

## District Heating carbon footprint calculator

Nottingham - 2021

Change start and end date (Inclusive)	Start	End
	01/01/2021	31/12/2021

CO <sub>2</sub> e Emission Gross factors		
Gas	0.18316	kg CO <sub>2</sub> e/kWh
Gas oil	0.25679	kg CO <sub>2</sub> e/kWh
Grid Supplied Electricity		
Industrial (Consumption-based)	0.2725	kg CO <sub>2</sub> e/kWh
Generation-based	0.2582	kg CO <sub>2</sub> e/kWh
BEIS conversion factor 2021		
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2021 marginal factors		
2021 marginal factors		
Gas consumption (DH)	7,672	MWh
Gas Oil consumption (DH)	0	MWh
Electricity consumption (DH)	1,717	MWh
Electricity consumption (ERF)	9,464	MWh
Gas oil consumption (ERF)	1,288	MWh
ERF heat generation	129,109	MWh
ERF electricity generation	61,800	MWh
ERF total waste input	185,444	t
Z ratio	6.3	
Waste generating heat	46,181	t
Electrical Generation Sacrificed	20,493	MWh
Electrical Generation Sacrificed (%)	25%	
Heat used by customers (incl. losses)	129,109	MWh
Heat Losses	5%	
Alternative gas consumption	151,893	MWh

### Assumptions:

- 1) 85% efficiency for gas and oil fired boilers
- 2) Alternative gas consumption is based on gas boilers located on customer premises

### PRIVATE WIRE SUPPLY:

2021 Values	Units	Description	Data Source
17,253,390	kWh	Total private wire electricity supplied (Fd) less import	Cust Services
6.3		z-factor of heat station turbine	Reference 2, Table GN28-1 Using EE steam pass-out pressure
11,731,000	kWh	Additional electricity used for heat station and FCC overheads (pumps etc.)	Logged by EnviroEnergy for ROC's
28,984,390	kWh	Total extra electricity that has to be sourced from the grid (compared to if district heating network wasn't there)	
0.272	kgCO <sub>2</sub> e/kWh	Long-run marginal electricity emissions factor (consumption-based)	BEIS Long run marginal emissions factor for 2020 (generation-based) - Reference 3
3,196,163.54	kg	Extra indirect CO <sub>2</sub> e emitted	
0.2582	kgCO <sub>2</sub> e/kWh	Long-run marginal electricity emissions factor (generation-based)	BEIS Long run marginal emissions factor for 2020 (generation-based) - Reference 3
4,455,488.90	kg	Extra CO <sub>2</sub> e emitted (from displaced electricity)	
7,651,652	kg	Extra CO <sub>2</sub> e emitted	
7,651,652	kg	Total 'extra' CO <sub>2</sub> e emitted	
61,800,000	kWh	Total Electricity Generated (kWh) (Private Wire, London Rd + Eastcroft, spill to grid)	Logged by EnviroEnergy
0.1238	kgCO <sub>2</sub> 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 <sub>2</sub> e)
Electricity displaced	20,493	5,292
Gas consumption (DH)	7672	1405
Gas Oil consumption (DH)	0	0

	MWh	Indirect emission (t CO <sub>2</sub> e)
Electricity consumption (DH)	1,717	468
Electricity consumption (ERF)	9464	2,579
Gas oil consumption (ERF)	1288	331

### Total emission (t CO<sub>2</sub>e)

10,074

### Carbon Intensity (kg CO<sub>2</sub>e/kWh)

0.0780

### Compared to...

	Direct emission (t CO <sub>2</sub> e)
Gas consumption	27,821
Electricity consumption	3,663
Total	31,484

### Tonnes CO<sub>2</sub>e

Carbon saving	21,410
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### Calculation

Electricity consumption at standard grid factor	3,663.41	tCO <sub>2</sub> e
Private wire consumption at overall scheme electricity factor	2,136.20	tCO <sub>2</sub> e
<b>Carbon saved</b>	<b>1,527.22</b>	<b>tCO<sub>2</sub>e</b>