

Heat Pumps Are Coming

The role of electrification in decarbonising homes & the role of government policy

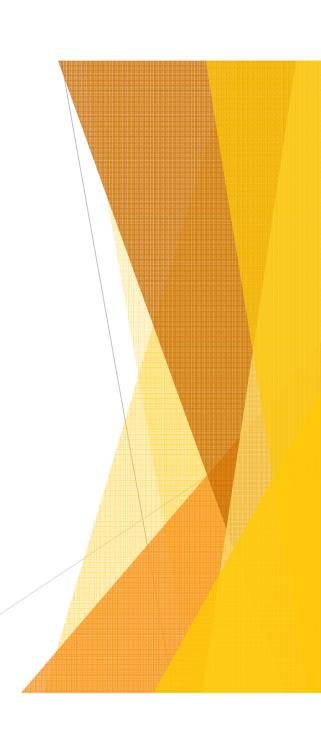
14th June 2021



The ultimate renewable energy resource







Why is electrification carbon-efficient?

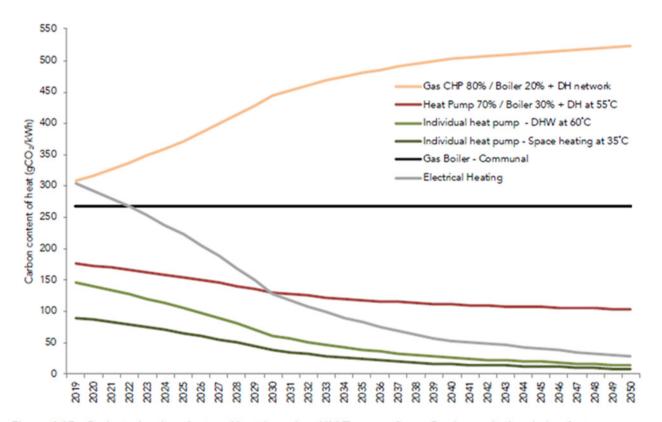
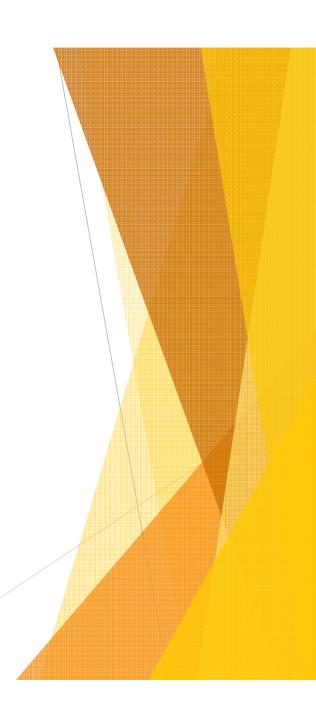


Figure 4.05 - Projected carbon factor of heat based on HM Treasury Green Book marginal emission factors



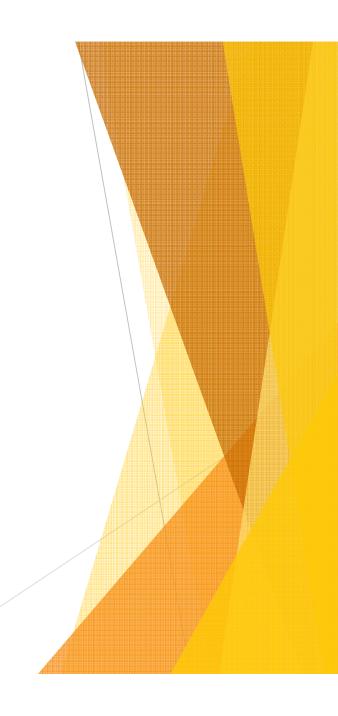


Why is electrification carbon-efficient?





https://www.hpf.org.uk/carbonwatch



Carbon Dioxide Emissions Comparison - Electricity vs. Oil vs. LPG vs. Gas

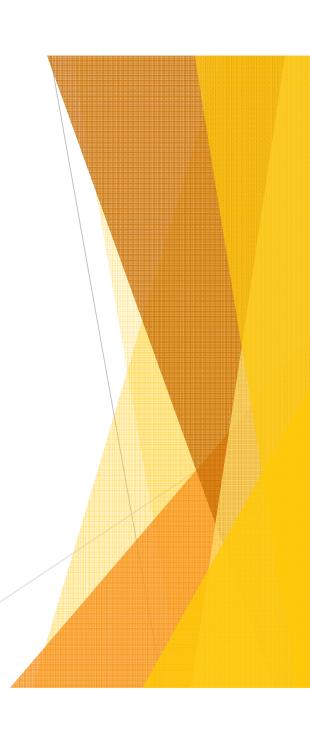
Total Heating (+ DHW) Demand	10,800	kWh/annum	Note:						
SPF	3.20								
Electricity Consumed By Heat Pump	3,375	kWh/annum	Note:						
			Carbon			Carbon Dioxide	Heat Pump CO2 Saving	% CO2 Saving	Average no. of
		Boiler	Dioxide		Demand	Emissions	Against	With Heat	family cars
Fuel/Carbon Emissions		Efficiency %	Factor		kWh/annum	kg	Fuel	Pump	displaced
Electricity (National Grid)		100	0.212	kgCO2/kWh	10,800	2,290	1,574	69%	0.9
Oil		89		kgCO2/kWh					
LPG Gas		90		kgCO2/kWh		,			
Mains Gas		92		kgCO2/kWh					0.8
Coal		80	0.333	kgCO2/kWh	13,500	4,496	3,780	84%	2.2
Biomass (High Quality Pellets)		85	0.040	kgCO2/kWh	12,706	508	-207	-41%	-
Electricity - Heat Pump		320		kgCO2/kWh		716			
Assumes that electricity is purchased from	om a standard su	pply. Purchasi	ing from a	green energ	y tariff will s	ignificantly	increase CC)2 emission	s savings.
			Carbon factors taken from Defra figures						
			Carbonnac		III Bolla ligaro	0 101 2021.			
	Average fan	l nily car :	Ford B-MA	X 2017 1.4 P	etrol				
	Emissions	Emissions (DVLA Vehicle Certification Agency) :				0.139	kg/km		
	Average ani	Average annual mileage (RAC Foundation):				12,560	km		
		Average annual emissions:				1 746	kaCO2e		



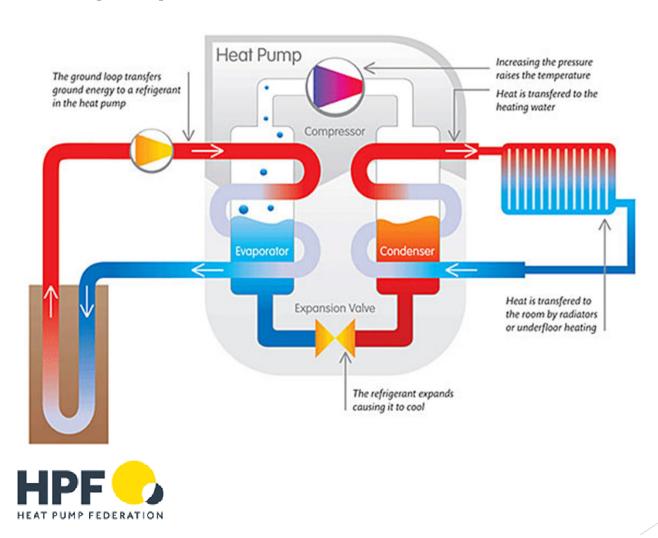
The heat efficiency hierarchy

- Waste heat you lose, you lose!
 - Building fabric, insulation
- Waste heat you harvest, you win!
 - Heat recovery
- Waste heat may be "over the fence"
 - Water treatment plants, escaping process heat, mine water, cooling processes, neighbouring power plants (including nuclear)
- Heat from self-generated sources
 - Local electricity, biomass, all forms
- Heat from bought-in resources
 - Grid electricity, gas, CHP





Heat pumps 101





Heat pumps 101 – what do they look like?









Heat pumps 101 – any emitter type











Heat pumps 101 – all house & development types

