Future heating seminar
At Hoare Lea, London, 14 Sept 2016

CIBSE
Homes for the Future Group

The All-Electric City

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http://www.wspgroup.com/Globaln/UK/Whitepapers/Cities/WSP_Electric_Cities_Whitepaper.pdf

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METHOD

- **CO_2**
  - Modelled London progress predicted (Pathway Alpha)
  - Modelled An All-Electric Future

- **Air Quality**
  - Collated London Atmospheric Emissions Index
    Modelled progress as usual
  - Modelled all-electric future

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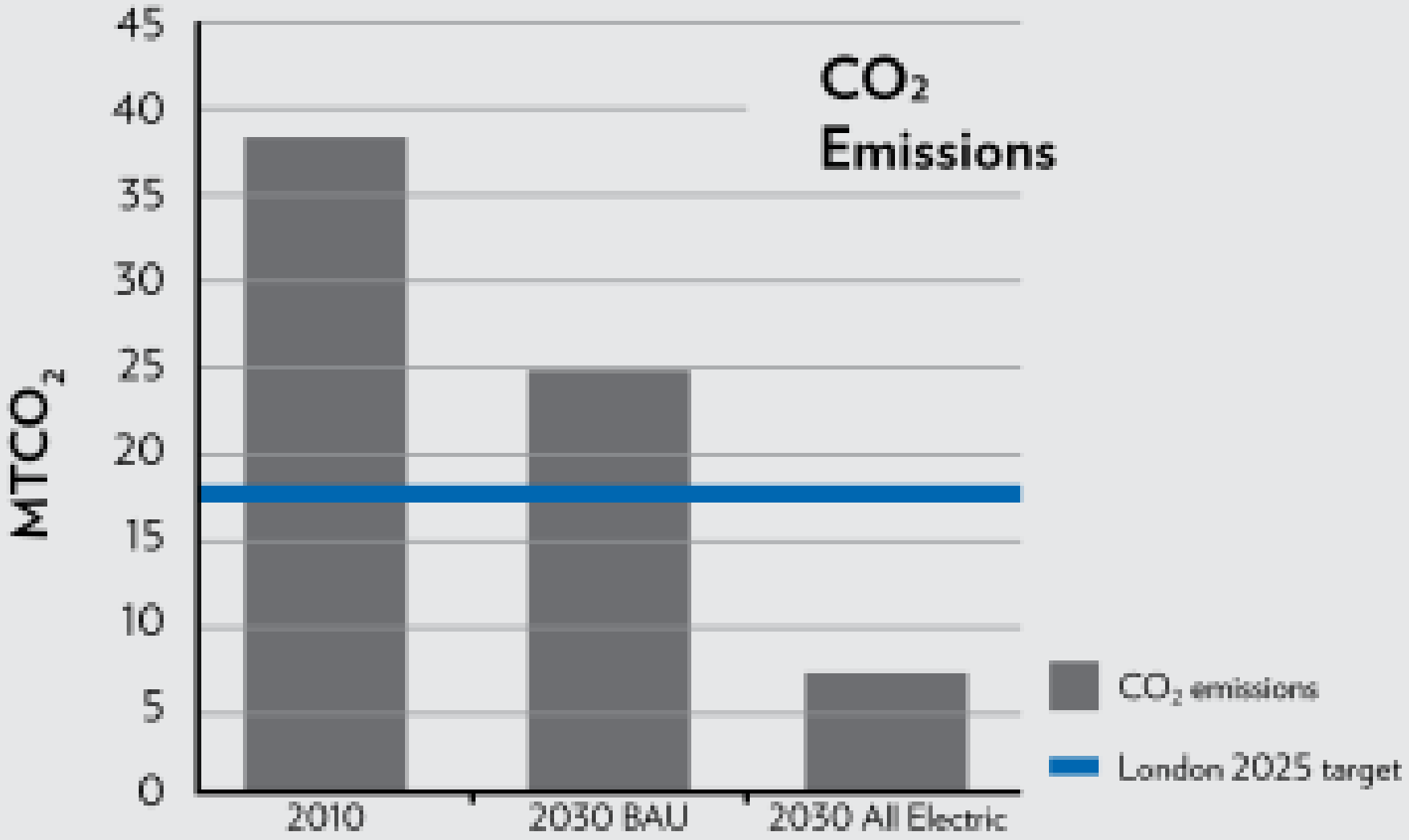
RESULTS– CO_2 EMISSIONS



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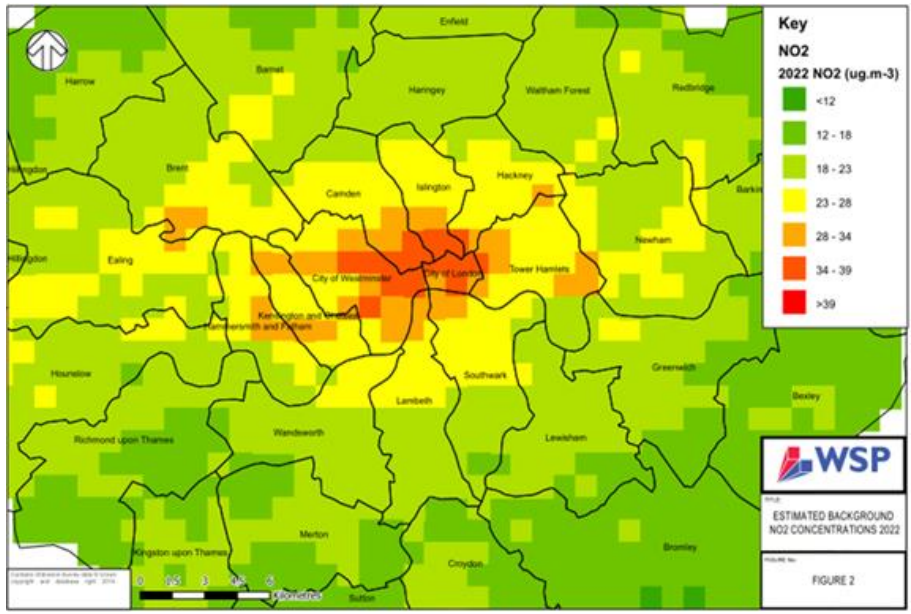
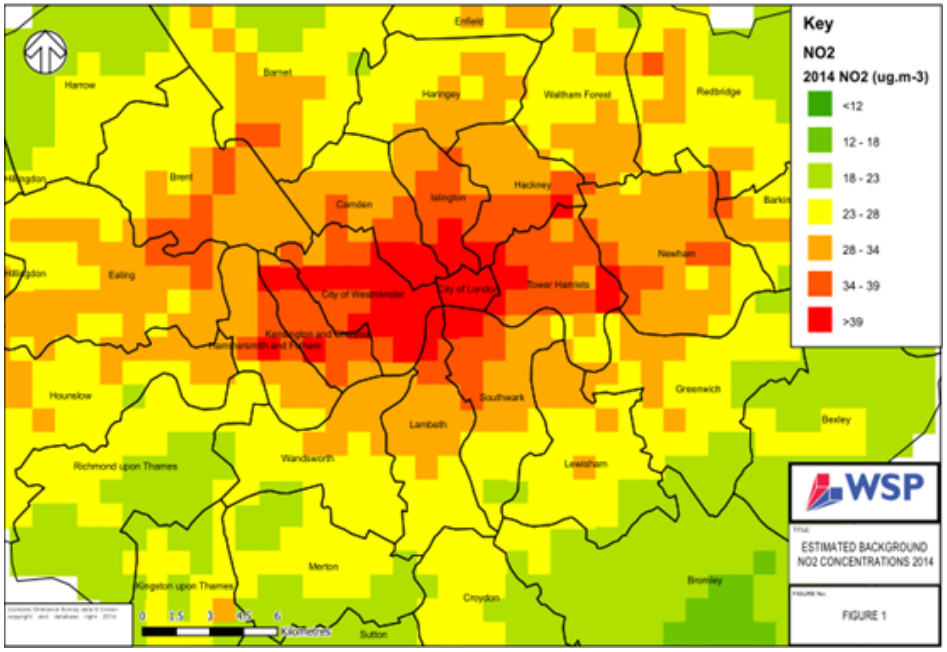
RESULTS– AIR QUALITY

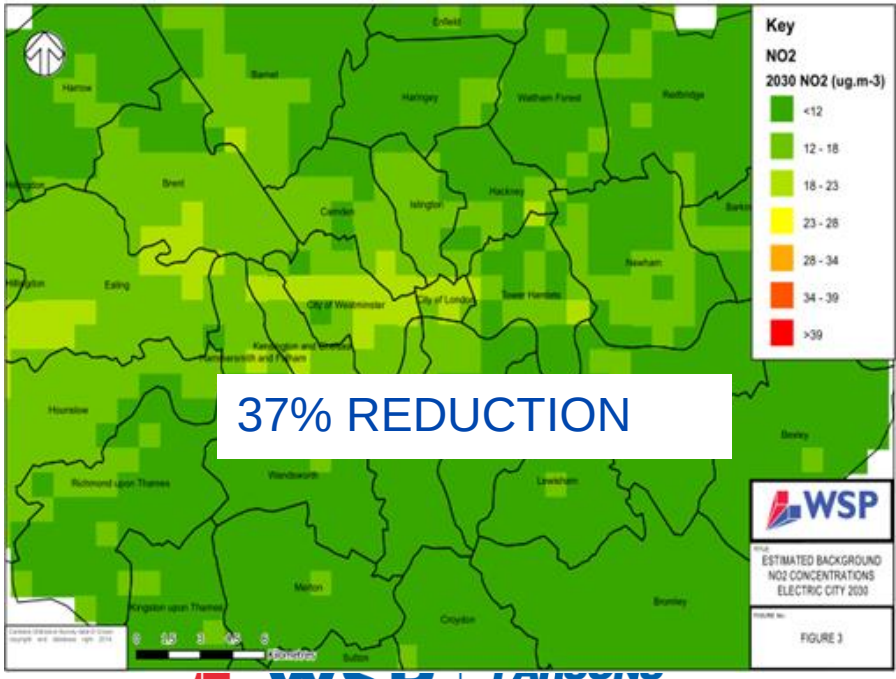
NO_2 2030 – TRAJECTORY



NO_2 TODAY



NO_2 2030 – ALL ELECTRIC



37% REDUCTION

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RECOMMENDATIONS (BUILDINGS)

1. New developments to be all-electric

- Reduce CO_2 emissions
- Immediately reduce air pollution
- Reduce risk of overheating

2. Existing Stock - Efficiency / electric heating

- Reduce long term CO_2
- Reduce energy bills

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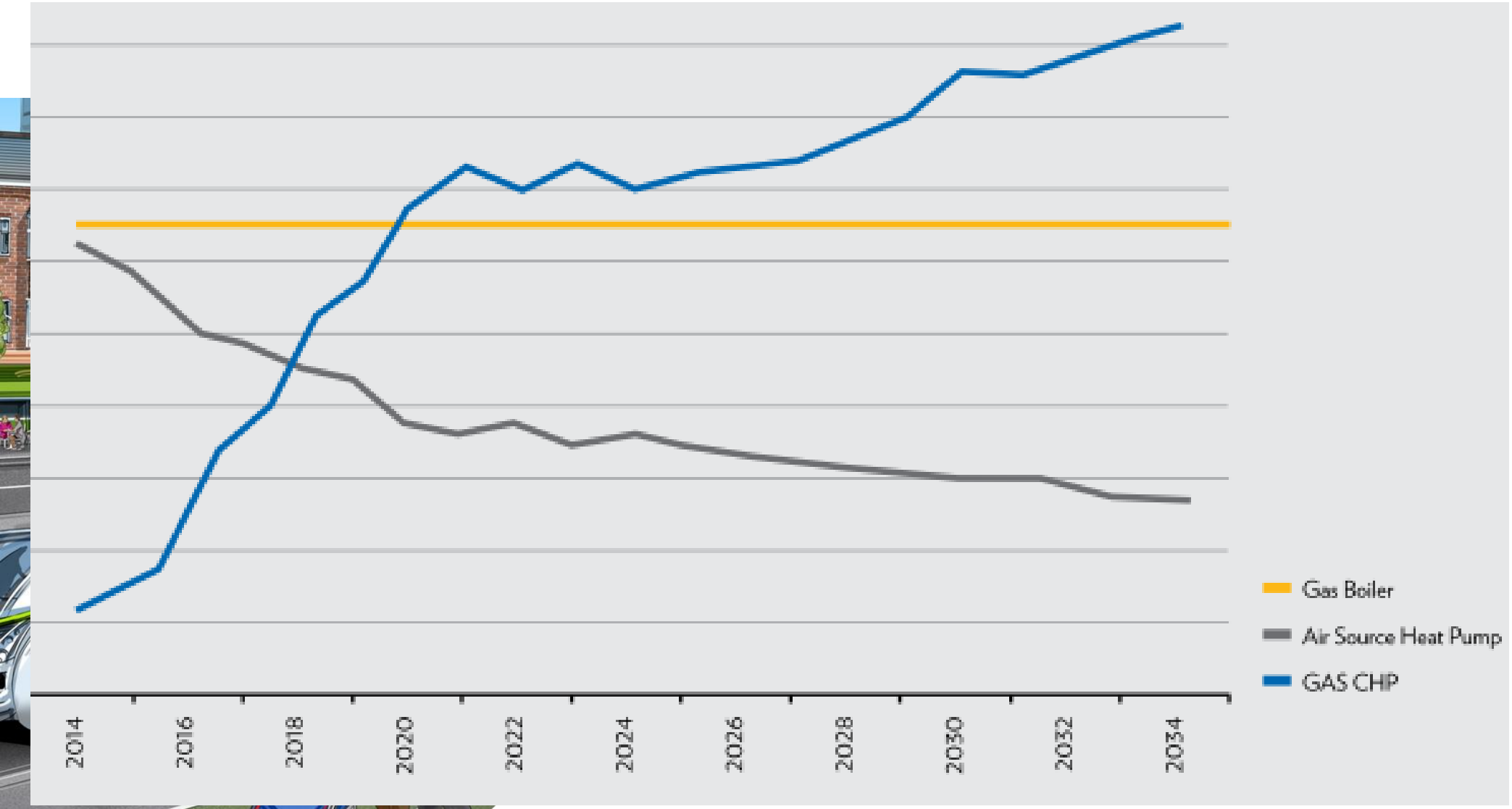
WHY ARE ALL-ELECTRIC CITIES BETTER?

LARGE CO_2 EMISSIONS REDUCTIONS



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LARGE CO_2 EMISSIONS REDUCTIONS

Arup – CIBSE Symposium 2016

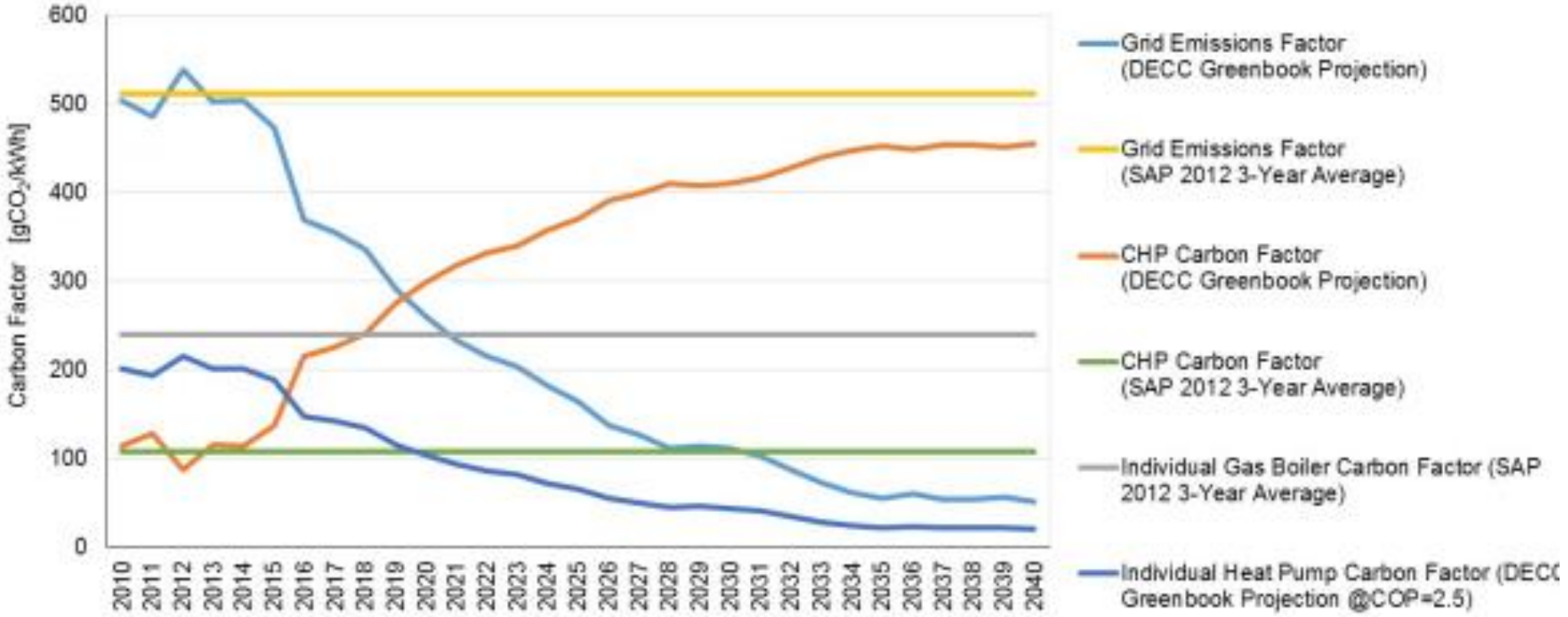

Figure 5: Future projections for electrical grid carbon intensity and effect on carbon factors from heat supplied by gas CHP and heat pumps [15].

LARGE CO_2 EMISSIONS REDUCTIONS

Keepmoat – CIBSE Journal 2016

Carbon ranking	2012 emissions (tCO_2/home) with grid intensity 519g CO_2/kWh		2016 emissions (tCO_2/home) with grid intensity 288g CO_2/kWh	
Low carbon	Gas CHP district heat	1.74	ASHP heat and DHW	1.15 ↑
	ASHP heat and DHW	2.07	ASHP heat, direct DHW	1.53 ↑↑↑
	Local gas boilers	2.13	Local gas boilers	1.67 -
	Gas boiler DH	2.40	Electric storage heat	1.87 ↑↑
	ASHP heat, direct DHW	2.72	Gas boiler DH	1.94 ↓
Highest carbon	Electric storage heat	3.37	Gas CHP district heat	2.06 ↓↓↓↓↓

Carbon ranking	2025 emissions (tCO_2/home) with grid intensity 165g CO_2/kWh		2035 emissions (tCO_2/home) with grid intensity 65g CO_2/kWh	
Low carbon	ASHP heat and DHW	0.66	ASHP heat & DHW	0.26 -
	ASHP heat, direct DHW	0.87	ASHP heat, direct DHW	0.34 -
	Electric storage heat	1.07 ↑	Electric storage heat	0.42 -
	Local gas boilers	1.42 ↓	Local gas boilers	1.22 -
	Gas boiler DH	1.69	Gas boiler DH	1.49 -
Highest carbon	Gas CHP district heat	2.23	Gas CHP district heat	2.36 -

THEY ARE FUTURE READY - OVERHEATING

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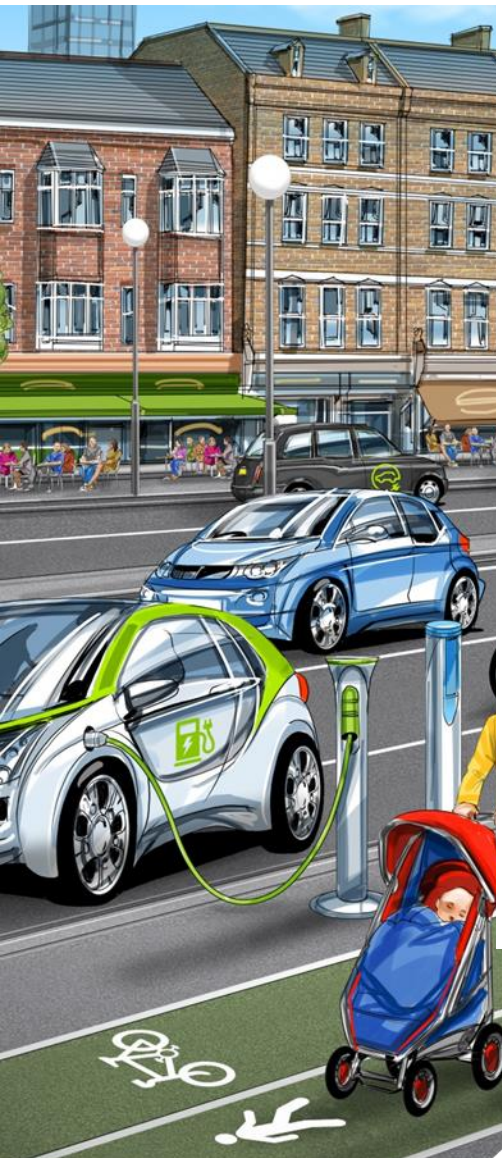
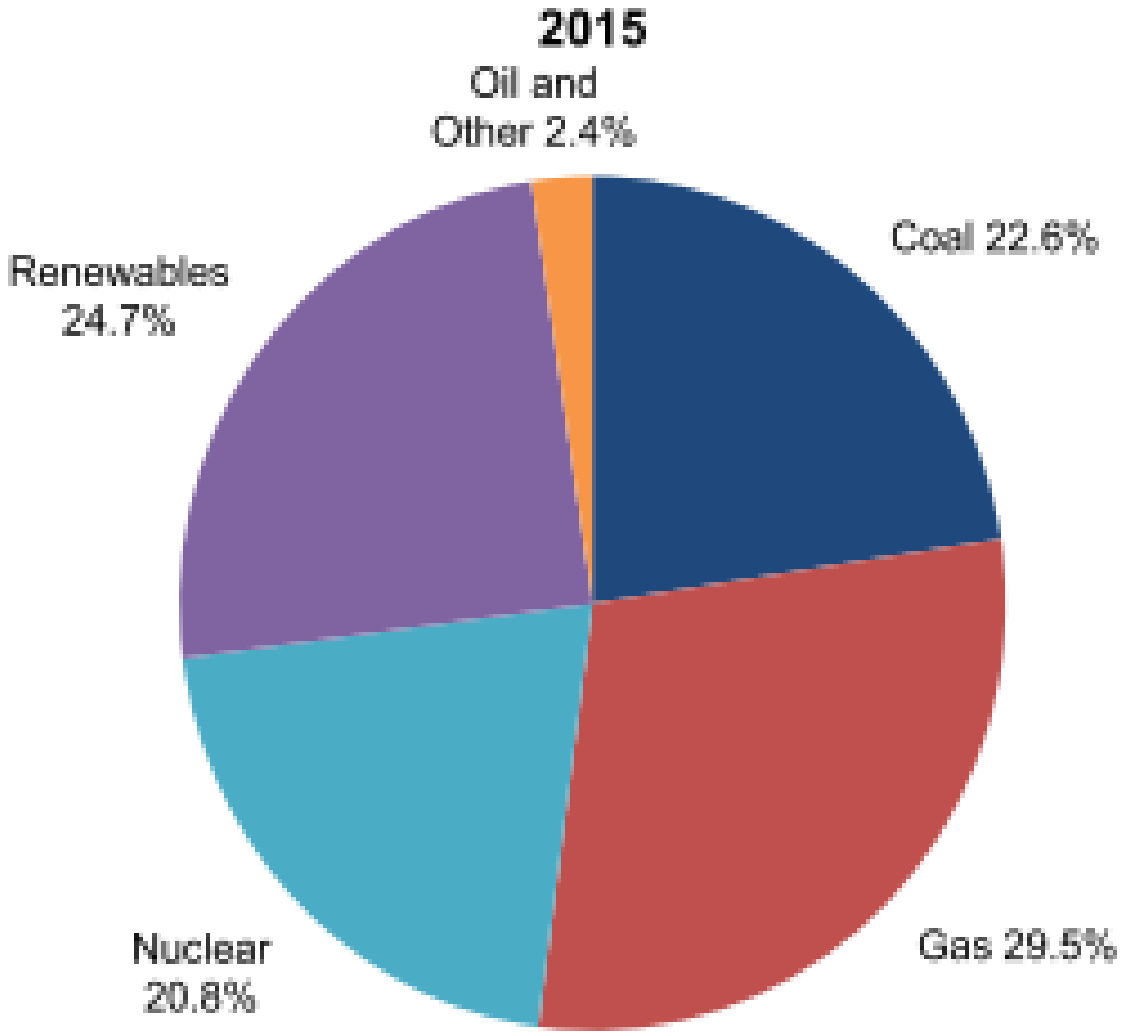
THEY IMPROVE ENERGY SECURITY





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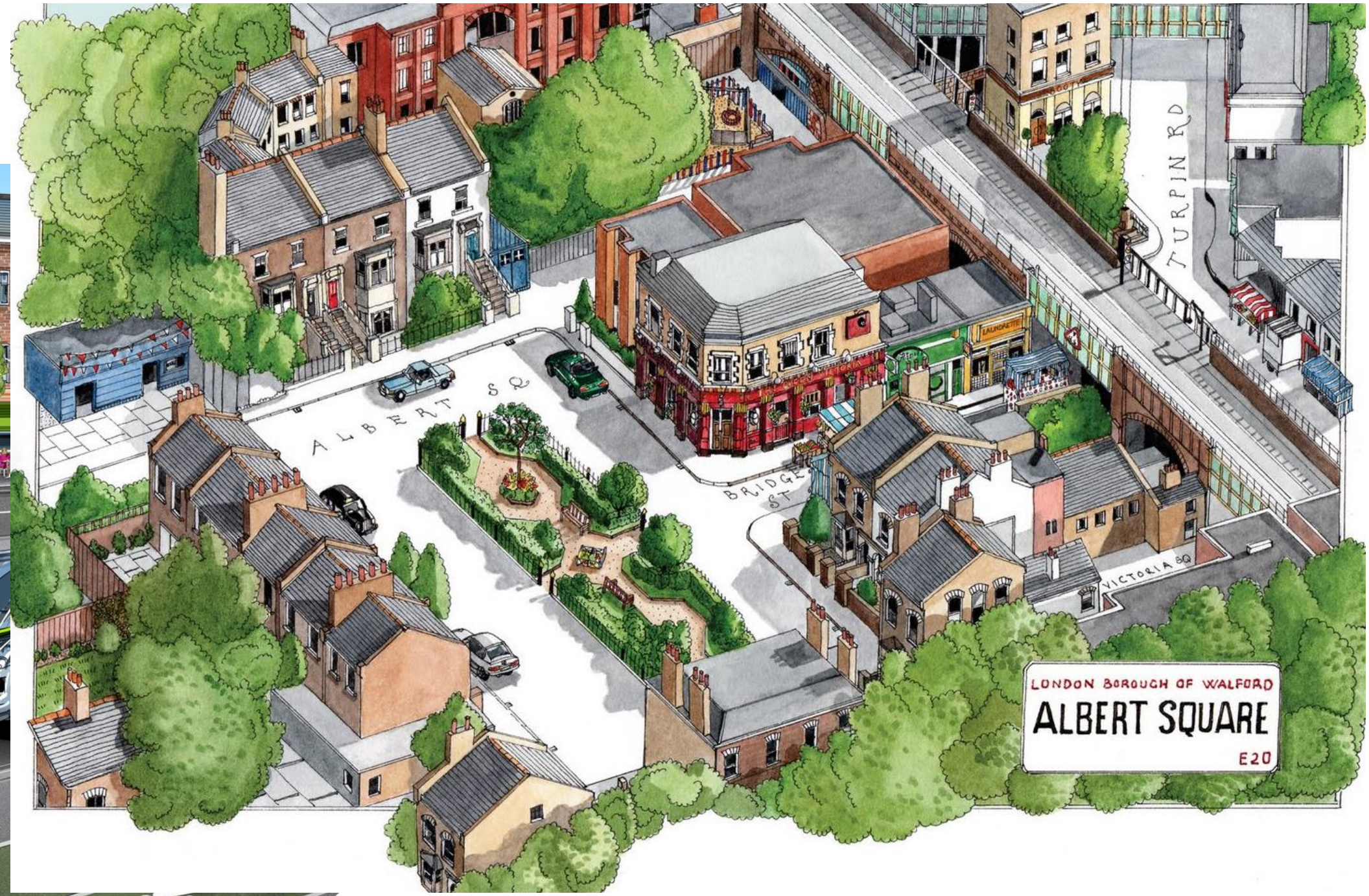
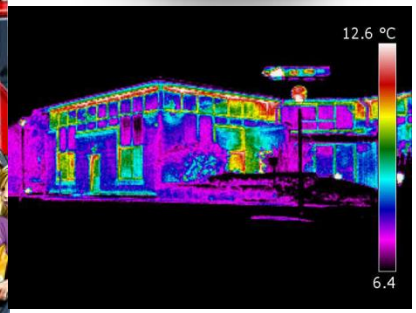
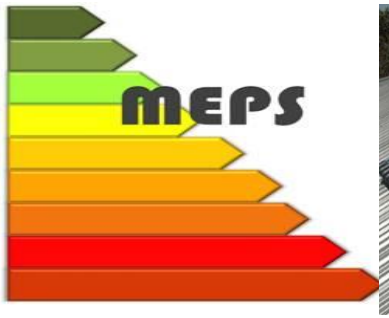
THEY ARE FLEXIBLE



THEY LOVE EFFICIENCY





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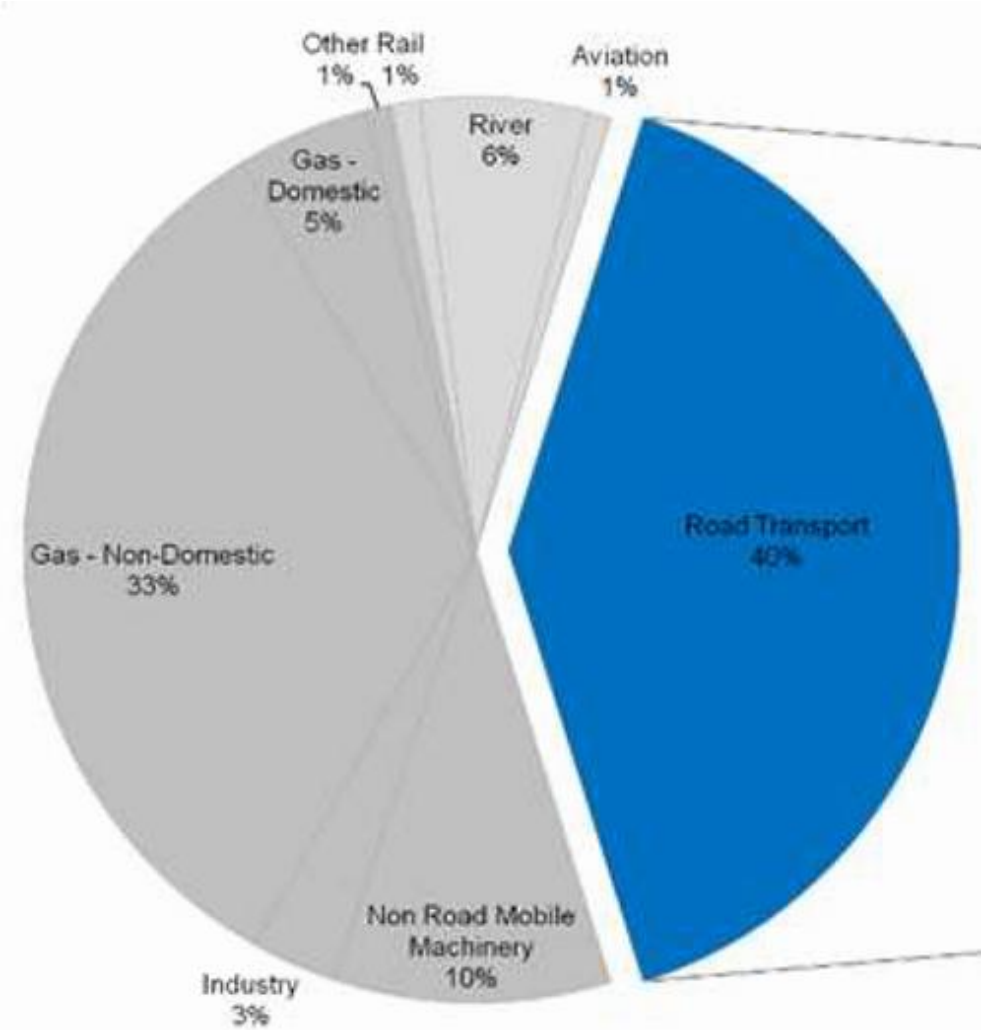
THEY WILL SOLVE OUR AIR QUALITY PROBLEMS



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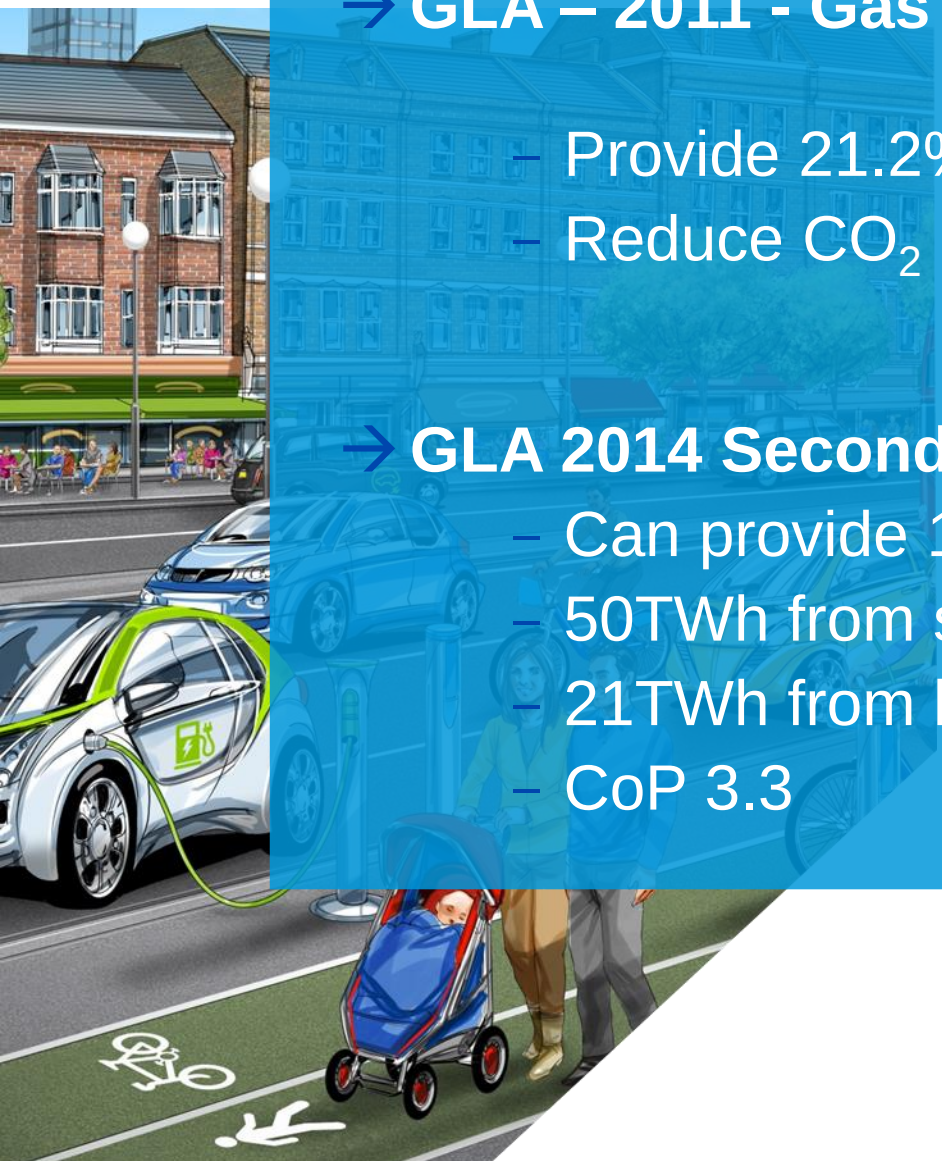
THEY ARE INEVITABLE



→ **GLA – 2011 - Gas CHP / Heat Network systems**

- Provide 21.2% of heat
- Reduce CO_2 by 0.8MTCO_2 (~2%)

→ **GLA 2014 Secondary Heat Networks / Heat Pumps**

- Can provide 100% of heat
- 50TWh from secondary source
- 21TWh from heat pump
- CoP 3.3

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CHALLENGES FOR ALL-ELECTRIC CITIES

→ **Peak power** demand

→ Improving **efficiency** of building stock

→ **Short-term Policy** – National/Local, Part L

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SUMMARY

All-Electric Cities

- Massively reduce CO_2 emissions
- Reduce air pollution
- Are flexible
- Love efficiency
- Are future ready
- Are Inevitable

Much better places to live and work

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Powering ahead Fast track to an all-electric city

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