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Evaluation of Regional Learning Energy Efficiency Networks

Generation, Audits, Targeting, and Network Operation

1 Background

More efficient use of energy is one of the major pillars of the European energy transition (European Commission (EC) 2016). Energy efficiency networks aim at accelerating the reduction of energy costs and of mitigating greenhouse gas emissions in companies. Energy efficiency networks started as regional networks of companies of different branches in the 1990s in Switzerland (Jochem et al. 2016). Since the last decade, branch-specific and also group-internal networks started operating (in branches like trade, hotel business, electric steel, non-ferrous metals, or machine building industry). The energy efficiency networks operate with a specific design: an energy audit and an individual efficiency target of the participating companies is the initial step of each network. The individual targets are also used to set up an efficiency target for the network that is usually publicly communicated. The major gain of the networks, however, stems from regular meetings (three to four times a year) with a well moderated exchange of experiences among the participating energy managers and a production site visit of the inviting company. The achievement of the targets of the individual participants and of the network is evaluated annually through a monitoring process. A very good description of the learning energy efficiency network design from audit to monitoring give Dütschke and colleagues (2018) and Köwener and colleagues (2014).

2 Data and central research questions

Currently 25 energy efficiency networks operating with the so called LEEN or AGEEN standard are running since 2015 with about 250 companies in total. The Federal Ministry for the Environment (BMU) contributes a small share of the network costs for about half of these networks. 87 companies from 14 networks participated in the online survey; among them, 70 companies belong to the funded networks. The questionnaires, elaborated by the project team¹, were distributed by network operators to the companies and usually answered by the responsible energy manager in the company or business management. In addition, the data of this survey can be linked to energy monitoring data of the companies and qualitative data from interviews with network managers via company codes².

Central research questions that are analysed within this paper are: Why do companies take part in an energy efficiency network? What is the impact of energy audits and targeting on the implementation of energy efficiency measures? How do participating companies rate energy efficiency networks?

3 Generation of the networks

A lot of communication channels are used by network operators or initiators to start energy efficiency networks and to acquire companies to participate in a new network. This includes information events and leaflets, municipal climate protection agents, call centers or sales staff of utilities, energy agencies, applied research institutes, or

¹ IREES together with STREKS and Fraunhofer ISI

² This means that all data protection rights are accounted for.
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representatives of the local Chamber of Commerce. 74 % of the survey participants heard about the energy efficiency network for the first time from the network operator, the moderator or the consulting engineer. Promotion of the network via events or printed information caught only 18% of the companies. Therefore, personal contact is strongly recommended when starting the network acquisition.

The participants were asked what convinced their company to take part in the network. 77 % of the participants mentioned the possibility of exchanging experiences and plans with colleagues from other companies that convinced the most. Other important arguments are the reduction of energy demand (63 %) and energy costs (62 %) as well as new stimuli for energy efficiency measures (60 %). These answers indicate that the priority of energy efficiency was already relatively high before companies participated in the network (6 points in a scale of 1/very low to 10/very high, see Figure 1) and that the priority of energy efficiency increased even further by participating in a network (presently: 8 points).

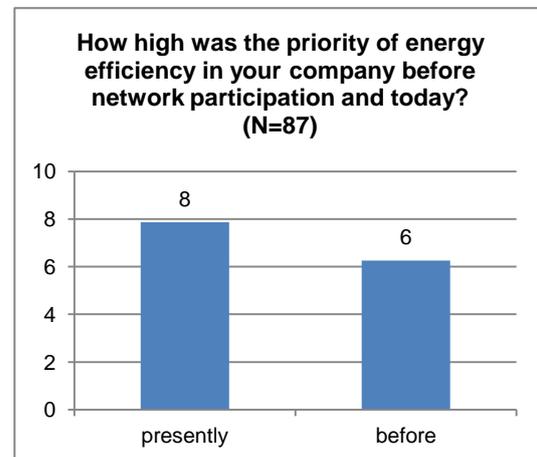


Figure 1: Priority of energy efficiency in the companies

40 % mentioned the mitigation of CO₂ emissions and 34 % the public image aspect of contributing to reduced energy demand and related climate protection. On the other side, arguments such as compatibility with ISO standards of auditing and monitoring (21 %) and contribution to strengthening the competitiveness of the regional economy (9 %) were not the determining factors in the decision to participate in the network.

4 Implemented Measures (audits and targeting)

The implementation of energy efficient solutions - whether concerning investments or organisational measures - is the core target of all efficiency networks. In a previous pilot project "30 pilot efficiency networks" (involving 366 medium sized and large companies in 30 regional efficiency networks), the average of implemented measures after three to four years of network operation was 11 measures per participant (Jochem et al. 2016). The result of 39 small and medium sized companies (with yearly energy cost between 50.000 and 1 Mill. € per year) of four networks was 2.5 implemented measures within two years of network operation (Mai 2016). The average impact per company was 3 % efficiency improvement, covering almost 30 % of the profitable potential identified in the initial audits and the related list of measures.

In the current survey, the 87 companies (most of them are larger companies) implemented about 4.7 efficiency measures on average within the short operation time of two years. Only 3 % did not (yet) implement any measure at all.

Most companies conducted energy audits before the network started in order to meet obligations from the Article 8 of the European Energy Efficiency Directive (EED), introduced in April 2015 by the German Government. Some experts expressed their apprehension that this late implementation by the German Government of the directive

would lead to ‘quick and dirty’ audits that overlooked essential energy efficiency potentials. This hypothesis seems to be confirmed as more than 70 % of the companies with a prior energy audit implemented more energy efficient measures as identified in the audit since they were part in the network.

The survey brought some more detailed information about this additional effect on identifying and realising energy efficiency measures (see Table 1):

- The energy consultant had a substantial impact on the selection of measures to be implemented and on the level of investment for one third of the respondents (see Table 1).
- Almost half of all respondents (45 %) said that some of the implemented measures would not have been implemented without participation in the network.
- Suggestions from colleagues or the consulting engineer in the energy efficiency network were implemented and translated into measures (77 %).
- Another important factor for more than half of the participants was the joint target of the network. Reasons for that could be that energy managers want to contribute their fair share to the target (to get the acknowledgement of their colleagues in the network) or they could argue with their boards that their company had sufficiently to contribute to the joint target.
- Additional benefits of energy efficiency measures were recognised by only 13 companies (15 %). This may be due to the short operating time of the reviewed networks, during which additional benefits of the first investments do not show that often or are not yet recognised by the energy managers.

Table 1: Impact of LEENs on measures undertaken by participating companies (N=87)

How do the following statements apply to your company? Do you agree that...	yes	no	I can not say	no answer
The energy consultancy had a significant impact on the selection of measures to be implemented and the level of investment.	33 %	53 %	9 %	3 %
Some of the implemented efficiency measures would not have been implemented without participation in the network.	45 %	40 %	10 %	5 %
Suggestions from the energy efficiency network were implemented in measures.	77 %	15 %	5 %	3 %
A common target of the network is an important incentive to implement energy efficiency measures.	55 %	32 %	6 %	7 %
As a result of the measures implemented, additional benefits were achieved for other areas (e.g. more efficient production processes, better quality, less waste).	15 %	60 %	18 %	7 %

Although the results of this survey after the short period of one to two years of network operation are only preliminary results, they already indicate the reasons why the progress of efficient energy use is substantially higher than the progress of companies individually trying to reduce their energy costs (Jochem et al. 2014).

Obstacles for energy efficiency measures have been the topic of many papers during the last 20 years (Cagno et al. 2012; Dütschke et al. 2018; Johansson et al. 2017). In the current survey, the main obstacles for implementing energy efficiency measures were identified as

- time restrictions of the acting energy managers (49 %),
- other investments with higher priority (often for core business purposes; 42 %),
- unacceptable payback periods (such as two or three years)(41 %), although the planned investments were highly profitable with internal rates of return of more than 30% or even 50 %), and
- financial limits (mostly due to financing from cash flow; 33 %).

This result clearly shows that even if a lack of knowledge and a lack of market survey are no longer valid in energy efficiency networks, several other obstacles are simultaneously important to hinder the implementation of very profitable investments or organisational measures.

5 Evaluation of network operation

Although the operating time of the energy efficiency networks surveyed was rather short (one to two years), a few questions were asked related to a general opinion on the energy efficiency networks.

All in all, the responding 87 companies rate their participation in an energy efficiency network as very positive. (1) 66 % of the respondents state that their benefit in relation to their efforts is high or quite high. (2) Expectations from the network were mostly met as 68 % of the companies confirm. (3) 100% of the participants would recommend an energy efficiency network of which 52 % would recommend it in general, 30 % especially recommend a network as the one they have been participating in and the rest of the companies would recommend a company network to some extent.

As an argument to attract other companies to join energy efficiency networks the interviewed companies suggest to focus on exchanging experiences among the energy managers, getting new ideas, and neutral informative presentations for selected topics. In addition, the energy consultants - being specifically trained in technical and economic analysis as well as in yearly monitoring before they start their audits and the consulting in the networks - are rated as good or very good by about 90% of the companies regarding his professional competence, reliability and availability. Most of the consulting engineers already had experience in consulting former energy efficiency networks.

With regard to ex ante expectations and ex post judgement, the survey confirms that the exchange of experience with colleagues from other companies is the most important factor to take part in an energy efficiency network (see Figure 2). Besides the exchange of experience and plans, the companies also value neutral lectures, site

inspections, independency of advice and saved time through quick knowledge acquirement. 24 % of the participants also agreed that their planning and decision costs (transaction costs) were reduced by about 10 % through exchange of experiences, bilateral advice and consulting processes. This argument could be used to address the quite important time constraint barrier of energy managers.

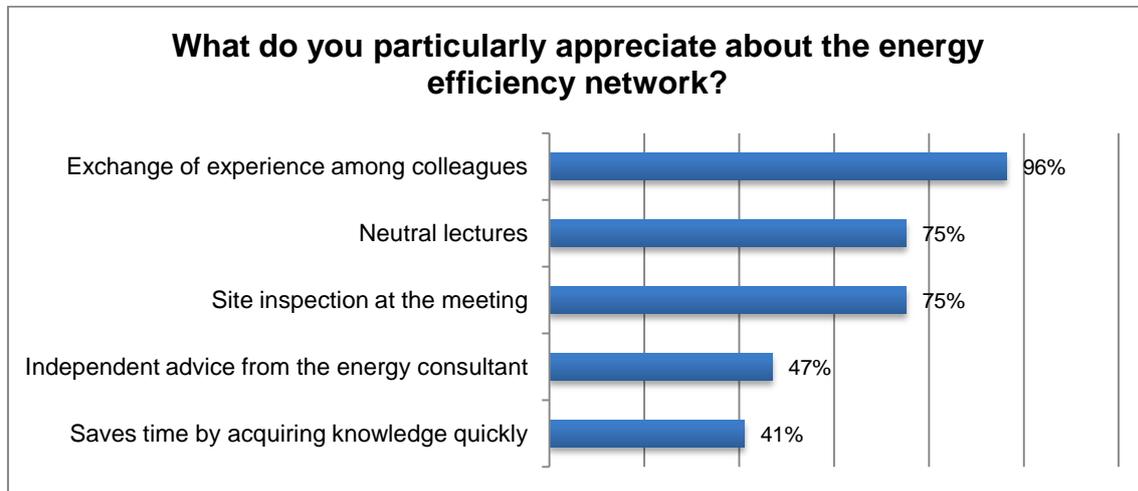


Figure 2: Features that companies do appreciate most about their energy efficiency network

6 Conclusion/Outlook

The results of the survey show that the successful generation of an energy efficiency network is mostly based on personal acquisition by the network operator or moderator (who is usually also the initiator). The focus on the argument of the exchange of experience with other colleagues in the participating companies is most promising. When operating, energy efficiency networks contribute to an accelerated implementation of energy efficiency measures and therefore energy cost and CO₂ savings. Participating companies rate energy efficient networks very positive and would recommend them to other companies.

Since the sample is small, the results have a low statistical relevance but are all in line with previous findings for regional energy efficiency networks for large companies (30 Pilotnetzwerke 2014, Köwener et al. 2014, Jochem et al. 2016) and for small and medium sized enterprises (SMEs) (Gerspacher et al. 2016).

To conclude: there is obviously a paradox in the area of energy efficiency networks: all initiators and acquiring network operators complain about the high efforts of about four to six days to convince a company to participate. Once the network has started, almost all participants are very content with the benefits they gain from the operating network. Reasons for this paradox could be:

- Energy efficiency networks are a relatively new and unknown energy services.
- There is no mandatory standard of operating an energy efficiency network in most countries (except Switzerland). So, different concepts of networks with different prices are offered by new actors and may confuse quite a few companies.

- Energy managers often have additional tasks such as environmental protection and safety. So there is simply not enough time in their eyes to take up an additional work load for accelerating the reduction of energy cost.

This paper addresses just a compendium of results from the conducted survey. An additional survey with the same target group will be conducted at the end of 2018, where also monitoring results will be addressed. Further analyses will then be reported in early 2019.

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