

District Heating carbon footprint calculator

Nottingham - 2023

Start	End
31/01/2023	31/12/2023

CO ₂ e Emission Gross factors		
Gas	0.18256	kg CO ₂ e / kWh
Gas oil	0.25359	kg CO ₂ e / kWh
Grid Supplied Electricity		
Industrial (Consumption-based)	0.2394	kg CO ₂ e / kWh
Generation-based	0.2269	kg CO ₂ e / kWh

BEIS conversion factor 2023
BEIS conversion factor 2023
2023 marginal factors
2023 marginal factors

Proportion of year on zero carbon electricity	0%	%
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Gas consumption (DH)	8,702	MWh
Gas Oil consumption (DH)	0	MWh
Electricity consumption (DH)	1,612	MWh
Electricity consumption (ERF)	10,048	MWh
Gas oil consumption (ERF)	1,533	MWh

ERF heat generation	89,611	MWh
ERF electricity generation	62,702	MWh
ERF total waste input	185,319	t
z ratio	6.3	
Waste generating heat	34,266	t
Electrical Generation Sacrificed	14,224	MWh
Electrical Generation Sacrificed [%]	18%	

Heat used by customers (incl. losses)	89,611	MWh
Heat Losses	8%	

Alternative gas consumption	105,425	MWh
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Assumptions:

- 1) 85% efficiency for gas and oil fired boilers
- 2) 1721MWh electrical consumption on DH Network
- 4) Alternative gas consumption is based on gas boilers located on customer premises

PRIVATE WIRE SUPPLY:

2023 Values	Units	Description	Data Source
17,097,380	kWh	Total private wire electricity supplied (F&I) less import	Cust Services
6.3		z-factor of heat station turbine	Reference 2, Table GN28-1 Using EE steam pass-out pressure
12,217,000	kWh	Additional electricity used for heat station and FCC overheads (pumps etc.)	Logged by EnviroEnergy for ROC's
29,314,380	kWh	Total extra electricity that has to be sourced from the grid (compared to if district heating network wasn't there)	
0.2394	kgCO ₂ e/kWh	Long-run marginal electricity emissions factor (consumption-based)	BEIS Long run marginal emissions factor for 2020 (generation-based) - Reference 3
0%		Proportion of calendar year on zero carbon tariff for electricity	Switched to zero carbon tariff 1st October 2022
2,925,019.21	kg	Extra indirect CO ₂ e emitted	
0.2269	kgCO ₂ e/kWh	Long-run marginal electricity emissions factor (generation-based)	BEIS Long run marginal emissions factor for 2020 (generation-based) - Reference 3
3,879,336.83	kg	Extra CO ₂ e emitted (from displaced electricity)	
6,804,356	kg	Extra CO ₂ e emitted	
6,804,356	kg	Total 'extra' CO ₂ e emitted	
62,702,000	kWh	Total Electricity Generated (kWh) (Private Wire, London Rd + Eastcroft, spill to grid)	Logged by EnviroEnergy
0.1085	kgCO ₂ e/kWh	Overall electricity carbon factor	

References

- 1 Technical Note – Modelling Energy from <https://www.bregroup.com/sap/bre-technical-notes/>
- 2 CHPQA Guidance Note 28 - The <https://www.gov.uk/guidance/chpqa-guidance-notes>
- 3 Data tables 1 to 19: supporting the toolkit <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

	MWh	Emission (t CO ₂ e)
Electricity displaced	14,224	3,227
Gas consumption (DH)	8702	1589
Gas Oil consumption (DH)	0	0

	MWh	Indirect emission (t CO ₂ e)
Electricity consumption (DH)	1,612	386
Electricity consumption (ERF)	10048	2,406
Gas oil consumption (ERF)	1533	389

Total emission (t CO ₂ e)	7,996
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Carbon Intensity (kg CO ₂ e/ kWh)	0.0892
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Compared to...

	Direct emission (t CO ₂ e)
Gas consumption	19,246
Electricity consumption	3,306
Total	22,553

Tonnes CO ₂ e	14,556
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Calculation		
Electricity consumption at standard grid factor	3,306.29	tCO ₂ e
Private wire consumption at overall scheme electricity factor	1,855.39	tCO ₂ e
Carbon saved	1,450.90	tCO ₂ e

Grid electricity carbon factor	0.19338	kgCO ₂ e
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