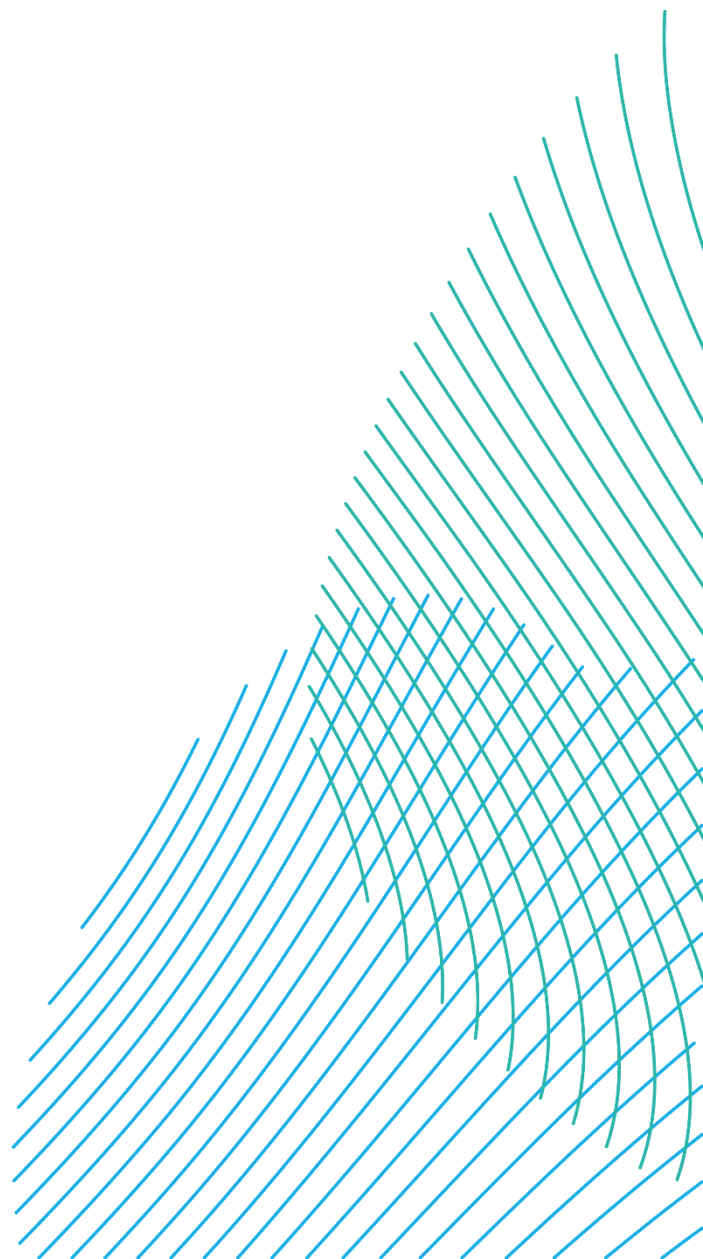




# Climate Data Sources and Assumptions



**Table A8.1: Delivery Assumptions**

Transport scenario (both road and sea to be used)	Km by road (average rigid HGVs, average laden)	Km by sea (average container ship)	Source
European manufactured	1,500	100	RICS 2023 <sup>1</sup>
Globally manufactured	500	10,000	RICS 2023

**Table A8.2: Environmental Product Declarations**

Asset	Emission category	Emission Factor	Unit	Source
Solar PV	A1-3	217	kgCO <sub>2e</sub> /m <sup>2</sup>	Average of various EPDs sourced from One Click LCA
Solar PV	C1-4	4	kgCO <sub>2e</sub> /m <sup>2</sup>	Average of various EPDs sourced from One Click LCA
BESS	A1-3	175	kgCO <sub>2e</sub> /kwh	Romare and Dahllöf 2017 <sup>2</sup>
BESS	C3-4	8	kgCO <sub>2e</sub> /kg	Li et al., 2023 <sup>3</sup>
Transformers	A1-3	577, 835	kgCO <sub>2e</sub> /unit	Guo et al., 2022 <sup>4</sup>
Transformers	C1-4	607 5	kgCO <sub>2e</sub> /unit	EPD Italy 2023 <sup>5</sup>
Inverters	A1-3	399 0	kgCO <sub>2e</sub> /unit	Huawei 2023 <sup>6</sup>
Inverters	C3-4	30	kgCO <sub>2e</sub> /unit	Huawei 2023
Switchgear	A1-3	325 5	kgCO <sub>2e</sub> /unit	EPD Italy 2022 <sup>7</sup>

<sup>1</sup> RICS (2023) Whole Life Carbon Assessment for the Built Environment. Available online: [https://www.rics.org/content/dam/ricsglobal/documents/standards/whole\\_life\\_carbon\\_assessment\\_for\\_the\\_built\\_environment\\_1st\\_edition\\_rics.pdf](https://www.rics.org/content/dam/ricsglobal/documents/standards/whole_life_carbon_assessment_for_the_built_environment_1st_edition_rics.pdf)

<sup>2</sup> Romare, M. and Dahllöf, L., 2017. The life cycle energy consumption and greenhouse gas emissions from lithium-ion batteries.

<sup>3</sup> Li, J., Li, L., Yang, R. and Jiao, J., 2023. Assessment of the lifecycle carbon emission and energy consumption of lithium-ion power batteries recycling: A systematic review and meta-analysis. *Journal of Energy Storage*, 65, p.107306.

<sup>4</sup> Guo, H., Gao, Y. and Li, J., 2022. The greenhouse gas emissions of power transformers based on life cycle analysis. *Energy Reports*, 8, pp.413-419.

<sup>5</sup> EPD Italy (2023). Available from: <https://www.epditaly.it/en/epd-search/>

<sup>6</sup> Huawei (2023). Available from: <https://www.epditaly.it/en/epd/sun2000-330kti-h1/>

<sup>7</sup> EPD Italy (2022). Available from: <https://www.epditaly.it/en/epd/sf6-insulated-shielded-switchgear-cbgs/>

Asset	Emission category	Emission Factor	Unit	Source
Switchgear	C3-4	55	kgCO <sub>2</sub> e/unit	EPD Italy 2022

**Table A8.3: Emission Factors**

Description	Description	EF	Unit	Source	Notes
Materials	Weathering steel	3.28	kgCO <sub>2</sub> e/kg	TATA Steel 2020	Produced in Europe
	Aluminium	5.58	kgCO <sub>2</sub> e/kg	ICE 2019 <sup>8</sup>	Produced in Europe
	Steel - Cold Rolled	2.73	kgCO <sub>2</sub> e/kg	ICE 2019	World Average
	Steel - Plate	2.46	kgCO <sub>2</sub> e/kg	ICE 2019	World Average
	Insulating paper	1.76	kgCO <sub>2</sub> e/kg	Guo et al., 2022 <sup>9</sup>	
	Copper	2.71	kgCO <sub>2</sub> e/kg	ICE 2019	Produced in Europe
	Mineral Oil	1401	kgCO <sub>2</sub> e/t	DESNZ 2023 <sup>10</sup>	Primary material production
	Diesel	2.51	kgCO <sub>2</sub> e/l	DESNZ 2023	Biofuel blend
Transport	All Rigids	0.18	kgCO <sub>2</sub> e/tkm	DESNZ 2023	Average Laden
	Average Container Ship	0.02	kgCO <sub>2</sub> e/tkm	DESNZ 2023	Average
	All Rigids	0.21	kgCO <sub>2</sub> e/tkm	DESNZ 2023	50% Laden
	Average diesel Van	0.23	kgCO <sub>2</sub> e/km	DESNZ 2023	

<sup>8</sup> University of Bath (2019) Inventory of Carbon and Energy. Available online: <https://greenbuildingencyclopaedia.uk/wp-content/uploads/2014/07/Full-BSRIA-ICE-guide.pdf>

<sup>9</sup> Guo, H., Gao, Y. and Li, J., 2022. The greenhouse gas emissions of power transformers based on life cycle analysis. *Energy Reports*, 8, pp.413-419.

<sup>10</sup> Department for Energy Security and Net Zero (2023) Conversion factors. Available online: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2023>

De-scription	Description	EF	Unit	Source	Notes
Disposal	Mineral Oil - recycling	21.28	kgCO <sub>2</sub> e /t	DESNZ 2023	Construction
	Other metals recycling	One Click 2024 <sup>11</sup>	kgCO <sub>2</sub> e /kg	One Click 2024	e.g., Aluminium recycling
	Structural steel recycling	One Click 2024	kgCO <sub>2</sub> e /kg	One Click 2024	Steel recycling
	Inert materials landfill	One Click 2024	kgCO <sub>2</sub> e /kg	One Click 2024	
	Glass recycling	One Click 2024	kgCO <sub>2</sub> e /kg	One Click 2024	
	PVC incineration	One Click 2024	kgCO <sub>2</sub> e /kg	One Click 2024	
	Recycling of reinforcement steel	One Click 2024	kgCO <sub>2</sub> e /kg	One Click 2024	
Water	Consumption	0.18	kgCO <sub>2</sub> e /m <sup>3</sup>	DESNZ 2023	
	Treatment	0.20	kgCO <sub>2</sub> e /m <sup>3</sup>	DESNZ 2023	
Fuel	Gas	0.35	kgCO <sub>2</sub> e /kWh	DESNZ & BEIS2023	
Electricity	Europe	IEA 2023 <sup>12</sup>	kgCO <sub>2</sub> e /kwh	IEA 2023 <sup>13</sup>	Location
Electricity T&D	Europe	IEA 2023	kgCO <sub>2</sub> e /kwh	IEA 2023	

**Table A8.4: Key Assumptions**

Category	Assumption	Source
Construction worker water use	45 litres/worker/day	BSRIA 2011 <sup>14</sup>
Construction worker commuter distance	25km one-way	NP Assumption
Operational worker commuter distance	20-km one-way	RWE Assumption
PV cleaning water use	76 litres/MWh	SEIA 2023 <sup>15</sup>
HGVs - deliveries	43% empty running factor	RICS 2023

<sup>11</sup> Unable to share emission factors from One Click LCA due to contractual obligations

<sup>12</sup> Unable to share emission factors from IEA due to contractual obligations

<sup>13</sup> International Energy Agency (2023). Annual GHG emission factors for World countries from electricity and heat generation.

<sup>14</sup> BSRIA (2011) Rules of thumb. Guidelines for building services.

<sup>15</sup> SEIA (2024) Water use management. Available online: <https://www.seia.org/initiatives/water-use-management>

<b>Category</b>	<b>Assumption</b>	<b>Source</b>
Sea - deliveries	0% empty running factor	RICS 2023
Repair	25% of maintenance emissions	RICS 2023
Landfill disposal distance	100km	NP Assumption
Recycling disposal distance	100km	NP Assumption
Service life	40 years	RWE provided