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UK Energy Policy Renewable Heating and Heat Pumps

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British Embassy Tokyo

Key drivers for renewable heat



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“ Climate change:

- . Key part of strategy for achieving 80% CO₂ reduction target by 2050
- . Technology support complementary to carbon price and behaviour change

“ Security of energy supply:

- . Diversity of fuel sources and reduction in dependence on fossil fuel imports

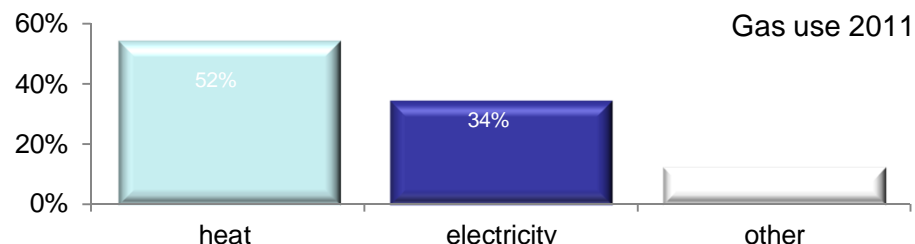
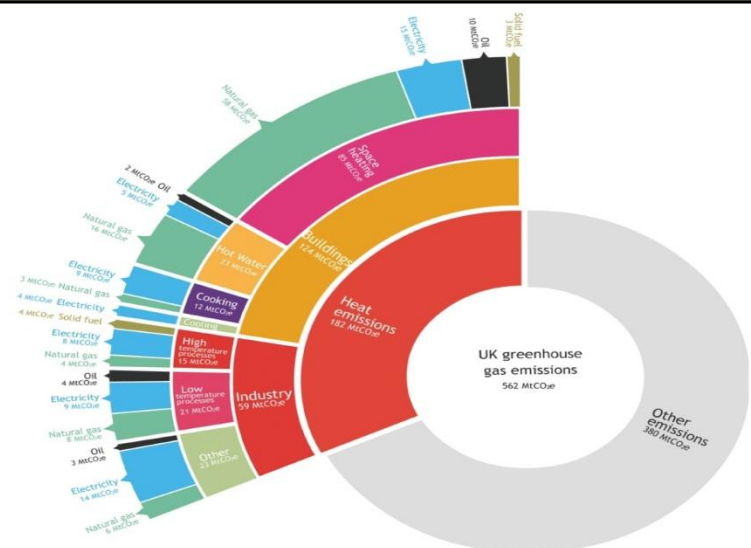
“ Legal obligation:

- . EU Renewable Energy target: 20% by 2020
- . UK target: 15% by 2020

Why heat is important



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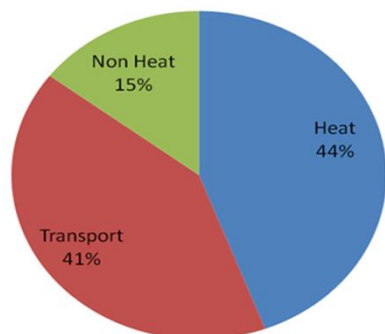


1.6 million
boilers are
replaced each
year

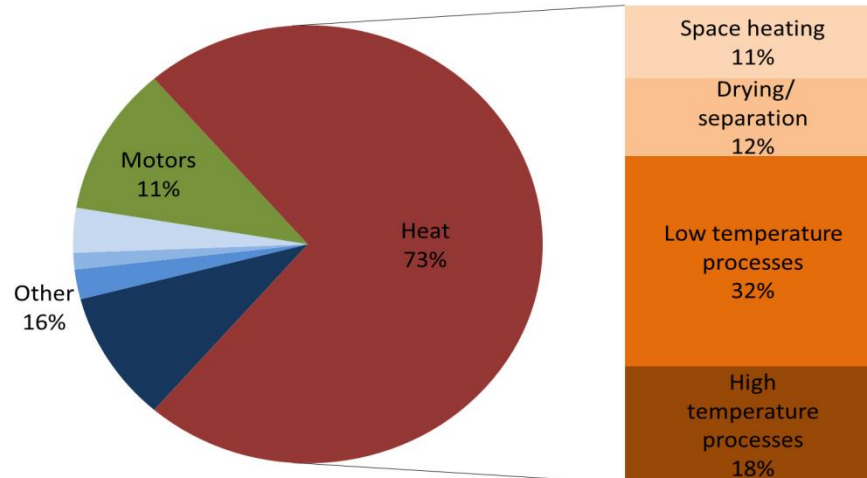
The move to condensing
boilers saved UK consumers
£800 million in fuel costs in
2009 alone

Most of our gas is used to provide heat

Energy Usage for Heat, Non Heat and Transport, 2011



More energy is used for heating than for electricity

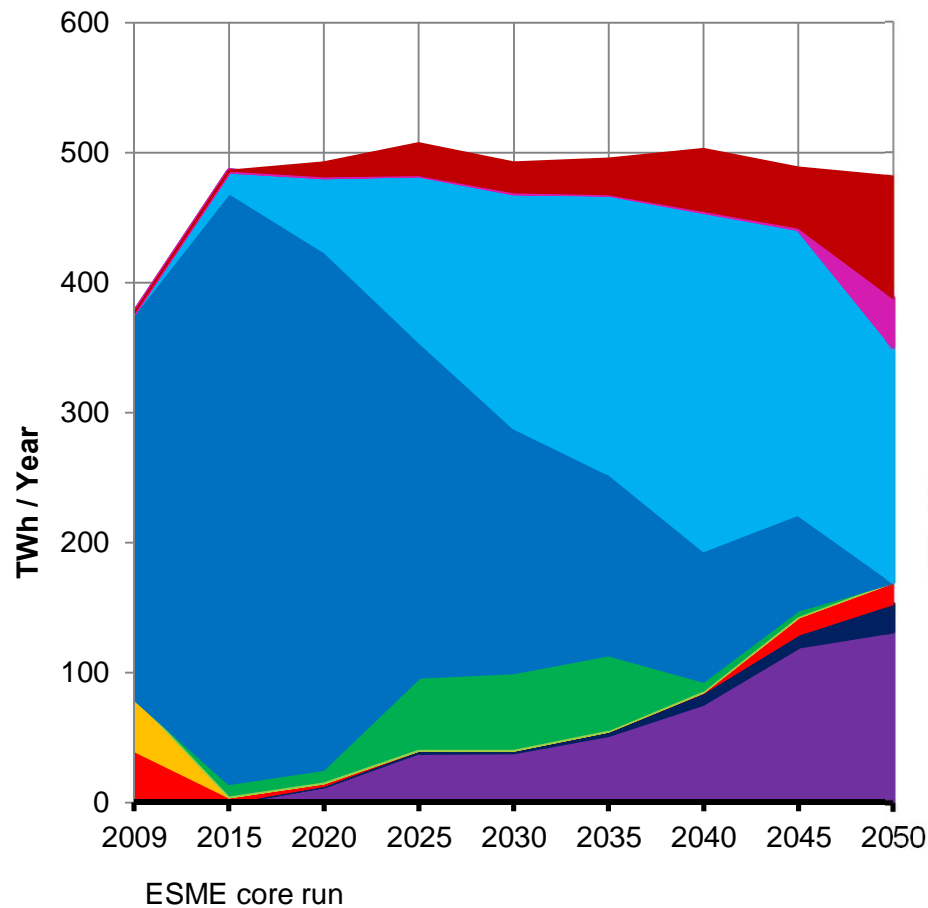


What industry uses energy for

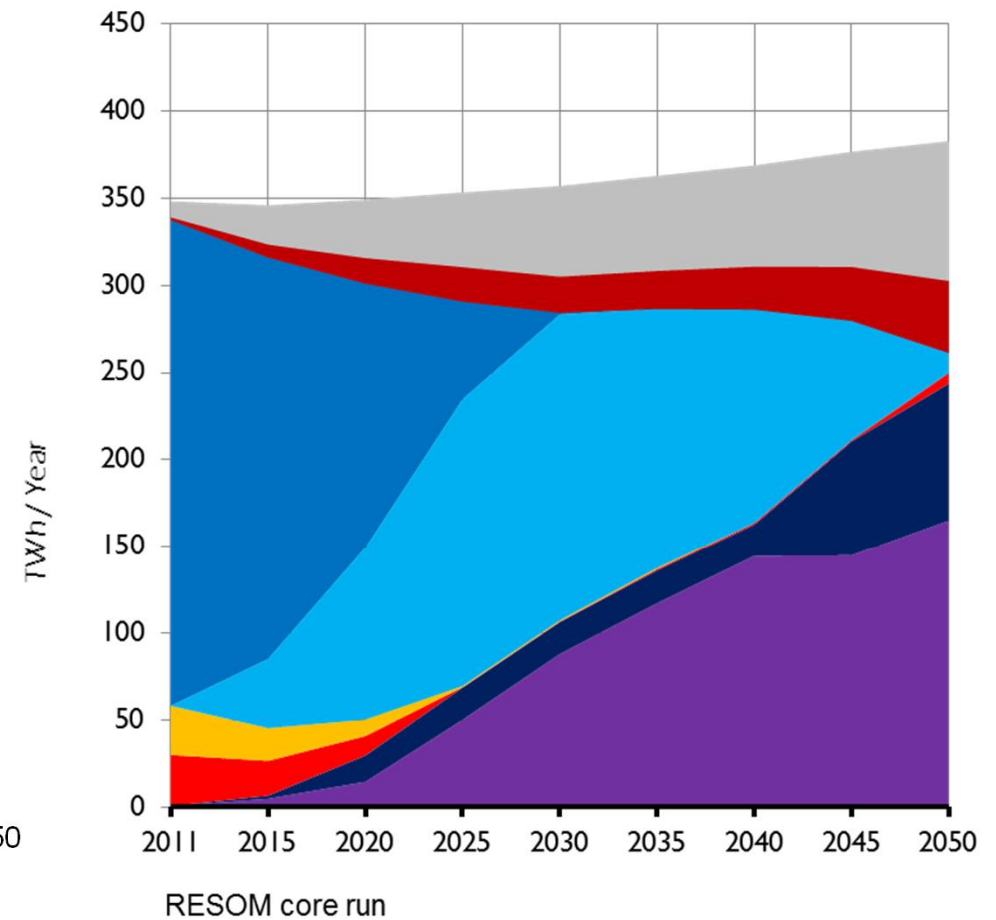
Heat Demand Modelling



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ASHP
 Oil and solid fuels
 Gas heat pump
 GSHP
 Biomass boiler
 Hydrogen boiler
 Electric
 Gas boiler
 Heat network

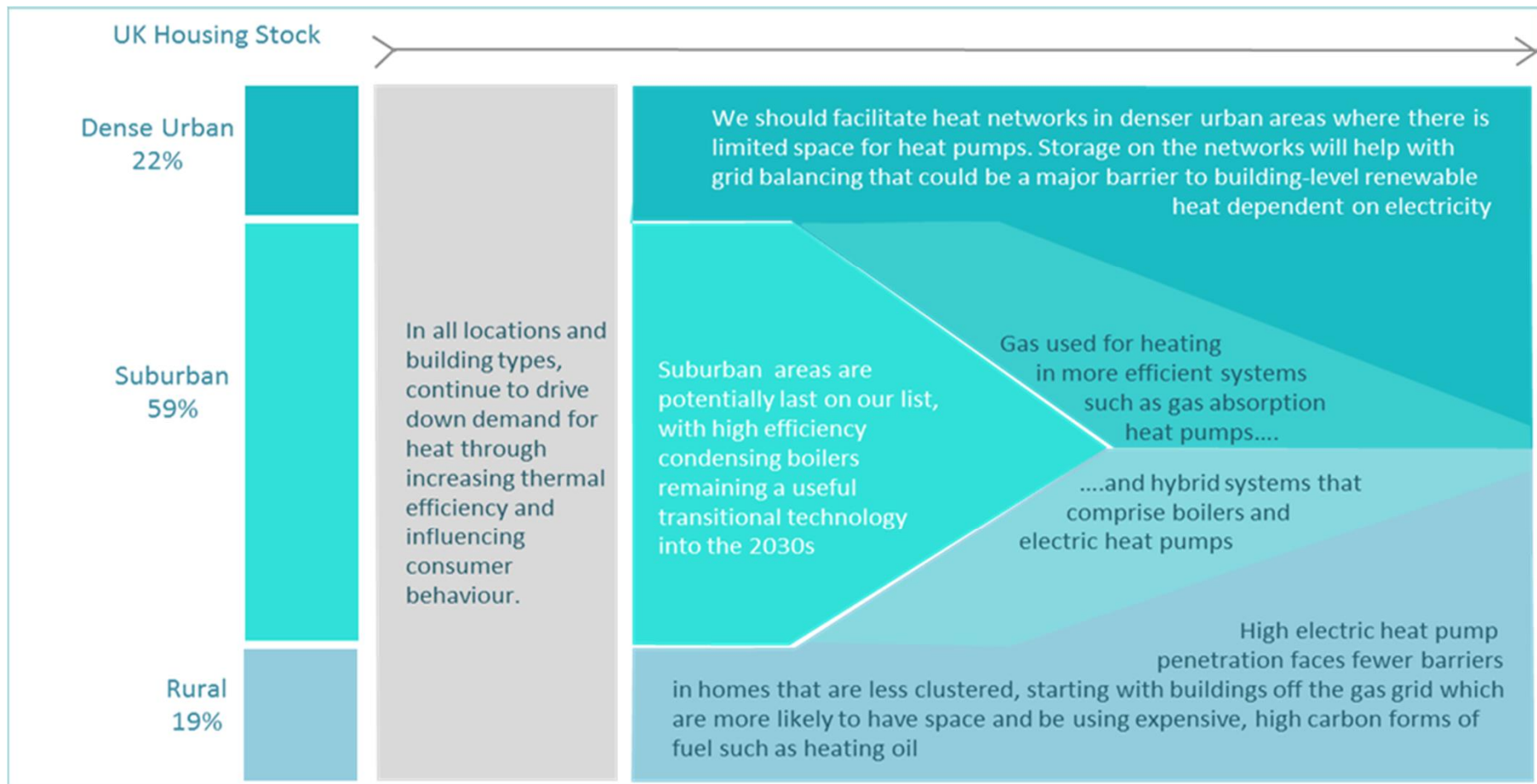


ASHP
 Fuel Oil
 District heating
 GSHP
 Hybrid Gas boiler
 Efficiency
 Electric
 Gas boiler

UK Heat Strategy



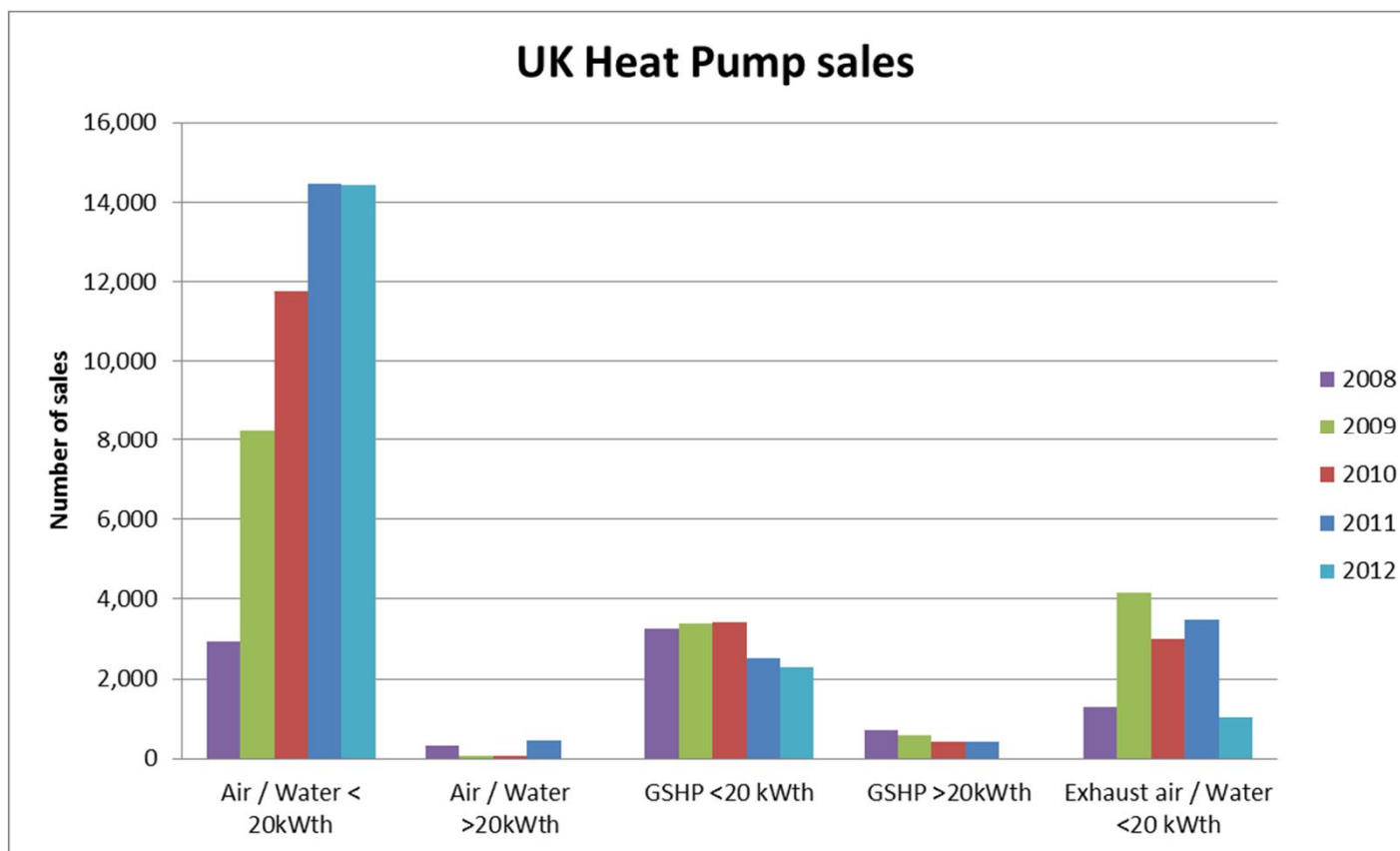
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Current heat pump market



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Key policies to incentivise heat pumps: Renewable Heat Premium Payment (RHPP)



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- “ Grant scheme to offset the capital cost of renewable heating technology.
- “ Only available to domestic dwellings
- “ First phase targeted through social housing landlords
- “ Currently in an extended second phase with increased grants to bridge the gap to the implementation of the domestic RHI
- “ Will run until 31 March 2014 when it will be replaced by the domestic RHI

Technology	Grant value	
	Phase 2	Phase 2 extension
Air . Water Heat Pump	£850	£1,300
Biomass Boiler	£950	£2,000
Ground or Water-source Heat Pump	£1,250	£2,300
Solar Thermal Hot Water	£300	£600

Key policies to incentivise heat pumps: Renewable Heat Premium Payment (RHPP)



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Technology	Total capacity (MW)		
	Phase 1	Phase 2	Phase 2 extension
Ground or Water Source Heat Pump	11.5	8.3	1.2
Biomass Boiler	17.6	15.0	3.4
Air Source Heat Pump	21.7	23.2	4.5
Total	50.8	46.5	9.1
Total estimated heat generated per year (MWh)			
	Phase 1	Phase 2	Phase 2 extension
Solar Thermal	3,609	3,266	542

Total installed capacity under the RHPP

Key policies to incentivise heat pumps: Non-domestic Renewable Heat Incentive (RHI)



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Technology	Current Tariff (p/kWh) payable over 20 years	Proposed new categories	Proposed new tariffs (p/kWh)
Ground or Water-source Heat Pump <100kWth	4.7	Air . air heat pumps (heating only)	0.97
Ground or Water-source Heat Pump >100kWth	3.4	Air . Water heat pumps	1.7
Biomass <200kW	8.3	Small/medium biomass direct air heating	2.1
Biomass 200 . 1000 kW	5.1	Large biomass direct air heating	1.0
Biomass 1000 kW+	1.0	CHP . biomass/bioliquids	4.1
Solar Thermal <200kWth	8.9	Medium biogas combustion	5.9
Biomethane and Biogas <200kW	7.1	Large biogas combustion	2.2
		Deep Geothermal	5.0

Key policies to incentivise heat pumps: Non-domestic Renewable Heat Incentive (RHI)



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Technology	Heat generated and paid for under the scheme (GWh)		Number of installations receiving payment	
	Number	% of total	Number	% of total
Small biomass boiler (<200kW)	148.5	33.3%	1,309	78.2%
Medium biomass boiler (200-1000kW)	191.3	42.9%	240	14.3%
Large biomass boiler (>1000kW)	81.8	18.3%	11	0.7%
Small water or ground source heat pumps (< 100 kW)	3.5	0.8%	51	3.0%
Large water or ground source heat pumps (>100kW)	3.1	0.7%	6	0.4%
Solar thermal (<200kW)	0.2	0.1%	54	3.2%
Total	428.4		1,671	
	Equivalent calorific value of gas produced (GWh)		Number of installations receiving payment	
	Number	% of total	Number	% of total
Bio-methane	17.5	3.9%	1	0%
Biogas	0.2	0.0%	1	0%
Total	17.7		2	
Overall Total	446.2		1,673	

	Number of full applications	Cumulative number of full applications	Number of accreditations	Cumulative number of accreditations	Accredited installed capacity (MW)	Cumulative installed capacity
Q4 2011	44	44	29	29	14.5	14.5
Q1 2012	183	227	146	175	64.6	79.1
Q2 2012	216	443	181	356	46.7	125.8
Q3 2012	333	776	304	660	54.7	180.5
Q4 2012	425	1,201	384	1,044	75.1	255.6
Q1 2013	589	1,790	521	1,565	100.9	356.5
Q2 2013	611	2,401	494	2,059	99.1	455.6
Q3 2013	873	3,274	336	2,395	47.5	503.1
Total	3,274	3,274	2,395	2,395	503.1	503.1

Key policies to incentivise heat pumps: Domestic Renewable Heat Incentive (RHI)



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- “ Only available to domestic dwellings
- “ Energy use for payment to be predominantly %deemed+ i.e. calculated based on the amount of renewable energy generated.
- “ Tariff are to be received over 7 years.
- “ All installations must be accredited under the Microgeneration Certification Scheme (MCS)
- “ To be launched in Spring 2014

Technology	Proposed Tariff (p/kWh)
Air-to-water Heat Pump	7.3
Ground-source Heat Pump	18.8
Biomass	12.2
Solar Thermal	19.2

Summary



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Drivers

- “ UK is committed to ambitious carbon reduction
- “ EU renewable energy targets 20-20-20

Strategy

- “ Recognition of the importance of heat to meet our key targets
- “ Clear role for heat pumps in the UK, both electric and gas/hybrids

Market

- “ Current UK market is immature with relatively slow growth
- “ Potential for significant growth in a number of different sectors and with different heat pump technologies.

Policy

- “ RHPP and non-domestic RHI so far have had limited impact on heat pumps.
- “ Support for domestic scale systems coming soon through the domestic RHI will hopefully boost the number of systems installed and the amount of renewable heat generated.

Future

- “ Growth in conventional heat pump systems
- “ Large potential for new technologies . gas heat pumps, hybrid heat pumps, something new ?

Questions



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Thank you

Any questions?

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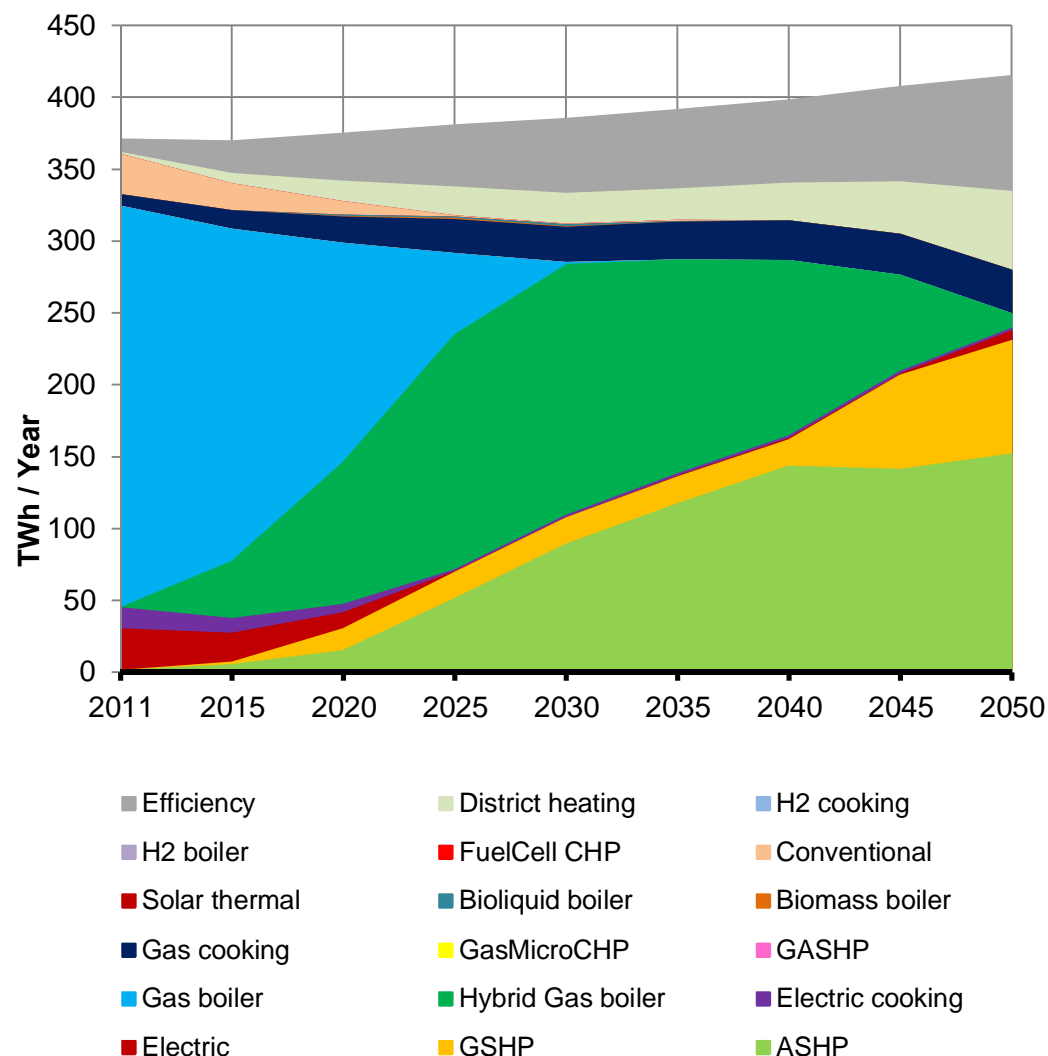
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RESOM Modelling: core run shows a much larger take up of hybrid gas boilers, but by 2050 gas is only used at peak times.



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- Relatively quick adoption of hybrid gas boilers – which are used mainly as base load in the 2020-2040s
- Limited role for gas in 2050, being used only in peaks as part of hybrid systems
- Hybrid gas boilers are taken up in preference to gas fired heat pumps
- No role for hydrogen in homes, reflecting infrastructure costs.
- Steady roll-out of heat pumps, high power prices mean increased use of ground-source over air-source models
- Substantial role for heat networks in 2050, with marine HPs providing majority of heat. Demand-side measures may limit heat networks, as cheaper to serve lower heat demands using hybrids.



ESME modelling: core run shows a role for gas heat pumps in 2050, a picture fairly robust to cost uncertainties.



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- A limited role for gas in 2050, used mainly in gas heat pumps rather than boilers.
- Relatively slow roll out of electric heat pumps, due largely to the major transitional role of Gas HPs – a new technology in 2050 models
- Gas provides back up for the 1 in 20 cold winter.
- Much bigger role for heat networks because storage means it can meet peak demand
- Potential role for biomass in transition to a low carbon world. It is present in all runs for 2020 and around 80% from 2025 to 2035.
- Results show hydrogen taken up – but no grid costs included in results.

