

## **Supplementary materials**

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**Table S1****Geographic and socioeconomic information of 31 provincial regions in 2012.**

Region	Area (10 <sup>4</sup> km <sup>2</sup> )	Population (million)	GDP (billion CNY)	Urbanization rate (%)
Liaoning	14.6	43.9	2484.6	65.7
Jilin	18.7	27.5	1193.9	53.7
Heilongjiang	45.5	38.3	1369.2	56.9
Beijing	1.7	20.7	1787.9	86.2
Tianjin	1.1	14.1	1289.4	81.6
Hebei	18.8	72.9	2657.5	46.8
Shanghai	0.6	23.8	2018.2	89.3
Jiangsu	10.3	79.2	5405.8	63.0
Zhejiang	10.2	54.8	3466.5	63.2
Fujian	12.1	37.5	1970.2	59.6
Shandong	15.4	96.9	5001.3	52.4
Guangdong	18.0	105.9	5706.8	67.4
Hainan	3.4	8.9	285.6	51.6
Shanxi	15.6	36.1	1211.3	51.3
Anhui	14.0	59.9	1721.2	46.5

Jiangxi	16.7	45.0	1294.9	47.5
Henan	16.7	94.1	2959.9	42.4
Hubei	18.6	57.8	2225.0	53.5
Hunan	21.2	66.4	2215.4	46.7
Inner Mongolia	118.3	24.9	1588.1	57.7
Guangxi	23.6	46.8	1303.5	43.5
Chongqing	8.2	29.5	1141.0	57.0
Sichuan	48.1	80.8	2387.3	43.5
Guizhou	17.6	34.8	685.2	36.4
Yunnan	38.3	46.6	1030.9	39.3
Tibet	122.8	3.0	70.1	22.8
Shaanxi	20.6	37.5	1445.4	50.0
Gansu	45.4	25.8	565.0	38.8
Qinghai	72.2	5.7	189.4	47.4
Ningxia	6.6	6.5	234.1	50.7
Xinjiang	166.0	22.3	750.5	44.0
<b>Total</b>	<b>961.0</b>	<b>1347.9</b>	<b>57655.1</b>	<b>52.6</b>

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**Table S2****Sectoral information for MRIO analysis.**

Code	42 sectors	30 sectors	8 aggregated sectors
S1	Agriculture	<i>Agriculture (S1)</i>	<i>Agriculture</i>
S2	Coal mining	<i>Coal mining (S2)</i>	
S3	Petroleum and gas	<i>Petroleum and gas (S3)</i>	
S4	Metal mining	<i>Metal mining (S4)</i>	<i>Mining</i>
S5	Nonmetal mining	<i>Nonmetal mining (S5)</i>	
S6	Food processing and tobaccos	<i>Food processing and tobaccos (S6)</i>	
S7	Textile	<i>Textile (S7)</i>	
S8	Clothing, leather, fur, etc.	<i>Clothing, leather, fur, etc. (S8)</i>	<i>Light industry</i>
S9	Wood processing and furnishing	<i>Wood processing and furnishing (S9)</i>	
S10	Paper making, printing, stationery, etc.	<i>Paper making, printing, stationery, etc. (S10)</i>	
S11	Petroleum refining, coking, etc.	<i>Petroleum refining, coking, etc. (S11)</i>	
S12	Chemical industry	<i>Chemical industry (S12)</i>	
S13	Nonmetal products	<i>Nonmetal products (S13)</i>	<i>Heavy industry</i>
S14	Metallurgy	<i>Metallurgy (S14)</i>	
S15	Metal products	<i>Metal products (S15)</i>	

		<i>General and specialist machinery</i>	
S16	General machinery	(S16, S17)	
S17	Specialist machinery	<i>Transport equipment</i> (S18)	
S18	Transport equipment	<i>Electrical equipment</i> (S19)	
S19	Electrical equipment	<i>Electronic equipment</i> (S20)	
S20	Electronic equipment	<i>Instrument and meter</i> (S21)	
S21	Instrument and meter	<i>Other manufacturing</i> (S22, S23)	
			<hr/>
S22	Other manufacturing	<i>Electricity and hot water production and supply</i> (S25)	
			<i>Power, gas and water</i>
S23	Waste resources	<i>Gas and water production and supply</i> (S26, S27)	
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S24	Repair of fabricated metal products, machinery and equipment	<i>Construction</i> (S28)	<i>Construction</i>
			<hr/>
S25	Electricity and hot water production and supply	<i>Transport and storage</i> (S30)	<i>Transportation</i>
			<hr/>
S26	Gas production and supply	<i>Wholesale and retailing</i> (S29)	
S27	Water production and supply	<i>Hotel and restaurant</i> (S31)	
			<i>Services</i>
S28	Construction	<i>Leasing and commercial services</i> (S35)	
S29	Transport and storage	<i>Scientific research</i> (S36)	

*Other services* (S24, S32, S33, S34,

S30 Wholesale and retailing

S37, S38, S39, S40, S41, S42)

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S31 Hotel and restaurant

Information transmission,

S32 software and information

technology services

S33 Finance

S34 Real estate

S35 Leasing and commercial services

Scientific research and technical

S36

services

Management of water

S37 conservancy, environment and

public facilities

Households, repair and other

S38

services

S39 Education

Health care and social work

S40

activities

S41 Cultural, sports and amusement

activities

Public management, social

S42

security and social organization

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**Table S3**

Embodied primary energy uses in exports (EEEs) by region (Mtce).

Region	Coal	Oil and gas	Other primary energy	Total	Fraction (%)
<b>1.Northeastern area</b>	<b>23.85</b>	<b>5.33</b>	<b>1.06</b>	<b>30.25</b>	<b>4.8</b>
Liaoning	15.86	4.47	0.75	21.09	3.3
Jilin	2.55	0.35	0.12	3.02	0.5
Heilongjiang	5.44	0.51	0.19	6.14	1.0
<b>2.Eastern area</b>	<b>379.89</b>	<b>75.12</b>	<b>22.76</b>	<b>477.77</b>	<b>75.5</b>
Beijing	9.47	1.72	0.45	11.64	1.8
Tianjin	6.22	3.26	0.48	9.97	1.6
Hebei	14.93	1.93	0.57	17.43	2.8
Shanghai	49.03	18.95	1.45	69.43	11.0
Jiangsu	105.76	12.94	3.37	122.07	19.3
Zhejiang	73.09	10.54	5.65	89.28	14.1
Fujian	10.73	2.62	1.99	15.33	2.4
Shandong	35.53	6.24	0.83	42.60	6.7
Guangdong	74.61	16.33	7.92	98.85	15.6
Hainan	0.52	0.61	0.05	1.18	0.2
<b>3.Central area</b>	<b>50.98</b>	<b>4.50</b>	<b>2.47</b>	<b>57.96</b>	<b>9.2</b>

Shanxi	6.81	0.16	0.10	7.06	1.1
Anhui	12.74	1.10	0.22	14.07	2.2
Jiangxi	9.60	0.87	0.54	11.01	1.7
Henan	7.98	0.98	0.18	9.14	1.4
Hubei	7.53	1.00	1.14	9.67	1.5
Hunan	6.32	0.40	0.30	7.01	1.1
<b>4.Western area</b>	<b>52.72</b>	<b>8.63</b>	<b>5.68</b>	<b>67.03</b>	<b>10.6</b>
Inner Mongolia	5.70	0.61	0.23	6.54	1.0
Guangxi	2.88	0.51	0.37	3.76	0.6
Chongqing	7.30	1.12	0.72	9.14	1.4
Sichuan	8.64	2.85	1.86	13.35	2.1
Guizhou	3.68	0.19	0.30	4.16	0.7
Yunnan	3.96	0.32	0.90	5.18	0.8
Tibet	0.73	0.12	0.09	0.93	0.1
Shaanxi	5.46	0.85	0.17	6.48	1.0
Gansu	1.99	0.11	0.26	2.36	0.4
Qinghai	0.58	0.11	0.20	0.89	0.1
Ningxia	1.59	0.16	0.08	1.82	0.3
Xinjiang	10.21	1.70	0.51	12.42	2.0

<b>Total</b>	<b>507.44</b>	<b>93.59</b>	<b>31.97</b>	<b>633.01</b>	<b>100</b>
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*Note:* The 31 provincial-level regions of Mainland China are aggregated into four areas in terms of the

Northeastern, Eastern, Central, and Western areas. EEE/EDEI is the ratio of regional EEE to the EDEI.

**Table S4****Direct primary energy inputs driven by exports (EDEIs) into the regional economy (Mtce).**

Region	Coal	Oil and gas	Other primary energy	Total	Fraction (%)	EEE/EDEI
<b>1.Northeastern area</b>	<b>19.36</b>	<b>19.26</b>	<b>0.93</b>	<b>39.55</b>	<b>6.2</b>	<b>0.76</b>
Liaoning	6.96	3.37	0.54	10.87	1.7	1.94
Jilin	3.23	1.91	0.18	5.31	0.8	0.57
Heilongjiang	9.18	13.98	0.21	23.36	3.7	0.26
<b>2.Eastern area</b>	<b>43.34</b>	<b>29.66</b>	<b>17.51</b>	<b>90.51</b>	<b>14.3</b>	<b>5.28</b>
Beijing	0.99	0.00	0.05	1.05	0.2	11.12
Tianjin	0.00	11.08	0.04	11.12	1.8	0.90
Hebei	13.47	1.99	0.65	16.11	2.5	1.08
Shanghai	0.00	0.20	0.08	0.28	0.0	247.92
Jiangsu	3.56	0.71	1.98	6.25	1.0	19.52
Zhejiang	0.02	0.00	5.03	5.04	0.8	17.70
Fujian	3.52	0.00	1.93	5.46	0.9	2.81
Shandong	21.77	6.21	0.39	28.38	4.5	1.50
Guangdong	0.00	9.02	7.29	16.31	2.6	6.06
Hainan	0.00	0.45	0.06	0.50	0.1	2.34

<b>3. Central area</b>	<b>164.31</b>	<b>1.37</b>	<b>2.88</b>	<b>168.56</b>	<b>26.6</b>	<b>0.34</b>
Shanxi	124.58	0.00	0.28	124.87	19.7	0.06
Anhui	15.77	0.00	0.08	15.85	2.5	0.89
Jiangxi	3.04	0.00	0.30	3.34	0.5	3.29
Henan	13.91	1.18	0.19	15.28	2.4	0.60
Hubei	0.69	0.19	1.56	2.44	0.4	3.96
Hunan	6.31	0.00	0.47	6.78	1.1	1.03
<b>4. Western area</b>	<b>280.43</b>	<b>43.30</b>	<b>10.66</b>	<b>334.39</b>	<b>52.8</b>	<b>0.20</b>
Inner Mongolia	135.82	0.00	1.32	137.14	21.7	0.05
Guangxi	0.77	0.00	0.70	1.46	0.2	2.57
Chongqing	4.82	0.01	0.40	5.23	0.8	1.75
Sichuan	9.28	4.92	2.40	16.60	2.6	0.80
Guizhou	20.44	0.00	0.98	21.42	3.4	0.19
Yunnan	10.40	0.00	2.17	12.57	2.0	0.41
Tibet	0.00	0.00	0.06	0.06	0.0	15.97
Shaanxi	63.06	19.10	0.14	82.30	13.0	0.08
Gansu	4.57	0.17	1.04	5.78	0.9	0.41
Qinghai	1.65	2.02	0.57	4.25	0.7	0.21
Ningxia	12.71	0.07	0.26	13.03	2.1	0.14

Xinjiang	16.90	17.02	0.63	34.55	5.5	0.36
<b>Total</b>	<b>507.44</b>	<b>93.59</b>	<b>31.97</b>	<b>633.01</b>	<b>100</b>	<b>1</b>

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**Table S5**

Exports-driven embodied primary energy transfer via interprovincial trade by energy type  
(Mtce).

Region	Coal			Oil and gas			Other primary energy		
	EEIO	EEII	EEIB	EEIO	EEII	EEIB	EEIO	EEII	EEIB
<b>1.Northeastern area</b>	11.44	-15.93	-4.49	17.76	-3.83	13.93	0.39	-0.52	-0.13
Liaoning	2.45	-11.35	-8.90	2.39	-3.49	-1.10	0.16	-0.37	-0.21
Jilin	2.05	-1.38	0.68	1.66	-0.10	1.56	0.11	-0.05	0.06
Heilongjiang	6.93	-3.20	3.74	13.71	-0.24	13.47	0.12	-0.10	0.02
<b>2.Eastern area</b>	18.48	-355.03	-336.55	16.99	-62.46	-45.47	2.64	-7.89	-5.25
Beijing	0.67	-9.14	-8.47	0.00	-1.72	-1.72	0.02	-0.42	-0.40
Tianjin	0.00	-6.22	-6.22	8.55	-0.72	7.83	0.01	-0.46	-0.45
Hebei	8.20	-9.66	-1.46	1.74	-1.68	0.06	0.38	-0.29	0.09
Shanghai	0.00	-49.03	-49.03	0.05	-18.80	-18.75	0.01	-1.38	-1.36
Jiangsu	2.33	-104.52	-102.19	0.10	-12.33	-12.23	0.31	-1.70	-1.39
Zhejiang	0.02	-73.09	-73.08	0.00	-10.54	-10.54	0.71	-1.33	-0.62
Fujian	0.72	-7.93	-7.21	0.00	-2.62	-2.62	0.28	-0.33	-0.05
Shandong	6.55	-20.31	-13.75	3.47	-3.49	-0.03	0.10	-0.54	-0.44
Guangdong	0.00	-74.61	-74.61	3.09	-10.40	-7.31	0.79	-1.42	-0.63
Hainan	0.00	-0.52	-0.52	0.00	-0.17	-0.17	0.03	-0.02	0.01

<b>3. Central area</b>	144.71	-31.38	113.33	1.14	-4.27	-3.14	1.28	-0.87	0.41
Shanxi	118.44	-0.66	117.78	0.00	-0.16	-0.16	0.23	-0.05	0.19
Anhui	11.02	-7.99	3.03	0.00	-1.10	-1.10	0.05	-0.18	-0.13
Jiangxi	1.44	-8.00	-6.56	0.00	-0.87	-0.87	0.11	-0.35	-0.24
Henan	9.89	-3.96	5.93	1.02	-0.82	0.20	0.12	-0.11	0.01
Hubei	0.37	-7.20	-6.83	0.12	-0.93	-0.81	0.55	-0.14	0.41
Hunan	3.57	-3.58	-0.01	0.00	-0.40	-0.40	0.22	-0.04	0.18
<b>4. Western area</b>	249.42	-21.71	227.71	39.17	-4.50	34.67	6.01	-1.04	4.97
Inner Mongolia	130.96	-0.84	130.12	0.00	-0.61	-0.61	1.11	-0.03	1.09
Guangxi	0.63	-2.75	-2.12	0.00	-0.51	-0.51	0.40	-0.07	0.32
Chongqing	3.27	-5.75	-2.48	0.01	-1.11	-1.10	0.12	-0.44	-0.32
Sichuan	4.63	-3.99	0.64	3.00	-0.93	2.07	0.66	-0.12	0.54
Guizhou	17.31	-0.54	16.77	0.00	-0.19	-0.19	0.71	-0.03	0.68
Yunnan	7.74	-1.31	6.43	0.00	-0.32	-0.32	1.32	-0.05	1.27
Tibet	0.00	-0.73	-0.73	0.00	-0.12	-0.12	0.01	-0.04	-0.03
Shaanxi	59.18	-1.58	57.60	18.42	-0.17	18.25	0.10	-0.12	-0.03
Gansu	3.56	-0.97	2.59	0.16	-0.10	0.06	0.81	-0.02	0.78
Qinghai	1.14	-0.06	1.07	1.93	-0.02	1.91	0.37	0.00	0.37
Ningxia	12.13	-1.00	11.13	0.06	-0.15	-0.09	0.19	-0.02	0.18
Xinjiang	8.87	-2.18	6.69	15.61	-0.28	15.32	0.21	-0.09	0.12

<b>Total</b>	424.05	-424.05	0.00	75.06	-75.06	0.00	10.33	-10.33	0.00
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**Table S6**

Exports-driven embodied primary energy transfer via interprovincial trade by aggregated sector (Mtce).

Region	Light manufacturing			Heavy manufacturing			Transportation			Other services			Other sectors		
	EEIO	EEII	EEIB	EEIO	EEII	EEIB	EEIO	EEII	EEIB	EEIO	EEII	EEIB	EEIO	EEII	EEIB
<b>1.Northeastern area</b>	<b>4.60</b>	<b>-3.70</b>	<b>0.89</b>	<b>18.06</b>	<b>-14.49</b>	<b>3.57</b>	<b>3.34</b>	<b>-0.87</b>	<b>2.46</b>	<b>3.15</b>	<b>-0.73</b>	<b>2.42</b>	<b>0.44</b>	<b>-0.49</b>	<b>-0.04</b>
Liaoning	0.73	-2.17	-1.45	3.21	-11.69	-8.48	0.50	-0.60	-0.10	0.48	-0.34	0.14	0.08	-0.40	-0.32
Jinlin	0.73	-0.48	0.25	2.36	-0.73	1.63	0.31	-0.08	0.23	0.35	-0.20	0.14	0.07	-0.03	0.04
Heilongjiang	3.14	-1.05	2.10	12.49	-2.07	10.42	2.52	-0.18	2.34	2.31	-0.18	2.13	0.29	-0.06	0.24
<b>2.Eastern area</b>	<b>6.79</b>	<b>-85.67</b>	<b>-78.89</b>	<b>24.25</b>	<b>-276.94</b>	<b>-252.70</b>	<b>3.31</b>	<b>-24.14</b>	<b>-20.82</b>	<b>3.24</b>	<b>-30.53</b>	<b>-27.29</b>	<b>0.53</b>	<b>-8.10</b>	<b>-7.57</b>
Beijing	0.15	-0.69	-0.54	0.46	-6.47	-6.01	0.03	-1.51	-1.49	0.04	-1.41	-1.38	0.01	-1.19	-1.18
Tianjin	1.10	-0.64	0.46	5.25	-4.83	0.42	1.15	-0.69	0.47	0.96	-0.92	0.04	0.09	-0.33	-0.24

Hebei	1.62	-1.34	0.28	7.50	-8.77	-1.27	0.48	-1.10	-0.62	0.58	-0.17	0.41	0.15	-0.26	-0.11
Shanghai	0.01	-6.17	-6.16	0.04	-39.69	-39.66	0.01	-10.69	-10.68	0.01	-12.24	-12.24	0.00	-0.41	-0.41
Jiangsu	0.66	-19.68	-19.02	1.75	-88.99	-87.23	0.10	-4.59	-4.49	0.17	-4.25	-4.08	0.06	-1.05	-0.99
Zhejiang	0.24	-26.37	-26.13	0.40	-52.08	-51.69	0.03	-1.53	-1.50	0.05	-4.91	-4.86	0.01	-0.06	-0.05
Fujian	0.24	-3.71	-3.47	0.64	-5.61	-4.97	0.03	-0.43	-0.40	0.06	-0.34	-0.28	0.02	-0.78	-0.76
Shandong	2.21	-4.93	-2.72	5.86	-17.39	-11.52	0.97	-0.56	0.41	0.92	-1.14	-0.22	0.15	-0.31	-0.17
Guangdong	0.55	-21.98	-21.43	2.33	-52.78	-50.45	0.52	-2.97	-2.45	0.44	-5.00	-4.56	0.04	-3.70	-3.65
Hainan	0.01	-0.16	-0.15	0.02	-0.34	-0.32	0.00	-0.06	-0.06	0.00	-0.14	-0.14	0.00	-0.01	-0.01
<b>3.Central area</b>	<b>30.79</b>	<b>-5.95</b>	<b>24.84</b>	<b>98.84</b>	<b>-26.61</b>	<b>72.23</b>	<b>6.21</b>	<b>-1.73</b>	<b>4.47</b>	<b>8.52</b>	<b>-1.91</b>	<b>6.61</b>	<b>2.78</b>	<b>-0.32</b>	<b>2.45</b>
Shanxi	25.10	-0.06	25.04	79.37	-0.53	78.83	5.08	-0.17	4.91	6.84	-0.08	6.76	2.28	-0.02	2.26
Anhui	2.38	-1.82	0.56	7.42	-6.40	1.03	0.41	-0.51	-0.10	0.66	-0.50	0.15	0.19	-0.04	0.15
Jiangxi	0.24	-1.85	-1.60	1.17	-6.58	-5.41	0.04	-0.18	-0.14	0.07	-0.58	-0.52	0.03	-0.03	0.00

Henan	2.01	-0.50	1.51	7.62	-4.06	3.55	0.51	-0.10	0.41	0.69	-0.10	0.59	0.20	-0.12	0.08
Hubei	0.29	-1.18	-0.89	0.61	-6.07	-5.46	0.05	-0.57	-0.52	0.07	-0.40	-0.33	0.01	-0.04	-0.03
Hunan	0.76	-0.54	0.22	2.64	-2.96	-0.32	0.11	-0.20	-0.08	0.21	-0.25	-0.05	0.06	-0.07	0.00
<b>4.Western area</b>	<b>58.37</b>	<b>-5.21</b>	<b>53.15</b>	<b>194.64</b>	<b>-17.74</b>	<b>176.90</b>	<b>16.17</b>	<b>-2.28</b>	<b>13.89</b>	<b>19.67</b>	<b>-1.41</b>	<b>18.26</b>	<b>5.75</b>	<b>-0.60</b>	<b>5.15</b>
Inner Mongolia	27.81	-0.09	27.72	89.31	-0.26	89.05	4.76	-0.94	3.82	7.13	-0.18	6.95	3.06	-0.01	3.05
Guangxi	0.19	-0.62	-0.44	0.74	-2.17	-1.43	0.03	-0.27	-0.24	0.05	-0.16	-0.11	0.02	-0.11	-0.09
Chongqing	0.70	-1.20	-0.50	2.33	-5.76	-3.43	0.12	-0.21	-0.09	0.19	-0.11	0.08	0.06	-0.03	0.04
Sichuan	1.61	-0.59	1.02	5.29	-3.90	1.40	0.60	-0.34	0.26	0.65	-0.20	0.45	0.13	-0.01	0.13
Guizhou	3.56	-0.14	3.42	12.46	-0.45	12.00	0.68	-0.05	0.62	1.00	-0.10	0.90	0.33	-0.01	0.32
Yunnan	1.59	-0.59	1.00	6.46	-0.77	5.69	0.36	-0.04	0.32	0.51	-0.16	0.35	0.14	-0.12	0.03
Tibet	0.00	-0.37	-0.37	0.00	-0.20	-0.20	0.00	-0.04	-0.04	0.00	-0.03	-0.03	0.00	-0.25	-0.25
Shaanxi	15.03	-0.17	14.86	49.50	-1.26	48.24	5.76	-0.23	5.53	6.09	-0.20	5.89	1.32	-0.02	1.30

Gansu	0.71	-0.23	0.48	3.25	-0.72	2.53	0.21	-0.03	0.19	0.28	-0.10	0.18	0.07	-0.02	0.05
Qinghai	0.63	-0.02	0.61	2.23	-0.04	2.19	0.27	-0.01	0.26	0.26	-0.02	0.24	0.05	0.00	0.05
Ningxia	2.64	-0.13	2.52	8.26	-0.96	7.30	0.53	-0.02	0.51	0.71	-0.05	0.65	0.24	-0.01	0.23
Xinjiang	3.90	-1.08	2.83	14.79	-1.26	13.53	2.86	-0.11	2.74	2.81	-0.10	2.71	0.33	-0.01	0.31
<b>Total</b>	<b>100.54</b>	<b>-100.54</b>	<b>0.00</b>	<b>335.78</b>	<b>-335.78</b>	<b>0.00</b>	<b>29.02</b>	<b>-29.02</b>	<b>0.00</b>	<b>34.58</b>	<b>-34.58</b>	<b>0.00</b>	<b>9.50</b>	<b>-9.50</b>	<b>0.00</b>

**Table S7**

Embodied primary energy uses in exports by sector (Mtce).

Sector	Coal	Oil and gas	Other primary energy	Total	Fraction (%)
S1	1.35	0.24	0.10	1.69	0.3
S2	4.47	0.06	0.01	4.54	0.7
S3	0.09	2.17	0.01	2.27	0.4
S4	0.32	0.06	0.02	0.40	0.1
S5	0.75	0.12	0.06	0.93	0.1
S6	6.29	0.88	0.42	7.59	1.2
S7	25.74	2.46	1.73	29.93	4.7
S8	34.49	4.37	2.60	41.45	6.5
S9	11.96	1.80	0.95	14.72	2.3
S10	23.73	2.55	1.80	28.07	4.4
S11	5.61	9.72	0.16	15.48	2.4
S12	64.17	11.00	3.47	78.64	12.4
S13	31.80	2.73	1.60	36.12	5.7
S14	40.18	4.34	2.06	46.58	7.4
S15	26.78	3.18	1.86	31.81	5.0
S16	45.13	5.98	2.94	54.04	8.5

S17	22.94	3.10	1.38	27.41	4.3
S18	41.22	5.29	2.87	49.38	7.8
S19	54.78	7.37	3.58	65.73	10.4
S20	4.53	0.58	0.31	5.41	0.9
S21	4.64	0.30	0.19	5.12	0.8
S22	2.77	0.05	0.65	3.47	0.5
S23	0.00	0.00	0.00	0.00	0.0
S24	3.26	0.52	0.26	4.04	0.6
S25	22.44	13.26	1.05	36.75	5.8
S26	14.43	4.16	1.10	19.69	3.1
S27	1.34	0.19	0.12	1.65	0.3
S28	9.04	6.39	0.44	15.87	2.5
S29	0.03	0.01	0.00	0.04	0.0
S30	3.18	0.75	0.25	4.17	0.7
<b>Total</b>	<b>507.44</b>	<b>93.59</b>	<b>31.97</b>	<b>633.01</b>	<b>1</b>

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*Note:* The original 42 industrial sectors are merged into 30 sectors. Detailed sectoral information are provided in Table S2, according to the classification of 30 industrial sectors.

**Table S8**

The top 30 inter-provincial paths induced by exports.

Rank	Path	EEE (Mtce)	Contribution (%)
1	Shanxi, S2→Shanghai, S14	0.96	1.4
2	Shanxi, S2→Jiangsu, S12	0.90	0.7
3	Inner Mongolia, S2→Shanghai, S14	0.85	1.2
4	Heilongjiang, S3→Shanghai, S11	0.82	1.2
5	Inner Mongolia, S2→Jiangsu, S12	0.78	0.6
6	Heilongjiang, S3→Shanghai, S11→Shanghai, S250.70		1.0
7	Shanxi, S2→Guangdong, S13	0.62	0.6
8	Inner Mongolia, S2→Guangdong, S13	0.56	0.6
9	Xinjiang, S3→Shanghai, S11	0.52	0.7
10	Shanxi, S2→Zhejiang, S21	0.49	0.6
11	Shaanxi, S2→Shanghai, S14	0.44	0.6
12	Shaanxi, S3→Shanghai, S11→Shanghai, S25	0.44	0.6
13	Inner Mongolia, S2→Zhejiang, S21	0.43	0.5
14	Shanxi, S2→Jiangsu, S22→Jiangsu, S19	0.43	0.3
15	Shaanxi, S2→Jiangsu, S12	0.41	0.3
16	Shanxi, S2→Guangdong, S22	0.41	0.4

17	Shanxi, S2→Jiangsu, S10	0.40	0.3
18	Shaanxi, S3→Shanghai, S11	0.40	0.6
19	Shanxi, S2→Guangdong, S22→Guangdong, S19	0.39	0.4
20	Shanxi, S2→Guangdong, S22→Guangdong, S10	0.39	0.4
21	Shanxi, S2→Zhejiang, S22→Zhejiang, S12	0.38	0.4
22	Shanxi, S2→Jiangsu, S12→Jiangsu, S12	0.38	0.3
23	Heilongjiang, S3→Shanghai, S11→Shanghai, S28	0.38	0.5
24	Shanxi, S2→Zhejiang, S22→Zhejiang, S7	0.37	0.4
25	Shanxi, S2→Jiangsu, S11→Jiangsu, S25	0.37	0.3
26	Shanxi, S2→Jiangsu, S11	0.37	0.3
27	Shanxi, S2→Guangdong, S10	0.37	0.4
28	Inner Mongolia, S2→Jiangsu, S22→Jiangsu, S19	0.37	0.3
29	Inner Mongolia, S2→Guangdong, S22	0.37	0.4
30	Shanxi, S2→Jiangsu, S14	0.36	0.3

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*Note:* The contribution rate is calculated as the ratio of embodied primary energy uses of supply chain paths to the total EEE of exporting provincial region. Detailed sectoral information are provided in Table S2, according to the classification of 30 industrial sectors

**Table S9**

The top 30 intra-provincial paths induced by exports.

Rank	Path	EEE (Mtce)	Contribution (%)
1	Shanxi, S2	1.31	18.5
2	Xinjiang, S2→S13	1.20	9.6
3	Shandong, S2→S12	1.15	2.7
4	Shanxi, S2→S11→S25	0.81	11.5
5	Guangdong, S3→S11→S28	0.74	0.7
6	Guangdong, S3→S11	0.71	0.7
7	Hebei, S2	0.70	4.0
8	Tianjin, S3	0.58	5.8
9	Shandong, S2→S12→S12	0.57	1.3
10	Yunnan, S2→S12	0.57	11.0
11	Shandong, S2→S22	0.56	1.3
12	Inner Mongolia, S2→S11→S25	0.54	8.2
13	Guangdong, S3	0.52	0.5
14	Hainan, S3	0.44	37.6
15	Shandong, S2	0.43	1.0
16	Jiangxi, S2→S13	0.43	3.9

17	Inner Mongolia, S2→S12	0.43	6.5
18	Anhui, S2→S12	0.42	3.0
19	Guangdong, S3→S11→S25	0.40	0.4
20	Liaoning, S2→S13	0.37	1.8
21	Shandong, S2→S13	0.37	0.9
22	Hebei, S2→S14	0.37	2.1
23	Jiangxi, S2→S12	0.37	3.3
24	Shanxi, S2→S11→S14	0.32	4.6
25	Hebei, S2→S12	0.32	1.9
26	Liaoning, S2→S14	0.32	1.5
27	Jiangxi, S2→S13	0.29	2.6
28	Shanxi, S2→S11	0.29	4.1
29	Shandong, S2→S12→S12→S12	0.29	0.7
30	Shandong, S2→S22→S12→S12	0.28	0.7

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*Note:* The contribution rate indicates the share of supply chain path in the total EEE of final export province. Detailed sectoral information are provided in Table S2, according to the classification of 30 industrial sectors.

**Table S10**

Top three supply chain paths in nine eastern developed regions in 2007 and 2012.

Export 2007 path province	EEE Contribution		2012 path	EEE Contribution	
	(Mtce)	(%)		(Mtce)	(%)
Inner Mongolia, S2→Tianjin, S2	0.55	2.5	Tianjin, S3→Tianjin, S11→Tianjin, S25	0.16	1.6
Tianjin Tianjin, S3→Tianjin, S11	0.49	2.2	Tianjin, S3→Tianjin, S3	0.10	1.0
Shanxi, S2→Tianjin, S2	0.44	2.0	Tianjin, S3→Tianjin, S11	0.10	1.0
Shanxi, S2→Hebei, S2	1.35	3.9	Hebei, S2→Hebei, S14	0.37	2.1
Hebei Shanxi, S2→Hebei, S12	1.22	3.5	Hebei, S2→Hebei, S12	0.32	1.9
Shanxi, S2→Hebei, S14	1.12	3.2	Shanxi, S2→Hebei, S13	0.21	1.2
Inner Mongolia, S2→Shanghai, S22→Shanghai, S19	0.56	1.0	Shanxi, S2→Shanghai, S14	0.96	1.4
Shanghai Inner Mongolia, S2→Shanghai, S12	0.54	1.0	Inner Mongolia, S2→Shanghai, S14	0.85	1.2
Shaanxi, S2→Shanghai, S11	0.43	0.8	Heilongjiang, S3→Shanghai, S11	0.82	1.2

	Shanxi, S2→Jiangsu, S12	0.50	0.8	Shanxi, S2→Jiangsu, S12	0.90	0.7
Jiangsu	Shanxi, S2→Jiangsu, S14	0.46	0.7	Inner Mongolia, S2→Jiangsu, S12	0.78	0.6
	Shanxi, S2→Jiangsu, S7	0.45	0.7	Shanxi, S2→Jiangsu, S22→Jiangsu, S19	0.43	0.3
	Anhui, S2→Zhejiang, S7	0.24	0.4	Shanxi, S2→Zhejiang, S21	0.49	0.6
Zhejiang	Shanxi, S2→Zhejiang, S7	0.24	0.4	Inner Mongolia, S2→Zhejiang, S21	0.43	0.5
	Shanxi, S2→Hebei, S14→Zhejiang, S15	0.17	0.3	Shanxi, S2→Zhejiang, S22→Zhejiang, S12	0.38	0.4
	Fujian, S2→Fujian, S7	0.18	1.2	Fujian, S2→Fujian, S13	0.16	1.0
Fujian	Guangdong, S3→Fujian, S11→Fujian, S25	0.13	0.9	Fujian, S22→Fujian, S12	0.09	0.6
	Fujian, S2→Fujian, S12	0.11	0.7	Fujian, S2→Fujian, S22→Fujian, S12	0.09	0.6
	Shandong, S2→Shandong, S12	1.50	4.0	Shandong, S2→Shandong, S12	1.15	2.7
Shandong	Shandong, S2→Shandong, S13	1.50	4.0	Shandong, S2→Shandong, S12→Shandong, S12	0.57	1.3
	Shandong, S3→Shandong, S11→Shandong, S25	1.05	2.8	Shandong, S2→Shandong, S22→Shandong, S12	0.56	1.3
Guangdong	Shanxi, S2→Guangdong, S13	1.51	1.3	Guangdong, S3→Guangdong, S11→Guangdong, S28	0.74	0.7

Shanxi, S2→Guangdong, S14	1.36	1.2	Guangdong, S3→Guangdong, S11	0.71	0.7
Shanxi, S2→Guangdong, S10	0.78	0.7	Shanxi, S2→Guangdong, S13	0.62	0.6
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Guangdong, S3→Hainan, S11	0.25	30.9	Heilongjiang, S3→Hainan, S11	0.02	1.3
Hainan Guangdong, S3→Hainan, S11→Hainan, S25	0.09	11.4	Xinjiang, S3→Hainan, S11	0.02	1.3
Xinjiang, S3→Hainan, S11	0.05	6.4	Shaanxi, S3→Hainan, S11	0.01	0.9

*Note:* The contribution rate indicates the share of supply chain path in the total EEE of final export province. Detailed sectoral information are provided in Table

S2, according to the classification of 30 industrial sectors