CONCERTED ACTION
ENERGY EFFICIENCY
DIRECTIVE

Cost effectiveness of individual metering/billing

Executive Summary Report 3.3

Core Theme 3 – Metering and billing, demand response and grid issues
Working Group 2

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1 Summary

According to the International Energy Agency (IEA), the building sector accounts for more than 35% of the world's total energy demand, "of which 75% is for space heating and domestic water heating". In Europe, the estimation for final energy demand for heating and cooling (49%) is higher than the numbers for electricity (20%) or transport (31%). Cooling, ventilation and refrigeration account for approximately 20% of the overall electricity consumption of a building, depending on climate and geographic location. Where a large number of buildings are heated and cooled from a central source by conveying steam or hot/chilled water through a network of insulated pipes, substantial energy efficiency improvements can be realised by monitoring the energy system and by making users aware of their usage by introducing individual metering & billing.

Many Member States (MS) consider introducing individual metering and billing as a cost effective and quick way to reduce emissions, improve energy security and competitiveness and make energy more affordable for consumers. To help MS ensure this information is provided in a clear and useful way, Articles 9(1) and (3) of the Energy Efficiency Directive (EED) impose the following requirements: 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 be installed by **31st December 2016.** The aim is to measure the consumption of heating or cooling or hot water for each unit, where technically feasible and cost-efficient. Articles 10 and 11 require MS to create rules regarding billing information and the costs of billing homogenisation.

This subject is made more sensitive and complex based on the current situation in each MS, not only because of technical difficulties but mainly because there are many important differences between the MS. Thus, there is no single solution and each MS has to adapt their approach to their reality.

In many studies and, more recently, in several pilot cases where individual energy meters were installed for heating, cooling or hot water, the savings achieved in countries like Poland, Denmark, Germany and the Netherlands is on average 20%. This energy reduction is a result of changes in final consumers' habits, made possible by the information available from the meters. This information is very important when we discuss the assessment of cost effectiveness of individual metering for heating, cooling and hot water.

Most Concerted Action for the Energy Efficiency Directive (CA EED) representatives agree on the same criteria that should be used in the assessment of cost effectiveness of individual metering for heating, cooling and hot water. In general, CA EED attendees believe that, on the cost side, the cost of education of end-users for energy conservation should be added to costs for the meter, infrastructure and installation, meter configuration and meter calibration. On the benefits side, the energy savings should be considered; however, the reduction in consumption depends on the energy quality level of the building (as indicated above, studies and pilot cases indicate an average consumption reduction of 20%).

For some MS, the assessment of cost effectiveness of individual metering for heating, cooling and hot water is negative. CA EED representatives from these MS believe they should invest in control systems or other energy efficiency measures as a priority instead of individual metering for heating, cooling and hot water. However, there were some discussions as regards the critical assumptions used in these assessments (e.g. metering costs).

The main conclusion to be drawn is the clear need to legislate and invest in the combination of control systems and metering of individual metering for heating, cooling and hot water. Where there is a negative assessment of the cost effectiveness of individual metering for heating, cooling and hot water, this combination will reduce the payback period, and the investment in individual meters can be a benefit to the final consumer.

2 Recommendations & Conclusions

2.1 Cost effectiveness of metering

At the Plenary Meeting in March 2014, criteria to establish the cost-effectiveness of individual metering and billing of heating, cooling and hot water consumption were discussed and identified. Some MS are developing guidelines for cost effectiveness. It is too early to share a draft or final version of these guidelines yet, but hopefully this will be possible in the near future. In the meantime, a framework (see table 1) for assessments of cost effectiveness can be considered as a high level alternative for the guidelines under construction.

Table 1: Cost effectiveness criteria

General	Specific	
	Costs	***savings***
1.Cost Elements of Economic Assessment	**I Type of costs:** a. *Installation* costs, including costs for metering and billing b. *Operational* costs, e.g.: - maintenance costs - reading and processing costs - billing costs c. *Costs for measures*, i.e. costs other than operational costs for activities towards consumers to use the meter data to save energy d. *Calibrations costs* **II Cost allocation methods** a. *Cost allocation common units* b. *Need for compensation of inefficient individual units* **III Defining other relevant cost factors** a. *Subsidy opportunities* b. *Tax regime* c. *Depreciation rules*	**I Type of Savings:** a. *Savings at building level* b. *Saving in common units* c. *Savings at individual unit level*
2. Stakeholder Analyses	**IV Relevant issues for** a. *Building Owner* b. *Operator or supplier* c. *End User*	
3. Specific Characteristics	**V Relevant cost issues for** a. *Heating* b. *Cooling* c. *Hot Water*	
4. Situations	**VI Relevant cost issues for** a. *Building with central district heating* b. *Multi-apartment or multi-purpose building with individual units*	

2.2 Lessons from the Plenary Meeting presentations and discussions

The metering projects deployed across Europe can provide the basis for developing a generalised model for implementing metering as an energy conservation measure in each MS. An energy metering system is most useful when installed prior to the identification and installation of energy conservation measures.

So, it seems to be more realistic that the first step should be the implementation of a cost effective energy metering system using a consolidated process which provides guarantees of success.

Interest in and awareness of measuring and - more recently - optimising energy consumption and costs are growing. Whether in the private or public sector, the need to be aware of current consumption is, nowadays, a fundamental premise. Consumers expect it to be possible to control what energy is consumed and where, as it is already possible, for instance, in telecommunications bills, the fuel used in a car or when we buy any product or service.

A first conclusion is that the initial focus of individual metering and billing for heating and hot water is definitely on the residential segment in the EU and it is generally considered to have a significant impact.

Another overall conclusion is that basically all Member States believe that they can learn from other MS. 12 MS state that they can learn from the feasibility studies carried out by other MS, and another 7 MS claim that they can learn from energy efficiency best practice.

All in all, this indicates a high need and good potential for sharing information among Member States (e.g. critical assumptions, costs and expected benefits).

3 Practical Examples

3.1 District heating legal and regulatory framework in Lithuania

Lithuania presented an overview of their approach to metering and billing of heating, cooling and hot water. Different ways of metering and billing were presented. These included situations where consumption is measured only by meters, situations where only correction factors or indicators are applied, and other situations which use a combination of approaches (i.e. real metering data and correction factors / indicators at the same time).

3.2 Study of cost effectiveness of individual heat meters and heat cost allocators in apartment buildings in Finland

Finland demonstrated that individual heat meters would be considered cost effective only if they would drive the occupants to save heat energy by more than 45% in apartment buildings and by 30% in row (terraced) houses. Heat cost allocators would be considered cost effective only if they would drive the occupants to save energy by more than 21 % in apartment buildings and by 14% in row houses. This means that, in 99% of existing multi-apartment buildings, individual heat measurement or indirect cost allocation carries such high costs that it is not possible to cover these costs through the energy savings typically achieved by behavioural changes. According to Finland, it is more cost effective to invest in controlling and balancing the heating system and network, which will bring cost savings with more certainty than devices that affect the system indirectly.

3.3 Considering an approach to metering and billing at a tourist resort in Malta

Malta presented a case-specific situation about the cost effectiveness of individual metering and billing. In the case of a modern holiday resort where tourist rent units, the building owner is less interested in individual metering and billing, as they do not take individual energy costs into account in their pricing methods for tourists. Energy costs are included in the rental price for tourists (which is a widespread practice). The interest of the building owner is in the overall system, where energy savings will result in lower costs and probably in higher margins overall. This means that, in this specific case, individual metering and billing might not be the best choice for achieving energy efficiency. Malta demonstrated that investments in the overall efficiency of the system can a sense making alternative for investments in individual metering and billing.

3.4 Customer-friendly Individual Heat Metering in the Netherlands

The Netherlands presented that true individual metering and billing implies that so called ‘reductions’ should be eliminated. These reductions, which are a way of socialisation of energy inefficiency, have a substantial impact on the individual energy bills of consumers. A pilot study among some 100 households in two different apartment blocks showed that removal of ‘reductions’ may result in doubling the energy costs for households that, for example, live on the top floor and east side of the building (which are usually the coldest units in a multi-unit building block). There is nothing wrong with true individual metering and billing, but there is a risk of fuelling a broader discussion about the affordability of energy for vulnerable customers. In the case of so called ‘social rental apartments’, it is currently not a common practice to take differences in energy costs into account. Both rental corporations and consumers should learn to start taking individual energy cost differences into account when they are defining the affordability of a unit.

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Legal Disclaimer

The Concerted Action for the Energy Efficiency Directive (CA EED) was launched by Intelligent Energy Europe (IEE) in spring 2013 to provide a structured framework for the exchange of information between the 29 Member States during their implementation of the Energy Efficiency Directive (EED).

For further information please visit **www.eed-ca.eu** or contact the CA EED Coordinator Lucinda Maclagan at **lucinda.maclagan@rvo.nl**

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