Renewable Heat – UK Policy

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Department for
Business, Energy
& Industrial Strategy

Overview

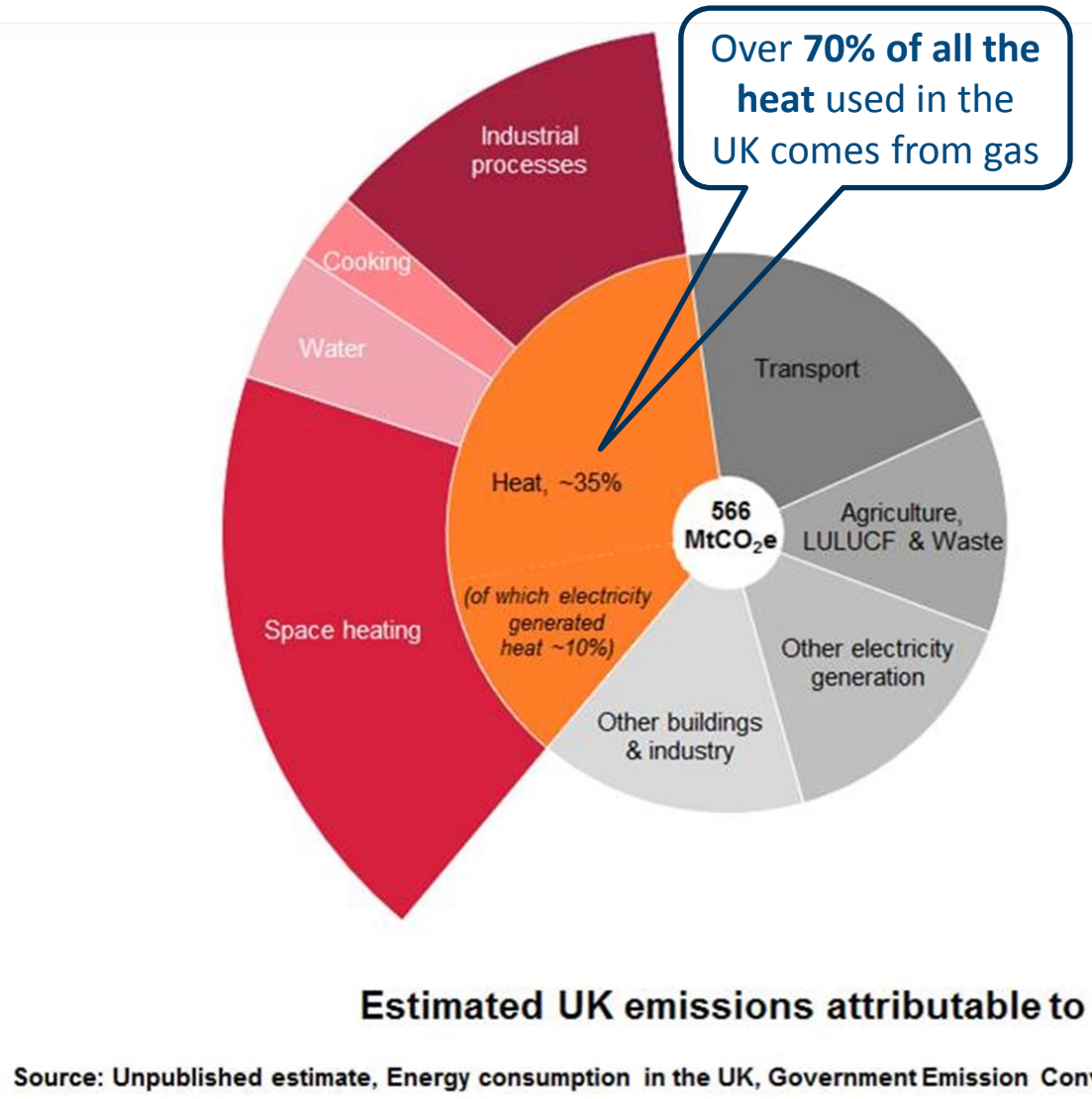
- UK heat background
- The RHI
- Future options

Heat and energy use in the UK

Heat is the single biggest energy end use in UK

- Around **a third of the UK's carbon emissions** come from the energy used to produce heat.
- **44% of final energy consumed** in the UK is used to generate heat for domestic, commercial and industrial purposes.
- UK consumers spend **£32 billion a year** on heating.

Heat and energy use in the UK



Estimated UK emissions attributable to heating, 2013

Source: Unpublished estimate, Energy consumption in the UK, Government Emission Conversion Factors (BEIS)

The Committee on Climate Change estimate that heat related emissions need to reduce from their current levels to around 18MtCO_2e by 2050:

- Domestic and service sectors need to reduce to nearly zero
- Industry needs to reduce to 18MtCO_2e (it is harder to decarbonise some of the heat used for industrial processes)

The Committee on Climate Change, 2013

UK – low level of Renewable Heat & Cooling

	2011	2012	2013	2014	2015
Renewable energy for H&C (ktoe)	1,674	1,925	2,433	2,536	3,037
Total energy consumption for H&C (ktoe)	53,569	57,988	59,262	52,689	53,867
% H&C energy from renewable sources	3.1%	3.3%	4.1%	4.8%	5.6%

- Long history of gas use with high grid access – c. 85% of UK households
- Gas price relatively low
- Relatively low availability of biomass – forest area
- Heat policy has focussed more on demand reduction through efficiency (condensing gas boilers, insulation) than fuel-switching

The Renewable Heat Incentive

- The non-domestic RHI has been operational since 2011, with the domestic RHI added in 2014
- The RHI provides financial incentives to install renewable heating in place of fossil fuels. It is available to households and non-domestic consumers to help bridge the gap between the cost of renewable heating systems and conventional alternatives
- The RHI supports a range of low carbon heat technologies - main focus is off-gas-grid sites, and production of biogases that decarbonise the gas grid
- The incentive is paid as per kWh tariff for renewable heat produced – 7 years for households and 20 years for others. No up-front grant
- Non-domestic tariffs (per kwh) range from 1-3p (biogas); 2-5p (biomass); 2.5-9p (heat pumps) to 10.3p (solar thermal)
- Domestic tariffs (per kwh) range from 4.2p (biomass) to 19.7p (solar)

The RHI budget

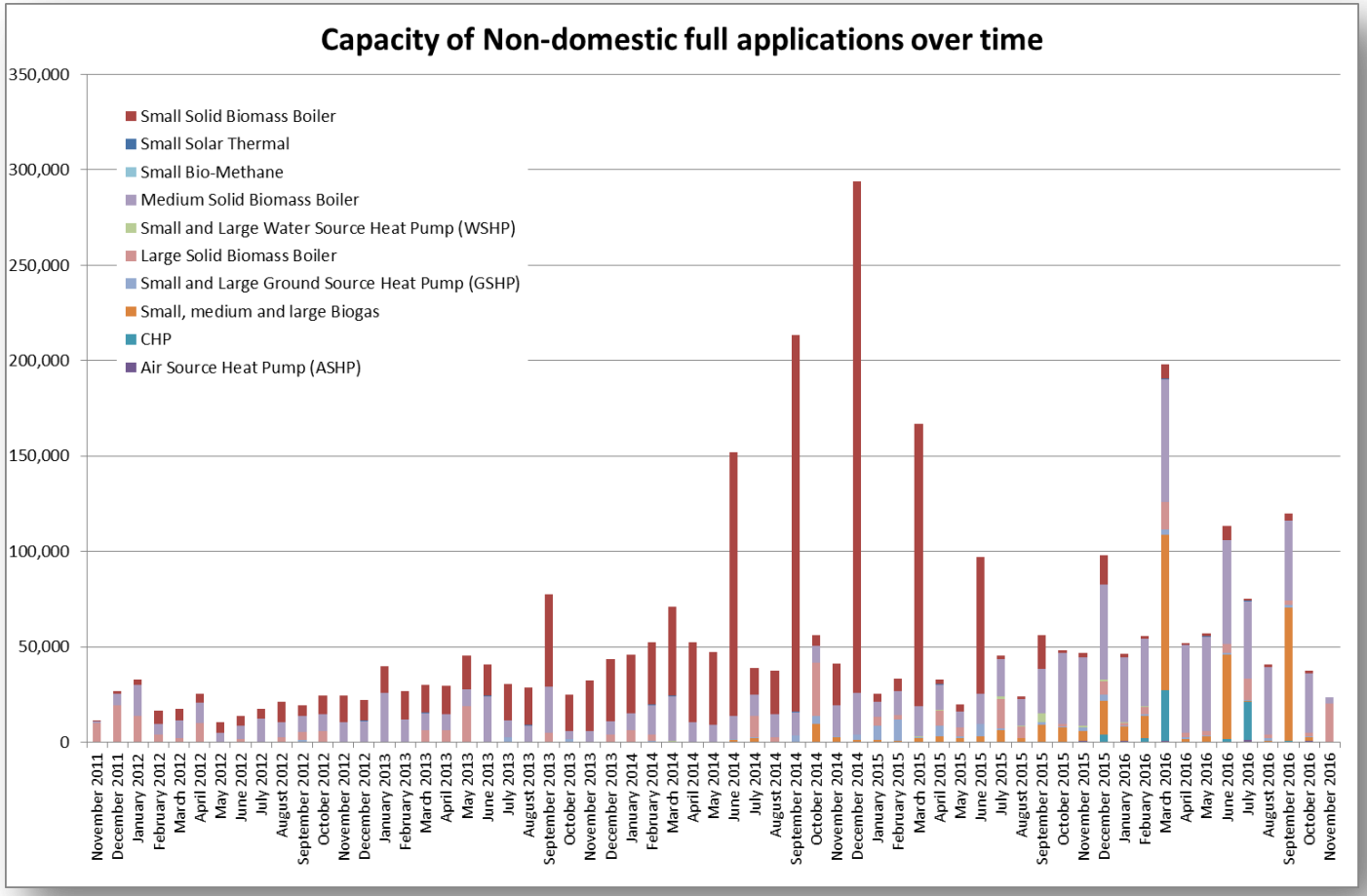
	16/17	17/18	18/19	19/20	20/21
Budget (GBP)	£640m	£780m	£900m	£1010m	£1150m
Current estimate of committed spend	£547m	£645m	£674m	£699m	£718m
Non-domestic	£455m	£548m	£574m	£595m	£611m
Domestic	£91m	£97m	£100m	£104m	£107m
Figures may not sum due to rounding					

Total budget by 2041 will be >£20bn

Data from December 2016

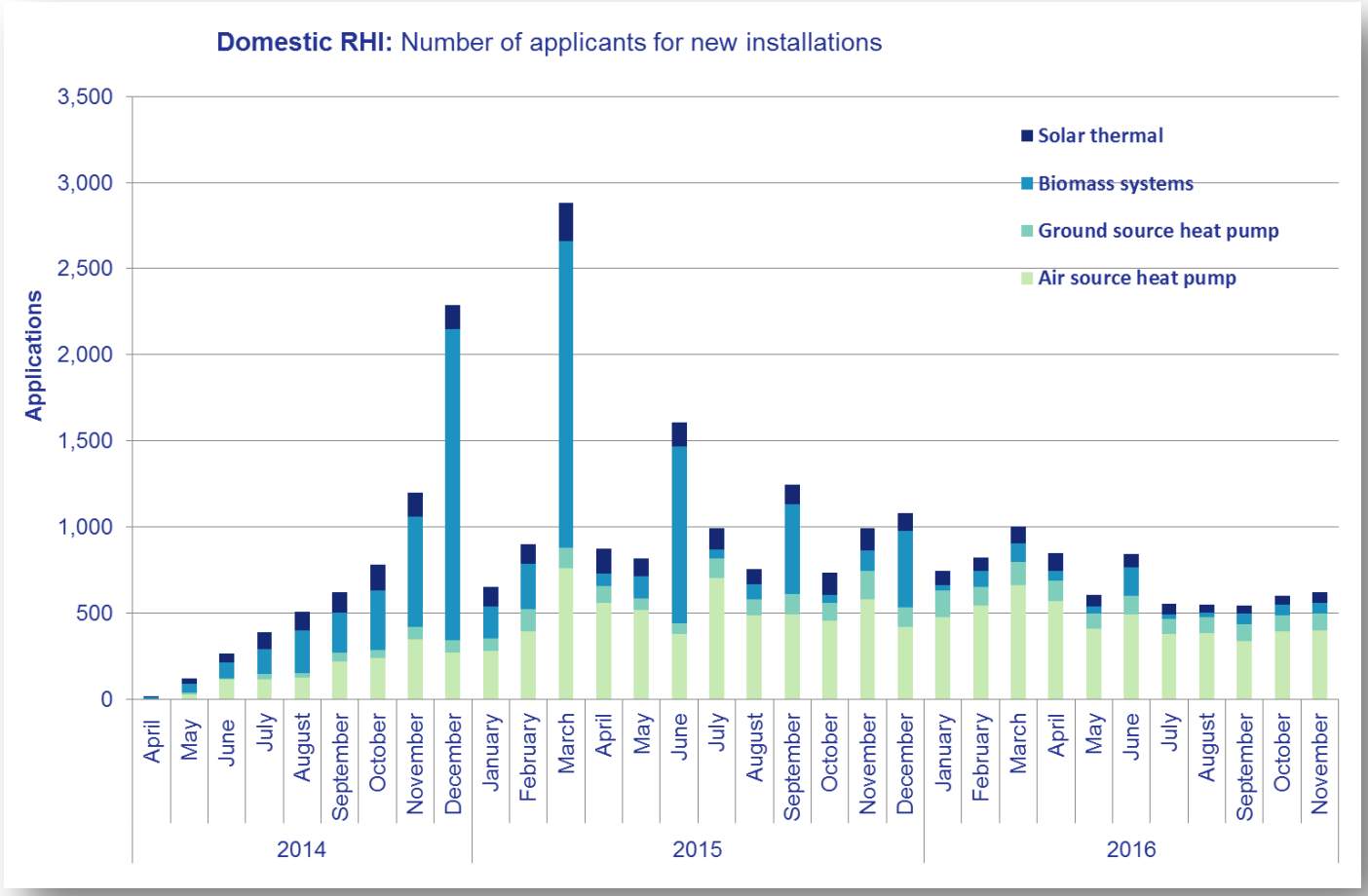
Monthly budget cap publications can be found at
https://www.gov.uk/government/publications/rhi-mechanism-for-budget-management-estimated-commitments

Non-domestic deployment



The last twelve months has seen a refocus of the non-domestic scheme away from small biomass and onto medium biomass, biogas and CHP. Fewer, larger installations.

Domestic deployment



Early deployment heavily driven by biomass, now ASHPs.

Key RHI statistics – non-domestic

Technology	Heat generated and paid for under the scheme	Number of installations that have received payment[1]	Capacity of installations that have received payment[1]
	GWh	Number	MW
Small biomass boiler (<200 kW)	**4,547**	**12,352**	**1,467**
Medium biomass boiler (200-1000 kW)	**3,103**	**1,785**	**957**
Large biomass boiler (>1000 kW)	**1,715**	**40**	**211**
Solar thermal (<200 kW)	4	229	4
Small water/ground source heat pumps (< 100 kW)	47	501	14
Large water or ground source heat pumps (>100 kW)	89	103	52
Air Source Heat Pumps	8	175	5
CHP	30	5	22
Deep Geothermal	0	0	0
Biogas	162	117	53
Biomethane	**2,162***	**42**	-
* GWh equivalent			
Overall total	**11,866**	**15,349**	**2,785**

76% of heat

18% of heat

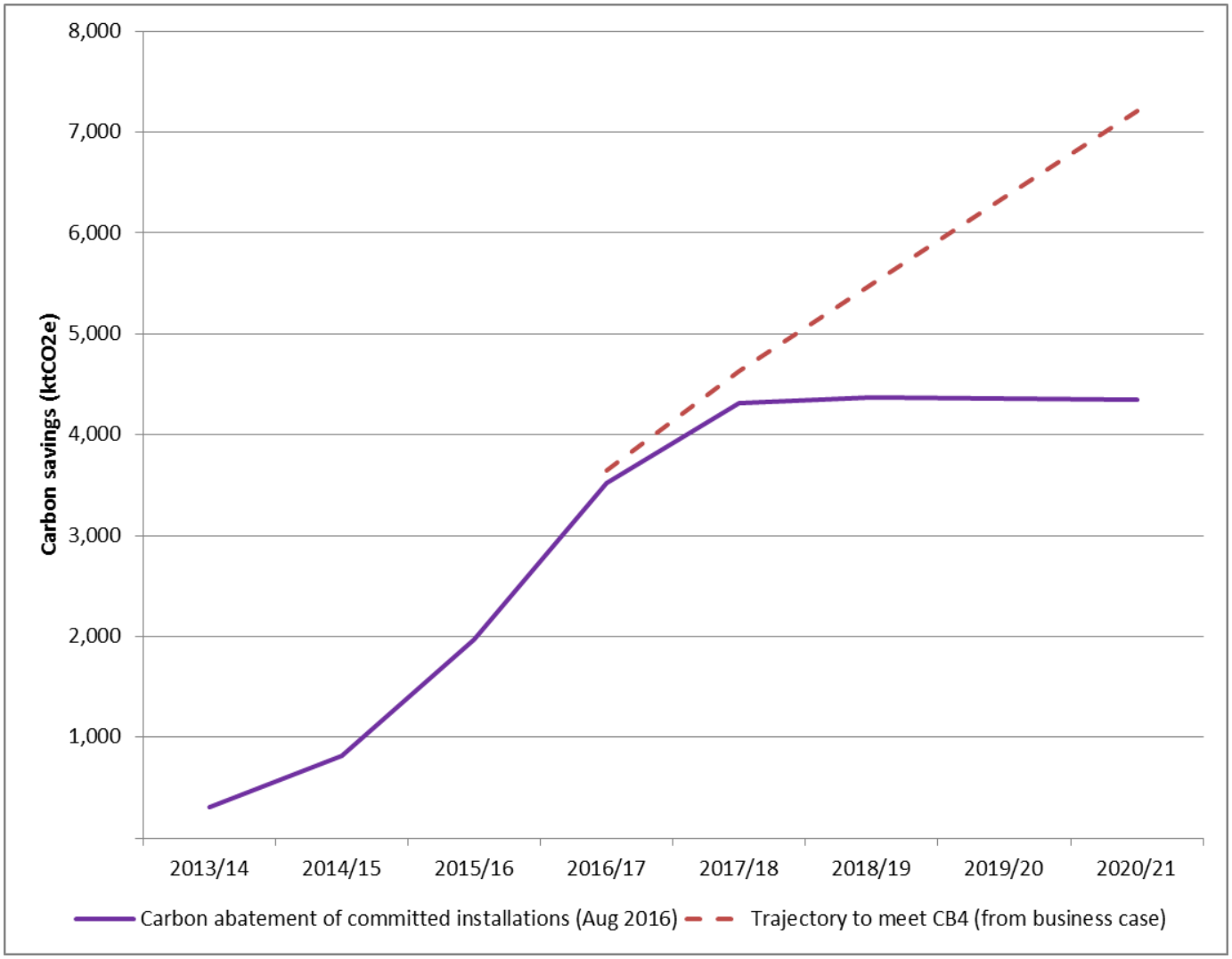
Key RHI statistics – domestic

Tariff Band	Heat paid for under the domestic scheme (MWh)	Number of installations that have received payment (Number)
Air source heat pump	388,336	**24,263**
Ground source heat pump	213,054	7,732
Biomass systems	**784,787**	12,294
Solar thermal	22,478	8,201
Total	**1,408,656**	**52,490**

ASHP: Half the systems, one quarter of total heat

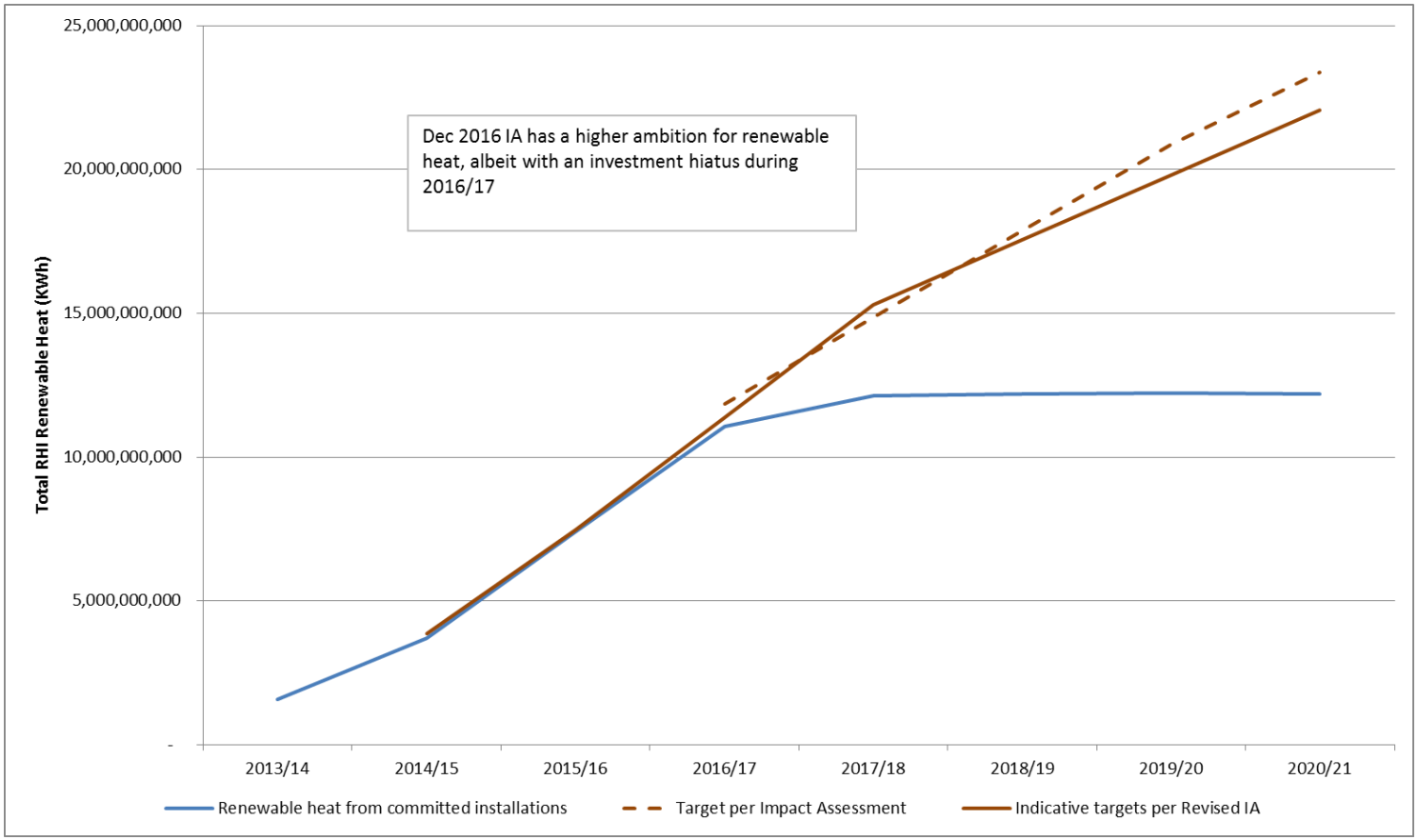
Biomass: One quarter of the systems, half the heat

Carbon Abatement



Based on committed stock data to end-Nov 2016

Renewable Heat Committed



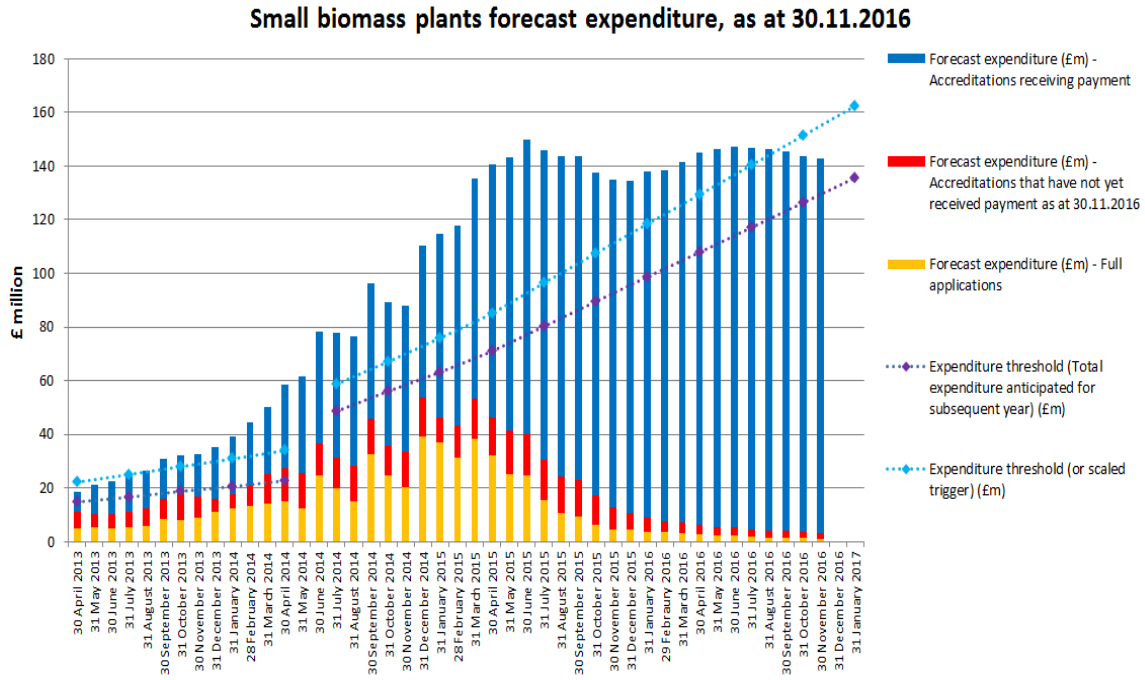
Based on committed heat from stock data, with renewable proportions applied by technology

RHI - Challenges

- **Tariffs** – hard to get right
- **Managing demand** – hard to balance budget control with consistent signals to market
- **Additionality** of heat uses – has required regular changes to rules to ensure we support heat uses in line with policy intent
- **Technology mix** – dominated by biomass, low deployment of heat pumps so far
- Is it creating **sustainable markets** for renewable energy technologies?

Degression

- Reducing a technology's tariff at pre-set thresholds – has successfully controlled expenditure but tends to bring deployment to a halt

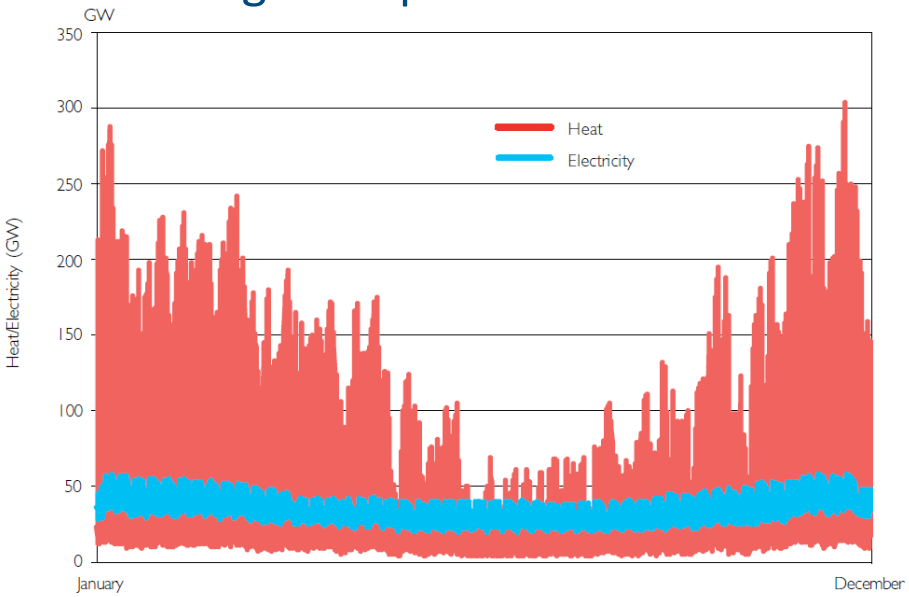


Charts like this and the underlying data are published monthly on the gov.uk website.

Degression announcements made quarterly

Long-term challenge of heat

- Our heat infrastructure is diverse and interdependent, comprising the gas grid, electricity networks, heat networks, appliances and building fabric.
- There are a wide variety of technologies which can deliver low carbon heat – ranging from electric heat pumps and district heating networks,
- Replacing natural gas with hydrogen in the gas grid is also a possibility – but raises issues of how to source H_2 in a low-carbon way – likely to require CCS
- A particular challenge is the large seasonal variation in space heating demand. Alternatives to natural gas heating will need to address the issues of storage and peak demand.

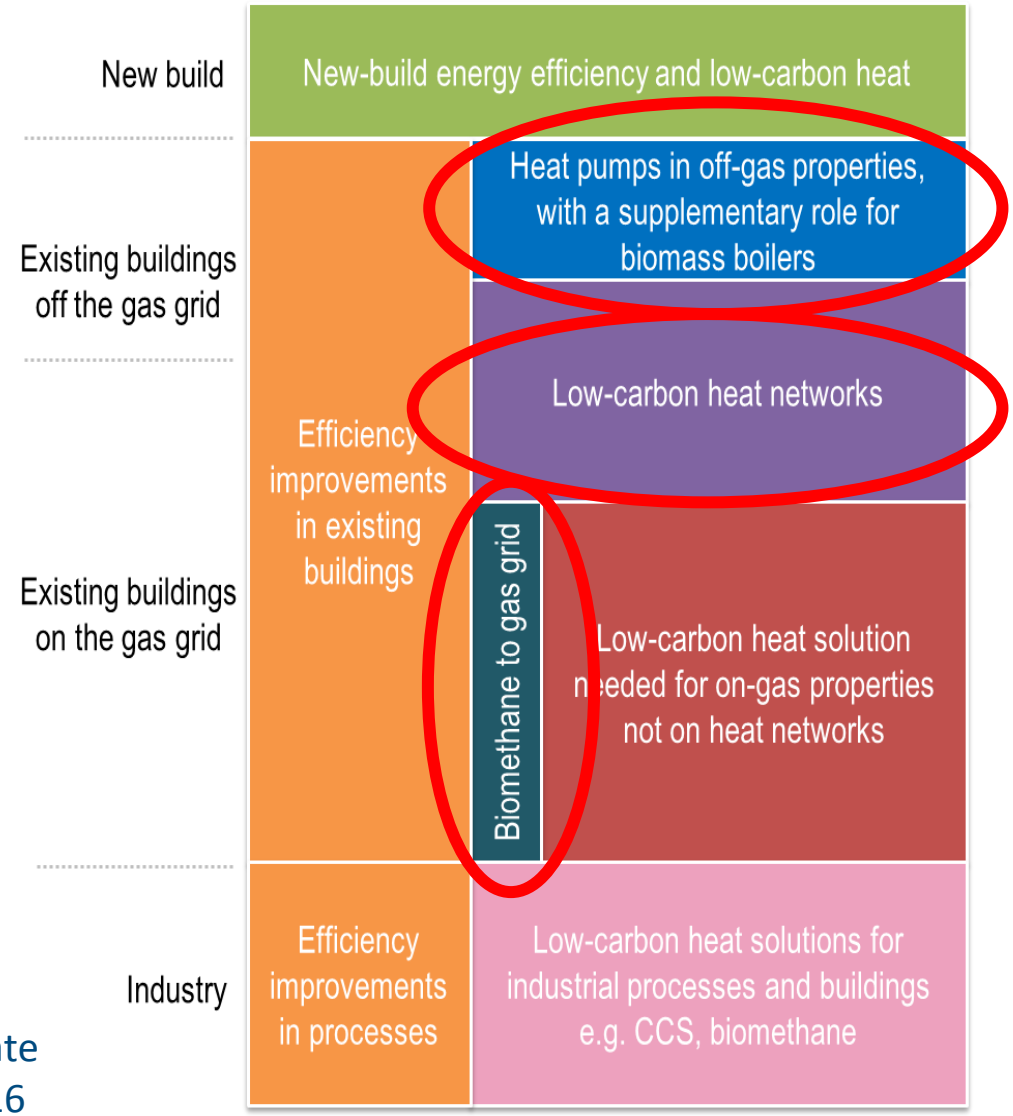


- "…overall [heat] demand is about 150% of total electricity and **peak requirements in winter can be 5 or 6 times those for electricity**." *Imperial College Centre for Energy Policy and Technology report Managing Heat System Decarbonisation (April 2016)*

Courtesy of Imperial College. For illustrative purposes only, and based on actual half-hourly electricity demand from the national grid and an estimate of half-hourly heat demand

Low carbon heat infrastructure options

- No one-size-fits-all solution
- Will require a range of approaches for different heat market segments
- RHI targeting off-gas grid properties and biomethane
- BEIS investing £324m to support heat networks
- Industry and on-gas-grid buildings will be the hardest to tackle



BEIS, based on UK Committee on Climate Change. *Next Steps for Heat Policy*, 2016

Thank You