

Care Pathway Carbon - emission factors

Correct as of date: 24/09/2024

Module / Category	Sub-Category	Name / Activity	GHG Emissions (kg CO ₂ e)	Unit	Source	IPCC	Notes
Diagnostics	Scan	MRI Non Contrast Scan	24.70	per scan	SHC Case Study (2019): MRI Scan. Case Study to Support the Assessment of Care Pathways 2019.	AR5	Includes, consumables, equipment, staff time, and energy use (including standby, off mode and cooling chiller units). US activity data (i.e. energy consumption, staff time, consumables); UK electricity emission factor used to estimate a UK MRI impact.
Diagnostics	Scan	CT Scan	9.20	per scan	McAlister S, McGain F, Petersen M, Story D, Charlesworth K, Ison G, Barratt A. (2022) The carbon footprint of hospital diagnostic imaging in Australia. Lancet Reg Health West Pac. doi: 10.1016/j.lanwpc.2022.100459. PMID: 35538935; PMCID: PMC9079346.		Australian study that included consumables and direct energy use. Did not include staff time, equipment manufacture.
Diagnostics	Scan	Chest X-Ray	0.80	per scan	McAlister S, McGain F, Petersen M, Story D, Charlesworth K, Ison G, Barratt A. (2022) The carbon footprint of hospital diagnostic imaging in Australia. Lancet Reg Health West Pac. doi: 10.1016/j.lanwpc.2022.100459. PMID: 35538935; PMCID: PMC9079346.		Australian study that included consumables and direct energy use. Did not include staff time, equipment manufacture.
Diagnostics	Scan	Mobile Chest X-Ray	0.50	per scan	McAlister S, McGain F, Petersen M, Story D, Charlesworth K, Ison G, Barratt A. (2022) The carbon footprint of hospital diagnostic imaging in Australia. Lancet Reg Health West Pac. doi: 10.1016/j.lanwpc.2022.100459. PMID: 35538935; PMCID: PMC9079346.		Australian study that included consumables and direct energy use. Did not include staff time, equipment manufacture.
Diagnostics	Scan	Ultrasound	0.50	per scan	McAlister S, McGain F, Petersen M, Story D, Charlesworth K, Ison G, Barratt A. (2022) The carbon footprint of hospital diagnostic imaging in Australia. Lancet Reg Health West Pac. doi: 10.1016/j.lanwpc.2022.100459. PMID: 35538935; PMCID: PMC9079346.		Australian study that included consumables and direct energy use. Did not include staff time, equipment manufacture.
Emergency department	Appointments/visits	Emergency department	14.00	per visit	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
GP Consultation	Appointments/visits	GP Consultation	1.10	per visit	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Inpatient admission	Bed days	Low intensity	38.00	per day	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Inpatient admission	Bed days	High intensity	90.00	per day	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Outpatient	Appointments/visits	In-Centre Haemodialysis session	15.793	per session attended	NUTH, SHC and ERM, In-Centre Haemodialysis Care Pathway Assessment (April 2022). Available at https://shcoalition.org/wp-content/uploads/2022/06/ICHD_CarePathway_-220610.pdf	AR5	Patient travel removed for purpose of calculator
Patient travel	Transport	Self - to GP	0.56	per one way trip	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Patient travel	Transport	Self - to elective care	2.90	per one way trip	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Patient travel	Transport	Provided non-emergency	7.90	per one way trip	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Patient travel	Transport	Provided emergency	36.00	per one way trip	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Procurement	Pharmaceuticals	Pharmaceuticals	0.137	per £	NHS: Trust contributions to the NHS Carbon Footprint Plus (2019)		
Procurement	Equipment	Medical Instruments /equipment	0.446	per £	NHS: Trust contributions to the NHS Carbon Footprint Plus (2019)		
Procurement	Services	Procurement Commissioned health and social care services	0.056	per £	NHS: Trust contributions to the NHS Carbon Footprint Plus (2019)		
Self-management	Workshops	Patient education session	1.60	per session attended	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Surgery	Surgical procedure	Surgery default total (incl. Desflurane use)	54.40	per hour	Care Pathways: Guidance on Appraising Sustainability (November 2023)	AR5	
Surgery	Surgical procedure	Surgery default total (excl. Desflurane use)	38.40	per hour	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Utilities	Electricity	3.00	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	

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Surgery	Utilities	Natural Gas	8.80	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Utilities	Mains water	0.03	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Sevoflurane	5.90	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Desflurane (litres)*	17.10	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Isoflurane (litres)	0.50	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Nitrous Oxide (litres)	9.30	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Carbon Dioxide (litres)	0.02	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Waste	Waste - bottom up (kg)	1.40	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Equipment	Equipment (default)	1.30	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Consumables	Consumables (default)	7.10	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Transport	Staff travel (default)	0.80	per hour of surgery	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Consumables	Carpal tunnel decompression	11.22	per surgical procedure	Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. Journal of the Royal Society of Medicine. 2023;116(6):199-213. doi:10.1177/01410768231166135		Excludes Pharmaceuticals
Surgery	Consumables	Inguinal hernia repair (excl. pharmaceuticals)	10.25	per surgical procedure	Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. Journal of the Royal Society of Medicine. 2023;116(6):199-213. doi:10.1177/01410768231166135		Excludes Pharmaceuticals
Surgery	Consumables	Knee arthroplasty (excl. pharmaceuticals)	58.65	per surgical procedure	Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. Journal of the Royal Society of Medicine. 2023;116(6):199-213. doi:10.1177/01410768231166135		Excludes Pharmaceuticals
Surgery	Consumables	Laparoscopic cholecystectomy (excl. pharmaceuticals)	18.87	per surgical procedure	Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. Journal of the Royal Society of Medicine. 2023;116(6):199-213. doi:10.1177/01410768231166135		Excludes Pharmaceuticals
Surgery	Consumables	Tonsillectomy (excl. pharmaceuticals)	7.01	per surgical procedure	Rizan C, Lillywhite R, Reed M, Bhutta MF. The carbon footprint of products used in five common surgical operations: identifying contributing products and processes. Journal of the Royal Society of Medicine. 2023;116(6):199-213. doi:10.1177/01410768231166135		Excludes Pharmaceuticals
Surgery	Medical gas	Desflurane	2807.67	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Isoflurane	876.96	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Sevoflurane	546.14	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Nitrous oxide	0.50403	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Nitrous oxide w/ Oxygen (50/50)	0.20806	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Oxygen	0.0006553	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	

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Surgery	Medical gas	Nitrogen	0.0002332	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Surgery	Medical gas	Carbon dioxide	0.003272	per litre (cradle - release)	Care Pathways: Guidance on Appraising Sustainability, Surgical Procedure Module (November 2023)	AR5	
Transport	Travel	Aeroplane travel (UK, long haul)	0.29341	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Long haul average passenger + WTT, with radiative forcing
Transport	Travel	Aeroplane travel (UK, long haul, economy)	0.22472	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Long haul economy class + WTT, with radiative forcing
Transport	Travel	Aeroplane travel (UK, short haul)	0.20878	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Short haul average passenger + WTT, with radiative forcing
Transport	Travel	Bus travel (UK)	0.12708	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Average local bus + WTT
Transport	Travel	Car travel (UK, petrol fuel)	0.20942	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Average car (petrol) + WTT
Transport	Travel	Car travel (UK, diesel fuel)	0.21128	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Average car (diesel) + WTT
Transport	Travel	Car travel (UK, unknown fuel)	0.21030	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Average car (unknown fuel) + WTT
Transport	Travel	Car travel (UK, unknown fuel) - driver	0.19502	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Assumes 14.5% of drivers have 1 passenger
Transport	Travel	Car travel (UK, unknown fuel) - passenger	0.10515	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Assumes cars have 1 driver and 1 passenger
Transport	Travel	Coach travel (UK)	0.03374	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Coach + WTT
Transport	Travel	Ferry travel (UK, car passenger)	0.15865	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Ferry (car passenger) + WTT
Transport	Travel	Ferry travel (UK, foot passenger)	0.02295	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Ferry (foot passenger) + WTT
Transport	Travel	Light rail/tram travel (UK)	0.03609	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Light rail and tram + WTT
Transport	Travel	Motorbike travel (UK)	0.14323	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Average motorbike + WTT
Transport	Travel	National rail travel (UK)	0.04443	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	National rail + WTT
Transport	Travel	Taxi travel (UK, black cab)	0.38238	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Black cab + WTT
Transport	Travel	Taxi travel (UK, regular)	0.25982	km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Regular taxi + WTT
Transport	Travel	Underground rail travel (UK)	0.03508	passenger.km	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	London Underground + WTT
Transport	Travel	Ambulance (provided travel non emergency)	0.271	km	NHS: Improving non-emergency patient transport services. Report of the non-emergency patient transport review (2021)		https://www.england.nhs.uk/wp-content/uploads/2021/08/B0682-fnal-report-of-the-non-emergency-patient-transport-review.pdf
Transport	Travel	Ambulance emergency	3.55	km	Care Pathways: Guidance on Appraising Sustainability, Patient travel module (November 2023)	AR5	Emergency travel divided by 10.16 km (average distance between person home and hospital site used for an emergency admission; taken from 'Focus On: Distance from home to emergency care', Roberts, Blunt and Bardsley (2014)).
Transport	Travel	self-travel	0.17	km	Care Pathways: Guidance on Appraising Sustainability, Patient travel module (November 2023)	AR5	GP travel divided by 3.3 km average distance between person home and GP.
Utilities	Electricity	Default	0.275	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Electricity generation + T&D + WTT + T&D WTT
Utilities	Green electricity emission	Default	0.000035	kWh	The Covenant of Mayors for Climate and Energy Reporting Guidelines, Version 1.0 (2016)		Assumed wind
Utilities	Water (mains)	Default	0.000177	litre	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Water supply
Utilities	Water (mains)	GB	0.000177	litre	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Water supply

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Utilities	Electricity	AT	0.1185	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	BA	0.5585	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	BE	0.1226	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	BG	0.4041	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	CH	0.0116	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	CY	0.6230	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	CZ	0.5067	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	DE	0.3776	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	DK	0.1813	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	EE	0.6161	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	ES	0.1533	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	FI	0.0958	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	FR	0.0410	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	GB	0.275	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Electricity generation + T&D + WTT + T&D WTT
Utilities	Electricity	GR	0.3366	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	HR	0.2005	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	HU	0.2240	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	IE	0.3771	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	IS	0.0001	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	IT	0.3069	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	LT	0.2185	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	LU	0.0988	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	LV	0.2197	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	ME	0.4253	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	MT	0.6607	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	NL	0.3704	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	NO	0.0045	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	PL	0.7766	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	PT	0.1642	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021

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Utilities	Electricity	RO	0.2775	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	RS	0.6951	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	SE	0.0077	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	SI	0.2169	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Electricity	SK	0.1655	kWh	European Residual Mixes, Association of Issuing Bodies (2021)		Production Mix 2021
Utilities	Heating: Natural gas	GB	0.2102	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Natural gas combustion + WTT (Gross CV)
Utilities	Heating: Oil	GB	0.3140	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Burning oil combustion + WTT (Net CV)
Utilities	Heating: Biomass	GB	0.0482	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Wood pellets combustion + WTT
Utilities	Heating: Other	default	0.2226	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Other petroleum gas combustion + WTT (Net CV)
Utilities	Heating: Natural gas	default	0.2226	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Other petroleum gas combustion + WTT (Net CV)
Utilities	Heating: Oil	default	0.3140	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Burning oil combustion + WTT (Net CV)
Utilities	Heating: Biomass	default	0.0482	kWh	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Wood pellets combustion + WTT
Waste	Waste water to public sewer	Default	0.000201	litre	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Water treatment
Waste	Waste water to public sewer	GB	0.000201	litre	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Water treatment
Waste	Waste Incineration (clinical waste)	default	0.901	kg	NHS: Trust contributions to the NHS Carbon Footprint Plus (2019)		
Waste	Waste landfill	default	0.52034	kg	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Commercial and industrial waste disposal, landfill
Waste	Waste Energy from Waste	default	0.02128	kg	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Commercial and industrial waste disposal, combustion (with energy recovery)
Waste	Waste Recycling	default	0.02128	kg	UK Government GHG Conversion Factors for Company Reporting (2023)	AR5	Recycling