

What prevents organisations from implementing energy saving measures?

Case studies of Norwegian public and commercial companies

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Keywords

Demand Side Management, network planning, end-users, motivation, energy saving, peak load reduction, network tariff

Abstract

The background for this project is analyses conducted in an industrial area with a capacity problem concerning electricity supply. To cope with the problem the network operator, in cooperation with the Norwegian Research Council, executed a project focusing on how to reduce peak loads and energy consumption. Technical and economical analyses of energy efficiency actions were offered to 40 companies and 20 out of these decided to implement the proposed actions.

Two years later, 7 out of these 20 companies had not implemented the suggested actions or the starts were delayed. These cases were analysed based on personal interviews. The goal was to study the reasons for *not* implementing actions or for the delay. Most analyses of this kind analyse successful implementations. Here, however, the research issue is why organizations choose not to implement solutions that make sense, both economically and technically?

Results suggest that information overload, bad timing, lack of personal address and formal responsibility for the report hindered companies from using the report as a basis for decision-making. Different aspects of financial management systems, such as rigid routines not allowing means for investments and aversion of less predictable costs, also hindered implementation.

Despite these findings several organisations do have interest in energy saving and consumption, personnel that takes responsibility and financial incentives for reducing en-

ergy costs. Although the study is based on only a few cases to draw sound conclusions there are indications that, targeting the right organisations, energy efficiency is an interesting alternative to increasing power capacity.

Definitions (Glossary)

Several concepts are used in this paper. These concepts are defined as follows:

ENERGY AUDITING

Energy analysis accomplished within the end-users building. Mapping all kind of energy consumption both electrical and other carriers. Energy consumption and historical peak load for the actual building are compared to similar buildings and a similar group of end-users. All possible energy efficiency actions are localized and a cost-benefit analysis regarding all possible actions is carried out.

ENERGY EFFICIENCY ACTIONS

Actions which improve the end users energy consumption with regard to the volume (energy saving), the time/profile (peak load reduction) and the characteristics (choice of energy carrier).

DEMAND SIDE MANAGEMENT ACTIONS (ABBREVIATED AS DSM-ACTIONS)

Energy efficiency action accomplished by the end users i.e. management on the demand side. The end-user adapts his consumption to the existing capacity of the electricity grid.

BUILDING AUTOMATION SYSTEM

Control system with the possibility to control the consumption of energy and power for each installation in one or several building(s).

NETWORK OPERATOR

In the deregulated Norwegian power market sale and transmission of electricity are separated in two parts. The monopoly part concerning transmission of electricity to the customer is performed by the network operator. The power supplier sells the power to the customer.

Introduction

The steady growing problem of capacity shortage in electricity production and transmission in Norwegian power industry has served as a push for developing technical solutions that can increase consumer flexibility and reduce load factors. The experience from different DSM-projects in Norway shows, however, that the implementation of these solutions on a larger scale meets serious obstacles such as low interest and lack of commitment from end-users. The technical solutions have had too little focus on actual needs and wishes from end-users (the “what’s-in-it-for-me”-argument). When the network operator experience customers who withdraw from projects, customers who wish to partake but do not contribute in projects, and experience difficulties in recruiting new customers, it is a strong signal that better understanding of customers’ needs is necessary, both for households and commercial customers.

A research project named “Implementation of Demand Side Management” was conducted in the period 1998-2001 (Lund et al. 2001). In this project 40 commercial customers in an industrial area, outside a large Norwegian city, were offered an energy efficiency analysis. 34 of the customers accepted this offer. Based on the proposed actions 20 customers decided to implement these actions. 7 out of the 20 participants signed up, chose not to go through with the actual recommendations.

A new research project named “Improving end-user knowledge for managing energy loads and consumption” was established to i.e. study the problem why companies did not implement recommended energy efficient actions, and what specific characteristics of these customers could explain why actions were not implemented. The study showed that several of the customers had executed a number of actions, but the actual implementation was for various reasons delayed. The approach was therefore extended to both include the reasons for not implementing actions and the reasons for the delay.

The objective of this study was to describe the situation for the different companies. This was presented in a descriptive report (Hagen et al. 2004), which is the basis for this paper.

According to a growing number of studies, the level of energy efficiency among end-users is well below both a technological and a economical optimum (cf. Eyre 1998). Furthermore, as Decanio (1998) note, the modern, profit-maximising firm, “*should be risk neutral [...] and should invest in all projects having a positive net present value[...]*”, but does not implement energy saving projects with an annual return

exceeding 20-30%. This is what Decanio designates as *the efficiency paradox*. In our material the proposed actions are all cost-efficient. In Decanio’s study, a number of organizational and institutional factors are seen as the important, but often overlooked barriers that hinder implementation of energy saving actions. Factors pointed at are i.e. timing, business sector, and organizational type. This is more precisely stated by Bansal (Bansal 2003), who addresses how (environmental) issues are handled in organisations. Bansal points at the importance of having a “champion” who is connected to decision-making and is able to state the issues plainly and rationally.

This paper aims to do two things; first, based on these studies to try to translate these issues to the Norwegian setting, second to take a qualitative look at decision-making based on the factors mentioned.

Background for analysis

First a description is given of the comprehensive efforts that are made to help the customers making the best decisions to achieve lower loads and energy efficiency.

ENERGY AUDITING REPORT

The project arranged introduction meetings where all customers were offered an energy auditing report to be performed. The reports were prepared by different external energy advisers. If the customers already had completed such a report or done similar evaluation of the energy consumption, the project offered the customers an upgraded report that included evaluation of possible energy efficiency actions as regards to the technological development (e.g. building automation systems). The purpose of the report was to help the customers finding the possible actions, making the most out of existing municipal subsidy arrangements, and analysing costs and benefits of each action. If the end-user recently had completed energy efficiency actions or if the end-user in the near future had plans for rehabilitation or extension of buildings this was considered in the report. 40 customers were offered an energy auditing and 34 decided to order such a report.

SUBSIDY

The report was almost cost-free for some participants and entirely cost free for others. Dependent on the requested level of accuracy of the evaluation of actions, the customers could enlarge the scope of the report, by choosing a so called main report which involved paying 20% of the report costs. Among the six customers analysed in this article only two of the customers chose a so-called main report (enlarged report).

The payment for the energy auditing report could be subsidised from two different sources. The first was the existing subsidy arrangement from the city of Oslo which funded energy efficiency actions up to 30% of the action cost. In addition the project also offered subsidy to customers that had a considerable potential for peak load reduction. The requirement to achieve such an extraordinary subsidy was that the peak load reduction was realised within the winter months December-March and that the total subsidy from the project and from the municipality did not exceed 50% of the imple-

mentation cost. The extra subsidy was also limited to 200 NOK (25 Euro) per reduced kW.

PRICE SIGNALS – NETWORK TARIFF

Today the electricity price in Norway consists of three parts: energy price per kWh, network tariff (see Table 1) and taxes (per kWh and VAT in %). Most commercial customers in Norway have an energy price which follows the spot price¹ in the competitive Nordic power market, NordPool. This energy price constitutes about 30-40% of the total electricity price, while network tariff constitute about 30-40% and the taxes about 30%. The six analysed customers in this paper were not given any extra price signals. The customers had an energy price which followed the spot price and a network tariff, described in the following table.

The network tariff consists of a fixed part, a power part and an energy part. The power part is defined from the single hour of maximum peak load during the calendar year and is quantified by a gradual price interval. The energy part is seasonally variable with four week periods.

Method

The collection of data was performed by interviews with relevant representatives from the companies, based on a structured interview guide. The representatives were mostly persons with decision-making authority within the company. The interviews were performed in the summer 2003. One interview was only partly used in the analysis because the representative did not have knowledge about the current topic.

The focus in the interviews was on how the evaluation of proposed energy efficient actions was handled in the organisation. Important topics were i.e. organisational characteristics, experienced barriers and foundation or lack of foundation in the organisation.

Companies in the CASE studies

COMPANIES

An anonymous and brief description of the six different companies included in the study is presented below.

Public prison



Company; One of six prisons in a Region of Norway. Controlled by the Ministry of Justice.

Decision-making process; The Finance Ministry determines the financial budget for the Ministry of Justice, which further determines the financial budget for its subordinates, such as prisons.

Budget process; The Prison is restricted to keep a balanced budget. Reduced costs for energy consumption can be transferred to the next year, supposed the budget contains no negative numbers. Normally the prison’s total budget will be in balance, and reduced costs on some posts will be used for extra investments or to cover posts with negative numbers. All investments except normal maintenance have to be specified as a specific post in the budget. This also includes energy efficiency actions.

Completed energy efficiency actions; New windows (due to maintenance), improved insulation at the attic, new control valves and an agreement with power supplier concerning Building Automation System.

Private rental company



Company; A small family owned company letting out commercial buildings. The building in question has two different renters; Renter 1 is exposed to strict environmental requirements, while Renter 2 is a polluting engineering industry. Renter 1 has focus on energy- and power saving ac-

Table 1. Network tariff to commercial customers in the Norwegian city, year 2001.

Type of network tariff	Grid level	Fixed price (Euro/Year)	Power load interval (kW)	Power load price (Euro/kW)	Energy consumption price (Euro/kWh)			
					Week no 2-14	Week no 15-27	Week no 28-40	Week no 41-1
Ordinary tariff for commercial customers	230 V Or 400 V	689	0-200	53	0,0127	0,0057	0,0034	0,0048
			200-1 000	45				
			> 1 000	37				

1. The spot price is calculated on an hourly basis in the Nordic power market (NordPool).

tions and proposes new requirements, while Renter 2 has not.

Decision-making process; A short procedure for decision-making. The person with operational responsibility suggests actions to the manager, who presents the actions to the board.

Energy efficiency; For the company it is more important with actions that increase the value of the building, than just evaluating the payback period. In the rental market steady income is important before making investments.

Completed actions: New windows in ground and first floor. Investment in a Building Automation System was found too expensive.

Municipal nursing home



Company; A municipal nursing home. Part of the Norwegian city where the analysis is performed.

Budget process; The budget is discussed internally before it is presented for the city ward council in December. Decisions are performed by the head of section at the nursing home. These are presented to the civil servant in the municipal organisation, and further to the director of finance. Final decisions are performed by the city ward council. Efforts smaller than 150 000 NOK (18 750 Euro) can be decided by the head of section at the nursing home.

Electricity costs; In 2002 the nursing home saved 250 000 NOK (31 250 Euro) in electricity costs, compared to the budget, but then they did not profit themselves from these savings. Presently the nursing home gets the saved money.

The nursing home has a focus on their energy consumption and they read the electricity consumption on Mondays. The employees have participated in workshops, which made them more focused on their electricity consumption. The contracting concerning electricity is performed centrally in the municipality. The nursing home's only relation to the power supplier and the network operator is the quarterly reception of the bill.

Energy efficiency; During recent years (before the interview) the nursing home has made some extensions. In connection with this work several of the ovens were replaced, and a timer was put on the kitchen ventilation. A number of energy efficiency actions were proposed during this building period, however only a few smaller actions have been performed.

Private import firm

Company; A private import firm. British owners control the firm within strict financial limits. The company rent the location from the previous owners. The rental contract has a duration of three years. When the interview was performed, renewal of the rental contract was not decided.



Budget process; All investments larger than £500 (800 Euro) have to be decided by the board.

Electricity costs; There is little focus on the electricity consumption, because the industry is not energy intensive. Reduced electricity costs will result in better profits for the owners, which could make room for more energy-efficiency investments.

Energy efficiency; The owners of the company require all investments to be paid back within 2 years. Because of this requirement, none of the recommended energy efficiency actions were regarded as profitable. Several efforts are on hold due to short durability of the tenancy agreement. A longer tenancy agreement could secure the profitability of the actions.

Completed actions: Windows in specific parts of the building have been replaced, weather strips have been put to use and the control system of the ventilation system has been replaced.



Private wholesale dealer

Company; Has changed from a government-owned public company to a company with a private, foreign owner.

Budget process; The new foreign owner is focused on profitability, and the dealer gets money for investments that can be justified and proved. The budget process is continuous, with all actions individually evaluated – even if they are already approved in the budget. Due to the long budget process, a five years plan for investments is wanted.

Electricity costs; The dealer has entered into a power contract with a fixed price for the electricity used for lighting (50% of total) and a spot price for the electrical boiler used for heating (other 50%). The company focuses on peak load costs and not on energy costs.

Energy efficiency; The proposed energy efficiency actions were turned down due to some internal circumstances and long pay-back time. In connection with a reorganisation the company wanted to make investments to increase the well-being for the employees instead of energy efficiency actions. This might indicate a misunderstanding of the intention of energy efficiency actions which also involve increased comfort. If the dealer reduces electricity costs, the savings are only shown as reduced budget for the next year.

Completed actions: New luminous tubes are installed in existing fittings (recommended as an energy efficiency action, but actually done for environmental reasons due to content of PCB). Existing machinery is 30 years old and will be replaced during the coming five years. This will probably result in reduced electricity consumption.



Public training institution

Company; A state university college.

Electricity costs; Rent instead of ownership was introduced in 2002, which implies that the training institution is not responsible for the buildings, but rents them from the state. In addition to the rent, the costs for energy consumption are paid for by the renter. The institution does not receive invoices on the energy costs from neither the network operator nor the power company. The energy costs are determined in the budget – based on expected consumption of electricity and district heating – and subsequently adjusted the following year.

Energy efficiency; The owner of the building performs the energy efficiency actions, but they expect that the training institution sees to these actions. To perform such actions, a specific budget has to be allocated and pay-back periods less than 5 years are important when prioritizing different actions.

The students at the training institution seem indifferent concerning the energy consumption because of unnecessary use of lighting.

Completed actions; Rehabilitation of the district heating plant, arrangement of an awareness campaign concerning

energy efficiency and implementing control system for lighting.

PROPOSED ENERGY EFFICIENCY ACTIONS AND PAYBACK PERIODS

Proposed energy efficiency actions for the different companies and the payback periods are presented in Table 2.

Operating related actions

Energy follow-up are proposed for all the different companies, and this is also the kind of action that has the lowest pay-back time. *Energy follow-up* involves training of production workers and introducing systematic, weekly controls of the energy consumption of the building. Increased information on energy consumption will probably result in reduced consumption. An insecurity related to this action is that the results are dependent on the person(s) responsible for this.

Instructions for management and maintenance are recommended for four of the studied companies. This action requires restructuring/documentation of routines to be able to use different installations in the most energy efficient way.

Technology related actions

Building Automation System was proposed for five of the studied companies. The estimated pay-back time was more than 10 years or even infinite. A Building Automation System makes it possible to control the energy consumption for different installations, but this action in most cases requires huge investments in technology.

Peak load reduction actions, Time control of electric heating and Control system for lighting were proposed for three of the studied companies. These actions influence directly the electricity consumption and they require investments in control systems, in a simpler version than for the Building Automation System.

Table 2. Energy efficiency actions proposed in the energy auditing reports.

Proposed actions	Public Prison	Private rental company	Municipal nursing home	Private import firm	Private wholesale dealer	Public training institution
Energy follow-up	0,5	0,9	0,7	0,5	X	0,2
New ventilating system	∞					
Building Automation System	∞	>10	∞	>10		10
Thermostat on radiator	17,8					
New windows	∞					
Instructions for management and maintenance		6,8		3,7	X	0,8
Peak load reduction efforts		3,1	3,5	9,0		
Time control of electric heating		8,7	4,4	>10		
Control system for lighting		2,6	1,2	>10	X	
Weather stripping for windows		1,2				
Energy efficiency shower						0,8
Energy recovery in the ventilation system					X	
Time control of ventilation system					X	
Regulation of electrical boiler during the summer					X	
Energy efficiency light bulb				>15	X	

∞ = Infinite payback period;

X = Payback period is not given

Analysing obstacles for implementation

The focus of the analysis has been on why the six different companies involved in the study did not implement proposed energy efficiency actions or the reason for the delay of implementing actions. This question could be answered through a closer look at the following themes:

- A. How the Energy Auditing report was received in the company
- B. Placing of the responsibility for energy efficiency actions
- C. Economy
- D. Decision-making processes

Each of these themes is further examined in the next four sections.

A. HOW THE ENERGY AUDITING REPORT WAS RECEIVED IN THE COMPANY

Evaluation of how the report was received in the company is important when explaining why the companies waited so long before performing the proposed actions. As stated by (Bansal 2003), to find the right addressee is central to the success of the action. The destinies can be summarised in the following four to-the-point formulations: “*Yet another document to consider*”, “*Missing addressee*”, “*Good ideas but at the wrong time*” and “*Good ideas at the right time*”.

It is important to mention that 4 of the customers did not pay for the Energy Auditing report and that 2 of the participants paid a small share of 20% of the cost to prepare the report. If the participants themselves had taken the initiative for the reports and paid 100% of the report costs, they would probably make stricter requirements concerning the content, and also be more motivated to read the report and perform the proposed actions. The 2 participants that required a more precise evaluation of recommended actions paid 20% of the costs and received an enlarged report.

Yet another document to consider

The opinion that the Energy Auditing report is *yet another document to consider* in an already busy working day is the most common one. The intentions are good when receiving the report, but the days are too busy to do something about this. The content of the report and proposed actions will probably never be discussed.

Different reasons for not considering the report are:

- The company has no experience and routines for evaluating inputs from the report. The company has changed to a foreign owner, and nobody knows the routines for proposing energy efficiency actions. Other reasons are uncertainty concerning the calculations in the report, as well as finding the report is too comprehensive and hard to read.
- In one company there is lack of communication and routines for distribution of the information in the report. The Operational Manager has not received the report.

Missing addressee

Another reason for not reading the report and evaluating the proposed actions is that there was no clear addressee for the

report in the company. Nobody knew who was responsible for following up this topic. This was visible in one particular company, where nobody had this responsibility in his or her job instructions.

Good ideas but at the wrong time

In one company they were interested in the Energy Auditing report, but the timing of the report was not good. The company was expanding their building stock, and the building process had advanced too far to use the report as an additional initiative. It was also difficult to discuss this with the representative builder, because he was exclusively dealing with the buyers of the buildings at municipal level. The report was therefore not studied before the buildings were finished.

Good ideas at the right time

In many companies the Energy Auditing report will only be studied when the electricity consumption is on the agenda for example in connection with an upcoming maintenance period. One example is the private rental company that before receiving the report had got signals from an attractive, environmentally conscious renter, that the environmental profile of the building should be improved. An extended Energy Auditing analysis was ordered, and this extended analysis was the reason for the delayed implementation of proposed energy efficiency actions.

B. WHERE IS THE RESPONSIBILITY LOCATED?

The destiny of the Energy Auditing report and implementation of actions are dependent on a targeted addressee in the company. Somebody has to be responsible for putting energy efficiency on the agenda.

Four different kinds of responsibility were visible in the data material: “*Team*”, “*Top executive*”, “*Absent*” and “*Pragmatic*”.

Team

In companies where several persons are spokespersons for energy efficiency and are setting this on the agenda, there is a team responsibility. This is when persons on different levels in the company are active. The responsibility is often attached to a person/job, but additionally several people are interested in the theme.

One company established an agreement concerning energy efficiency actions and financing of a Building Automation System through the power contract. To link the project at different levels in the company, the power supplier invited different persons from the company to information meetings and workshops. Both executive director, management responsible and personnel manager become spokespersons for energy efficiency.

Top executive

The top executive is a central actor concerning priorities of the company. Projects linked to the top executive will often be put on the agenda and realised. The company that had ongoing construction work when the report was finished had a leader involved in energy efficiency. Even if it was not possible to influence the construction company to include energy efficiency in the current working plans, the manager

started energy efficiency actions after completing the building project. The motivation for the manager was mainly based on the argument that the electricity cost was a too large part of total operating costs.

Absent

In several of the studied companies no person responsible for energy efficiency was appointed. Energy efficiency is not formalised or assigned to specific tasks, and nobody has this as a criterion for evaluating their job. In one company this was shown as neither the owner nor the executive director was focusing on energy consumption.

Pragmatic

The responsibility for energy efficiency is not assigned to any formal structures or specific persons, but it will be visible when the situation so requires. An example is the private rental company where a solvent renter more than indicated that implementing energy efficiency actions would make the premises even more attractive for them.

C. ECONOMY

Both in the literature and among policymaker, economy is the most important factor when evaluating energy efficiency actions (cf. (Strøm-Erichsen and Olje- og energidepartementet 1998). And, accordingly, the most important motivation for implementing actions is the possibility to reduce costs. In the organizational setting, however, this is mitigated through lack of benefit for involved departments, access to information and lack of visibility ((Strøm-Erichsen and Olje- og energidepartementet 1998), chp. 14). Important topics concerning economy are: “*The role of the budget*”, “*Predictability*”, “*Where does profit from reduced costs end up*” and “*Visibility of electricity costs*”.

The role of the budget: Disciplining or paralysing?

An important success factor for several of the companies is to stay within the budget, especially for the centrally controlled municipal, public and official entities, but also for private companies with peripheral owners. The budget seems to be less used as a control tool for the private rental firm with close contact between the general manager and the board. In this particular company actions evaluated as necessary and profitable will be implemented independent of the budget for the particular year.

In companies budget limits could be disciplining, but can also result in paralysation related to investing in and implementing of energy efficiency actions. Investing in such actions requires both planning and allocation of assets before implementing the actions. This often results in bureaucratic processes where the proposed actions have to be evaluated in several different parts of the organisation before final budget allocation is decided.

Predictability

Predictability of costs is an important factor in budget discussions. To keep a company within the budget limits, an overview of the costs is important. Financial predictability and possibility to control is one reason why public companies with strict control of the budget, have made power agreements with a fixed price.

The requirements concerning predictability is also one reason why companies with strong demand for keeping within budget limits, want certainty concerning the financial outcome of energy efficiency actions. Especially public companies have little acceptance of financial risk, because the success criterion is to keep within the budget limit, rather than maximising financial profit.

One of the public companies reduced their financial risk by financing the investment in an Building Automation System through the power contract. The private rental company reduced their financial risk through a strengthened relation with the environmentally conscious renter.

Where does profit from reduced costs end up?

A third aspect in the discussion concerning the budget is the question *who gets the financial benefits from reduced energy costs*. The motivation for implementing actions will increase if the customer sees an immediate financial profit.

In the decentralized private rental company reduced electricity costs and increased rental income from implemented energy efficiency actions will go directly to the company. For the centralized companies, the profit disappears to the central organisation. This was noted as unmotivating.

The public training institution pays for energy costs as planned in the budget. Reducing energy costs will only result in a reduced budget for energy costs next year. This arrangement does only give the end user a weak incentive to change their energy consumption.

For the municipal nursing home, the profit from reduced electricity costs was previously sent back to the local government authority. But in 2003 this was changed and the profit should instead be given back to the nursing home. This is mentioned as important for further focus on energy efficiency.

Electricity costs as a visible cost

The interviews were performed during the summer of 2003, after a winter with scarcity of energy and high prices in the Nordic power market. This price increase had resulted in increased focus on the consumption of electricity, even in companies having a fixed price contract with the power supplier.

Even if the price rise resulted in increased focus on energy efficiency actions, it did not result in the start of implementing actions. The price rise has rather resulted in lifting energy efficiency a bit higher up on the agenda, which in the longer term could result in implementation of the proposed actions.

D. DECISION-MAKING PROCESSES

The decision-making process itself is a central factors when and if energy efficiency actions will be implemented (cf. DeCanio 1998). The type of decision-making structure is of particular importance for larger decisions that have to be brought up to the highest level in the organisation. Small decisions can be easier to take, if these are within the decision-making authority for the local level in the company. In DeCanios quantitative material, however, larger organizations are willing to accept longer pay-back time for energy saving actions. Furthermore, public entities need higher profitability than private entities before implementing actions.

The companies in the analysis have very different decision-making structures. The most important differences are between *public vs. private*, *local vs. remote* and *bureaucratic vs. informal*.

Public vs. private

Decisions within *public* companies are dependent on guidance, based on political decisions on a supervisory level. Political decision-making processes are about allocation of limited resources, and are dependent on existing values and politics. The budget allocations go through different departments before they at least come to the unit that should spend the money. The decision-making processes are often very slow due to several decision segments. Concerning energy efficiency actions, this means that large investments have to be planned a long time in advance. The allocations are also dependent on changing conditions in the political arena.

Decisions within *private* companies are often described as financial considerations with elements of uncertainty. Decisions will often be taken faster than in a public company. The main reason is that actions will generate profit for the owner of the company. It is therefore important that energy efficiency actions lead to a positive influence on the financial position of the company, such as reduced electricity costs (direct influence), increased attractiveness of the rental building or increased job satisfaction for employees (indirect influence).

Local vs. remote

The location of the decision-makers is also an important part.

Local decision-makers often have local attachment and belonging and have knowledge about different characteristics of the company. They are dealing with daily management and have personal relationship with staff and local community. Decisions are often evaluated, based on the possibility for profit concerning the local company. The private rental company and the nursing home are examples of this.

Remote decision-makers are often located far away from where the decisions have their effects. The decision-makers often lack local knowledge, and the company is only one of several branches where the decisions are valid for. Decisions are often financial and only a part of a larger budget. Exam-

ples are the import firm, the wholesale firm, the prison and the training institution. With a remote decision-making structure economy is often the only parameter considered.

Bureaucratic vs. informal

With a *bureaucratic* decision-making structure there are specific rules and routines that tell how decisions should be made. It is important that the decision is within the defined rules and procedure for the process. Examples are the public training institution and the prison. Also big, private companies can have such trends (the wholesale dealer). When taking decisions concerning energy efficiency actions it is more important that the procedure is followed, than the argumentation. Decisions can also be withheld because the actions were presented at the wrong time.

The opposite case is the *informal* decision making structure where there are no clearly expressed rules and routines that tell how the decisions should be taken. The most common way is that "some people have been talking together". The important issue is whether the decisions agree with standards and values. The decision-making process for the rental firm has this characteristic. The decisions concerning energy efficiency actions will be taken if it feels right. The emotional aspect is an important part in addition to general arguments. Decisions will be taken fast, and sometimes on a superficial basis.

Conclusion – What prevents and what triggers implementation?

The question "What prevents and what triggers implementation of energy efficiency" has been discussed in four factors in the previous sections of this paper. As shown in the figure below the four factors "how the report was received", "placing of responsibility", "economy" and "decision-making process" interfere with each others as cause and effect. The combination of the factors can explain why energy efficiency is not given priority or it can explain why other goals get higher priority than energy efficiency.

A consequence of not appointing responsibility for energy efficiency can be the reason for why the Energy Auditing report is not discussed within the company. Nobody takes initiatives to make use of the report, since no one is responsible. In another company the responsibility for energy efficiency might for instance be included in the task of one person which, in combination with a localized decision-making process, leads to implementation of cost-efficient actions.

A method to convince customers to implement energy efficiency actions is knowledge about the characteristics of the companies with large probability for implementation of energy efficiency actions. Such knowledge might increase the efficiency of the means by choosing the "most interested customers" and thus focusing the efforts in the most successful way.

The discussion in this paper indicates several characteristics that will be crucial to the successfulness of implementation of energy efficiency actions. It is important to mention that the list of characteristics is based on a limited number of companies.

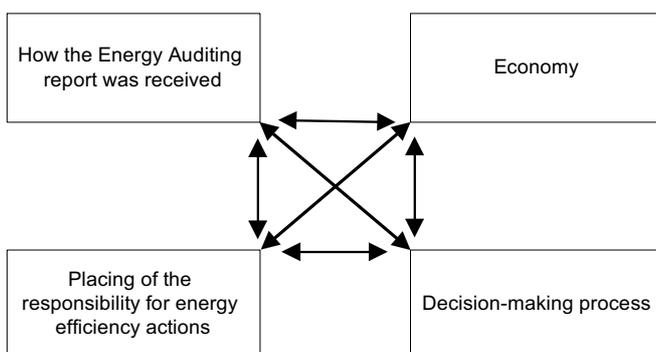


Figure 1. The interaction between the four factors of analysis "what prevents or triggers energy efficiency actions?"

- **Existing consciousness;** In companies focusing on energy efficiency before an energy auditing report is made, it is also more likely that recommended energy efficiency actions will be fulfilled.
- **Responsibility attached to a person or assignment;** Consciousness of energy saving is often a result of one person's opinion that this enters into his or her job. Assigned responsibility ensures an internal effort on this theme. An indication of assigned responsibility comes into sight when the customer is able to give a quick answer on who is working with energy saving within the company.
- **External impetuses;** Companies that are part of a business sector where it is expected that efficient energy consumption is given high priority, will most likely focus on energy efficiency.
- **Clear owners;** Owners that are clear about the goals and expectations of the company might also be an initiator of energy efficiency actions. Remote owners often have the opposite effect on the companies.
- **Timing;** A company that is thinking ahead of important decisions for large investments crucial for future activity, will be receptive to proposals on energy efficient actions, until the decisions are made and the plans are determined.
- **Incentives in the account system;** A cardinal motivation factor for implementing energy efficiency actions is the financial profit. In those companies where saved money (financial profit) disappears in a general account, the financial profit will not act as a motivation factor. This is also the case if saved money through energy efficiency in one year would result in a reduced budget next year.
- **Making costs visible;** Companies not motivated to implement energy efficiency actions usually do not know what costs energy consumption represents. Making these costs visible seems to be a possible way to create motivation for energy efficiency actions as well as raising consciousness.
- **Knowledge of the decision making process within the company;** Knowledge of the decision-making procedure within the organisation and how to manoeuvre this process is crucial to achieve approval for implementation. Especially in larger and decentralized companies this might be a challenge.

An aspect concerning whether the energy efficiency actions will be implemented or not can be dependent on the design and presentation of the Energy Auditing report. This introductory sale process requires reflections of how energy efficiency actions should be presented and recommended. The above-mentioned characteristics of the companies can be used in such an introductory sale process.

Successful introduction of energy efficiency actions in companies is dependent on choosing companies with the right characteristics that predict a positive response to the introductory sale of the proposals.

Of equal importance is it to give useful incentives to the companies. In addition to the normal power based network tariff, the network operator offered 25 Euro/reduced kW of

peak load. The actions for peak load reduction was very few compared to the suggested actions. The contribution from the network operator varied from zero to some percent of the costs.

When the interviews were performed other factors than the network tariff and support schemes were of less importance when performing important decisions concerning energy efficiency actions.

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