Enfield Heat Pumps

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Commercial Sustainability Manager

In collaboration with Kensa & Engie

Kensa Contracting
A KENSA GROUP COMPANY

Striving for excellence

★★★★

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Decarbonising Heating

- The Bigger Sustainability Picture- *Sustainable Enfield*
- Fuel Poverty- Enfield *Warmer Homes*
- National and Local Policy
- What is a Ground Source Heat Pumps
- Business Case
- Delivery
- Lessons Learnt

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Our timeline

sustainable enfield

Building a better tomorrow, today

2011

Enfield Council's Sustainability Team created

2013

Council approved 'Enfield 2020' sustainability action plan

2020

2016

Awarded LGC Public Sector 'Team of the Year'

2011 - 2017

Sustainability Team brought in £33 million funding into Enfield

2017

40%

Council exceeded its 40% carbon reduction target three years early and launches **'Sustainable Enfield'**

2025

New 60% carbon reduction targets

60%

www.enfield.gov.uk/sustainable

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Energetik: Enfield's own heat network company

Our vision is to revolutionise the local energy market and be the supplier to trust

Energetik has been established to provide better value energy that's reliable and environmentally friendly

- Enfield Council has chosen to invest in Energetik's £85m business plan to deliver a series of low carbon heat networks via a wholly owned limited company
- Energetik's first two heat networks are now live
- Up to 80% reduction in homes' carbon footprint for heating
- When the networks are complete, they will save 8,000 tonnes of CO_2 **every year.** That's the weight of 626 London buses!
- Not installing 10,000 individual boilers at our biggest network is the equivalent of taking **2,000** cars off the road every year

>15,000 connections

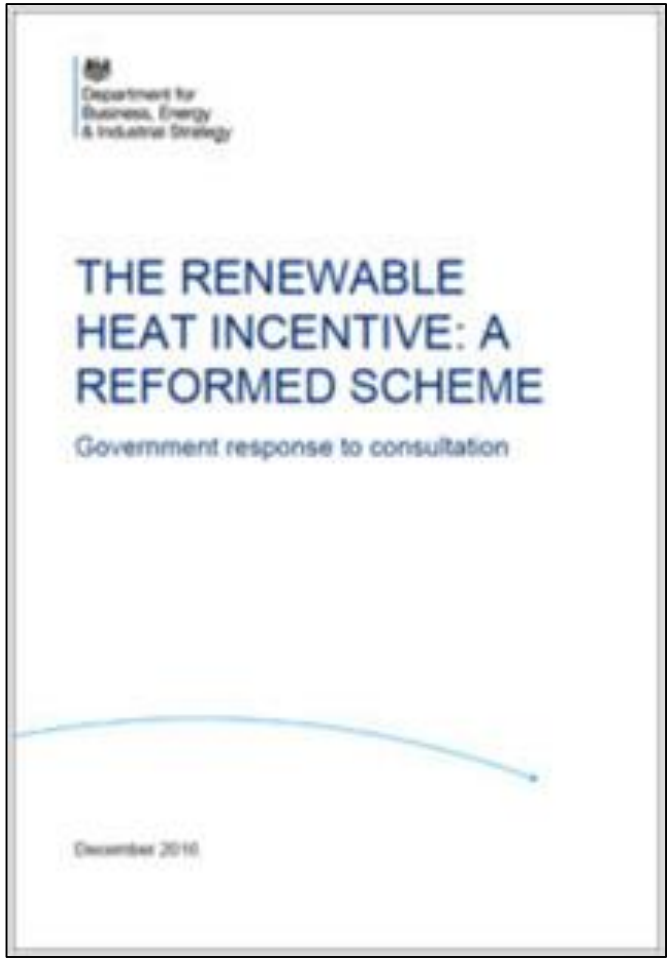
Tackling fuel poverty

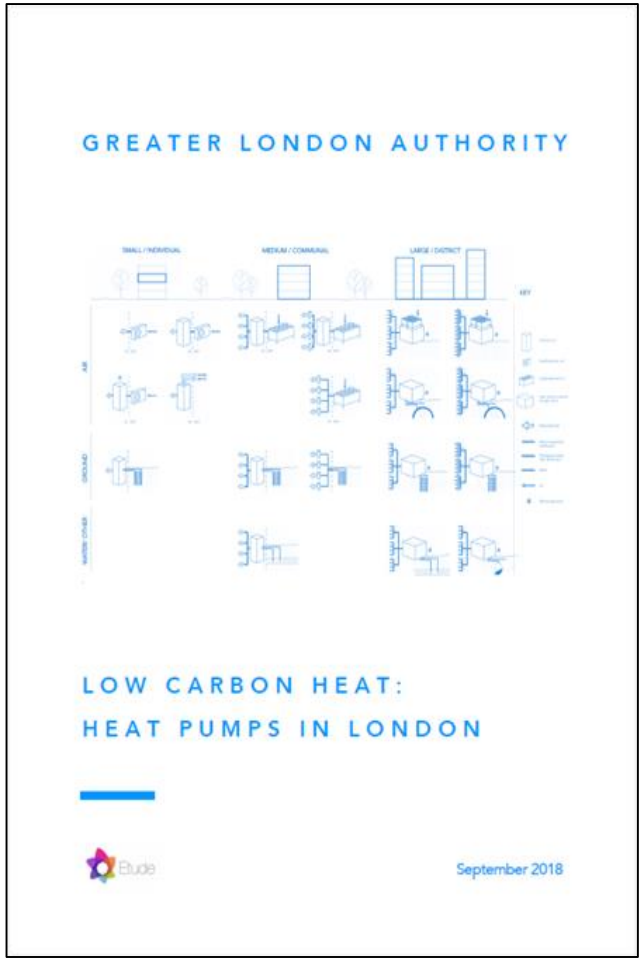
- 11% of Enfield residents are in fuel poverty
- Funding certainty has always been an issue due to lack of strategy
- 264 Green doctor visits saving a total of £323k
- 60 boilers installed to private sector vulnerable households (NEA)
- Carbon Offset funding available
- Installing free energy efficiency measures
- Offering hints and tips on energy switching

Significant savings for Mrs Z in Enfield through Local Energy Advice Programme:

Mrs Z's daughter said: "*Thank you SO much for everything you did at my mum's house last week. The heating surveyor came round today and took lots of measurements and photos. It's all happening very quickly. On your advice, I've also convinced mum to change energy supplier, saving her nearly £150 a year. My mum will be so much more comfortable at home now.*"

Why GSHP?
Supporting National & Local Policy





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FUTURE PATHWAYS

(Carbon intensity for the generation of electricity supply is falling)

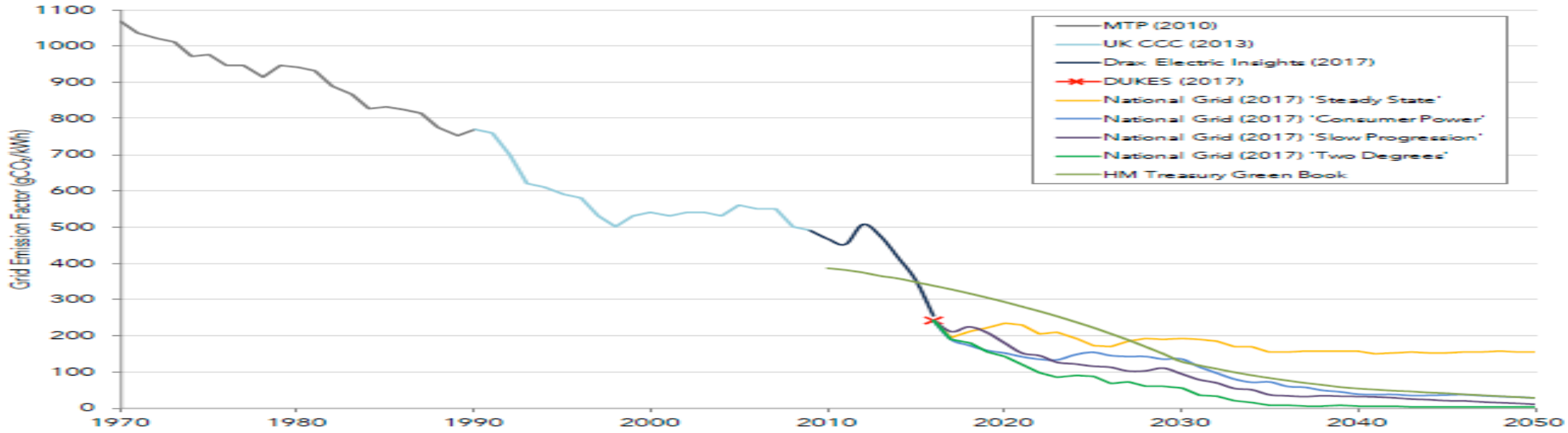

Figure 3.01 — Historic and projected carbon content of electricity

Source: Etude, *Low Carbon Heat: Heat Pumps In London* (September 2018)

	Current SAP	Next Generation SAP (SAP 10)	Projected 2030
GSHP Carbon Savings against Gas Combi Boiler	**24%**	**65%**	**77%**

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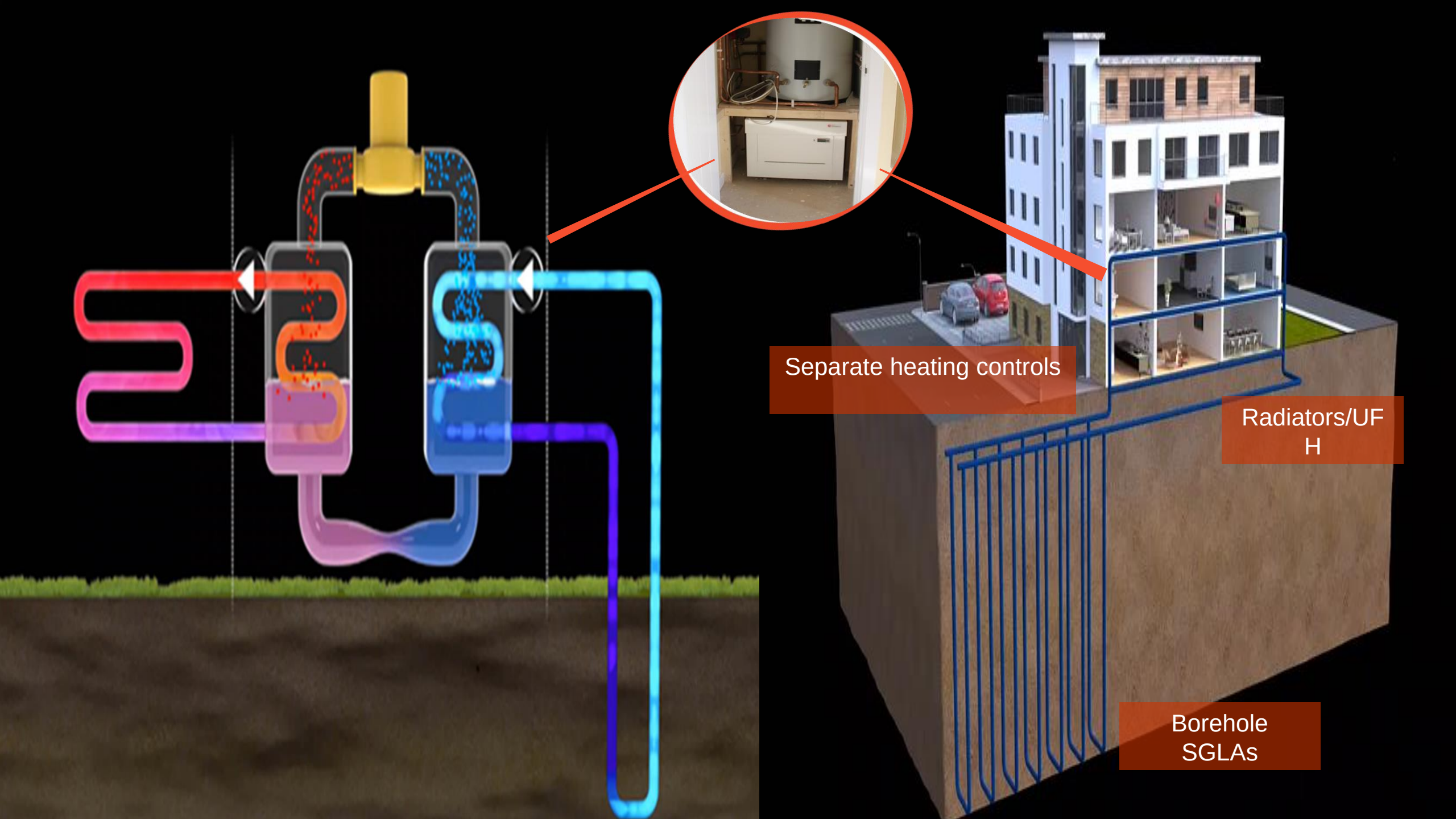

Separate heating controls
Radiators/UF H
Borehole SGLAs

Heat Pumps- not just a great photo opportunity

The “Green” Business Case

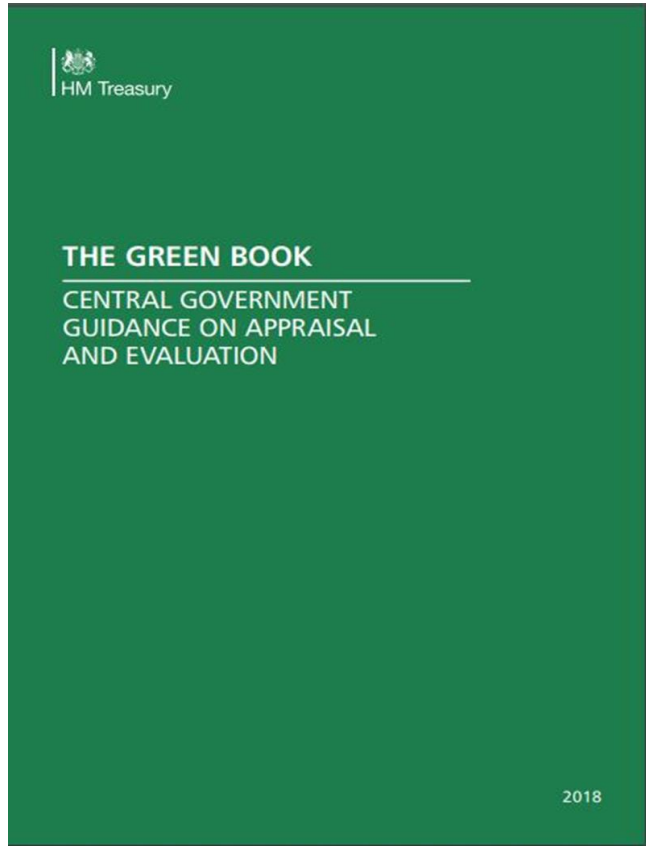
1. **Strategic Case**
   - Decarbonising heat, national and local policy

2. **Economic Case**
   - Value for money, cost benefit & options appraisal
   - DO NOT LOOSE SIGHT OF THE SOCAIL IMPACTS

3. **Commercial Case**
   - Strategy, HRA 20 year business plan & cost recovery

4. **Financial Case**
   - Financial modeling, pay back periods, RHI, ECO

5. **Management Case**
   - 20 years of monitoring, Project management, choosing contractor & contract delivery



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Basic Options Appraisal
(Life Cycle Costing)

Heating Source (100 properties)	Cap EX	Maintenance, Consumption income	Life Cycle Cost
GSHP	£1,500,000	£1,200,000 - £1,000,000(RHI)	£1,700,000
Gas boiler (Condensing)	£750,000	£1,750,000	£2,500,000
Electric (Modern storage heater)	£400,000	£2,500,000	£2,900,000

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Renewable Enfield: Ground Source Heat Pumps

- 2 ground source heat pump projects in 2 years
- Largest installation in local authority setting in England
- Initial 4 tower blocks and 187 properties
- Second project scaled up to 8 tower blocks and 400 properties
- £15 million CapEx across both projects
- ECO and RHI subsidies
- 8,000 tonnes of lifetime carbon saved per block
- Total 96,000 tonnes lifetime carbon saved
- 50% heating cost saving for residents, helping alleviate fuel poverty in some of London's most deprived wards
- Increased thermal comfort: external wall insulation and ventilation installed at the same time
- Appetite for further installation projects subject to HRA funding


STAGE 2
BOREHOLE DRILLING
THE NUMBER OF BOREHOLES WILL VARY FOR EACH PROJECT
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Depth Required

Borehole depth
=
4 Tower blocks


Welch
Keys
Woolpack
Dorset
Kettering Rd

Resident Engagement

- **Resident remained in occupation throughout the works**
- ENGIE and Enfield Resident Liaison Officers consulted each family before, during and after works
- Communal meetings held for each block prior to works
- Access to respite area for residents
- Ability to view mock-up for typical flat installation
- Opportunity to ask technical/general questions
- Dedicated website for residents to view progress information, photos, upcoming community events

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Challenges

- Strategic drivers DEN vs GSHP
- Initial Contractor going in to administration
  - should not have been principle contractor
  - This did not deter us, we just procured differently
- Operation and Maintenance
  - issues with day to day repairs team
- Lack of Software in the market for monitoring
  - Developing a bespoke software
- Complicated heat pumps initially
  - Simple design and UK manufacturing is a must

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Lessons Learned

(APSE Briefing 18/18 4th December 2018)

- **Technical design:** consider opportunities to reduce energy consumption on landlord supplies, as well as operations and maintenance to reduce maintenance costs by thinking of alternative designs
- **Specialist renewable expertise:** required to input into the technical scope, as opposed to a standard mechanical and electrical framework contractor
- **Funding and policy:** be aware of different funding options and keep abreast of regulatory changes e.g. heat meter requirements
- **Heating technologies:** consider lifecycle costs of different technologies over the same period
- **Business model:** carry out an early options appraisal on various billing options, balancing the Council's appetite for risk against income opportunities and social benefits
- **Evaluate different funding options and write them into the contract:** ensures the contractor delivers them, avoiding the use of in-house resources
- **Project meetings:** they require proactive input and challenge from someone with renewable expertise
- **Air cooling:** install air conditioning at the same time as ground source heat pumps. As summers become hotter, excess deaths from heat waves will become more common, especially in big cities from the heat island effect. It is cheaper to install cooling as part of ground source heat pump installations, than to have to retrofit later. They will also replenish the ground source heat supplies

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Benefits V Risks

- Independent & Lowest bills
- Lowest emissions
- Payback through RHI
- Potential for summer cooling
- Planning exempt
- No plant room required
- Makes use of natural capital
- Longer life cycle 20 years+
- Fuel poverty mitigation

- Lack of knowledge in Day to Day supply chain (upskilling)
- Technical design subject to change on site
- RHI application onerous
- Annual statements required to claim RHI
- No monitoring unless you specify in design
- Resident behaviour change

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LOAD SHIFTING

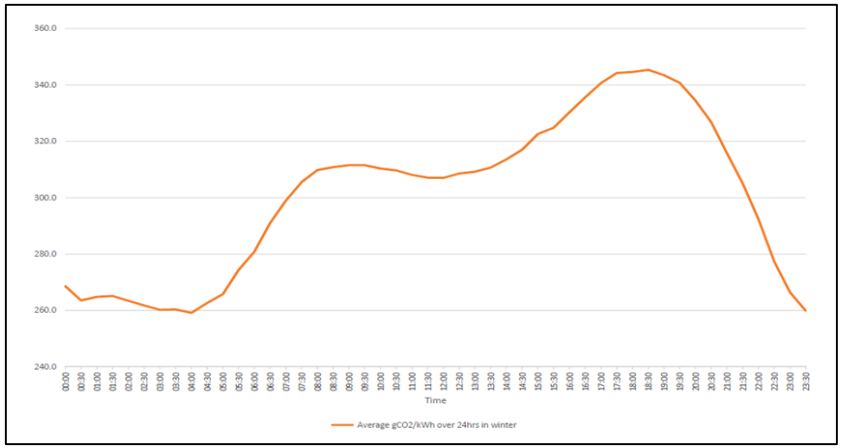
FUTURE-PROOFING

- To further reduce carbon emissions, the operation of the heat pump should be focussed on periods of low carbon electricity generation (i.e. through the night or when the wind is blowing)

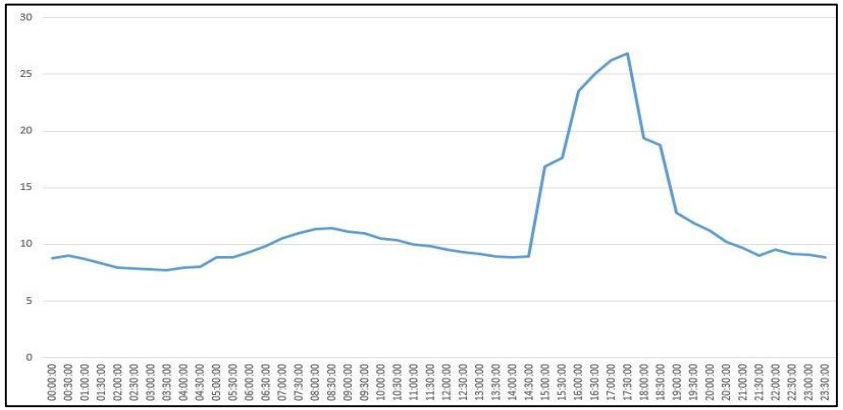
- The ground is a very stable temperature heat source allowing you to run the heat pump at the same efficiency any time of day or night (unlike air source where the efficiency is lower when the outside air temperature is lower at night)

- If you combine this feature with some energy storage local to the heat pump, it would be possible to even further reduce the peak demand by shifting heat production to times when the grid can best accommodate it

Average carbon intensity by half hour (1/11/2017 – 31/3/2018)



Average price by half-hour segment (23/5/2017 – 23/5/2018)



The Social Economic & Environmental impacts

- £7.2m is made available to residents
- Average fuel poverty gap in UK is £350 pa < £600 savings per resident from GSHP
- Carbon saving = 4800 cars of the road every year

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