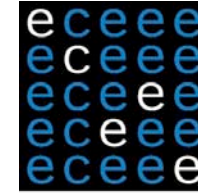




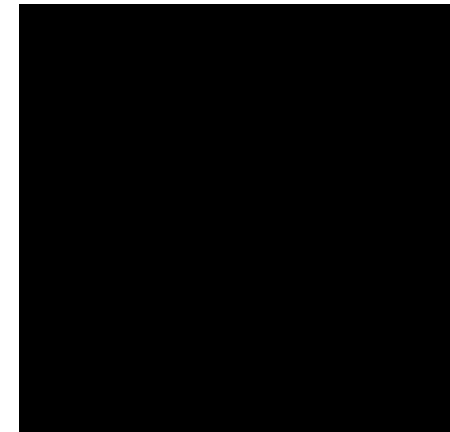
Evaluation of water and energy metering and monitoring practices in European local authorities

Vasco Ferreira

Paul Fleming



european
council for an
energy efficient
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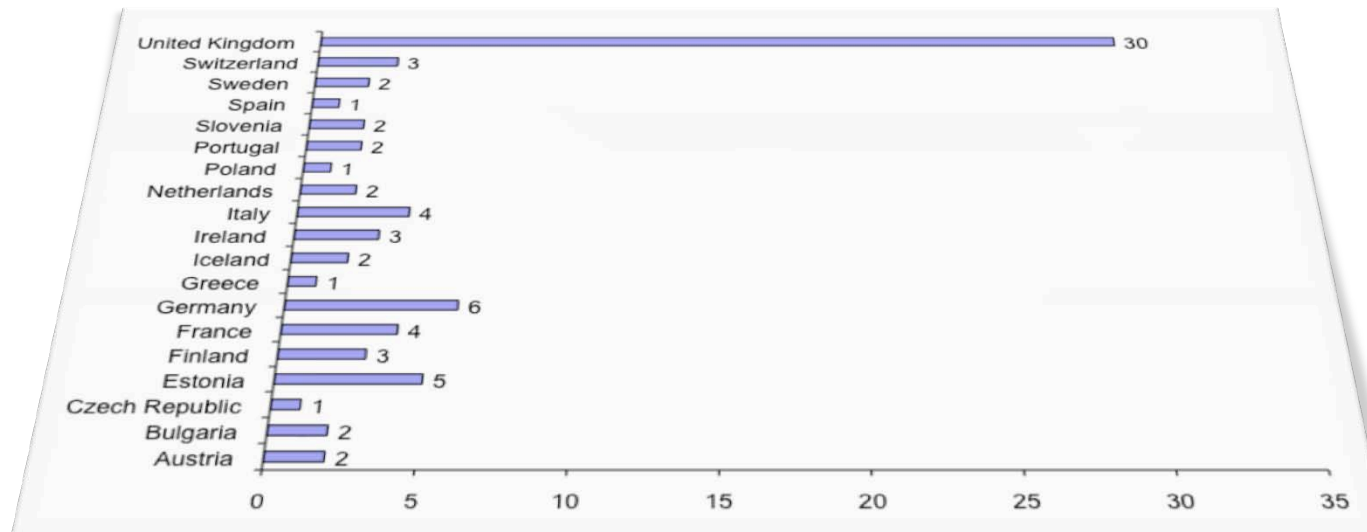


+ Survey

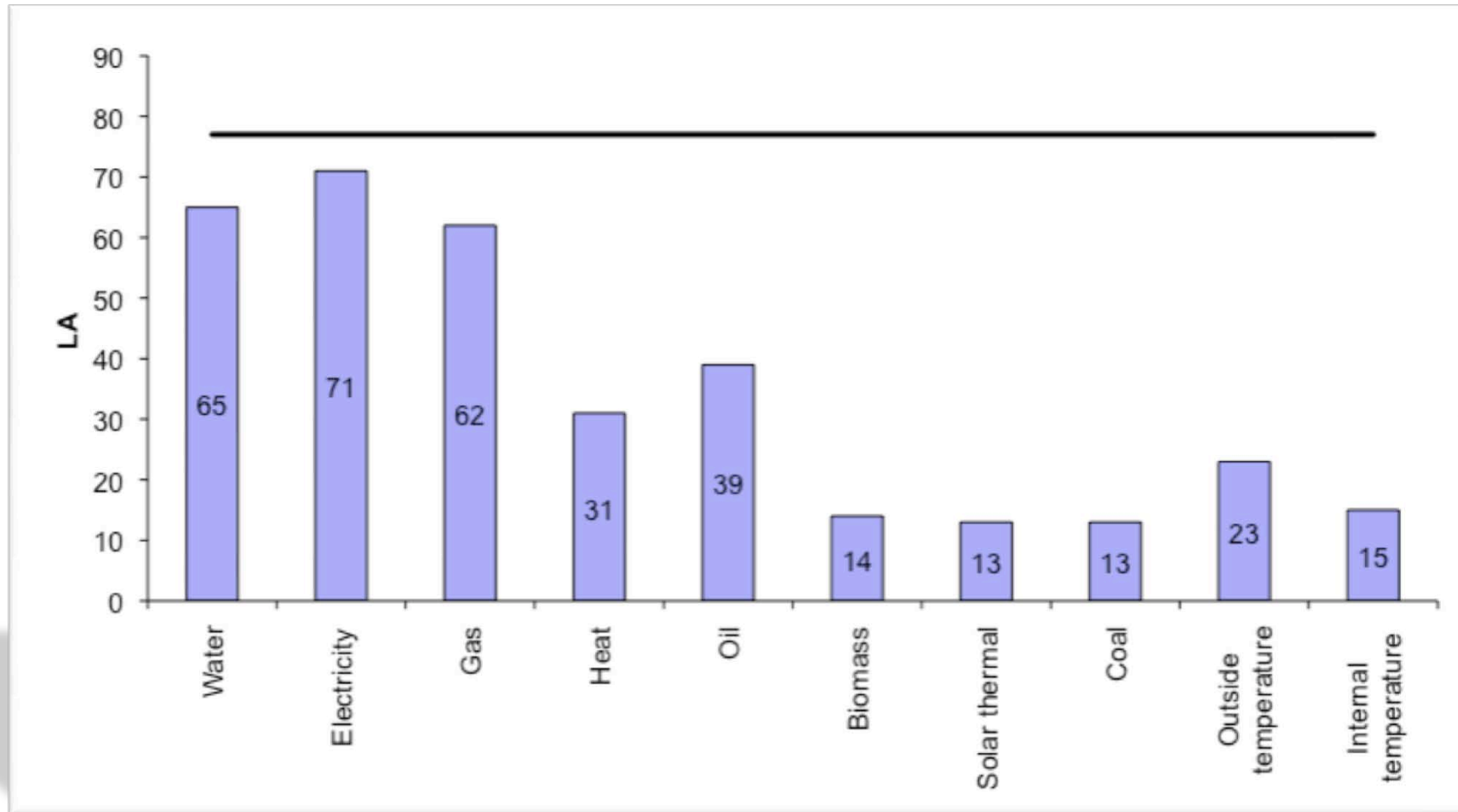
- ❑ (smart or not so smart) Metering and monitoring building water and energy consumption is becoming an important aspect of building energy management;
- ❑ PhD programme on analysis of short time series (sub-hourly) energy consumption data;
- ❑ Survey to investigate what is happening in the field – energy and water metering and monitoring practices in European municipal buildings;
- ❑ All survey answers were from voluntary respondents informed through different European networks of cities: Energie-Cites, ICLEI and CEMR.

+ Survey

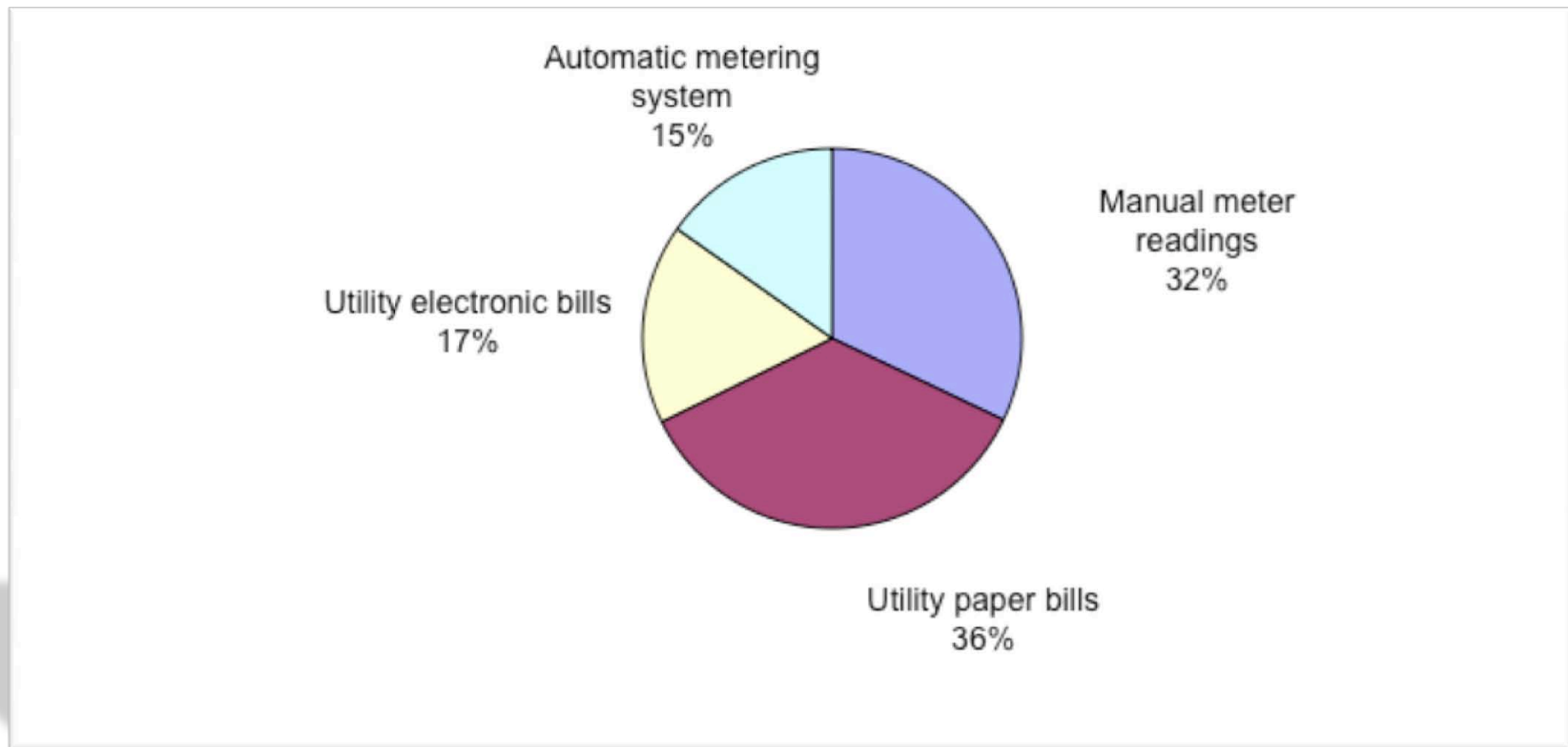
- The survey had a total of **76 respondents** from **19 European countries**,
- Representing energy and/or water consumption in over 63,000 municipal buildings.



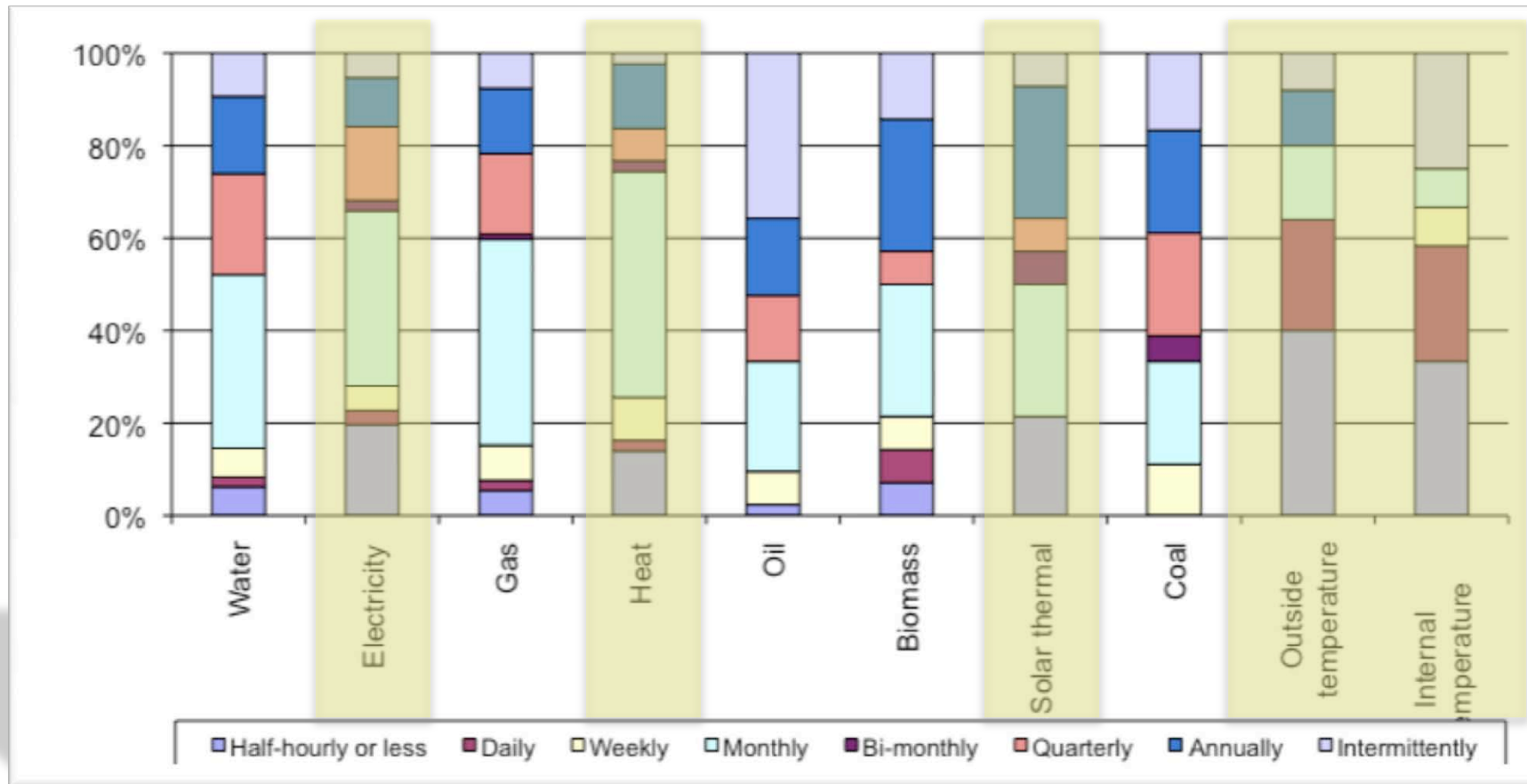
+ Data collection



+ Data collection system



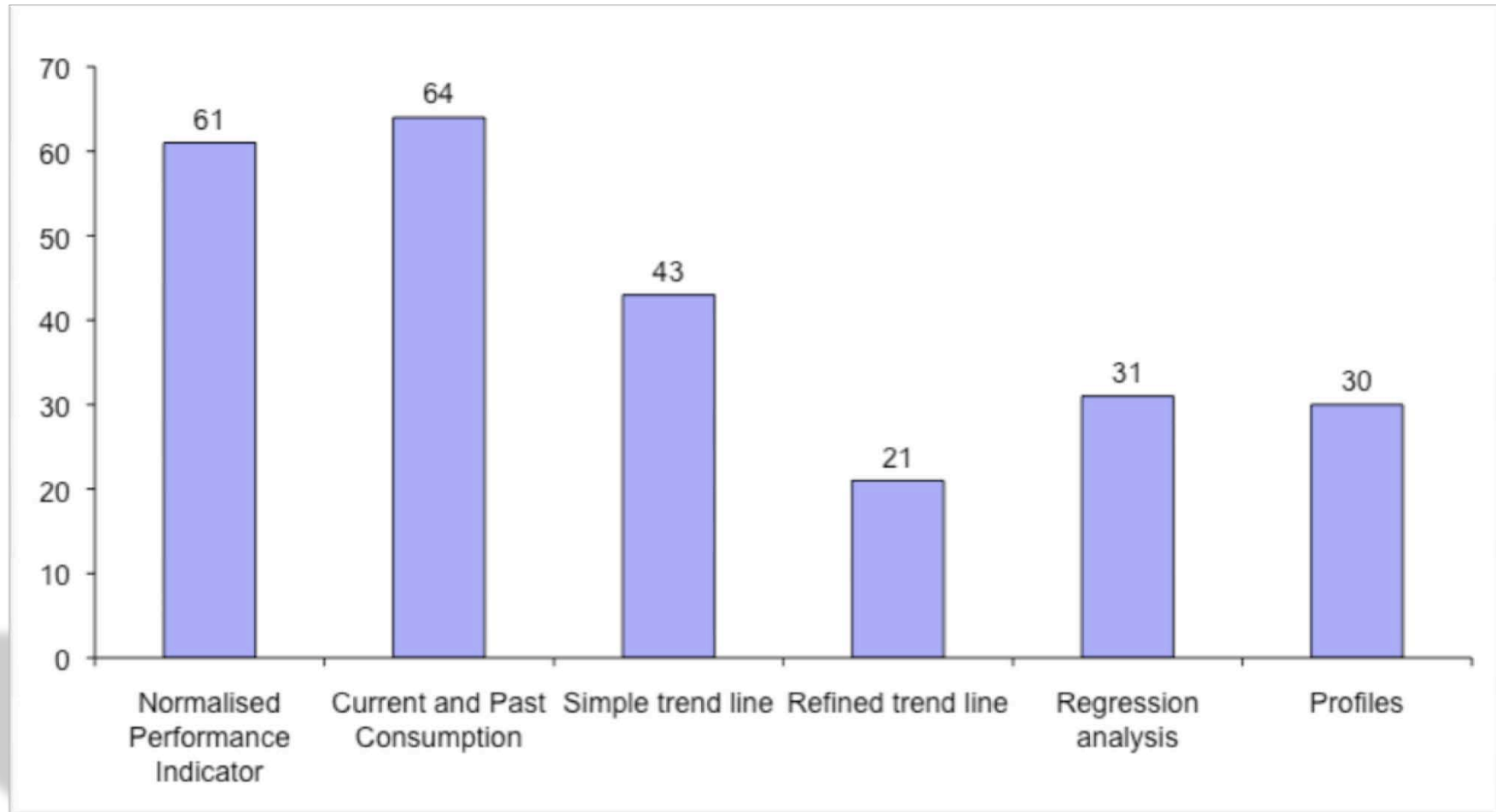
+ Data collection frequency



+ Applications of collected data

- ❑ To identify excessively high levels of consumption in normal use (61);
- ❑ To verify utility billing data (59)
- ❑ To monitor unusually high or low consumption to identify energy wastage (58);
- ❑ To measure and verify energy/water savings measures (55);
- ❑ To communicate with buildings occupants in order to change behaviour (51);
- ❑ ...
- ❑ Not effectively used (11).

+ Data analysis



+ Energy manager needs - metering

- ❑ Automatic metering, constant monitoring and real time data;
- ❑ Accurate data (not estimated);
- ❑ Data management and secure databases;
- ❑ System with flexible data import facilities: manual, invoice, electronic data from utilities and automatic metering.

+ Energy manager needs – data analysis

- ❑ Normalised Performance Indicators, and EPBD;
- ❑ Benchmarking for costs, energy, water and carbon emissions (local and standard);
- ❑ Historical comparisons, current and past consumption;
- ❑ Weather adjustment and building energy signature;
- ❑ Tariff analysis, billing verification and budget forecasting;
- ❑ Visualisation of data;
- ❑ Exceptions reports, targeting, alarm;

+ Energy manager needs – other features

- ❑ More automated analysis;
- ❑ Easy to use software with user-friendly interface;
- ❑ Suitable report templates and custom reporting;
- ❑ Report in units that people understand (money, amount of light bulbs, etc.)

+ Conclusions I

- ❑ Typically data is collected in monthly periods, from paper bills and manual meter readings;
- ❑ Data is stored in computer databases and analysed using Excel and commercial software tools;
- ❑ Short time series data, is not yet very frequently used, only about 15% of the municipalities in the study have technology that generates this data.

+ Conclusions II

- ❑ Techniques used by energy managers (including the ones featured in commercial software packages) are not sophisticated enough for dealing with large volumes of data;
- ❑ Energy managers need an easy to use, straightforward, and as much as possible automatic software tool to analyse building energy data.

+ Further research

- ❑ Further research on automating metered data analysis;
- ❑ Support for data analysis interpretation and to improve building performance assessment using smart meter data;
- ❑ For example: New benchmarks for identifying potential energy saving opportunities... Focus of the PhD research!!

+ **Thank you!**

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