

Large Scale Heat Pump Deployment – The Opportunities and Challenges



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Renewable
Heat System
Design and
Development



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Agenda

- Introduction to Infinitas Design
- Large heat pumps in the UK
- Effect of the Renewable Heat Incentive
- Case Studies
- Challenges
- Future opportunities



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Infinitas Design Ltd

- Established 2014
- Derby based
- Specialists in renewable heat system design and development
- Heat pumps, heat networks, energy storage, RHI applications
- Commercial, industrial and mixed use developments



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Heat Pumps in the UK



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- Kingston Heights, Surrey UK
 - Constructed May 2013
 - 2.3MW heat pump for heat & cool
 - 10°C water from River Thames; 45°C flow temp
 - 137 apartments & 145-room hotel
- Pusey House, Oxford
 - Georgian Grade 2 listed building
 - 292kW heat pump, 3,000l buffer vessel
 - 300m horizontal ground collector
 - Replaces oil fired boilers
 - District heat scheme encompasses other estate buildings



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Case Study 1 Shavington Stables

- Complete refurb of 17th Century stable block to make two residences
- Shared horizontal ground loop and 80kW Nibe heat pumps
- 2,000l thermal stores and hot water cylinder
- Annual demand c.162MWh
- 100% of demand supplied by heat pumps
- Saves 28te CO₂/year or 66% of LPG alternative
- Generates £11k/year RHI
- Costs £5k/year in electricity



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Case Study 2 – Scottish Borders College, Galashiels

- First sewage heat recovery system in the UK
- 800kW Carrier heat pumps using sewage as heat source
- Provides heat to 5 remote plant rooms via preinsulated heat network
- Annual heat demand c.1.6GWh
- Average SCOP 3.8 (23 months)
- Saves 152te CO₂/year or 40% of gas alternative
- Generates £112k/year RHI + heat sales
- Annual electricity bill £53K
- IRR >10%



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ENERGY SYSTEMS



Case Study 3 – Oxfordshire Estate heat network

- 26 estate houses; EPC F & G
- 360kW Nibe heat pump energy centre
- Adjacent borehole field
- Low temperature heat network & HIUs
- Battery storage (arbitrage)
- EPC rating increased
- Tenant comfort increased
- IRR 6.5% over 20 yrs exc. arbitrage



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Renewable Heat Incentive

- Launched Nov 2011
- Pays a tariff for every kWh of eligible heat generated (heat pumps, biomass, solar thermal, biogas combustion)
- Has it helped heat pumps?
- Accreditations to Dec 2018: WSHP 0.42%, GSHP 4.84%, ASHP 2.44%
- Biomass boilers accredited – 86.41%!
- Due to end 2021; next scheme unknown – carrot or stick?



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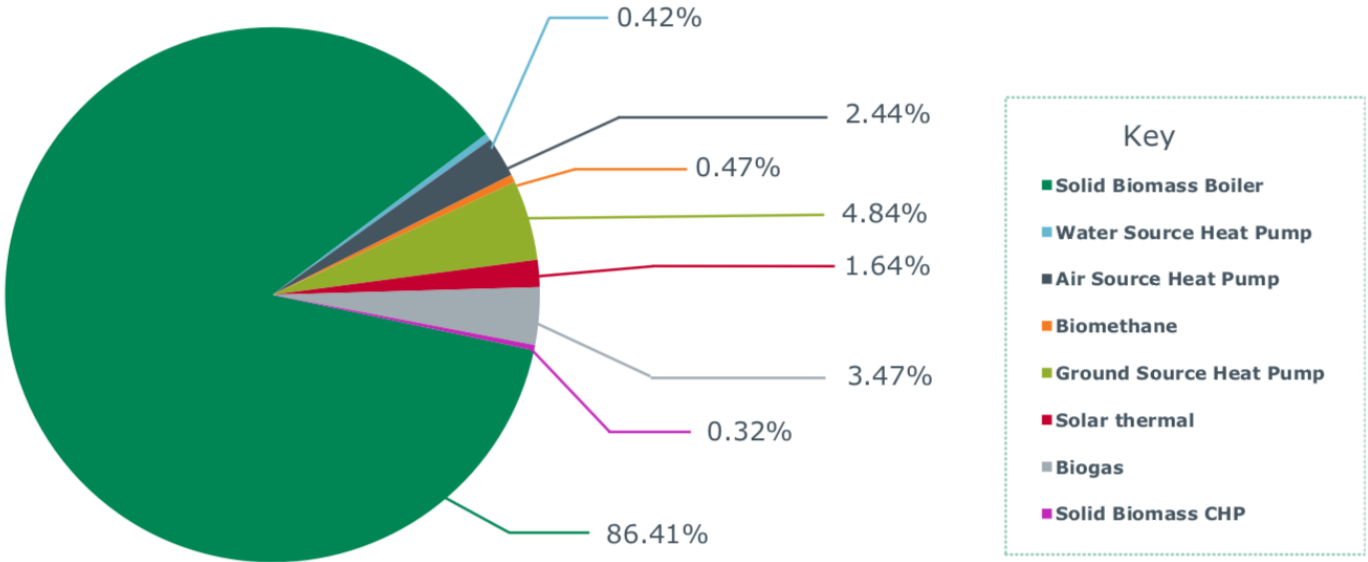
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Renewable Heat Incentive

Chart 1: Proportion of accredited Non-Domestic RHI installations by technology type (Scheme to date)



Historical figures can be found on our [website](#).



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Challenges

- Myths:
 - Don't they just generate low temperatures for underfloor heating?
 - Only suitable for new builds?
 - Lose all efficiency in the colder months?
 - Can't work with existing emitters?
 - Consume too much electricity and expensive to run?
- Government support still required to make up for higher capital costs
- Lack of design and install **expertise** in the UK
- Lack of well publicised, well performing systems in the UK
- Low gas price



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Opportunities & Benefits

- Use a wide variety of energy sources:
 - Air, lakes, rivers, sewage, minewater, ground, waste heat, etc
 - Can be deployed in a variety of locations
- Can be used in combination with other technologies such as CHP
- Air quality improvements
- Heat & cool generation
- Financial generation through heat sales
- Can be used to balance national grid through demand response
- Heat demand and heat generation can be decoupled through wise use of electrical and thermal storage



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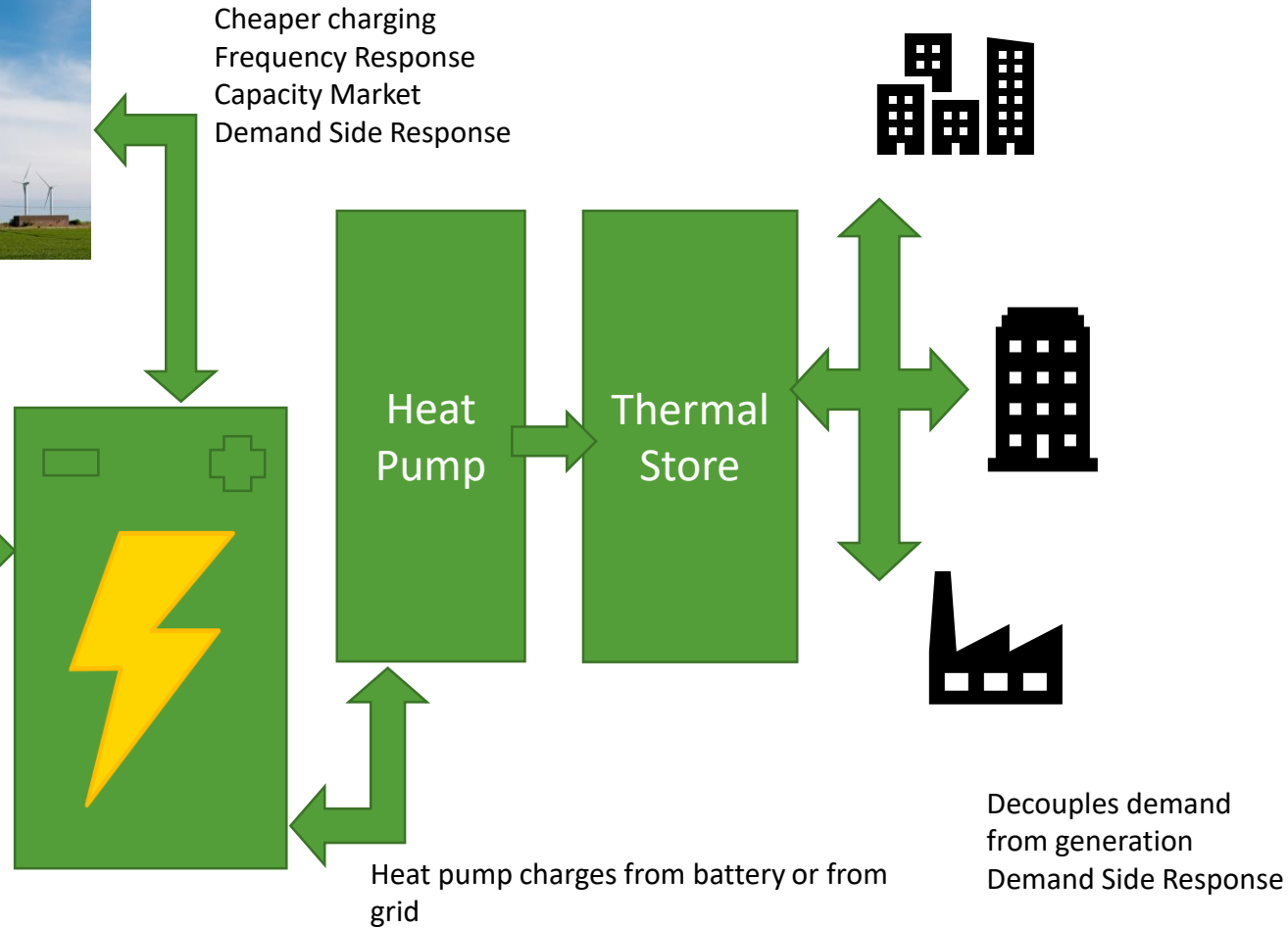


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Heat Pumps & Storage



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Thank you.



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