

# District Heating carbon footprint calculator

Nottingham - 2020

Start End  
Change start and end date (Inclusive) 01/01/2020 00:00 31/12/2020 00:00

CO <sub>2</sub> e Emission Gross factors		
Gas	0.18367	kg CO <sub>2</sub> e/kWh
Gas oil	0.25672	kg CO <sub>2</sub> e/kWh
Grid Supplied Electricity		
Industrial (Consumption-based)	0.2848	kg CO <sub>2</sub> e/kWh
Generation-based	0.2699	kg CO <sub>2</sub> e/kWh
Gas consumption (DH)	7,894	MWh
Gas Oil consumption (DH)	0	MWh
Electricity consumption (DH)	1,569	MWh
Electricity consumption (ERF)	9,150	MWh
Gas oil consumption (ERF)	1,861	MWh
ERF heat generation	106,611	MWh
ERF electricity generation	62,581	MWh
ERF total waste input	191,347	t
Z ratio	6.3	
Waste generating heat	40,728	t
Electrical Generation Sacrificed	16,922	MWh
Electrical Generation Sacrificed (%)	21%	
Heat used by customers (incl. losses)	106,611	MWh
Heat Losses	6%	
Alternative gas consumption	125,425	MWh

### 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:

2020 Values	Units	Description	Data Source
15,407,000	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
12,023,000	kWh	Additional electricity used for heat station and FCC overheads (pumps etc.)	Logged by EnviroEnergy for ROC's
27,430,000	kWh	Total extra electricity that has to be sourced from the grid (compared to if district heating network wasn't there)	
0.285	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
3,424,150.40	kg	Extra indirect CO <sub>2</sub> e emitted	
0.2699	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
4,158,349.30	kg	Extra CO <sub>2</sub> e emitted (from displaced electricity)	
7,582,500	kg	Extra CO <sub>2</sub> e emitted	
7,582,500	kg	Total 'extra' CO <sub>2</sub> e emitted	
62,581,200	kWh	Total Electricity Generated (kWh) (Private Wire, London Rd + Eastcroft, spill to grid)	Logged by EnviroEnergy
0.1212	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	16,922	4,568
Gas consumption (DH)	7894	1451
Gas Oil consumption (DH)	0	0

	MWh	Indirect emission (t CO <sub>2</sub> e)
Electricity consumption (DH)	1,569	447
Electricity consumption (ERF)	9150	2,606
Gas oil consumption (ERF)	1861	478

Total emission (t CO<sub>2</sub>e)  
9,549

Carbon Intensity (kg CO<sub>2</sub>e/kWh)  
0.0896

### Compared to...

	Direct emission (t CO <sub>2</sub> e)
Gas consumption	23,062
Electricity consumption	3,592
Total	26,654

Tonnes CO<sub>2</sub>e  
Carbon saving 17,105

Calculation		
Electricity consumption at standard grid factor	3,591.99	tCO <sub>2</sub> e
Private wire consumption at overall scheme electricity factor	1,866.75	tCO <sub>2</sub> e
<b>Carbon saved</b>	<b>1,725.24</b>	<b>tCO<sub>2</sub>e</b>