	Carbon fiber (CF; PAN-based; HT)												
	Name		Treatment, standards, routes	Precursor production		Carbon fiber production							
No				Raw material	Electricity for precursor production	Production processes	Type of energy use	Electricity for carbon fiber production	Thermal energy for carbon fiber production	Credit for returned thermal energy	Sizing	Recycling
1	GLO	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production capacity world mix 2016. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Production capacity world mix	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
2	GLO	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production capacity world mix 2016. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Production capacity world mix	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
3	GLO	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production capacity world mix 2016. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Production capacity world mix	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
4	GLO	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production capacity world mix 2016. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Production capacity world mix	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
5	US	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production US electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix United States of America	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
6	US	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production US electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower United States of America	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
7	US	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production US electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower United States of America	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
8	DE	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production DE electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Germany	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
9	DE	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production DE electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Germany	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
10	DE	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production DE electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Germany	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
11	EU27	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production EU27 electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Europe (EU27)	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
12	EU27	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production EU27 electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Europe (EU27)	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
13	EU27	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production EU27 electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Europe (EU27)	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
14	JP	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production JP electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Japan	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
15	JP	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production JP electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricitc from hydropower Japen	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
16	JP	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production JP electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricitc from hydropower Japen	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
17	CN	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CN electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix China	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
18	CN	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CN electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower China	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
19	CN	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CN electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower China	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.
20	TW	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production TW electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Taiwan	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.

Carbon fiber (CF; PAN-based; HT)														
				Precursor production		Carbon fiber production								
No	Name		Treatment, standards, routes	Raw material	Electricity for precursor production	Production processes	Type of energy use	Electricity for carbon fiber production	Thermal energy for carbon fiber production	Credit for returned thermal energy	Sizing	Recycling		
23	HU	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production HU electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Hungary	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
24	HU	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production HU electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Hungary	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
25	HU	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production HU electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Hungary	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
26	KR	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production KR electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix South Korea	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
29	FR	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production FR electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix France	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
30	FR	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production FR electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower France	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
31	FR	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production FR electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower France	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
32	GB	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production GB electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Great Britain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
33	GB	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production GB electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Great Britain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
34	GB	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production GB electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Great Britain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
35	ES	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production ES electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Spain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
36	ES	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production ES electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Spain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
37	ES	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production ES electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Spain	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
38	BR	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production BR electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Brazil	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
39	BR	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production BR electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Brazil	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
40	BR	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production BR electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower brazil	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
44	CA	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CA electricity mix. Precursor production: JP electricity mix	Acrylonitrile	Electricity grid mix Japan	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity grid mix Canada	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
45	CA	Carbon fiber (CF; PAN-based; HT)	Production processes: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CA electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Regular energy used	Electricity from hydropower Canada	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		
46	CA	Carbon fiber (CF; PAN-based; HT)	Production processes with optimized use of energy: spinning, stabilization, carbonization, surface treatment, sizing. CF production: CF production CA electricity from hydropower. Precursor production: JP electricity from hydropower	Acrylonitrile	Electricitc from hydropower Japen	Spinning, stabilization, carbonization, surface treatment, sizing.	Optimized energy use	Electricity from hydropower Canada	Electricity grid mix Europe (EU27)	Yes.	Epoxy (DE)	Not included.		

Legend: CF = carbon fiber, HT = high tensity, US = United States of America, DE = Germany, EU27 = European Union, JP = Japan, CN = China, TW = Taiwan, HU = Hungary, KR = South Korea, FR = France, GB = Great Britain, ES = Spain, BR = Brazil, CA = Canada