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A simple and effective energy-auditing method for SMEs

Researchers have developed a straightforward approach to help small to medium enterprises (SMEs) analyse their energy use and increase efficiency. They tested the methodology on 280 businesses in Europe, which, as a result, invested more than €10m in energy-saving measures. The measures reduced energy use by 6 500 toe (tonnes of oil equivalent) per year and avoided 13 500 tonnes of CO_2 emissions.

The European Energy Efficiency Directive[1] requires energy audits to all large enterprises across Europe. SMEs are not subject to this mandatory requirement and are deterred by the fees charged by professional energy-audit consultants. As SMEs, which generate 60% of European GDP, represent an enormous energy-saving potential for the Union[2], tools to help them address energy usage are a priority.

Reviewing previous studies[3], the researchers found that the key barriers to implementation of energy-saving measures are the cost of investment and low returns. Other barriers identified were a lack of in-house technical knowledge and awareness of energy costs. For example, a 2016 survey of 2.5m small businesses in the UK found that more than half did not know how much they spend on utility bills[4].

As reducing costs would be a key motivation for energy efficiency, the researchers decided to use an energy-modelling approach to present the business case for change. In order to do this, they drew on the model developed by the EU PINE project (Promoting industrial energy efficiency)[5], aimed at industrial SMEs. The PINE model pinpoints the drivers of energy consumption in an organisation, rather than offering them a long energy-auditing manual.

In the researchers' methodology, the audit begins with initial meetings and questionnaires to identify energy-intensive areas of the business. Data is then collected on energy use, using existing accounts, equipment data, hours of operation and electrical load data. Energy use is allocated to 'unit operations' of the business — for example, spray drying, which uses several pieces of equipment, is a single unit. Efficiency is assessed by comparing inputs and outputs, and detecting any leakages or faults with equipment that may cause energy loss.

Based on the data, compiled on a spreadsheet, this audit process connects energy use and the reasons driving its consumption. Finally, a report with suggestions for energy saving has been produced.

To test whether the methodology would convince businesses to implement energy saving measures, the audit was applied to businesses in Austria, Bulgaria, Cyprus, Italy, Romania, Slovakia and Spain, representing a variety of industries from mining to food processing. On average, the study found that the businesses could make savings of 5% on their energy demands.

Some of the energy-efficiency measures identified cost nothing to implement; for example, making good use of existing systems and switching off equipment when not in use. Other suggestions would depend on innovative technology, for example solar thermal systems, which require high investment.

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1. Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency

2. Ibid.

3. e.g. Sorrell, S., Schleich, J., Scott, S., O'Malley, E., Trace, F., Boede, E., Ostertag, K. & Radgen P. (2000). *Reducing Barriers to Energy Efficiency in Public and Private Organisations*. Report to the European Commission, available at http://www.sussex.ac.uk/Units/spru/publications/reports/barriers/final.html

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A simple and effective energy-auditing method for SMEs *(continued)*

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Building refurbishment (e.g. installing insulation) and heat recovery from production processes were shown to have the highest potential for achieving savings on heating, which accounts for 70% of total potential energy savings on average. For example, Austrian company IMR Metallverarbeitungs GmbH, a metal-processing business, consumes 2 905 megawatt hours[6] of electricity annually. The auditors proposed a lid to conserve energy in the furnace, saving 12% of energy in this process, and using waste heat to pre-heat and dry products, saving 20% of total electricity required.

Efficient control of electrical equipment, optimised lighting and use of compressed-air systems made up more than 50% of potential electricity savings in the study. Installation of smart meters to monitor and control consumption, with sub-meters on specific equipment was also shown to be crucial, with some companies already using these.

Most companies committed to measures that would see their investment paid back in under three years. The study found that production-sector SMEs looked for payback within one year, while those in capital-intensive sectors would accept a longer payback period of three to four years. All looked for added value from investments, for example replacing old machinery.

The businesses gave positive feedback on the audit. However, the researchers noted that measures that would lead to higher savings of up to 25%, were unattractive to the companies due to the cost of investment required, suggesting that grants might encourage them to make changes. Paradoxically, among the businesses studied, there was limited uptake of the available financial support schemes for energy efficiency (which exist in all seven countries involved in the project); this is, perhaps, because cheap energy prices or low consumption lead to the monetary savings actually achievable — being low.

The flexible methodology is compatible with energy audit standard ISO 16247 and offers a guidebook and auditing tools in seven languages. Crucially, the researchers found that working with industry associations trusted by SMEs improved programme participation. Governments could, therefore, consider offering incentives for business associations to actively encourage SME energy efficiency.

4. Utilitywise: https://www.utilitywise.com/2014/10/03/small-businesses-missing-out-on-energy-savings/

5. Promoting Industrial Energy Efficiency (PINE) was funded by the Intelligent Energy Europe programme, run by the Executive Agency for Competitiveness and Innovation, which has since become the Executive Agency for SMEs, on behalf of the EC: http://ec.europa.eu/energy/intelligent/projects/en/projects/pine

6. 1 megawatt hour is equal to 1 000 kilowatts of electricity used continuously for one hour.