

## Challenge 2; Residential heating

Heating homes accounted for 19% of Cork's energy demand in 2018, emitting 785 ktonne of CO<sub>2</sub> (12%). The All of Government Climate Action Plan published last year proposes to solve this by 2030;

- Retrofitting 450,000 houses to a BER rating of B2
- And 300,000 of these also installing a heat pump system

However, there are some problems with this, heat pumps require the house to have at least B2 BER rating and retrofits are expensive. It could cost €30,000 – €50,000 even with grant support;

- What other alternatives are there?
- And should all houses be treated the same?

	% Share	No. of houses	Avg. kWh / m <sup>2</sup> per year			Year built	Avg. m <sup>2</sup>
			Total energy demand	Lighting, Appliances, etc.	Heating & Hot water		
<b>A</b>	5%	9,878	34	13	21	Pre 1919	98
<b>B1</b>	2%	3,951	67	14	53	1919 - 1945	100
<b>B2</b>	4%	7,902	81	16	65	1946 - 1960	104
<b>B3</b>	11%	21,731	96	17	79	1961 - 1970	104
<b>C</b>	36%	71,118	113	18	95	1971 - 1980	106
<b>D</b>	25%	49,388	142	18	124	1981 - 1990	108
<b>E</b>	12%	23,706	179	19	160	1991 - 2000	110
<b>F</b>	4%	7,902	226	19	207	2001 - 2010	113
<b>G</b>	7%	13,829	265	21	244	2011 or 2016	231
<b>Total</b>		197,551				post 2016	225

## Example calculations

The average age / BER rating for houses in Ireland and likewise Co. Cork would be a C rated home built between 1981-1990. In the city these would primarily be heated by natural gas and outside the city, heating oil would be the most common fuel. The savings from retrofitting to a B2 would be as follows;

$$\text{City house} - 108 \text{ m}^2 \times (95-65) \text{ kWh/m}^2 \times 0.205 \text{ kgCO}_2/\text{kWh}^* = 664.2 \text{ kgCO}_2 \text{ per year}$$

$$\text{Country house} - 108 \text{ m}^2 \times (95-65) \text{ kWh/m}^2 \times 0.257 \text{ kgCO}_2/\text{kWh}^* = 832.7 \text{ kgCO}_2 \text{ per year}$$

In addition, by installing a heat pump;

$$\text{B2 rated house} - 108 \text{ m}^2 \times 65 \text{ kWh/m}^2 = 7,020 \text{ kWh per year}$$

$$\text{Assuming heat pump has Coefficient of Performance of 2.5} - 7,020 / 2.5 = 2,808 \text{ kWh per year}$$

$$\text{Country house} - (0.257 \text{ kgCO}_2/\text{kWh}^* \times 7,020 \text{ kWh}) - (0.375 \text{ kgCO}_2/\text{kWh}^* \times 2,808 \text{ kWh})$$

$$1,840 \text{ kgCO}_2 - 780 \text{ kgCO}_2 = 1,060 \text{ kgCO}_2 \text{ per year}$$

\*provided in supplementary information

## Useful sources of information

[Results from 2016 Census for Co. Cork](#)

[SEAI Energy in Residential Sector Report 2018](#)

[CSO Domestic Building Energy Ratings Q4 2019](#)