Title: Metering requirements for Heating, Cooling and Hot Water networks. IA No: DECC0154 Lead department or agency: Department of Energy and Climate Change	Impact Assessment (IA) **Date:** 11/12/2013 **Stage:** Consultation **Source of intervention:** EU **Type of measure:** Secondary Legislation **Contact for enquiries:** Sarah Doyle, 0300 068 2946, sarah.doyle@decc.gsi.gov.uk.

Summary: Intervention and Options

RPC: Amber

Cost of 'least cost' option (option 3 compared against a 'no Directive' baseline)				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB in 2009 prices)	**In scope of One-In, Two-Out?**	**Measure qualifies as**
£-20.3m	£-20.8m	£1.4m	No	Zero Net Cost

What is the problem under consideration? Why is government intervention necessary?

Around 2 per cent of homes in the UK are heated via heat delivered into their homes by a heat network. Customers on some networks are unmetered and pay a flat rate for their heat, which fails to provide customers with a financial incentive to reduce their consumption or to avoid wasteful activities. Charging customers based on actual use may provide a substantial incentive for energy efficiency, as well as allow for a more equitable distribution of costs between customers on a network.

Articles 9 and 11 of the Energy Efficiency Directive require Member States to ensure that customers of heat networks are provided with individual meters where these are cost effective and technically feasible. In addition, meters must be installed where heat from networks enters a multi-use/multi-occupancy building.

What are the policy objectives and the intended effects?

The objective of the policy is to give heating, cooling and hot water customers greater control over their consumption, and consequently costs, of heating. Meters provide a direct financial incentive to reduce demand, increase awareness of energy use and a more equitable allocation of costs between customers. Metering also gives system operators information on heat losses and allows better management of systems. This will save energy, as well as reducing carbon emissions and improving security of supply.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The Government is consulting on the best way to implement the requirements of Articles 9(1)&(3) and 11(2) of the Directive. An approach short of regulation is unlikely to be considered mandatory, would not properly implement the Directive, and would result in challenge from the European Commission, and potentially from customers of heat networks.

This Impact Assessment includes six options which represent different approaches to realistically implementing the minimum requirements, and is seeking views to establish certainty of costs and benefits. For ease of comparison, all options are compared against a hypothetical 'do nothing' where the directive does not exist and against the option currently identified as the lowest-cost under current assumptions. At this stage the lowest-cost option is option 3, however there is considerable uncertainty surrounding the estimated costs which this consultation seeks to address.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 06 / 2017

Does implementation go beyond minimum EU requirements?			**No**		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro No**	**< 20 Yes**	**Small Yes**	**Medium Yes**	**Large Yes**
What is the CO2 equivalent change in greenhouse gas emissions? (Million tonnes CO2 equivalent)			**Traded: -0.044**	**Non-traded: -0.004**	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister: ..... Date: 16 Dec 2013

Summary: Analysis & Evidence

Policy Option 1

Description: *Implementation is supported by detailed unit-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. No direct notification of implementation is required. Monitoring is through surveys and sampling.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: -2.1

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**2.1**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. An estimated 3000 heat networks would face assessment costs estimated at £2.1 m (£3.9m measured against a no directive baseline). An administrative burden of £0m (£0.5m), and capital costs of £0m (£23.1m). The central government will face scheme administration costs of £0m (£1.4m).

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating.
In comparison with other options, the wider benefits to the UK of the information created is less for this option, as HNOs will not be required to report data collected to the scheme administrators; this gives the option a red marking in the multi-criteria analysis undertaken in Section 7.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings from distribution infrastructure of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.15	Benefits: 0	Net: -0.15	Yes	IN

Summary: Analysis & Evidence

Policy Option 2

Description: *Implementation is supported by detailed unit-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation is required. Monitoring is through minimal sampling.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: -2.1

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**2.1**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. Many heat networks are operated by local authorities or housing associations. An estimated 3000 heat networks would face assessment costs estimated at £2.1 m (£3.9m measured against a no directive baseline). An administrative burden of £0.4m (£0.9m), and capital costs of £0m (£23.1m). The government will face scheme administration cost saving of £0.3m (£1.1m). As for Option 1 further compliance costs are not foreseen and the distribution of costs is not yet determined.

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.18	Benefits: 0	Net: -0.18	Yes	IN

Summary: Analysis & Evidence

Policy Option 3

Description: *Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. No direct notification of implementation is required. Monitoring is through surveys and sampling.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: 0

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. Many heat networks are operated by local authorities or housing associations. An estimated 3000 heat networks would face assessment costs estimated at £0m (£1.7m measured against a no directive baseline). An administrative burden of £0m (£0.5m), and capital costs of £0m (£23.1m). The government will face scheme administration costs of £0m (£1.4m).

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0	Benefits: 0	Net: 0	No	IN

Summary: Analysis & Evidence

Policy Option 4

Description: *Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation is required. Monitoring is through minimal sampling.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: -0.1

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0.1**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. Many heat networks are operated by local authorities or housing associations. An estimated 3000 heat networks would face assessment costs estimated at £0m (£1.7m measured against a no directive baseline). An administrative burden of £0.4m (£0.9m), and capital costs of £0m (£23.1m). The government will face scheme administration cost saving of £0.3m (£1.1m).

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.03	Benefits: 0	Net: -0.03	Yes	IN

Summary: Analysis & Evidence

Policy Option 5

Description: *Use of building regulations to implement the new connection metering requirements in the Directive, including in monitor and enforcing through building control inspections.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: -0.1

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0.1**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. Many heat networks are operated by local authorities or housing associations. An estimated 3000 heat networks would face assessment costs estimated at £0m (£1.7m measured against a no directive baseline). An administrative burden of £0.4m (£0.9m), and capital costs of £0m (£23.1m). The government will face scheme administration cost saving of £0.3m (£1.1m).

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating. This option is assessed as not adequately meeting the requirement it would entail separate reporting under building regulations for new connections and therefore may increase the administrative burden on HNOs, thus it receives a red signal under the multi-criteria in Section 7.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 5)

Direct impact on business (Equivalent Annual) £m:			In scope ofT?	Measure qualifies as
Costs: 0.03	Benefits: 0	Net: -0.03	Yes	IN

Summary: Analysis & Evidence

Policy Option 6

Description: *Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation is required. Monitoring is through minimal sampling. Costs of scheme administration are met by heat network operators.*

FULL ECONOMIC ASSESSMENT

Price Base Year 2013	PV Base Year 2013	Time Period Years 17	Net Benefit (Present Value (PV)) (£m)		
			Low: Optional	High: Optional	Best Estimate: -0.1

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0.1**

Description and scale of key monetised costs by 'main affected groups'

The cost of implementing this option will be borne by heat network operators, which range in size from large enterprises to small firms. Many heat networks are operated by local authorities or housing associations. An estimated 3000 heat networks would face assessment costs estimated at £0m (£1.7m measured against a no directive baseline). An administrative burden of £0.4m (£0.9m), and capital costs of £0m (£23.1m). Scheme administration costs recovered from heat network operators £1.1m (£1.1m), leading to a red signal in the multi-criteria analysis in Section 7.

Other key non-monetised costs by 'main affected groups'

Where meters are assessed to be cost-effective, consumers may incur a hassle cost from the inspection for technical feasibility and installation of meters and from learning to control their heating.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Optional		Optional	**Optional**
High	Optional		Optional	**Optional**
Best Estimate				**0**

Description and scale of key monetised benefits by 'main affected groups'

Main groups benefiting will be customers in heat networks and the heat network operators. It is expected that there will be efficiency savings of £0m (£4.9m), which will lead to lower bills. Wider society will benefit from improved air quality of £0m (£0.1m), traded allowance savings of £0m (£0.1m) and non-traded carbon savings of £0m (£2.1m)

Other key non-monetised benefits by 'main affected groups'

Installation of building level meters will allow operators to allocate the costs of heat between buildings to reflect actual use. This will ensure a fairer allocation of the costs between users and reduce transfers between users. Meters may also have impacts on the fuel poor.

Key assumptions/sensitivities/risks — **Discount rate (%)** 3.5

Assessment of whether individual meters are cost effective is sensitive to the assumed capital and on-going costs, and the behaviour change from consumers. Cost of assessments and administrative burdens sensitive to number of networks, the number of buildings and dwellings on the networks and the current level of metering.

BUSINESS ASSESSMENT (Option 6)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: 0.10	Benefits: 0	Net: -0.10	Yes	IN

Evidence Base

1. Summary

Articles 9(1) & (3) of the Energy Efficiency Directive (EED) (2012/27/EU) imposes requirements on the metering of district heating, district cooling and communal heating and/or hot water. Article 9(3) also states that Member States may consider the introduction of transparent rules on the allocation of the costs of heat consumption in multi-apartment buildings. Articles 10 and 11 require Member States to create rules to govern billing information and the costs of billing. This Impact Assessment considers the choice of options to most cost-effectively bring the UK into line with the minimum requirements of the EED. All options are realistic cost effective pathways to achieving the minimum requirements of the EED. An assessment of the current regulations covering heat networks has concluded that they do not currently meet the requirements of the Directive. Therefore, there is no 'do nothing' option presented in this IA.

The Directive imposes requirements on both individual units (dwellings) subject to tests of cost-effectiveness and technical feasibility. The requirement covering multi-use/multi-occupancy buildings does not impose these tests, therefore requiring all buildings to comply.

This Impact Assessment looks at the costs and benefits imposed by these requirements under a number of options (set out in section 5) in order to assess the least cost means of compliance with the Directive. The options considered vary in the level of detail required by heat network operators in assessing cost-effectiveness (detailed in options 1& 2, high-level in options 3-6); the requirement for notification (no notification in options 1 & 3, notification in options 2 & 4-6), the level of audits required to assess compliance (high in options 1 & 3, low in options 2 & 4-6); the use of building regulations to assess compliance for new networks (option 5); and whether scheme administration costs are recovered from heat network operators (option 6).

The main costs imposed by the requirements are:

- Cost of installing building level meters
- Cost of assessing the case for individual meters
- Installing individual meters where necessary
- Administration and notification costs to heat network operators
- Scheme administration costs to government/business

The main sources of benefits identified are energy savings, carbon savings and air quality benefits from efficiency gains to heat networks as a result of building level meters. Analysis of the cost-effectiveness of meters suggests that there are no properties which are likely to be cost-effective based on the assumptions used. Therefore the central case presented in the front sheets of the IA does not include any capital costs from individual metering, or any benefits in terms of bill savings to consumers. The assumptions used are tested in sensitivities presented in Section 8.

The options considered in this IA also generate a number of costs and benefits which could not be quantified. These are assessed separately as a multi-criteria analysis in Section 7. Therefore, no preferred option has been identified at this stage, but in order to allow comparison, costs and benefits of the options are assessed relative to the currently identified least cost option (option 3). Analysis conducted for the final Impact Assessment may produce a different lead option, as there is uncertainty around the costs and benefits surrounding the metering of heat networks.

The consultation is seeking views on whether the assumption and analysis set out in this Impact Assessment overestimate or underestimate the cost or benefits of the proposed policy options.

2. Problem under consideration

The EU Energy Efficiency Directive (2012/27/EU) entered into force on publication in the Official Journal of the EU[1] on 14 November 2012. Articles 9(1) & (3) concern the metering of

[1] 14.11.2012 OJEU L315/17 Volume 55

energy consumption. This Impact Assessment focuses on the Directive's requirements on the metering of district heating, district cooling and hot water (this includes those situations where the final customer is purchasing hot water provided either from a common boiler or from district heating). Article 9(3) also states that Member States may consider the introduction of transparent rules on the allocation of the costs of heat consumption in multi-apartment buildings. Article 10 introduces rules on billing information. Article 11(2) includes a requirement on Member States to create rules to govern the costs of billing pursuant to Article 9(3). EU member states are required to transpose the majority of the Directive's provisions into national law by June 2014. See Annex B for the full text of the relevant Articles.

Policy timeline

Table 1 below sets out the overall timeline for the policy covered by this impact assessment.

Table 1: policy timeline for implementing the requirements of the Directive

Technical feasibility and cost-effectiveness guidance in place	May 2014
Transposition of Directive – requirements come into force	5 June 2014
Scheme administrator established	5 June 2014
Deadline for assessment and installation of individual level meters in multi-occupancy/multi-purpose buildings	31 December 2016
First phase of evaluation	2016/17
Second phase of evaluation	2017/18

The Government is separately consulting on the implementation of Articles 10 and 11, and associated Annex VII, in relation to requirements these impose on the metering and billing of gas and electricity to domestic and non-domestic consumers, as well as the availability of consumption data. The costs and benefits of the billing requirements relating to electricity and gas are not within the scope of this IA and are therefore not considered further. The consultation document covers articles 9 – 11. This IA covers the costs and benefits associated with articles 9 and 11. The costs of article 10 are considered to be small and are not covered here. The final Impact Assessment, which will be published alongside the Government Response to the consultation, will if necessary contain any costs of article 10 identified during the consultation. However, the requirements of Article 11 as they apply to district heating, cooling and hot water, are considered here.

3. Rationale for intervention

A survey of heat networks conducted for DECC in 2011 found that only approximately 25% of customers properties are metered for the heat they use[2]. Where customers are billed based on a flat charge (typically per m^2 of floor space) they receive no incentive to reduce their consumption of heat.

Users who are charged a flat rate face little or no marginal cost from increasing their consumption[3]. This creates an incentive for users to free-ride on others as the cost of their increased energy consumption is shared by all users. Flat charges fail to provide a strong signal to use energy efficiently and therefore can lead to inefficient behaviours.

In addition, flat charges are unable to reflect the distribution of energy use between customers on a network, for instance as a result of different occupancy patterns or energy using behaviours. This could create inequitable transfers between customers on a network, where those who use less energy are subsidising others on the network.

[2] District Heating – Heating Metering Cost Benefit Analysis (2012), BRE and Databuild.

[3] Additional consumption by one user is therefore typically shared all customers on a network. Therefore, while on very small networks customers may see a significant fraction of the increased cost, on larger networks with more customers the share they pay for would be very small.

4. Policy objective

The Government has identified heat networks (district heating) as having an important role to play in the transition to low carbon heating. Heat makes up around half of the energy consumption in the UK and contributes around a third of the UK's greenhouse gas emissions. The Government is supporting the deployment of district heating in a number of actions set out in the March 2013 publication: "The Future of heating: Meeting the challenge". https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge. For example, the Government has established a new Heat Networks Delivery Unit to provide specialist expertise to assist Local Authorities to develop district heating plans to the point where they are feasible investment propositions. As well as practical assistance, the Unit is also administering a funding stream to support Local Authorities' plans.

Heat networks supply heat to a number of buildings or dwellings from a central heat production facility (or facilities) through an insulated pipe system, which is in general underground. Heat networks can be both lower carbon and cheaper for consumers than a building-level heat solution. The amount of heat supplied to buildings in the UK via heat networks is around 2% of domestic, public sector and commercial heat demand[4]. In the UK and across Europe, heat networks were first used in urban areas and predominantly in blocks of flats. They became popular in the UK for new developments of this type during the 1960s and 1970s. Many of the schemes in operation today in the UK originate from this period.

Central heating and hot water provided from a heat network can be controlled in the same way as with individual gas boilers, with meters and radiator valves. New private sector developments and new local authority-led schemes have heat meters installed as standard and charge on the basis of heat usage by individual properties. However in older schemes, customers are typically billed for a fixed proportion of the total heat generated, taking into account the size of the customer's property. While approximately 25% of existing heat networks serving domestic properties are metered. Initial discussions with industry suggest the majority of non-domestic properties are already metered.

The lack of individual heat meters in some older schemes leads to limited control over the temperature and amount of heat consumed. 'Smarter' heat meters have already been developed, which can be read remotely and can provide customers with near real-time information on their heat use. Smart heat meters can be switched from pre-pay arrangements to instalment-based payments immediately, providing customers with greater flexibility over billing.

The objective of the policy is to give consumers of heat and cooling greater control over their use of these commodities, with a view to reducing final consumption and promoting the efficient use of energy. This is consistent with the overall aims of the Directive. It is important to recognise the proportion of energy consumption which is for heating – for both space heating and hot water. For example, heating within the domestic sector accounts for approximately 85% of UK domestic energy use (2012), and heating within the domestic sector accounts for around 27% of UK total energy use (2012) [5].

There is also an important interaction with energy efficiency measures, where these are combined with metering and there is a resulting change in consumer behaviour. Evidence provided by the European Commission and from trial schemes (such as one in Camden) suggests savings can be significant (up to 30%), see Box 1.

[4] Davies, G.& Woods, P. 'The Potential and Costs of District Heating Networks', A report to DECC, Poyry Energy Consulting and Faber Maunsell AECOM, 2009

[5] DECC (2013). ECUK, Overall Tables 1.07, provisional 2012 levels. Based on 36,542 of domestic heat end use, with 43,153 total domestic consumption (thousand tonnes of oil equivalent).

Where meters are installed, with greater control and transparency of consumption and charging, it allows consumers to:

- Decide when to use their heating (and cooling) systems and at what temperature to heat their homes (and businesses);
- Have greater control over the energy they use and the amount that they pay;
- See accurately what energy they use and to encourage consumers to identify and reduce wasteful consumption;
- Avoid the subsidisation of abnormally high usage by lower energy consumers. For example, in multi-apartment buildings, where flat-rate charges can distort individual heat consumption variances. It is important to note that for those vulnerable consumers on heat networks who have been charged for the heat they consume at a flat-rate, there are methods to ensure they are not disadvantaged by new arrangements. For example, there are instances of the installation of heat metering to protect and manage system integrity but which maintains a flat rate charge for end consumer.

On a system-wide basis:

- Building-level meters will help to highlight those heat distribution networks that are poorly performing and therefore, where consumers are paying for heat lost though the pipework. This will enable heat network operators to identify system efficiencies and losses and help to analyse the value of potential energy saving interventions.

4.1. Requirements of the Directive

The metering provisions of the Directive can be considered in two broad areas: Individual meters and those for multi-purpose/multi-occupancy buildings. Taken in turn:

Article 9.1 (summarised): Individual heat meters*:* Member States shall ensure that where it is technically possible, financially reasonable and proportionate in relation to energy savings final customers for [district heating, district cooling and domestic hot water] are provided with competitively priced individual meter that accurately reflects the final customer's actual energy consumption and actual time of use.

- Individual meter must be installed where there is an existing meter (technical and cost conditions apply), or

- Where a new connection is made in a new building or a building undergoes major renovations

Article 9.3 (summarised): Heat meters in multi-apartment and multi-purpose buildings - *at building or block level and at individual unit level*

- Multi-apartment and multi-purpose buildings must have a building-level meter at point of exchange or point of delivery (cost and feasibility conditions do not apply).

- Multi-apartment and multi-purpose buildings need individual unit meters (conditions apply), if not multi-apartment and multi-purpose buildings may have heat cost allocators (conditions apply), or other ways to measure heat consumption may be considered

- Rules may be applied on multi-apartment and multi-purpose buildings individual consumption to ensure transparency and accuracy of individual consumption. Where appropriate, such rules shall include guidelines on the way to allocate costs for heat and/or hot water. This is an optional requirement that is not covered in this impact assessment. We anticipate that the proposed industry-led consumer protection scheme will in part support these objectives.

Article 11 (summarised): Cost of access to metering and billing information

- Final customers must receive all their bills and billing information for energy consumption free of charge and final customers also need to have access to their consumption data in an appropriate way and free of charge.

- The distribution of costs of billing information for the individual consumption of heating and cooling in multi-apartment and multi-purpose buildings shall be carried out on a non-profit basis. Costs resulting from the assignment of this task to a third party, such as a service provider or the local energy provider or supplier, covering the measuring, allocation and accounting for actual individual consumption in such buildings may be passed onto the final customers to the extent that such costs are reasonable.

Article 13 (summarised): Penalties.

- Member States shall lay down rules on the penalties that will be applied in the case of non-compliance.

4.2. Non-regulatory approaches

The Government has considered options for non-regulated approaches to overcome the requirement for new regulations. The heat networks sector as a whole is not regulated in the same way as gas and electricity markets. Following the analysis undertaken for the Department's "Future of heating: meeting the challenge" publication, there are a number of industry-led initiatives that will support the development of the sector. The initiative with most relevance here is the Government's commitment to support the establishment of an industry-led consumer protection scheme for heat network users. The second is about the development of common technical standards for heat networks to enable network expansion. One of the priorities is to assess UK standards against best practice across the UK, including standards for installation and operation and maintenance schemes.

However, these new initiatives are industry-led and we have concluded that they would not adequately meet the UK's legal obligations under the Directive. The Directive does not allow for transposition through self-regulatory means. There are therefore no 'do-nothing' or self-regulatory options available. Attempting to transpose the metering and billing requirements for heating, cooling and hot water networks by means of a non-regulatory approach would not lead to a legally binding requirement for heat network operators. Therefore the UK the UK would not have adequately transposed the requirements of the Directive requirements and would be infracted by the European Commission. This could result in on going fines to the UK until the requirements of the Directive were reflected in national law.

5. Description of options

The Government is consulting on what regime would be the most cost-effective means of meeting the requirements of the Directive on heat and cooling metering and associated billing in line with better regulation principles. Options 1 - 6 below represent alternative options for implementing the minimum requirements.

An analysis of existing policies has concluded that they do not adequately meet the UK's legal obligation under the Directive. The options appraisal focuses on the least cost way of implementing the requirements of the Directive and then the costs and benefits of any additional elements that could improve the net benefit to the UK. None of the options in this impact assessment look to gold-plate the requirements in the directive, but instead seek to

identify the most cost-effective way of meeting the requirements of the Directive, given the uncertainty around the costs and benefits.

The Directive applies to the UK and the current working assumption is that the same policy framework will be adopted by the Devolved Administrations. However, the analysis in this impact assessment looks at the costs and benefits to England only. Separate impact assessments will be put forward by the Devolved Administrations when they consult on transposing the requirements of the Directive into national law.

The Government is consulting on six different policy approaches. All of the options described below would require the lead action on implementation to rest primarily with heat network operators. The variation in the options follows two broad themes; on responsibility and support for the application of cost effectiveness and technical feasibility tests where these conditions apply to meter installation; and on how implementation is notified, monitored and enforced. The final option passes all the costs of monitoring and enforcement to heat network operators, which is consistent with the National Measurement Office's practice for gas and electricity meters.

It is important to note that tests of cost-effectiveness and technical feasibility do not apply to the following requirements (and therefore will be required regardless of the cost):

- Where a new connection is made in a new building
- Where a building undergoes major renovations. Major renovations are defined in EU Directive 2010/31/EU as: (a) The total cost of the renovation relating to the building envelope, or the technical systems is higher than 25% of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25% of the surface of the building envelope undergoes renovation.
- Where heating, cooling or hot water are supplied to a building from a district heating network or from a central source servicing multiple buildings, a heat or hot-water meter shall be installed at the heat exchanger or point of delivery. The Commission have clarified that this point is targeted at multi-apartment and multi-purpose buildings.

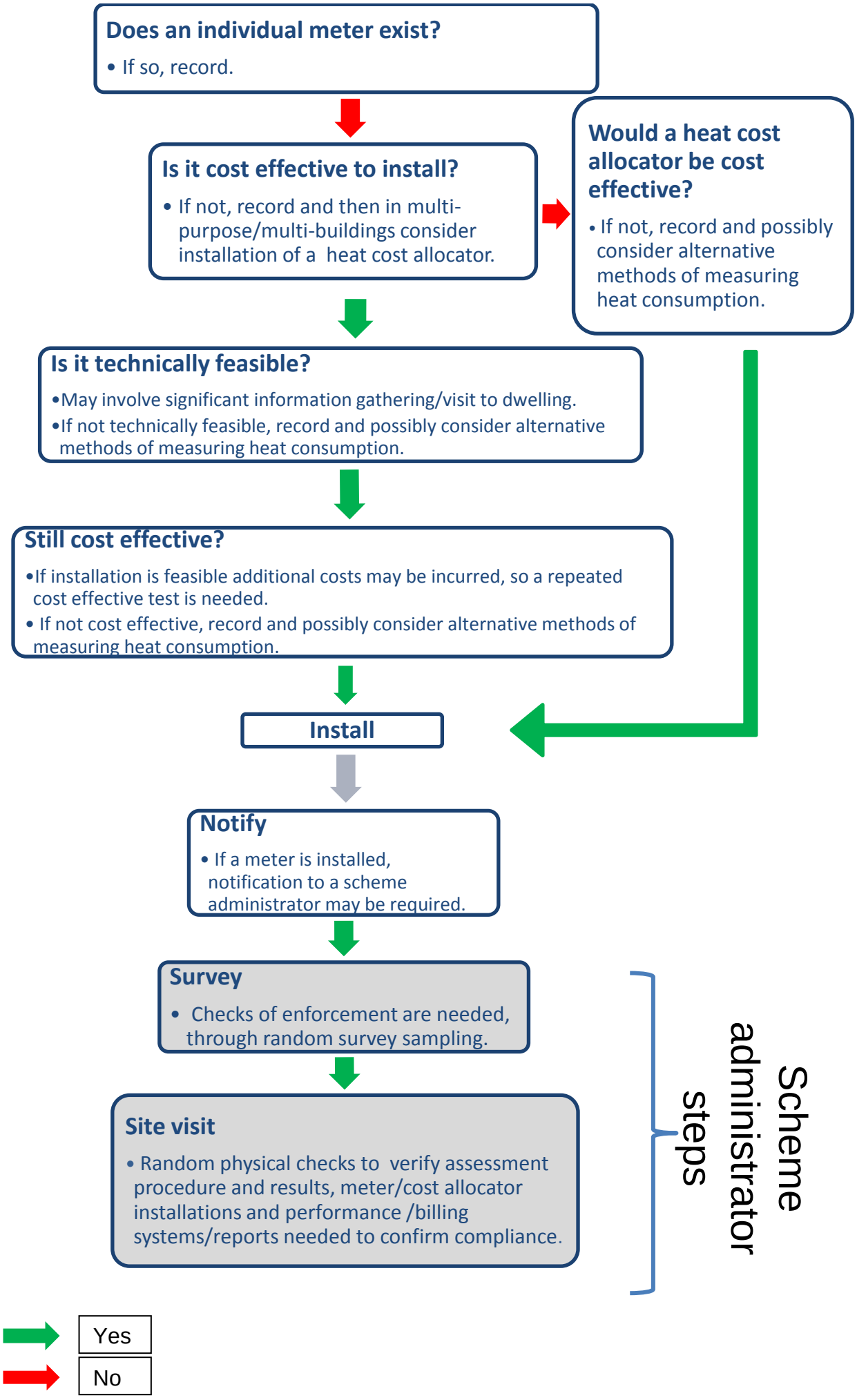
Option 1: Implementation is supported by detailed unit-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. No direct notification of implementation is required. Monitoring is undertaken using a larger sample.

Heat network operators (HNOs) would be required to implement the requirements of the Directive. For those requirements with conditions of technical feasibility and cost effectiveness, a scheme administrator will provide detailed guidance for a desk assessment of individual unit and dwelling-level feasibility to guide HNO implementation in these areas. The scheme administrator will check compliance of a sample of schemes through survey or on-site inspections of schemes of different scales to coincide with the UK's reporting requirements. The lack of a notification requirement will require the scheme administrator to use a larger sample to monitor implementation. This would involve a combination of surveys and on-site visits, it is envisaged that this would be an annual exercise.

The compliance check could take the form of a letter from the scheme administration to a range of HNOs requesting confirmation of their compliance or through a sample of on-site inspections of different schemes (in age and size). Civil penalties will be applied to those that have not complied. On the requirement for heat metering following major renovations, Building Control Officers will notify HNOs that a meter is required once renovation has been inspected and signed-off. It is also likely that, in line with better regulation principles and as required by the Directive, the scheme administrator would focus on bringing participants into compliance, with formal enforcement action (including penalties where appropriate) being used only as a last resort.

For the requirement for individual meters, where conditions of technical feasibility and cost effectiveness apply, the following flow diagram sets out the broad approach that might be taken – on assessment, notification and monitoring:

Figure 1:


Does an individual meter exist?
• If so, record.
Is it cost effective to install?
• If not, record and then in multi-purpose/multi-buildings consider installation of a heat cost allocator.
Would a heat cost allocator be cost effective?
• If not, record and possibly consider alternative methods of measuring heat consumption.
Is it technically feasible?
•May involve significant information gathering/visit to dwelling.
•If not technically feasible, record and possibly consider alternative methods of measuring heat consumption.
Still cost effective?
•If installation is feasible additional costs may be incurred, so a repeated cost effective test is needed.
• If not cost effective, record and possibly consider alternative methods of measuring heat consumption.
Install
Notify
• If a meter is installed, notification to a scheme administrator may be required.
Survey
• Checks of enforcement are needed, through random survey sampling.
Site visit
• Random physical checks to verify assessment procedure and results, meter/cost allocator installations and performance /billing systems/reports needed to confirm compliance.
Scheme administrator steps
Yes
No

Option 2: Implementation is supported by detailed unit-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation is required. Light touch monitoring and audit is needed.

Option 2 has the same implementation and enforcement requirement as Option 1. In this option HNOs would be required to notify the scheme administrator on implementation. The notification requirement would mean a smaller sample for surveying and on-site inspections would be required by the scheme administrator.

Option 3: Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. No direct notification of implementation required. Monitoring is undertaken using a larger sample for audit.

Option 3 has the same implementation, monitoring and enforcement requirement as Option 1. However, the scheme administrator would provide guidance to assist a part desk assessment and a part inspection of overall heat networks scheme and at overall building-level. This would be particularly important in helping to assess multi-purpose/multi-occupancy buildings and would not require individual unit assessment (where conditions of technical feasibility and cost-effectiveness apply). The lack of a notification requirement will require the scheme administrator to use a larger sample to monitor implementation. This would involve a combination of surveys and on-site visits, it is envisaged that this would be an annual exercise.

Option 4: Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation is required. Light touch monitoring and audit is needed.

Option 4 has the same implementation and enforcement requirement as Option 3. However, in this option HNOs would be required to notify the scheme administrator on implementation. The notification requirement would mean a smaller sample for surveying and on-site inspections would be required by the scheme administrator.

Option 5: Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation required. Light touch monitoring and audit. Use of building regulations to implement the new connection metering requirements in the Directive, including in monitor and enforcing through building control inspections.

This option would use the Building Regulations under the Building Act 1985 to require the installation of meters where a new connection is made in a new building. The monitoring and enforcement of this requirement would fall to building control officers. The other requirements of the Directive would be met through the measures proposed through Option 4.

Option 6: Implementation is supported by broader building and scheme-level technical feasibility and cost-effectiveness test guidance provided by a scheme administrator. Notification of implementation required. Light touch monitoring and

audit. Costs of scheme administration are recovered from heat network operators.

Option 6 replicates Option 4 with the exception of the costs of the scheme administration. In this option the costs would be recovered from the heat network operators in the same way that the costs of electricity and gas meters performance is recovered by the National Measurements Office, via Ofgem. This cost recovery arrangement might follow an initial period where the Government supports scheme administration.

Table 2 below summarises the options. These have been chosen to help identify the least cost approach of meeting the requirements of the directive. Comparison between options 1 and 3 shows the benefits/costs of applying higher level guidance on the assessment of individual meters. Under option 3, buildings which are highly unlikely to be deemed cost-effective to install a meter will not be assessed. However, there is a risk with this option that this will not provide sufficient information to report on the UK's compliance with the directive. Comparison between options 3 and 4 shows the benefits/costs of no notification requirement for firms, but higher enforcement costs from more audits, traded off against a notification requirement with fewer audits to confirm compliance. Options 5 looks at the potential benefits of using building regulations to supplement the scheme administrator. Comparison between options 3 and 6 shows the impact on business from choosing to recover the costs of the scheme administrator.

Table 2: summary of options for consultation

Summary table of Options: Implementation, guidance, monitoring variances						
	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Unit-level guidance	√	√				
Building/system level guidance			√	√	√	√
Larger sample for surveying and on-site visits	√		√			
Notification required and smaller sample used for surveys and onsite visits		√		√	√	√
Building regs used for new connections					√	
Cost recovery of scheme administration						√
Billing information & costs	√	√	√	√	√	√

6. Cost benefit analysis of the options

Evidence for this impact assessment has been drawn from available sources including the 2007 Desk Study on heat metering[6] and the 2012 study on Heat Metering Costs and Benefits[7]. Evidence on the number of heat networks and their characteristics has been taken from a database DECC commissioned in 2012 prepared by Databuild and BRE[8].

6.1 Scope of the policy

The regulations will cover all buildings where there is a central source of heating, cooling or hot water supplying a number of dwellings or units. This will include heat networks which supply a number of buildings, as well as blocks of dwellings which have a central heating source within the building.

The number of systems, buildings and dwellings that will be covered by the regulations is uncertain. Previous studies, completed before the Directive was agreed, have catalogued heat networks using different definitions. Therefore there is some uncertainty in the number of networks and dwellings which are covered by the regulations.

The 2012 Databuild/BRE study looked only at systems that connected two or more buildings from a central source, or buildings with more than ten customers connected to a single heat source. The database shows there are approximately 1,700 networks in England which meet this definition of a network. The database has a record of these networks supplying 173,000 dwellings, with 165,000 flats[9], 6,900 semi-detached and terrace homes and approximately 1,200 non-domestic properties recorded.

The Databuild/BRE definition excluded single blocks of dwellings with less than ten customers from its database. However, the scope of the Directive includes these, so they need to be included in the analysis. Evidence from the 2007 Desk Study shows there were approximately 228,000 communally-heated multi-occupancy individual buildings in England, Northern Ireland and Wales, which therefore could be additional to the 165,000 flats included in the Databuild/BRE database. However, the focus of this impact assessment is on English dwellings and as the Databuild/BRE definition already includes individual blocks with more than ten dwellings 228,000 additional dwellings needs to be revised downwards. In the subsequent analysis this IA assumes that 200,000 of the 228,000 dwellings in individual buildings with communal heating systems are in England[10], are not already captured by the Databuild/BRE definition, and that these are all flats. We are looking to refine these assumptions through the consultation. Costs of assessment and administration are calculated using the total number of dwellings connected to heat networks and with communal heating systems.

It is also likely that the Databuild/BRE survey underestimated the number of networks, and for many networks that were included it was not possible to obtain information about the number of dwellings or other key information. Therefore, the best estimate of the number of systems and dwellings by age band covered in this IA is presented in Table 3 below.

---

[6] http://www.chpa.co.uk/medialibrary/2011/05/18/241aecd2/DEFRA%20heat%20metering%202007%20inc%20DH%20survey.pdf

[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48389/5462-district-heating--heat-metering-cost-benefit-anal.pdf

[8] A summary of the data has been published at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212565/summary_evidence_district_heating_networks_uk.pdf

[9] The definition in the Databuild/BRE survey grouped together flats and maisonettes as a single group. It has not been possible to separate out the number of each type.

[10] The assumption of 28,000 flats either being in Northern Ireland/Wales or falling under the Databuild/BRE definition of having more than 10 customers in one block is partly based on regional 2010 data: the English Housing Survey, the Northern Irish Housing Condition Survey and Housing Estimates for Wales. These surveys suggest that 95% of Welsh, Northern Irish and English flats are in England.

Table 3: assumed breakdown of properties connected to heat networks by type and age.

	Non-domestic buildings	Detached	Semi-detached	Terraced	Flats / maisonettes[11]	Total
1939 – 1959	143	0	0	383	9912	10,439
1960 – 1975	546	14	445	1793	78827	81,625
1976 – 1982	53	102	4	2408	19746	22,313
1983 – 1989	176	1	178	334	10355	11,044
1990 – 1999	1	0	125	561	9399	10,086
Post 2000	230	4	190	463	36923	37,810
Total	**1149**	**121**	**942**	**5942**	**165162**	**173,316**

Source: DECC analysis of Databuild/BRE survey

6.2 Evidence on current level of metering

The Databuild/BRE database shows that there is currently only limited deployment of heat network metering in England.

For individual meters, the existing evidence base suggests:

- 25% of existing residential-led heat networks have heat meters installed
- 77% of dwellings in the social housing sector connected to a heat network do not have heat meters.
- 129,987 where there is no heat metering at dwelling-level
- 43,329 where this is heat metering at dwelling-level

Non-domestic buildings are estimated to have a greater proportion of heat meters. Heat networks generally place meters where there is a contractual exchange of the heat and where there is a step-down in heat network system pressure (required before the heat reaches the final consumer).There is very little evidence on the current installation of 'building level' heat meters connected to multi-occupancy/multi-purpose buildings.

6.3 Counterfactual

Do-nothing option

The UK is required to comply with the Energy Efficiency Directive, meaning there is no 'do nothing' option for this Impact Assessment. The NPV and Cost to Business presented in the summary sheets uses the 'least cost' minimum requirement option (option 3) as the counterfactual. However, for comparison, this option has been assessed against a 'no Directive' baseline and provides an estimate of the net cost of the impact of complying with requirements for metering in the Directive.

Question 1: Do you have any evidence that new networks are built with meters installed. Do you have any evidence on the number of meters currently being installed in the UK?

[11] Excludes flats in blocks of less than 10 dwellings with communal heating systems. There are estimated to be approximately 200,000 in England.

Metering of new-build networks

This impact assessment also makes assumptions about the installation of meters into newly built networks. From discussions with industry, the vast majority of new networks are installed with meters and controls for the customers. Installing meters and controls when the system is built can be much cheaper as the requirements for meters (such as space to locate the units, access to pipework) can be designed into the system. This impact assessment therefore assumes that new networks will install meters as routine. Therefore no additional cost of the obligation for new networks to install meters has been estimated. New networks will still have an obligation to report that they have installed. This cost has been included in the analysis.

For existing unmetered networks, there are some examples of these being retrofitted with meters. However, from discussions with operators, meters are often considered but not installed due to the high capital cost relative to the expected bill savings. This impact assessment therefore assumes that meters would not be installed into existing networks without intervention.

Non-domestic metering

The Databuild survey shows there are approximately 1,200 non-domestic buildings connected to heat networks in England. These appear to cover a range of uses, with hospitals, schools, universities, industrial and commercial buildings reported as connected to networks. These uses vary in their heat demand, and the potential for reductions in demand following metering.

The survey did not ask operators to report whether the non-domestic buildings were individually metered. Discussions with heat network operators suggest that many of these will be. As it is a commercial transaction, it is likely that meters will already be installed for non-domestic buildings where it is cost-effective to do so.

Question 2: Do you have any evidence on the existing level of metering in non-domestic properties supplied by heat networks?

Cost of billing

The directive requires HNOs to not separately identify a charge for providing customers with a bill based on actual use or information on energy consumption. This impact assessment assumes that HNOs with metered systems are not currently separately identifying a cost of billing or providing information on energy use to their customers.

Question 3: Do you have any evidence to support the assumption that it is not common practice for HNOs to separately identify a charge for providing a bill to customers or to provide customers with information on their energy consumption?

6.3 Costs

The implementation of the regulations will create a number of costs to heat networks operators, and government.

The direct costs include:

1) Assessment costs: the costs of assessing the case for individual meters and heat cost allocators (HCAs), including any site visits to properties to assess the technical feasibility of meters.
2) Administrative burdens: the cost to heat networks operators of complying with the regulations, including the time taken by staff to understand the requirements, gather

information on the network, to report and, (depending on the option) notify the scheme administrator as necessary.

3) Capital Costs and operating costs of individual unit meters: where meters or HCAs for individual customers are assessed to be cost effective and technically feasible, the costs installing meters or HCAs and the on-going costs of reading and maintaining the meter.
4) Capital Costs and operating costs of building level meters: the cost of installing meters in multi-occupancy/multi-purpose buildings, and maintaining the meters.
5) Scheme administration costs: the cost to Government or business of appointing an administrator to record information on compliance and monitor compliance through audits and site visits.

Heat network operators and their customers may also face additional 'hassle' costs caused by the requirements of the regulations. These could include the costs of managing the installation of the meters or HCAs, and hassle to customers from being at home during installation. These costs are discussed further in Section 7.

Question 4: Do you have any evidence on the potential 'hassle costs' for heat network operators from complying with these regulations?

Assessment costs

The options presented in this impact assessment assume that heat network operators would self-assess the case for individual meters based on guidance provided by the scheme administrator. The cost of conducting the assessment will depend upon the number of buildings and properties that are on the network. Assessments will be required every four years from 2016 onwards to ensure the UK complies with the Directive. For the purposes of this Impact Assessment the administration costs to 2030 have been included, covering assessment cycles in 2016, 2020, 2024 and 2028.

The requirements of the assessment will be determined after consultation, but for the purposes of this impact assessment it has been assumed that the assessment would consist of two stages. An initial stage would involve the heat network operator assessing whether a heat meter is deemed to be cost effective based on the guidance provided by the scheme administrator.

For networks where units are deemed to be cost-effective, a second stage would involve a site visit to confirm that a meter would be technically feasible. This may involve checking that there is sufficient space and access to pipework to install the meter. The site visit may also allow the heat network operator to collect information which may adjust the cost-effectiveness calculation; for instance confirming that there are heating controls installed.

Under all the options heat network operators would assess the case for individual meters on a unit by unit basis, where information on the properties (for instance the assumed heat demand, insulation levels etc.) is used to determine if heat meters are deemed to be cost-effective. Under options 1 and 2, heat network operators would be required to provide data for all the units on the system. Under options 3, 4 and 5 the heat network operator would not have to provide data on units where it would be highly unlikely that a meter would be cost effective[12].

In calculating the assessment costs this Impact Assessment assumes:

- Heat network operators will need to self-assess the cost-effectiveness of individual meters by collecting information about the properties on their system.
- Properties that are deemed cost effective will require an inspection by an engineer who will assess the technical feasibility of metering and report.

[12] For example it may be possible to rule out all flats built after 1990 as never meeting the cost-effectiveness definition based on assumed heat loads.

- Heat network operators will adjust the assessment of the properties that are cost-effective and technically feasible following the engineer's report.
- The assumed time required for HNOs to collect data is 30 minutes per building. This is based on the assumption that the cost-effectiveness assessment would be judged on a limited number of characteristics such as property type and age. If further characteristics were required to assess the cost-effectiveness such as insulation levels, the assumed time to collect information may have to increase.
- The criteria screening used in options 3-6 assume that it is possible to exclude 75% of buildings from the assessment of cost-effectiveness. For example if blocks of flats are determined to be not cost-effective through broad-level guidance, the HNO will not have to collect data on these properties. A more accurate estimation of the number of buildings included in the more in-depth cost-effectiveness test will be produced following consultation and the commissioning of cost-effectiveness guidance.
- The requirement for assessment covers 36,500 buildings, based on an assumed population of 365,000 dwellings in blocks of 10 flats each[13].
- For all options 5,000 technical feasibility assessments are required[14].

Table 4 below shows the assumptions for each stage of the assessment.

Table 4: Assumptions used to calculate assessment costs across options.

Requirement	Population/ Frequency	Person required	Cost per hour (£)	Time required by option
Collect data on each building on the system and each of the unit (e.g. location, building type etc.)	Assume 36,500 buildings connected to heat networks	Middle Manager	26	Options 1,2 – All buildings require 0.5 hours. Options 3-6 - 0.5 hours, but information only collected on 25% of buildings where likely to be cost effective.
Calculate if properties are cost effective using online calculator or spread-sheet	Assume 36,500 buildings connected to heat networks	Middle Manager	26	Options 1,2 – All buildings require 0.5 hours. Options 3-6 - 0.5 hours, but information only needs to be collected on the 25% of buildings where metering may be cost effective.
Site visits by Engineer to assess technical feasibility.	Assume 5000 dwellings are deemed cost-effective	Engineer	50	Assume assessment takes 1 hour per dwelling[15].

[13] These figures include flats only, for simplicity, to avoid placing individual metering assessment costs on single-occupancy buildings, where individual consumption metering isn't necessary. 25% of buildings have previously been estimated as already having meters installed, but this has not been factored in to the cost estimation as the uncertainty around the approximation and where these meters are installed may lead to underestimation of the assessment costs.

[14] As set out below, the analysis suggests, based on the limited evidence available, that no properties are likely to be cost-effective and therefore require a technical feasibility assessment. However to illustrate the potential costs, an assumption has been made that 5,000 properties may be identified as potentially cost-effective and therefore require technical feasibility assessments. As this assumption is held constant across options, it does not change the relative valuation the options.

[15] This is based on the assumption of relative uniformity between block-level flats and short distances travelled between dwellings.

Re-assessment if meters are required following technical feasibility visit.	5000 dwellings	Middle Manager	26	All options: 0.5 hours per dwelling to confirm meters are cost-effective and technically feasible.
Record information on meters installed for auditing purposes.	5000 dwellings as before	Middle Manager	26	All options: 0.25 hours per dwelling.

Using the assumptions above, Table 5 below shows the assessment costs for each option considered. The costs for each option are highly uncertain and are sensitive to the assumed time requirements and cost per hour for each activity.

Table 5: assessment costs by option £'000

	Option 1 & 2	**Option 3-6**
Collect data on each of the properties on the system (for example: location, building type)	475[16]	119
Calculate if properties are cost effective using online calculator or spread-sheet	475	119
Site visits by Engineer to assess technical feasibility.	250	250
Re-assessment if meters needed – following technical feasibility visit.	65	65
Record information on meters installed for auditing purposes.	33	33
Total per assessment cycle (FV)	**1,297**	**585**
Total (PV 2013-2030)	**3,850**	**1,737**

Question 5: do you have any evidence to help us revise the estimated time and cost of each activity required to undertake a cost-effectiveness and technical feasibility test?

Administrative burdens

The Standard Cost Model[17] approach has been used to estimate the administrative burden placed on heat network operators from complying with the regulations. This approach estimates the administrative cost by making assumptions about the time it will take each organisation to complete each activity, the person required, and the frequency of the task.

[16] Calculated using the following equation: (cost per hour) x (hours required) x (number of buildings), with values taken from Table 4 which are, in this example, £26 x 0.5 X 36,500 = £474, 500.
[17] Measuring administrative costs: UK standard cost model manual (www.berr.gov.uk/files/file44503.pdf)

Table 6 below sets out the components of the administration required as part of the assessment.

Table 6: Assumed administration requirements by option

Requirement	**Population/ Frequency[18]**	**Person required**	**Cost per hour (£)**	**Time required by option**
Develop understanding of requirements of the regulation and steps necessary to comply.	Assume 400 heat network operators	Senior Manager	45	All options – 6 hours
Registration with central body	Assume 400 heat network operators	Senior Manager	45	Options 1 and 3 – not required Options 2 and 4-6: 2 hours
Report and notify central body (for both individual and building level meters)	Assume 3000 heat networks	Senior Manager	45	Options 1,3 – no reporting. Options 2 and 4-6: 2 hours[19]
Audit by central body - checks assessment undertaken correctly , meters installed and working etc.	Assume 3000 heat networks	System manager	45	All options 4 hours/audit. Options 1 and 3: 10% sampled for audit Options 2 and 4-6: 5% sampled for audit

Some costs may be one-off transition costs (such as familiarisation with the guidance), while others will be incurred each time an assessment conducted every four years. For the purposes of this IA it is assumed that given the four year gap between assessments that the full cost is incurred each time an assessment is required. For example, some costs such as familiarisation with the guidance might be required each time if the guidance has been updated or the approach changed. There is potentially some scope for costs the second time to be lower, such as by re-using the data collected on the properties connected to the network

Where comparable we have assumed similar time commitments to other policies or programmes such as the Carbon Reduction Commitment or the Good Quality CHP quality assurance scheme. Table 7 below shows the administrative burden by option.

Table 7: administrative costs by option £'000

	Option 1 & 3	**Option 2, 4-6**
Develop understanding of requirements of the regulation and steps necessary to comply.	108[20]	108
Registration with central body	0	36
Report and notify central body (for both individual and building level meters)	0	135

[18] These 400 heat network operators and 3000 heat networks consist of local authorities, energy service companies etc. and accounts for communally heated blocks as well as larger networks and new builds.
[19] Assumed to be an average estimation of time, as larger networks may take longer to gather installation data; smaller networks are likely to take less time.
[20] Calculated using the following equation: (cost per hour) x (hours required) x (number of heat networks or operators), with values taken from Table 6 which are, in this example, £45 x 6 X 400 = £108, 000.

Audit by central body - checks assessment undertaken correctly , meters installed and working etc.	54	27
Total per assessment cycle (FV)	**162**	**306**
Total (PV 2013-2030)	**480**	**909**

Option 1 and 3 which do not include a notification requirement are less administratively burdensome to heat network operators than options 2 and 4-6. However, the savings from options 1 and 3 are offset by the assumed increase in the number of audits required to gather data on compliance.

Question 6: Do you have any evidence on the potential administrative burden to heat network operators from complying with the regulations, and how this may vary between the options?

Capital Costs and operating costs: individual meters and HCAs

The options under consideration call for HNOs to test whether an individual meter is cost-effective and technically feasible. To perform this assessment, HNOs will be given detailed guidance on determining which properties on their systems are deemed cost-effective and guidance on possible exemptions on the grounds of technical feasibility. The guidance will be prescribed by the scheme administrator.

To illustrate the possible scale of the costs, the analysis in this Impact Assessment follows the method for assessing the costs and benefits set out in the 2012 Databuild/BRE report. The method in the BRE report compares the capital and operating costs of a meter (including the cost of meter readings) against the expected energy savings for the final customer.

This impact assessment assumes that the assessment of cost-effectiveness from the point of view of the final customer, but assumes that the capital cost and cost of the billing will be passed through to customers by the HNOs. Therefore, in order for a meter to be assessed as cost-effective, the energy savings from consumers changing their behaviour must exceed the cost of the meter and the additional costs of billing.

Installing a meter incurs a capital cost in the first year, which is offset by a net bill saving over the lifetime of the meter (assumed to be 15 years). This Impact Assessment assumes, consumers' discount these future benefits using a private discount rate of 9%. Therefore a meter is only cost-effective to the consumer if the discounted net-benefits are greater than the initial capital and installation costs as well as the operating costs. Sensitivity analysis of the rate of return is presented in Section 8, including sensitivities where the social discount rate of 3.5% is use to determine the private cost effectiveness of metering.

<u>Size of energy savings</u>

Whether a meter is cost effective is highly sensitive to the assumed reduction in energy demand resulting from customer's changing their heating behaviour. The interpretative note to the Directive suggests this could be up to 30%, but other sources suggest lower responses in the range of 10-20% are more common (see Box 1 below). The size of the behaviour change will also potentially depend on the type of meter installed, with pre-payment meters or those with real time displays expected promote greater savings. The level user control over the system may also determine the size of the energy savings.

Box 1: Evidence on the Energy Savings from Individual Heat Metering

BRE's previous work on heat networks metering highlights a 15-17% realistic minimum energy saving, with up to 30% potential savings. This comes from a Danish study and is the most feasible figure in the paper[21]. The study also saw rented housing energy reductions of 28-42%, however these reductions occurred alongside an extensive information campaign as well as government grants to install controls and other efficiency measures. Another prevalent finding from this study is the noted lag in behavioural change after the transition to individual meters – energy savings lags were observed as being 1-2 years in length, therefore for the purposes of this IA, benefits of individual heat metering do not occur until the second year of the lifetime of the meter, 2017[22].

There was also anecdotal evidence from a previous consultation; where of two identical blocks of flats – one with a meter, one without – revealed a 25-33% reduction in energy in the presence of a meter. However this does not take into account baseline trends. A literature review for Defra[23] found that there was a 5-15% saving to be made from direct feedback (i.e. live monitors) and a 0-10% saving from indirect feedback (i.e. through informative billing), but only one of these studies focussed on heat networks which was from Sweden and failed to include a comparable control group.

After retrofitting heat meters in 4 blocks of 1960s flats, Kiln Place, Camden observed reductions in heat consumption of 30%. These were however installations of pre-payment meters which bring a different form of feedback to consumers and these costs/benefits are not yet identified in this assessment.
Therefore we have taken into account the low level of this behavioural estimation as well as our lack of information on smart meter costs by including a 20% energy saving as opposed to a 30% reduction (as cited by a number of other sources) in our baseline scenario. To capture a realistic range of behavioural change levels, sensitivity testing is undertaken with 10% and 30% energy reductions in Section 8.

The analysis in this IA assumes a 20% reduction to illustrate whether meters are cost-effective. This assumption is tested as a sensitivity in section 8. The evidence also suggests that there is a lag between installing meters and changes in consumers' behaviour as it takes time for consumers to adjust their use of heat and for them to receive their first bill based on actual use. The analysis in this IA assumes therefore that there is no benefits in the year of installation of the meter (assumed to be 2016), but that the 20% reduction in heat demand occurs from that year on.

Question 7: Do you have any evidence on the potential size of the energy savings from installing individual meters, and the lag between installation and energy savings starting?

Energy demands in unmetered properties

The assumed energy demand for each property type and age combination considered is presented below in table 8. These figures are taken from the BRE report which used the BREDEM (BRE Domestic Energy Model) to predict the space heating and hot water load. The study looked at three dwelling types over an eight age range categories.

[21] http://dbdh.dk/images/uploads/pdf-consumer/the-installation-of-meters-leads.pdf
[22] The Directive requires meters to be installed by 31 December 2016, in multi-apartment and multi-purpose buildings, but it is likely that HNOs will install earlier during the summer to avoid disruption to systems during the heating system. Therefore the assumption of no benefits in the first year assumes that customers will not change their behaviour during the first six months of the meter being installed.
[23] Darby, S. *The effectiveness of feedback on energy consumption – A review for Defra of the literature on metering, billing and direct displays.* Environmental Change Institute (Oxford), April 2006.

The energy demands used in the BRE report are based on observed/predicted behaviour for properties where energy consumption is already metered. Therefore there is a risk that these figures underestimate the energy demand currently experienced by properties on heat networks where no meter is installed. However, it has not been possible to identify any evidence on the current level of demand by property type for buildings on heat networks without meters. The implications of higher and lower heat demands are explored as sensitivities in Section 8.

Table 8: energy consumption (kWh/year) for heating and hot water by property type and age.

	Semi-detached	**Terrace**	**Purpose Built Flat**
Pre 1917	20,476	16,042	10,581
1918 – 1938	18,652	14,640	9,755
1939 – 1959	16,688	13,182	8,994
1960 – 1975	16,065	12,710	8,653
1976 – 1982	14,749	11,740	8,101
1983 – 1989	15,072	11,989	8,331
1990 – 1999	11,728	9,479	6,828
Post 2000	10,306	8,371	6,218

Source: BREDEM from Databuild/BRE

Question 8: Do you have any evidence on the heat demands of unmetered properties connected to heat networks and how these may differ from the assumed heat demands for metered properties set out above?

Capital and operating costs

Capital and annual operating costs of meters were taken from the BRE report, and are presented in Table 9 below. This assumes the capital cost of the meter, data gathering system and installation is £447. Annual operating costs are assumed to be £81/year.

Table 9: assumed capital and on-going cost for individual heat meters

One-off costs (per dwelling)	
Meter	£212
Installation costs	£80
Data gathering system	£62
installation of data gathering system	£93
Total	**£447**
On-going cost (per dwelling/year)	£81

Source: Databuild/BRE

The analysis suggests that using DECC's central fossil fuel prices, heat meters would only be cost effective to install in semi-detached properties built before 1959. However, interrogation of the database suggests that there were no properties of this type connected to heat networks. Therefore, using the assumptions set out above, no installations are expected to be made to existing domestic properties.

Question 9: Do you have any evidence on the capital, installation and annual on-going costs of individual meters?

Heat Cost Allocators

If properties are assessed as not cost-effective for metering, the regulations will also require an assessment of whether HCAs could be cost effective. HCAs are not currently widely used in the UK and it has therefore been difficult to gather evidence on their capital an on-going costs. Discussions with manufactures suggests the capital costs could be between £50-100 per allocator for an electronic HCA that can be read remotely, or less for an evaporative HCA that would require manual reading. As an allocator is required for every radiator, the capital costs will depend upon the number of rooms and the number of radiators in each property.

Given the lack of evidence on the capital and operating costs, this IA does not attempt to estimate whether it would be cost-effective to install HCAs in properties, but seeks views of stakeholders on the capital cost, operating cost, and evidence on the likely change in consumer behaviour.

Question 10: Do you have any evidence on the capital or operating costs of HCAs, and the likely change in consumer behaviour they may induce?

Capital and operating costs of building level meters:

The requirement to install building level meters for multi-occupancy/multi-purpose buildings is common to all the options. Unlike the provisions for individual meters, the installation of building level meters is not subject to caveats on the cost effectiveness and technical feasibility. Therefore the requirement for building level meters does not allow Member States much discretion in how this is implemented.

There are no reliable sources of evidence on the number of buildings served by meters. To estimate the costs, we have assumed that these requirements would require the installation of meters in blocks of flats[24].The Databuild/BRE survey suggests that there are 165,000 flats connected to heat networks which are supplied from sources external to the building[25]. In order to estimate the costs we have assumed that a block of flats consists of 10 properties in the central case, with sensitivities exploring other assumptions in Section 8. Discussions with heat network operators suggest it is unlikely that many systems will already have meters installed at the locations required by the Directive. Therefore for the purpose of this IA, it is assumed that all buildings will need to install a meter.

Question 11: Do you have any evidence on the number of buildings connected to heat networks that may already have meters installed at the locations required by the Directive?

Discussions with stakeholders suggest a building level meter has capital cost of approximately £1000, and installation costs of £500. The meters are assumed to have a lifetime of 15 years and assumed to be installed by 2015. The total cost in 2015 of the 16,500 meters at £1500 each is £24.75m, which discounted back to 2013 gives a present value cost of £23.1m.

Question 12: Do you have any evidence on the capital, installation and on-going costs of building level meters?

Scheme administration

[24] The requirements also apply to non-domestic buildings. However, it is not possible to determine whether these are charged as single units, or are part of a multi-occupancy/multi-purpose building.
[25] Blocks of flats with a communal heating system installed in the building are expected to be exempt from the requirement to install meters at the heat exchanger.

For the purposes of this impact assessment, the costs of administering the scheme are based on the costs of administering similar monitoring schemes for electricity and gas meters performed by the National Measurements Office.

The cost of the scheme administration framework may have a fixed component related to overall scheme administration and production of the guidance, and a variable part the will depend upon the number of site audits required to ensure compliance and collect sufficient data to report to the European Commission.

This IA assumes core administration costs (including the cost of developing the guidance used by the HNOs) would cost £250,000 in the first year, and every four years after that[26]. Under Options 1 and 3, with no notification, a sample of 10% of the HNOs is assumed with approximately 300 audits every four years. Therefore total costs under Options 1 & 3 are £475,000 every four years. A summary of the costs is presented in Table 10, below.

Under Options 2, & 4-6, the notification requirement would mean fewer audits would be required to ensure compliance and collect sufficient data to report to the European Commission. Therefore the costs for these options assume 150 audits per four year assessment cycle, with total scheme administration costs of £362,500.

Table 10: assumed breakdown of scheme administration costs by option:

	Option 1& 3	Option 2 &4-6
Core costs to administer scheme and develop guidance to HNOs	£250,000	£250,000
Number of visits	300	150
Cost per visit	750	750
Site audits	£225,000	£112,500
Total (FV per four year assessment cycle)	£475,000	£362,500
Total (PV 2013-2030)	£1,410,000	£1,076,000

6.4 Benefits:

Installing meters at the building level may allow heat network operators to gain a better understanding of the losses in distribution of heat on the system, and from improved management of the system to meet peak loads.

The Commission[27] estimate that there could be savings of 2-3% for network operators from better management of their systems following installation of meters. For illustration the analysis in this IA assumes that installation of individual meters generates a 1% saving in energy demand from improved management of the system.

The total heat supplied to dwellings is estimated at 1,340GWh based on the number of dwellings in the database and their estimated heat loads. The majority of heat networks use gas. Therefore 1% saving therefore equates to 13.4GWh of gas saved. Most networks are too small to be captured by the EU ETS, so this IA assumes 90% of this saving will be in the non-traded sector.

[26] It is possible that there would be costs savings in the second and subsequent assessments from updating the guidance to HNOs on the assessment of cost-effectiveness and technical feasibility.

[27] Annexes to the impact assessment accompanying the document Directive of the European Parliament and of the Council on energy efficiency and amending and subsequently repealing Directives 2004/8/EC and 2006/32/EC (page 58) http://ec.europa.eu/energy/efficiency/eed/doc/2011_directive/sec_2011_0779_ia_annexes.pdf

Using the IAG guidance, and DECC's central fossil fuel prices, the value of gas savings is £4.7m (PV). Emissions savings in the traded sector is valued at £0.08m, and £2.0m in the non-traded sector. The reduction in gas use will also result in air quality improvements worth £0.08m.

Question 13: Do you have any evidence on the potential energy savings for metering at a building level, and the potential energy savings this could generate for heat networks?

6.5 Costs to business

The direct cost to business are summarised in Table 11. The majority of the costs of the policy will fall on business, the exception being the scheme administration costs that are funded through taxes. The hassle costs of implementing recommendation are not included. Table 11 also presents the Equivalent Annual Net Cost to Business (EANCB).

Table 11: Costs to business (£m PV)

	Option 1	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**
Assessment costs	3.9	3.9	1.7	1.7	1.7	1.7
Administrative burden	0.5	0.9	0.5	0.9	0.9	0.9
Scheme administration	0	0	0	0	0	1.1
Total cost	4.6	4.8	2.2	2.6	2.6	3.7
NPV (£m, compared against 'non directive' baseline)	-22.4	-22.5	-20.2	-20.3	-20.3	-20.3
EANCB	0.30	0.33	0.15	0.18	0.26	1.44
NPV (£m, compared against 'Option 3' baseline)	-2.1	-2.1	0	-0.1	-0.1	-0.1
EANCB	0.15	0.18	0	0.03	0.03	0.10

The Better Regulation Framework guidance on One In, Two Out (OITO) sets out that in the case of EU legislation, the cost to business in scope of the OITO policy is the additional cost to business over and above the EANCB of implementing the minimum requirements.

The Government is consulting on the best way to implement the minimum requirements, so for the purposes of the Impact Assessment the cost in scope of OITO is measured against the least cost option (option 3).

6.6 Small and micro-businesses assessment

A small and micro-business assessment is not required as the regulations are transposing a European Directive.

7. Non quantified costs and benefits

This section presents the qualitative analysis of the policy options. Section 7.1 discusses the costs and benefit that are included in the qualitative analysis. Section 7.2 presents the multi-criteria analysis of the different options, assessed against the policy objectives set out in Section 4.

7.1. Non-quantified costs and benefits

Fuel Poverty

Providing meters to individual customers is intended to incentivise more efficient use of heat as reductions in energy use are translated into bill savings. However, bills based on metering may incentivise people to under-heat their properties (relative to need) in order to reduce their bills. This may be particularly important for customers on heat networks, many of whom are in social or local authority housing.

The additional costs passed through to individual consumers by HNOs, taking into account data collection, billing, capital costs etc., is likely have an adverse effect on the fuel poor. These costs will add to the bill threshold at which a home is adequately warm, potentially worsening those in current fuel poverty and pushing a greater number of people into fuel poverty, especially considering that these people tend to live in the least efficient houses.

However, the move from a flat rate charge to a system based on actual consumption is likely to benefit those under-heating (relative to need) their homes or heating their homes less than others on the network. Currently a flat rate charge allows for these consumers to subsidise people heating their homes more, as charging is not based on individual consumption. Therefore the move to metering could decrease bills in this way. However, there is very little evidence on the number of fuel poor residents currently living in properties served by heat networks and their behaviour in heating their homes in properties without meters.

Question 14: Do you have any evidence on the number and behaviour of heat network consumers likely to be in fuel poverty?

Transfers between customers

Installation of meters may also create transfers between customers on a network. The current basis for billing (typically based on floor area) does not take account of actual use. Charges for customers therefore do not reflect factors such as occupancy and heating behaviours. As the total cost of the system is recovered by the system operator when setting the charges each year, this creates implicit subsidies between users as all users face the same charge regardless of actual use.

Installing building level meters will allow HNOs to accurately determine the amount of heat used by each building. This may allow HNOs to allocate the cost of the heat more accurately between users in different buildings, reducing the size of potential transfers between users on the same system.

Establishing a billing system based on actual use will create a more efficient system of charges. Therefore it is possible that some users on a system may face much higher bills as a result of meters being installed, even after taking account of the behaviour change. Other customers who are low users may face much lower bills as they will now be charged only on the basis of the heat they consume.

Changes in back-office costs of billing systems

The analysis of individual meters does not take account of any fixed costs of switching from a flat rate charge for heat to billing based on actual use. These fixed costs may include the costs of changes to computer system required to bill customers based on use, or other changes to systems. In instances where meters are installed for some customers but not others, there may be additional costs of running two billing systems in parallel?

Question 15: Do you have information on the costs of billing systems for heat networks based on flat charges and actual use? Do you know of cases where both systems of charging are used simultaneously?

Hassle costs

HNOs will face hassle costs from managing the installation of building level meters onto their system and from disruption to their operations. Customers will also face hassle costs where building level meters are installed. These might include having the heating and hot-water to the building turned off for a period during installation and testing.

Customers may also incur hassle costs where a technical assessment of the feasibility of metering is required. This may involve customers having to stay home for the assessment and potentially clearing access to pipework which could be in cupboards for instance. If the meters are deemed cost-effective, the customers would incur these costs again during installation. There may be further costs for customers learning to control their heating system.

Question 16: Do you have any evidence to help quantify the possible 'hassle' costs to HNOs and consumers as a result of complying with the requirements of these regulations?

Growth and maturity of heat metering in UK

Installation of meters required by the regulations may increase the installer skill base and supply chain for heat meters in the UK. This could potentially benefit other policies such as the Renewable Heat Incentive, which is using metering to monitor heating system performance in both the domestic and non-domestic sectors. Given the relatively low level of meter installations currently, the regulations may increase the number of technicians with experience of installing meters and therefore may reduce the costs of additional meters and or the number of installers in the UK.

Direct and indirect rebound effect

One of the knock on effects from a consumer reducing energy consumption via a meter is that some of the financial savings may be spent on energy consuming goods and services: the rebound effect. This means that the overall impact on energy consumption is smaller (although consumers will still benefit from the energy consumption). In the example of meters, it is most likely to be an indirect rebound effect where bill savings from are used to purchase other energy using goods and services.

Wider benefits of information collected

There are potentially wider benefits to society that could be gained for effective use of the information collected through HNO assessments. Some of this information is a non-rival public good, meaning once it has been produced by the HNO it can be put to multiple uses for relativity low cost to society.

The assessment findings could be used to reduce the cost to HNOs of identifying potential options energy efficiency improvements in the buildings covered. For example, HNOs could reduce the cost of assessing the benefits and energy savings by reusing data already collected for the metering assessment.

The data collected could also be used to strengthen the evidence base underpinning policies to support development of heat networks. Provided all commercially confidential information was redacted, the aggregated results could also be made public, which would support wider analysis and debate around the role of heat networks in meeting the overall objectives of increasing economic growth, reducing carbon emissions and securing reliable energy supplies. Robust information on the current performance and level of heat network development would also provide information to potential investors in heat networks.

Finally, effective central reporting on the information gathered by the HNO assessments would enable a more robust evaluation of the policy, and enable any adjustments to be made to make the policy more effective. The results could also be fed into the wider European Commission evaluation of the Directive. Central reporting would enable DECC to monitor the development of heat networks over time and to evaluate the effectiveness of DECC policy interventions in this areas such as the development of the Heat Network Delivery Unit.

7.2 Multi-criteria assessment of the options

Given the challenges in quantifying some of the key benefits, this Impact Assessment also presents a multi-criteria analysis of the different options illustrated in Table 12. This assesses each option against the key policy objectives. The criteria used are:

- Maximise benefit to the UK:
    - The policy addresses the information failures by providing tailored assessment of the private cost effectiveness of individual meters.
    - The policy captures the wider benefits to the UK of the information created.
- Minimise cost to business:
    - The process of complying is simple for business to understand and implement.
    - The scheme administration of the requirements imposes minimal costs to businesses.
- Meet EU reporting obligations:
    - The policy ensures that the UK is able to accurately report on implementation of the requirements (as required by Article 24 of the Directive).

<u>Address information market failures</u>

Options 3-6 are expected to perform adequately against this criteria. The requirement within the Directive is that assessments be proportionate and sufficiently representative to enable recommendations to be made. Taking a proportionate approach using high level guidance may inevitably mean that some cases where meters may be cost-effective may be missed. However, under Options 3-6, the guidance for the assessment is expected to be sufficiently clear to avoid properties where metering may be cost-effective from not being assessed. Under options 1 and 2, the assessment of the properties at every block may help to ensure opportunities for cost-effective installations of meters are not missed. These options may therefore be more effective at tackling the information market failures and may lead to more opportunities for meters to be installed.

<u>Wider benefits to the UK of the information created</u>

Under options 1 & 2, HNOs will collect data on every block of dwellings or non-domestic buildings that are connected to their networks. However, under option 1, HNOs would not be obliged to report this data to the scheme operator. Under option 2 the reporting requirement combined with the detailed data collection would provide the richest and most complete data set on heat networks. Therefore this option is assessed as performing well against this criterion. Options 3-6 would not necessarily collect information on all buildings on HN systems, and therefore the value of this data would be lower. These options are assessed as performing adequately against these criteria.

<u>Light touch enforcement process</u>

The impact of the enforcement process on the cost to HNOs would depend on the level of interaction they are required to have with the scheme administrator. In this respect, Options 1 and 3 are likely to lead to the most intrusive enforcement for HNOs, as these options would involve a greater number of audits by the scheme administrator. Options 2, and 4-6 are assessed as performing well against this criteria as fewer audits are required as more information will be available to the scheme administrator as a result of the notification requirement.

Scheme administration of the requirements imposes minimal cost

Options 1 & 3 are assessed as performing well against these criteria as the HNOs will not have to notify and report on their assessments. Options 2 and 4 are assessed as amber because under these options the HNOs will need to notify and report on their compliance with the assessment requirements. Options 5 is assessed as not adequately meeting the requirement as this option would entail separate reporting under building regulations for new connections and therefore may increase the administrative burden on HNOs. Option 6 would impose a greater cost on business as the costs of the scheme administrator would be recovered from HNOs.

Enable accurate reporting to the European Union

The UK will have to report on the policy's operation to the European Union. Option 2, 3, 4, 5 and 6 are judged to provide more robust administrative data, which will ensure the UK is fully able to meet its reporting requirements. Options 1 & 3 would not automatically provide data to the scheme administrator to report to the Commission. Therefore a separate survey of HNOs would be required to assess the policies operation.

Table 12: Assessment of options against criteria

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Addresses the information failures	G	G	A	A	A	A
Wider benefits to the UK of the information created	R	G	A	A	A	A
Light touch enforcement process	A	G	A	G	G	G
Scheme administration of the requirements imposes minimal cost	G	A	G	A	R	R
Enable accurate reporting to the European Union	A	G	A	G	G	G

8. Sensitivity analysis

The costs and benefits presented in section 6 require a number of assumptions to be made to address the lack of evidence. These assumptions can significantly alter the costs and benefits of the options. Therefore, this section presents sensitivity analysis to illustrate the uncertainty around the costs. The input assumptions and their levels are shown in Table 13 below, where total NPV and the change from the central scenarios (set out throughout this document) is presented.

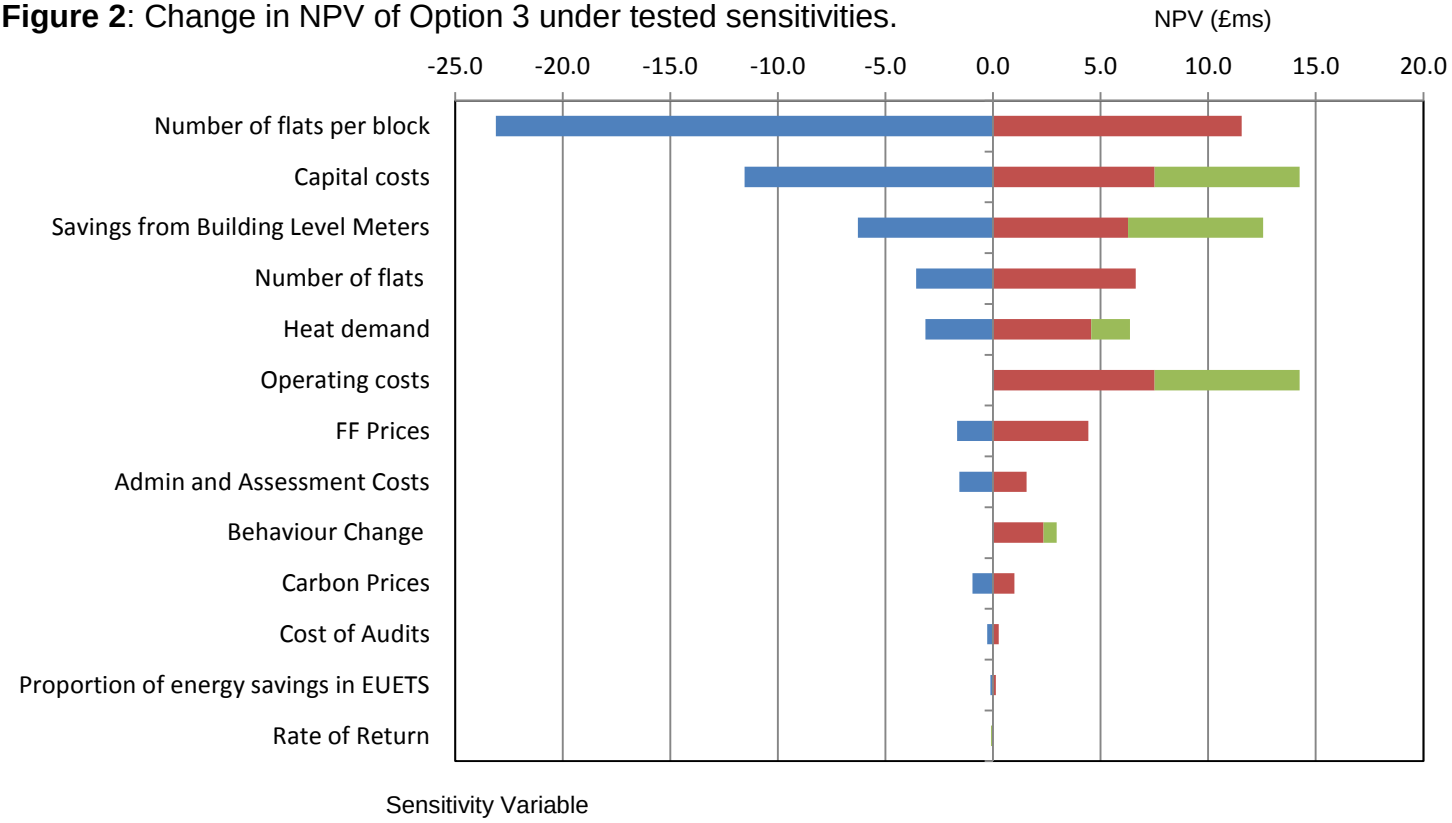
Table 13: Details of sensitivity analysis of Option 3.

Sensitivity	**NPV**	**Change from central NPV**
Option 3 (compared against no-directive baseline)	-21.7	0.0
Low FF prices	-23.3	-1.7

High FF prices	-17.2	4.4
Low Carbon prices	-22.6	-1.0
High Carbon Prices	-20.7	1.0
Behaviour change 10%	-21.7	0.0
Behaviour change 25%	-19.3	2.3
Behaviour change 30%	-18.7	3
Capex +50%	-33.2	-11.6
Capex -25%	-14.2	7.5
Capex -50%	-7.4	14.3
Opex +50%	-21.7	0.0
Opex -25%	-19.3	2.4
Opex -50%	-17.9	3.8
Heat demand -50%	-24.8	-3.1
Heat demand +25%	-17.1	4.6
Heat demand +50%	-15.3	6.4
Rate of return 10.5%	-21.7	0.0
Rate of return 7.5%	-21.7	0.0
Rate of return 3.5%	-21.8	-0.1
Number of flats = 100,000	-15.0	6.6
Number of flats = 200,000	-25.2	-3.6
Number in block = 5	-44.8	-23.1
Number in block = 20	-10.1	11.6
Building level savings = 0%	-27.9	-6.3
Building level savings = 2%	-15.4	6.3
Building level savings = 3%	-9.1	12.6
Cost of audits = £500	-21.4	0.3
Cost of audits = £1000	-21.9	-0.3
Admin & Assessment costs -50%	-20.1	1.6
Admin & Assessment costs +50%	-23.2	-1.6
Proportion of energy savings in EUETS = 0%	-21.5	0.1
Proportion of energy savings in EUETS = 20%	-21.8	-0.1

There are a number of key components to this analysis that change the overall NPV. As shown below in Figure 2, decreased operating costs (of individual meters) and capital costs (of both building-level and individual-level metering) have the potential to improve the NPV of installing meters greatly as a higher number of dwellings become cost-effective to install meters in particular importance to individual meter installation, as there are no cases of cost-effectiveness in our central scenario. Under differing scenarios, where individual meters are installed to meet EED requirements, it is assumed that HNOs make use of these and more to variable consumption-based charging. Other areas of impact are the levels of behavioural change from the installation of meters, savings from building level meters and the number of flats per block; obtaining accurate cost information is crucial to this analysis and option appraisal.

Figure 2: Change in NPV of Option 3 under tested sensitivities.



9. Evaluation plan

The government has committed itself to reviewing the heat metering and billing requirements from 2016/17. This review is likely to include an evaluation of the impacts of implementing the Directive on both a quantitative and qualitative basis. The details of how the evaluation will be conducted are being developed but it is envisaged that the approach will be a phased one, with the obligations that do not apply conditions of technical feasibility or cost-effectiveness, being the first to be assessed.

The key metrics used to assess the impact are likely to include the energy and carbon savings delivered against the number and cost of meters installed. A further phase of the evaluation will consider those requirements that are subject to tests of technical feasibility or cost-effectiveness. The process evaluation would focus on how effective the technical and cost guidance is at ensuring that appropriate assessments are made, and how heat network operators are using the information provided and the interaction with the wider policy landscape. The evaluation will draw on a combination of administrative and survey data.

Annex A: Summary of analytical questions

1) Do you have any evidence that new networks are built with meters installed? Do you have any evidence on the number of meters currently being installed in the UK?

2) Do you have any evidence on the existing level of metering in non-domestic properties supplied by heat networks?

3) Do you have any evidence to support the assumption that it is not common practice for HNOs to separately identify a charge for providing a bill to customers or to provide customers with information on their energy consumption?

4) Do you have any evidence on the potential 'hassle costs' for heat network operators from complying with these regulations?

5) Do you have any evidence to help us revise the estimated time and cost of each activity required to undertake a cost-effectiveness and technical feasibility test?

6) Do you have any evidence on the potential administrative burden to heat network operators from complying with the regulations, and how this may vary between the options?

7) Do you have any evidence on the potential size of the energy savings from installing individual meters, and the lag between installation and energy savings starting?

8) Do you have any evidence on the heat demands of unmetered properties connected to heat networks and how these may differ from the assumed heat demands for metered properties set out above?

9) Do you have any evidence on the capital, installation and annual on-going costs of individual meters?

10) Do you have any evidence on the capital or operating costs of HCAs, and the likely change in consumer behaviour they may induce?

11) Do you have any evidence on the number of buildings connected to heat networks that may already have meters installed at the locations required by the Directive?

12) Do you have any evidence on the capital, installation and on-going costs of building level meters?

13) Do you have any evidence on the potential energy savings for metering at a building level, and the potential energy savings this could generate for heat networks?

14) Do you have any evidence on the number and behaviour of heat network consumers likely to be in fuel poverty?

15) Do you have information on the costs of billing systems for heat networks based on flat charges and actual use? Do you know of cases where both systems of charging are used simultaneously?

16) Do you have any evidence to help quantify the possible 'hassle' costs to HNOs and consumers as a result of complying with the requirements of these regulations?

Annex B: Full text of Articles 9, 11 (and No 13 as applicable to heat metering)

Article 9

Metering

1. Member States shall ensure that, in so far as it is technically possible, financially reasonable and proportionate in relation to the potential energy savings, final customers for electricity, natural gas, district heating, district cooling and domestic hot water are provided with competitively priced individual meters that accurately reflect the final customer's actual energy consumption and that provide information on actual time of use.

Such a competitively priced individual meter shall always be provided when:

(a) an existing meter is replaced, unless this is technically impossible or not cost-effective in relation to the estimated potential savings in the long term;

(b) a new connection is made in a new building or a building undergoes major renovations, as set out in Directive 2010/31/EU.

9.3. Where heating and cooling or hot water are supplied to a building from a district heating network or from a central source servicing multiple buildings, a heat or hot water meter shall be installed at the heating exchanger or point of delivery.

In multi-apartment and multi-purpose buildings with a central heating/cooling source or supplied from a district heating network or from a central source serving multiple buildings, individual consumption meters shall also be installed by 31 December 2016 to measure the consumption of heat or cooling or hot water for each unit where technically feasible and cost-efficient. Where the use of individual meters is not technically feasible or not cost-efficient, to measure heating, individual heat cost allocators shall be used for measuring heat consumption at each radiator, unless it is shown by the Member State in question that the installation of such heat cost allocators would not be cost-efficient. In those cases, alternative cost-efficient methods of heat consumption measurement may be considered. EN L 315/18 Official Journal of the European Union 14.11.2012

Where multi-apartment buildings are supplied from district heating or cooling, or where own common heating or cooling systems for such buildings are prevalent, Member States may introduce transparent rules on the allocation of the cost of thermal or hot water consumption in such buildings to ensure transparency and accuracy of accounting for individual consumption. Where appropriate, such rules shall include guidelines on the way to allocate costs for heat and/or hot water that is used as follows:

(a) hot water for domestic needs;

(b) heat radiated from the building installation and for the purpose of heating the common areas (where staircases and corridors are equipped with radiators);

(c) for the purpose of heating apartments.

Article 11

Cost of access to metering and billing information

1. Member States shall ensure that final customers receive all their bills and billing information for energy consumption free of charge and that final customers also have access to their consumption data in an appropriate way and free of charge.

2. Notwithstanding paragraph 1, the distribution of costs of billing information for the individual consumption of heating and cooling in multi-apartment and multi-purpose buildings pursuant to Article 9(3) shall be carried out on a non-profit basis. Costs resulting from the assignment of this task to a third party, such as a service provider or the local energy supplier, covering the measuring, allocation and accounting for actual individual consumption in such buildings, may

be passed onto the final customers to the extent that such costs are reasonable

Article 13

Penalties

Member States shall lay down the rules on penalties applicable in case of non-compliance with the national provisions adopted pursuant to Articles 7 to 11 and Article 18(3) and shall take the necessary measures to ensure that they are implemented. The penalties provided for shall be effective, proportionate and dissuasive. Member States shall notify those provisions to the Commission by 5 June 2014 and shall notify it without delay of any subsequent amendment affecting them.