral changes on global emissions. We call this condition monotonicity.

The motivation for monotonicity is obvious: failure to meet its accounting method will have a counterproductive feedback to governments aiming to reduce their national carbon stocks in order to contribute to reducing global emissions. By successfully implementing policies to reduce national emissions, a country may promote an increase in global emissions.

The formal definition of monotonicity condition is similar to that of responsiveness condition. Monotonicity implies that, given (S1) and (S2):

If $\Delta G \geq 0$ then $\Delta E^{S} \geq 0$ (S4)

Condition 3. Additivity

The third property additivity requires that the sum of national emissions of all economies should be equal to the total global emissions (Kander et al., 2015). If properly explained, PBA, CBA and HBA all satisfy additivity - although in fact the UNFCCC report's PBA list does not satisfy additivity, because they do not include emissions from international shipping and aviation. Under HBA, the carbon emissions embodied in international trade are fully allocated by producers and consumers. The additivity condition requires that the sum of national carbon inventories is equal to global anthropogenic emissions. Formally, additivity means:

$$G = \sum_{R,i} HBA_i^R = \sum_{R,i} PBA_i^R = \sum_{R,i} CBA_i^R \tag{S5}$$

The latest version uses multi-regional input-output (MRIO) tables and emission data from actual producing countries to calculate embodied emissions in exports and imports. Therefore, the global sum of export embodied emissions and import embodied emissions is zero respectively.

Text S2. Carbon intensity of import and export trade of major economies

Although the first few sectors of each major country's trade-related carbon footprint overlap, the carbon intensity of each country's trade has obvious differences. Specifically, we use Equation (16) to show that the carbon intensity of trade (Figure S1, trade prices are measured at exporters' prices) is the ratio of carbon dioxide emissions per unit of energy (f^R) to energy consumption per dollar of trade (e^R). Therefore, the high carbon intensity of exports from emerging markets such as China, Russia and India reflects both the widespread use of carbon-intensive fuels such as coal in these countries and the low value of energy-intensive exports. In contrast, Germany and Japan export higher unit energy value, and a larger proportion of the required energy is produced using low-carbon technologies. The carbon intensity of mature USA economic exports is much lower than that of emerging markets, but still more than twice that of Western European countries such as Germany. In contrast, the CO_2 emissions per dollar of goods imported from Germany and Japan far exceed the CO_2 emissions of their exports, which reflects the energy-intensive products imported from other places, and this is also the reason why HBA and CBA in these countries are significantly higher than PBA. The import carbon intensity of China, Russia and India have been far lower than its export carbon intensity, despite the large differences in energy consumption per dollar of trade. However, this difference reflects the low HDI of emerging economies. HBA allocates emission responsibilities by considering the development of emerging economies, which helps to promote the development of emerging countries, thus promoting global emission reductions and equitable division of emission responsibilities.

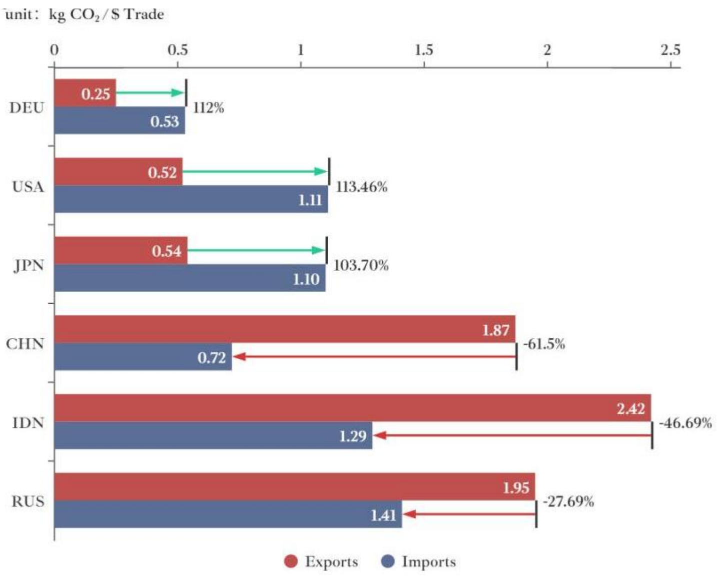


Figure S1 Carbon intensity of import and export trade of major economies.

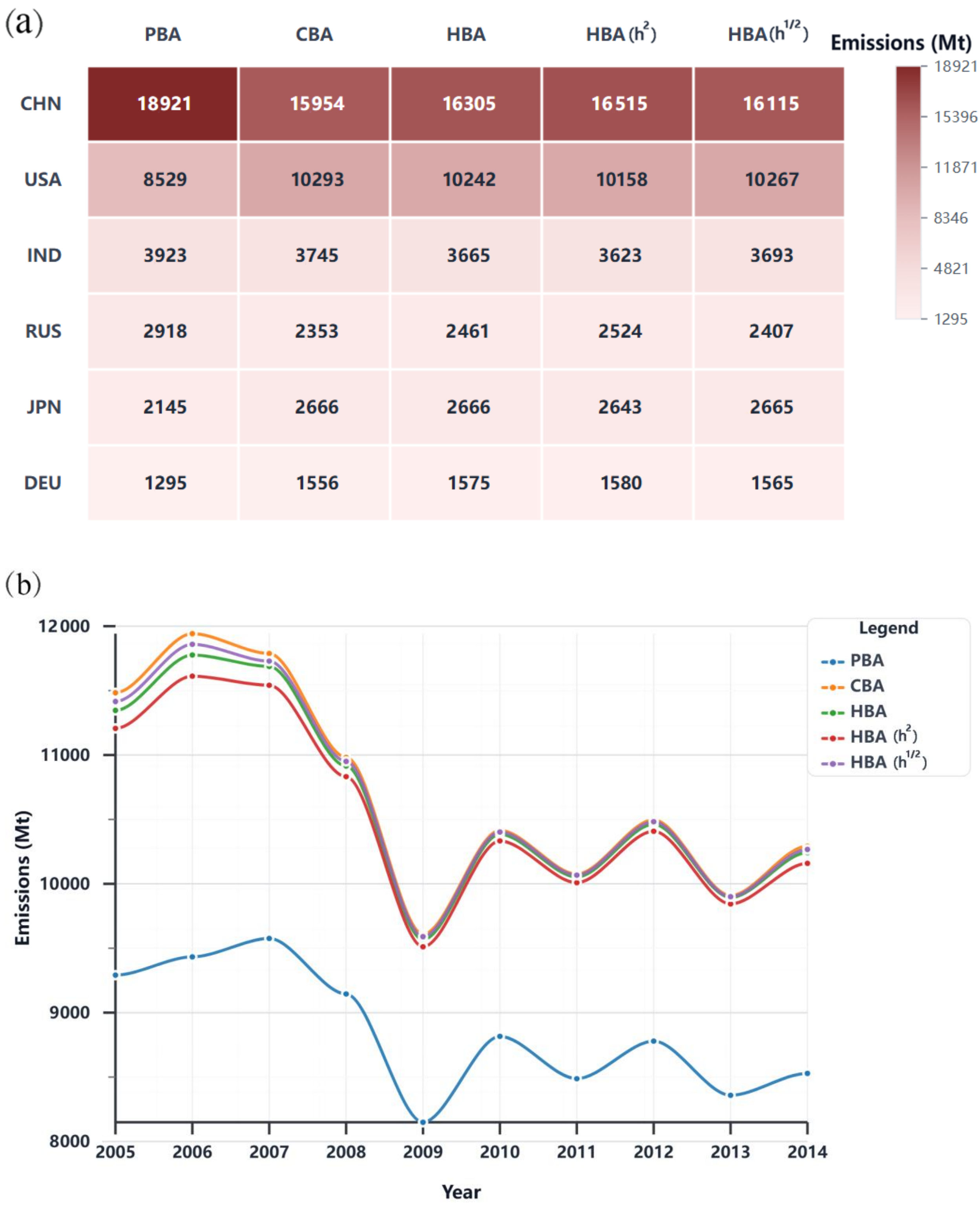
Note: The major economies selected the world's top six in terms of territorial carbon footprint.

Text S3. Robustness to HBA

This appendix evaluates the robustness of HBA to the choice of HDI-based weights. To accommodate small measurement and reporting uncertainties in HDI, and different scholarly preferences for representing development capability, we vary only the shape of the weighting function while holding trade flows and emission intensities fixed. We use a power-transformation family $h_\theta = h^\theta$ with $\theta \in \{0.5,1,2\}$ (Anscombe, 1948). Here $\theta = 1$ is the main-text baseline, $\theta = 0.5$ compresses differences between low- and high-HDI economies, and $\theta = 2$ amplifies them. This design preserves annual accounting closure and additivity identities, so it isolates robustness to the weighting scheme itself.

Mechanistically, under HBA, the consumer responsibilities for import-oriented emissions are shared in proportion to the consumer HDI (denoted as HIE), with the remaining portion borne by the producer of the goods (denoted as HEE). The net effect for any country therefore depends on its import-export structure and on the HDI distribution of its partners. Under convex weights ($\theta = 2$), already high-HDI economies receive relatively lower weights compared with the baseline; under concave weights ($\theta = 0.5$), differences are compressed. We assess robustness in terms of both directional responses and magnitudes.

In the 2014 cross section, figure S2a (a heat map) reports PBA, CBA, baseline HBA, and the two alternatives HBA (h^2) and HBA ($h^{1/2}$) for major economies. Across all cases, HBA remains between PBA and CBA, and country rankings are preserved. Directional changes are economically intuitive: high-HDI, import-oriented economies show lower HBA under the convex weighting and higher HBA under the concave weighting, while economies exporting primarily to high-HDI markets move in the opposite direction. The magnitudes are modest and concentrated within a narrow band, which supports robustness to reasonable alterations in weight shape.



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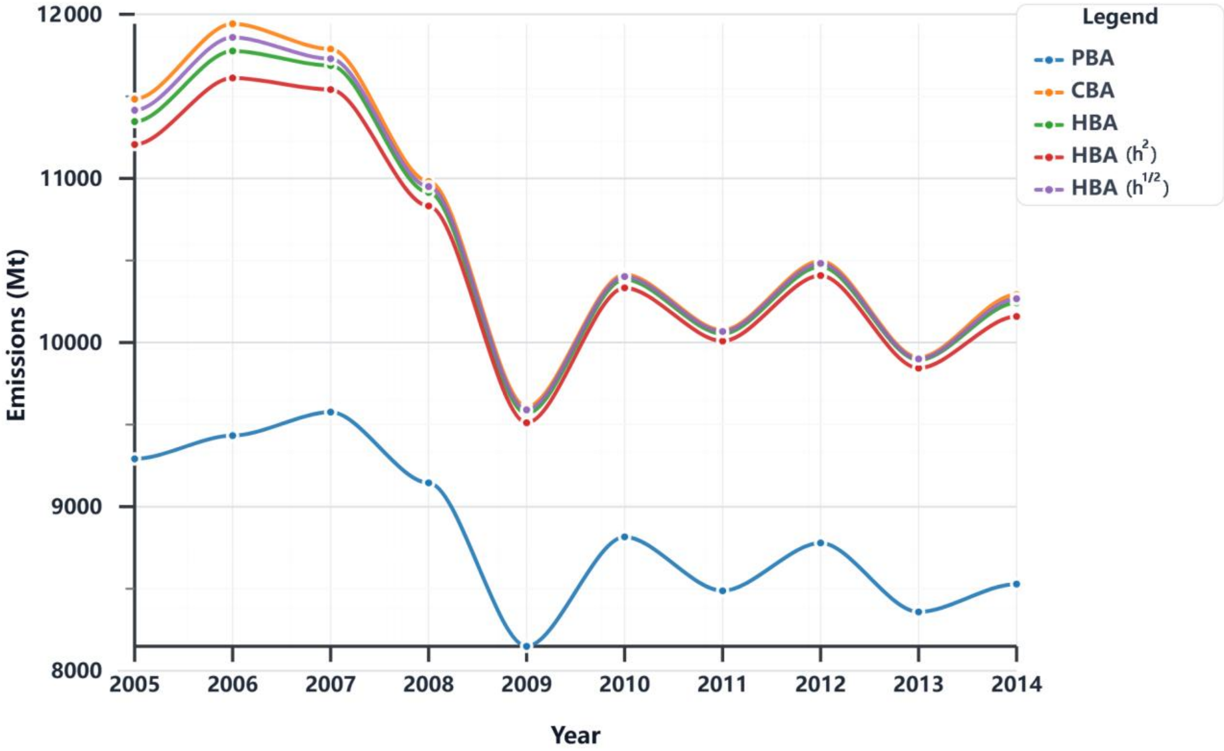

Figure S2 Robustness of HBA to HDI weighting: (a) 2014 cross-sectional heat map for major economies, (b) the USA's carbon emission responsibility (2005-2014), (c) China's carbon emission responsibility (2005-2014)

Time-series evidence leads to the same conclusion. For the USA (see figure S2b, 2005–2014), the three HBA series for $\theta = 2, 1, 0.5$ are close and smooth throughout, and they remain between PBA and CBA in every year; after 2009, all series display a plateau and converge toward CBA, indicating that alternative weight shapes do not distort the identification of macro shocks and subsequent adjustments. For China (see figure S2c, 2005-2014), the three HBA series likewise remain between PBA and CBA and shift upward over time as HDI rises and imports expand; the gaps across θ are small, cyclical movements (including the 2009 downturn and the 2012-2013 rebound) appear with similar amplitude and timing in all three series, and around 2010 there is a clear reversal in the relative magnitudes of export- and import-oriented emission allocations (from export-side larger to import-side no smaller), a feature that is visible under each weight shape.

In conclusion, the cross-sectional heat map and the two country time series show strong robustness of HBA to the HDI weighting scheme: ordering is preserved, the "remains between PBA and CBA" property holds, directional responses are economically interpretable, and magnitudes are limited. Figures S2a-S2c thus provide a systematic complement to the main-text results based on annually updated HDI scores.

REFERENCES

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Table S1 Comparison of carbon accounting methods

Method		Principle	Strengths	Limitations	Practical
PBA		Polluter-Pays	Simple; prevents free-riding	Carbon leakage; emissions outsourcing	Ignore trade-related emissions
CBA		Beneficiary-Pays	Reduces carbon leakage; links responsibility to consumption	Ignores producers' role; hinders tech transfer	Carbon-intensive producers are exempt from punishment
SRA	SRA	Beneficiary-Pays	Shared responsibility	Trade-related emissions are simply weighted	Both producers and consumers benefit.
	EBSR	Benefit-Based Allocation	Economic benefit shared responsibility	Sensitive to carbon price; requires detailed economic data	Aligns responsibility with trade benefits;
IBA	IBA	Investment and corporate control	Links responsibility to investment flows	Discourages Foreign direct investment to emerging economies	Reduces investment in high-emission regions
	TIBA	Technological Transfer Incentives	Encourages clean technology diffusion	Data scarcity; ownership ratio may not match influence	Limited by data availability and governance
HBA		CBDR and Beneficiary Pays	Balances equity and efficiency; reflects development disparities; incentivizes tech transfer	Requires reliable HDI data; omits direct historical emissions	Promotes equitable sharing; preserves development space for emerging economies

Table S2 Countries and territories included in the OECD-ICIO input-output tables

No.	Country's name	iso	No.	Country's name	iso
1	Australia	AUS	23	Ireland	IRL
2	Austria	AUT	24	Italy	ITA
3	Belgium	BEL	25	Japan	JPN
4	Bulgaria	BGR	26	Korea	KOR
5	Brazil	BRA	27	Lithuania	LTU
6	Canada	CAN	28	Luxembourg	LUX
7	China	CHN	29	Latvia	LVA
8	Croatia	HRV	30	Mexico	MEX
9	Cyprus	CYP	31	Malta	MLT
10	Czech Republic	CZE	32	Netherlands	NLD
11	Germany	DEU	33	Norway	NOR
12	Denmark	DNK	34	Poland	POL
13	Spain	ESP	35	Portugal	PRT
14	Estonia	EST	36	Romania	ROU
15	Finland	FIN	37	Rest of World	ROW
16	France	FRA	38	Russia	RUS
17	United Kingdom	GBR	39	Slovakia	SVK
18	Greece	GRC	40	Slovenia	SVN
19	Hungary	HUN	41	Sweden	SWE
20	Iceland	ISD	42	Switzerland	CHE
21	Indonesia	IDN	43	Turkey	TUR
22	India	IND	44	USA	USA

Table S3 National CO_2 emissions, per capita carbon emissions and HDI in 2014 (unit: Mt, t/person)

iso	PBA	CBA	HBA	Per capita (PBA)	Per capita (CBA)	Per capita (HBA)	HDI
AUS	672.87	793.60	803.86	31.65	37.32	37.81	0.909
AUT	80.23	139.17	138.65	9.77	16.95	16.89	0.931
BEL	130.29	182.11	182.49	12.51	17.49	17.52	0.924
BGR	83.28	72.70	74.08	11.56	10.09	10.28	0.807
BRA	914.43	1088.50	1036.03	4.60	5.48	5.21	0.754
CAN	898.89	923.39	941.27	26.84	27.57	28.11	0.925
CHE	47.48	152.37	149.59	6.24	20.04	19.67	0.952
CHN	18920.74	15954.12	16304.78	14.13	11.92	12.18	0.725
CYP	5.70	11.90	11.18	7.16	14.94	14.03	0.865
CZE	158.76	161.55	162.98	15.55	15.82	15.96	0.887
DEU	1295.45	1555.87	1575.15	15.73	18.90	19.13	0.937
DNK	112.02	121.04	126.92	20.37	22.00	23.07	0.932
ESP	392.34	473.28	470.09	9.68	11.68	11.60	0.884
EST	35.88	31.00	31.85	27.61	23.86	24.51	0.879
FIN	85.63	106.88	107.88	16.31	20.36	20.55	0.927
FRA	439.03	788.93	758.29	6.82	12.25	11.77	0.892
GBR	678.96	1039.96	1026.01	11.11	17.02	16.79	0.924
GRC	117.58	144.14	142.66	10.95	13.42	13.29	0.879
HRV	24.44	31.15	30.10	5.44	6.94	6.71	0.841
HUN	65.86	75.98	73.90	6.65	7.67	7.46	0.838
IDN	875.89	893.88	865.27	3.65	3.72	3.60	0.687
IND	3922.78	3745.10	3665.30	3.36	3.21	3.14	0.619
IRL	60.38	74.06	74.23	14.37	17.62	17.66	0.914
ITA	494.95	698.54	680.85	8.52	12.02	11.71	0.883
JPN	2144.55	2666.35	2665.94	16.88	20.98	20.98	0.914
KOR	1126.73	1136.32	1189.14	23.23	23.42	24.51	0.906
LTU	28.45	30.39	30.44	8.00	8.55	8.56	0.861
LUX	12.25	10.39	11.10	24.92	21.13	22.57	0.926
LVA	13.05	20.19	19.09	5.85	9.05	8.55	0.846
MEX	783.07	891.52	841.77	7.04	8.02	7.57	0.764
MLT	6.23	4.91	5.20	15.38	12.11	12.83	0.881
NOR	82.12	116.60	119.63	17.62	25.02	25.67	0.952
POL	524.79	521.19	522.85	13.64	13.54	13.59	0.865
PRT	75.94	88.60	87.06	7.09	8.27	8.13	0.848
ROU	125.78	132.92	130.27	5.66	5.98	5.86	0.811
ROW	13160.83	12274.65	12075.92	4.48	4.18	4.11	-------
RUS	2918.16	2352.60	2460.56	20.84	16.80	17.57	0.818
SVK	54.89	61.31	60.12	10.05	11.22	11.00	0.849

SVN	22.13	25.34	25.65	11.03	12.64	12.79	0.902
SWE	79.92	147.46	145.55	8.82	16.28	16.07	0.935
TUR	523.09	691.41	658.44	6.81	9.00	8.57	0.809
USA	8528.50	10293.03	10242.23	27.76	33.50	33.34	0.919

Table S4 Sectoral CO_2 emissions from import and export trade of major economies, 2014 (Mt)

Table S4a Sectoral CO_2 emissions from import trade of major economies, 2014 (Mt)

Code	USA	CHN	IND	JPN	DEU	RUS
A	32.98	26.49	3.46	12.10	12.04	6.94
B	236.67	176.60	61.35	98.10	51.04	11.58
C10T12	12.24	7.09	2.04	6.55	6.12	4.32
C13T15	30.46	3.81	1.78	8.88	6.01	3.98
C16	9.31	7.87	0.43	2.95	1.57	0.67
C17T18	17.97	9.65	2.62	4.54	5.51	2.78
C19	99.69	43.71	13.49	31.88	27.19	9.38
C20T21	177.44	82.48	43.61	55.77	43.68	25.19
C22	73.67	25.66	12.71	18.23	16.06	27.01
C23	281.00	55.64	46.77	78.39	54.12	35.42
C24	393.73	193.06	122.09	111.74	84.06	54.83
C25	17.15	6.60	1.11	2.75	3.41	2.08
C26	7.11	3.95	0.76	1.67	1.40	0.90
C27	8.38	1.73	0.92	3.44	1.85	1.04
C28	9.15	5.29	1.60	3.32	2.16	2.40
C29	8.39	2.67	0.30	0.71	1.38	1.05
C30	2.52	1.80	1.20	0.90	0.94	1.04
C31T33	35.09	13.18	9.92	13.41	8.60	6.44
DTE	797.86	451.14	196.26	308.05	203.40	132.90
F	2.05	1.60	0.50	0.66	1.01	0.44
G	42.13	34.45	7.98	15.19	13.59	7.76
H	267.20	215.50	57.00	101.43	81.14	54.39
I	24.16	26.80	1.83	2.58	5.45	4.79
J58T60	0.24	0.20	0.03	0.05	0.14	0.05
J61	0.47	0.37	0.11	0.18	0.25	0.22
J62T63	2.08	0.80	0.27	0.77	0.63	0.68
K	3.20	2.02	0.81	1.28	1.35	0.59
L	1.12	0.71	0.14	0.25	0.30	0.17
MTN	19.08	10.93	4.02	9.60	8.36	4.08
O	1.19	1.70	0.55	0.91	0.55	0.42
P	0.98	0.94	0.22	0.35	0.35	0.20
Q	2.50	1.36	0.35	0.59	0.67	0.36
RTS	4.14	2.77	0.79	1.38	0.99	0.72

Table S4b Sectoral CO_2 emissions from export trade of major economies, 2014 (Mt)

Code	USA	CHN	IND	JPN	DEU	RUS
A	20.83	31.20	12.29	0.51	5.27	7.00
B	52.81	101.12	91.28	19.17	3.58	145.86
C10T12	14.98	19.21	3.49	1.16	5.53	1.37
C13T15	0.95	64.91	11.31	1.19	0.82	0.24
C16	2.22	11.31	7.89	0.05	0.71	2.90
C17T18	12.03	23.06	4.62	4.42	7.17	1.44
C19	48.37	68.27	26.55	11.04	14.51	60.17
C20T21	64.04	382.91	48.58	28.30	35.01	75.64
C22	11.35	110.99	1.82	2.27	2.57	0.37
C23	31.98	896.61	55.96	31.98	25.46	23.06
C24	63.27	866.72	127.23	133.07	57.80	262.84
C25	4.02	14.47	29.60	1.37	3.63	0.00
C26	2.03	13.02	0.33	1.85	1.20	0.75
C27	1.88	23.27	1.03	0.67	1.27	0.00
C28	13.29	21.68	3.37	1.55	3.99	2.09
C29	2.05	5.04	1.05	2.32	5.41	0.81
C30	5.64	5.94	1.74	0.77	0.78	0.00
C31T33	3.55	50.57	4.23	2.19	0.99	0.17
DTE	224.80	1488.45	226.74	81.21	127.92	280.84
F	0.08	0.18	0.16	0.30	1.24	1.02
G	72.26	18.82	10.01	12.07	14.46	10.81
H	125.17	142.97	58.75	30.70	53.77	87.43
I	27.64	2.15	39.99	2.51	2.33	1.70
J58T60	0.05	0.00	0.00	0.07	0.37	0.00
J61	0.57	0.21	0.19	0.12	0.28	0.08
J62T63	2.75	0.13	2.02	0.26	0.97	0.00
K	5.71	1.86	0.48	0.44	0.91	0.43
L	0.78	0.26	0.16	0.07	0.17	0.52
MTN	34.60	10.58	2.91	3.35	6.19	1.98
O	4.03	0.11	0.00	0.02	0.04	0.01
P	1.27	0.30	0.04	0.02	0.32	0.08
Q	0.24	2.86	0.11	1.36	0.71	0.37
RTS	1.47	6.10	0.71	0.33	0.50	0.40

Table S5 OECD-ICIO Tables Sectors

No.	Code	Sector name
1	A	Agriculture, forestry and fishing
2	B	Mining and extraction of energy producing products
3	C10T12	Food products, beverages and tobacco
4	C13T15	Textiles, wearing apparel, leather and related products
5	C16	Wood and products of wood and cork
6	C17T18	Paper products and printing
7	C19	Coke and refined petroleum products
8	C20T21	Chemicals and pharmaceutical products
9	C22	Rubber and plastic products
10	C23	Other non-metallic mineral products
11	C24	Basic metals
12	C25	Fabricated metal products
13	C26	Computer, electronic and optical products
14	C27	Electrical equipment
15	C28	Machinery and equipment, nec.
16	C29	Motor vehicles, trailers and semi-trailers
17	C30	Other transport equipment
18	C31T33	Other manufacturing; repair and installation of machinery and equipment
19	DTE	Electricity, gas, water supply, sewerage, waste and remediation services
20	F	Construction
21	G	Wholesale and retail trade; repair of motor vehicles
22	H	Transportation and storage
23	I	Accommodation and food services
24	J58T60	Publishing, audiovisual and broadcasting activities
25	J61	Telecommunications
26	J62T63	IT and other information services
27	K	Financial and insurance activities
28	L	Real estate activities
29	MTN	Other business sector services
30	O	Public admin. and defence; compulsory social security
31	P	Education
32	Q	Human health and social work
33	RTS	Arts, entertainment, recreation and other service activities
34	T	Private households with employed persons

Table S6 Accounting for worldwide CO_2 emissions in 2014 (unit: Mt)

Year	DE	EE	IE	HIE	HEE
CHN	14535.459	4385.276	1418.663	1028.531	740.787
ROW	10111.649	3049.181	2162.998	1451.068	513.397
USA	7671.687	856.815	2621.345	2409.016	161.525
EU	2906.434	1618.835	2804.550	2524.249	247.953
IND	3148.104	774.675	596.999	369.542	147.651
JPN	1947.800	970.361	404.797	331.124	181.634
RUS	1767.758	376.789	898.589	821.311	76.876
KOR	658.630	468.104	477.687	432.785	97.723
BRA	731.887	182.546	356.610	268.884	35.263
GBR	511.079	167.882	528.880	488.685	26.247
CAN	516.123	382.768	407.269	376.724	48.426
MEX	573.376	209.698	318.148	243.065	25.333
IDN	676.110	199.782	217.772	149.609	39.547
AUS	500.784	172.090	292.815	266.169	36.906
TUR	387.371	135.716	304.035	245.964	25.109
CHE	25.924	21.561	126.446	120.376	3.291
NOR	31.218	50.906	85.384	81.286	7.128

Table S7 Carbon emissions and HDI in EU from 2005 to 2014 (unit: Mt)

Year	PBA	CBA	HBA	IE	EE	DE	HIE	HEE	**HDI**
2005	5901.11	7456.91	7333.22	3549.77	1993.97	3907.13	3090.18	335.90	**0.848**
2006	5924.50	7399.47	7295.81	3508.17	2033.20	3891.30	3072.31	332.20	**0.854**
2007	6001.99	7673.04	7562.75	3756.63	2085.58	3916.41	3298.31	348.03	**0.858**
2008	5528.41	7396.53	7258.32	3717.42	1849.30	3679.11	3272.82	306.38	**0.863**
2009	4970.20	6414.94	6320.04	2955.34	1510.59	3459.61	2607.07	253.37	**0.864**
2010	5103.99	6578.08	6501.35	3167.95	1693.86	3410.13	2810.24	280.98	**0.868**
2011	5025.94	6552.78	6480.34	3269.59	1742.76	3283.19	2913.57	283.58	**0.872**
2012	4989.71	6123.60	6105.66	2944.25	1810.36	3179.35	2627.78	298.53	**0.873**
2013	4712.79	5857.97	5832.72	2799.23	1654.04	3058.75	2511.98	261.99	**0.879**
2014	4525.27	5710.98	5678.64	2804.55	1618.84	2906.43	2524.25	247.95	**0.882**

Table S8 Carbon emissions and HDI in RUS from 2005 to 2014 (unit: Mt)

Year	PBA	CBA	HBA	IE	EE	DE	HIE	HEE	**HDI**
2005	2811.28	1920.89	2097.37	247.99	1138.38	1672.90	189.46	235.01	**0.764**
2006	2977.76	2094.44	2263.06	286.37	1169.70	1808.06	221.94	233.05	**0.775**
2007	2966.86	2264.29	2405.65	378.39	1080.95	1885.91	297.41	222.33	**0.786**
2008	2978.58	2288.69	2434.74	420.78	1110.67	1867.91	332.84	233.99	**0.791**
2009	2765.94	2040.91	2196.89	285.99	1011.01	1754.93	225.64	216.32	**0.789**
2010	2952.77	2240.25	2386.75	373.47	1085.99	1866.78	297.28	222.69	**0.796**
2011	3097.94	2394.89	2541.65	413.36	1116.41	1981.53	333.99	226.12	**0.808**
2012	3171.31	2511.04	2652.35	450.81	1111.08	2060.23	365.61	226.51	**0.811**
2013	3014.61	2496.91	2606.06	469.68	987.38	2027.23	383.73	195.10	**0.817**
2014	2918.16	2352.60	2460.56	404.80	970.36	1947.80	331.12	181.63	**0.818**