Promoting energy efficiency in small and medium-sized enterprises through network-based approaches – experiences from Swedish local governments

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Abstract

Policy instruments for improving energy efficiency in industry have historically focused on large and energy-intensive companies, likely because a large part of industrial energy use is concentrated in these companies. However, small- and medium-sized enterprises (SMEs) account for 30 % of Swedish industrial energy use. Research shows that both the relative energy efficiency potential and the cost-efficiency of implementing energy-efficiency measures in industrial SMEs are higher, compared with similar measures in large and energy-intensive companies.

One way to gain the interest of SMEs and achieve results in energy-efficiency measures is through energy-efficiency networks, where a group of companies work together to achieve energy-efficiency gains. Within the framework of the national programme Sustainable Municipality, local governments in Sweden have successfully developed and tested network-models for promoting energy-efficiency investments in the local business community with good results. The local projects sought to bridge the gap between potential and actual implementation of energy-efficiency measures in local businesses (particularly in SMEs) in ten Swedish municipalities, using a few different network-based approaches. This paper explores the work of Eskilstuna and Tranas municipality and their network models.

Both network models successfully managed to promote implementation of energy efficiency in SMEs. Further, the municipalities successfully developed methods for matching demand for energy efficient solutions in SMEs with suppliers of relevant services and products. Both the Tranas and Eskilstuna models have encountered challenges that could be partially overcome by combining characteristics of the two project models.

The lessons learned are that there is a need for developing network models in Sweden based on experience and results both in Sweden and abroad. More attention should be given to disseminate information on experiences and results regarding how to use networks for increased energy efficiency in SMEs.

Introduction

Improving energy efficiency in the industrial sector is an important step towards reaching the EU's 20-20-20 climate and energy targets. Historically, both the research and policy communities interested in industrial energy efficiency have focused their attention on large, energy-intensive companies, due to their higher or energy use. In Sweden, SMEs account for 30 % of industrial energy use (SCB, 2010). Therefore, the energy-saving potential for SMEs can be quite high (Thollander et al., 2013). According to the European Commission (2006), it is possible to reduce industrial energy use by 25 %. Furthermore, the relative potential for energy-efficiency and cost-efficiency of measures is often greater for SMEs than for large enterprises (IPCC Working group, 2013), (Shipley & Elliot, 2001). The explanation can partly be found in that SMEs have not been working to become energy efficient to the same extent as larger companies. A significant difference between large companies and SMEs is their management capability, i.e. the difference between how energy consumption is managed internally by companies.

Industrial companies, as well as companies in other sectors, can use energy efficiency as a business strategy to improve their competitiveness and also achieve societal environmental goals. The majority of the energy-efficiency improvements at industrial SMEs can be found in support processes and are relatively easy to implement. Nevertheless, the potential is not always realized due to barriers (Sorrell, 2000). Barriers to energy efficiency include financial, technical, behavioural, organizational, and other challenges. As a result, organizations do not always consider energy efficiency to be a high priority compared to other business investments and often leave energy efficiency measures unimplemented (IEA and IIP 2012). Examples of barriers to harnessing energy-efficiency potential at SMEs include lack of time or other priorities and lack of access to capital (Thollander & Palm, 2012). SMEs have limited possibilities of introducing energy management for economic reasons and because of insufficient knowledge (Kannan & Boie, 2001). Also, SMEs pay less attention to energy efficiency. They often do not have staff dedicated to taking care of energy issues, and the energy-saving potential found within an individual company is often small (Shipley & Elliot, 2001). Moreover, because SMEs commonly engage in a large variety of processes, it is difficult to identify which activities use most energy (Shipley & Elliot, 2001).

The project area "Business development from an energy efficiency perspective" addressed how local governments can promote and speed up SME's efforts to become more energy efficient. The municipalities in the project area were active between 2011 and 2014, and continue to involve local governments outside the group. The project area was part of the government programme *Sustainable Municipality*. The process, results and lessons learned from both the national programme and the local network-models developed for increased energy efficiency in SMEs is described and discussed in this paper.

Sustainable Municipality – the national programme

Sustainable Municipality began as a project involving five municipalities. The third and final programme period (2011–2014) involved a total of 38 municipalities. The local government entities in Sweden are comprised of municipalities ("kommun" in Swedish). There are currently 290 municipalities, organized into 21 counties. The national programme, run by the Swedish Energy Agency[1], featured two main characteristics: firstly it was based on distinct cooperation between local and central government levels, and secondly the support from central government took the form of expertise and network building, not funding. The programme offered municipalities support consisting of energy- and project-management expertise from consultants and the Swedish Energy Agency itself. The programme also offered municipalities a platform to meet and exchange experiences. The meetings (web-based or physical) often involved thematic content where both experts and the municipalities themselves contributed.

A well-known success factor for local energy and climate work is that it is well-rooted and prioritised among leading politicians and public officials at the municipal level. Accordingly, *Sustainable Municipality* included efforts that focus on and involve both of these groups. Each municipality was required to have a steering group consisting of representatives from both the political level and the local administration.

The overall objective of *Sustainable Municipality* is to develop the municipalities' methods to advance renewable energy and energy efficiency, as well as to integrate energy and climate issues into the local governance. The goals of the Sustainable Municipality programme can be summarised in the following three points:

- Develop a local energy and climate strategy based on broad political support.
- Develop new and existing methods and models for local and regional cooperation in the areas of urban planning and industrial energy efficiency.
- Develop and distribute methods, manuals, indicators and cutting-edge examples involving urban planning and industrial energy efficiency.

The third programme period was focused on producing cutting-edge examples in the municipalities in nine different project areas that were selected by the participating municipalities and the Swedish Energy Agency. Between five and ten municipalities cooperated in each of the project areas to prepare new innovative ways to solve energy-related municipal and societal challenges. Each municipality selected an existing, and/or developed a new, development project at the local level when they applied to enter the programme. The programme was based on voluntary commitment of the local governments, which created a special dynamic within the different project areas.

The project area "Business development from an energy-efficiency perspective" included approximately ten municipalities and has been focused on achieving energy efficiency in SMEs. The number of members grew over time. The intensity of activities also fluctuated amongst municipalities over time.

SUPPORT OFFERED IN BUSINESS DEVELOPMENT FROM AN ENERGY EFFICIENCY PERSPECTIVE

The group met approximately four times a year from 2012 through 2014. Below is a summary of thematic contents and support provided to the local governments.

The group met for the first time during the spring/summer of 2012 to identify areas of common interest. The objective was to identify contents for the thematic meetings and areas suitable for information exchange. The Swedish Energy Agency assessed each individual project prior to and following the meetings. An external consultant, procured by the Swedish Energy Agency, also provided tailored support for each individual project. Many meetings at the beginning of the programme period were held in the municipalities, to provide support for setting up the necessary organisation.

The format for the physical meetings was partly lectures and/or training and partly exercises and dialogue amongst the group. Themes were defined through dialogue with the participants. Assignments were distributed prior to and after the joint meetings and were followed up in subsequent meetings. Telephone meetings were organised in between the physical meetings.

1. The Swedish Energy Agency is the government agency responsible for national energy policy issues. Its mission is to promote the development of Sweden's energy system in a more ecologically and economically sustainable direction.

Recurring themes at the physical meetings were:

- *Project Management – Planning and Control.* Under this theme, which was about project management, a survey was conducted in the group with associated exercises in "classical project management". Areas touched upon included: scheduling, resource scheduling, Gantt charts, analyses of dependencies and project organization (steering committee, project team, peer group, project, client, etc.).
- *Goal setting and monitoring.* During the thematic meetings the group discussed how to set goals and objectives, and how monitoring and indicators could be defined and monitoring and measuring results. Each project developed goals and a project plan which was reviewed by the Swedish Energy Agency and an external consultant.
- *Communication.* The thematic meetings around this topic were divided into two parts. Part one had a greater focus on internal communications. The focus was on how communication is received, the type of communication that is relevant in different phases of a project, how a communication plan is designed with respect to, *e.g.,* stakeholder analysis, communication channels, clear messages and frequency of communication. It also emphasized how to mobilise internal resources in an organization; an area that the municipalities found challenging. The focus of this part was linked to various forms of meetings, dialogues and workshops carried out in each municipality.

  The second part was focused specifically on external communication with companies. Meeting and communicating with companies on their terms was a very important feature of the national programme as well as in the individual municipal projects.
- *Business Development.* The thematic meetings on this topic focused on increased understanding of the concepts of strategy and business development, partly tied to specific theories. Emphasis was put on understanding energy issues from a business perspective.
- *Marketing/Unique selling point.* Marketing was addressed both with a theory part and with the help of an external panel. Each respective project/municipality prepared a "pitch" according to an assumption that marketing the project is a combination of business and communicative idea. Then the projects presented their approach, or their idea, to a panel of external stakeholders to capture their interest. The panel, in turn, provided feedback.

In 2014, the focus shifted from inspiration and input to projects to an arrangement that revolved more around the municipalities themselves planning joint meetings, with a focus on implementation. Several meetings were held under the overall theme of implementation and dissemination.

LESSONS LEARNED FROM BUSINESS DEVELOPMENT FROM AN ENERGY EFFICIENCY PERSPECTIVE

The main lessons learned from the national programme, and specifically the project area Business development from an energy perspective, are summarized in the bullet points below.

Table 1. Participating municipalities.

Participating municipalities:
Eskilstuna
Karlskrona
Kungsbacka
Linkoping
Norrkoping
Nybro
Ornskoldsvik
Pitea
Tranas

- The national authorities and the central government at large have significant roles to play in adding legitimacy to projects at the local level. Many of the municipalities would not have been able to prioritize the local projects, should the Swedish Energy Agency not have supported them in the national programme.
- Lack of national funding for the municipal projects and, as a result, municipal involvement based on voluntary commitment was a challenge for some municipalities' participation in the programme. This fact prolonged the start-up period for many of the municipal projects.
- Local projects were defined by the municipalities, not by the Swedish Energy Agency. As a result, some projects were very similar, while others were not. It took time to reach consensus in the group regarding what needed to be done. Over time, different municipal projects became more and more harmonized with each other. The programme would likely have gone more smoothly if the Swedish Energy Agency had provided more steering with regard to the focus of the local projects prior to the launch of the programme.
- Municipalities needed a lot of support in the initial phases of setting up the projects. Their projects would have benefitted from an even more active role on the part of the Swedish Energy Agency, to ensure a sound focus and functioning steering groups/commitment in the local governments. Even though the individual representatives participating were motivated, several projects struggled with internal problems in their local government administration. Some local governments never managed to solve these issues, which had a negative influence on their project results. As always, project successes depended to a large degree on motivated and competent project leaders, back-up from the political level and access to necessary funds.
  - There has been a significant need of strong coordinators and project leaders. These two roles do not always need to be assigned to the same person, although the skills required for both were similar for most projects under the programme. The most important part of the coordinator qualifications is strong commitment and an understanding of the SME-perspective. Too high dependence on individuals, such as the coordinator/

project leader is a significant risk for the local projects. Loss of a project leader meant that some local projects could not be completed. Therefore, shared-responsibility and anchoring in the municipal organisation is very important.

- The Swedish Energy Agency and the municipalities should have shared responsibility for driving the programme agenda and the thematic meetings from the outset. A sense of shared ownership was developed in the later stages of the programme.
- A best-practice guide on how to set up and run energy-efficiency networks for SMEs would have been very useful at the start of the programme. Demand for such a product will likely be high in the future. How to best meet this demand needs further investigation.

Local models for energy efficiency

The goal of each municipality in the programme was to minimize their climate impact by enhancing SME companies' ability to implement energy-efficiency measures, by improving their knowledge and skills and, when necessary, encouraging them to invest in more energy-efficient products and services. Local and national energy and climate targets were used to motivate local governments to get involved.

The local governments had complete freedom to define their projects. As a result, their approaches to working with networks of SMEs varied. In some networks participating SMEs were loosely connected and mainly received information and individual coaching. Others networks were comprised of tight groups of companies working together over a period of time. A broad definition of networks in this case would be that several SMEs formed a group coordinated by an external party (from within or outside the local government organisation) and either met regularly to exchange experience and gain access to expertise, or met less regularly and obtained information as well as individual coaching and expertise. The coordinator had both an administrative role and led the activities within the network. In most cases the coordinator was a municipal official.

Energy audits were a central component of all networks. Some companies also used external specialists in order to identify possible energy-efficiency measures and/or to implement measures identified in the energy audits. In some cases, the companies in the group set mutual goals for the network and worked together to achieve them and their own individual targets. The general idea was that the network context would ease collaboration, reduce transaction costs, minimize risks and raise awareness. The models also aimed in part to enhance market for existing energy-efficient technologies, thus reducing barriers between customers and suppliers that hinder energy-efficiency improvements. Innovation became a topic in some of the municipalities, based on results from energy audits and subsequent market screening for solutions.

THE MOST SUCCESSFUL MODELS

Tranas and Eskilstuna municipalities have reached the furthest in developing and applying network-based models for improving energy efficiency in local SMEs. Hence, the remainder of this paper is focused on their models, with related processes, results and lessons learned. Although we refer to their work in this paper as the Eskilstuna and Tranas models, we recognize that the development of these models was based on the prior experience and versions of models in Europe and Sweden.

The approach that municipalities chose for engaging companies in the projects differentiates the Eskilstuna and Tranas models. Tranas municipality chose to create a project model where the municipality, as project manager, matched local suppliers of energy-efficient technologies and solutions to potential local buyers (SMEs). The goal was to attract a wide variety of SMEs where internal expertise and commitment to energy efficiency was low. Eskilstuna on the other hand, chose to focus on SMEs where internal commitment and competence for energy efficiency already existed. Their model was based on a corporate network where companies learn from each other over time, with the municipality providing support. The two models complement each other, as they target different groups of companies, at different stages related to energy efficiency, and offered participating SMEs different support to work to improve their energy efficiency.

A step-figure has been used to illustrate the differences in these two models and how they target different groups of companies (Figure 1).

THE TRANAS MODEL

The Tranas model offers local support and guidance related to energy efficiency to companies lacking own capability and initial motivation. Energy audits were offered to companies participating with power consumption less than 500 MWh, which is the official limit for the government energy audit programme. By brokering between/matching the identified measures in client companies and supplier networks (which offer energy-efficient technologies and solutions) the municipality coordinates and speeds up potential energy-efficiency investments. Creating a neutral arena for customers and suppliers, the municipality helps create economies of scale and build legitimacy. The process aims to bridge the gap between the potential for and actual implementation of energy-efficiency measures (mainly in SMEs), and speed up development by matching and monitoring of the implementation of cost-efficient investments/measures. The process is well defined and packaged to make the business case for energy efficiency clearer and aims to attract businesses that would otherwise have low commitment to, or little knowledge of, the benefits of becoming more energy efficient. Energy efficiency improvements typically deliver a range of business benefits beyond energy savings. For example, through the process of reviewing energy use, business improvement opportunities may be identified that save energy and also deliver productivity and other core business improvements.

Steps in the model

Step 1: Performing energy audits of companies

The process began with that the municipality offering companies free energy audits in which companies' energy-efficiency potentials, and proposed measures are identified and analysed. All participating companies signed a memorandum of understanding, agreeing to participate actively, share information and prioritize energy efficiency. Approximately 60 companies participated in the programme in Tranas.

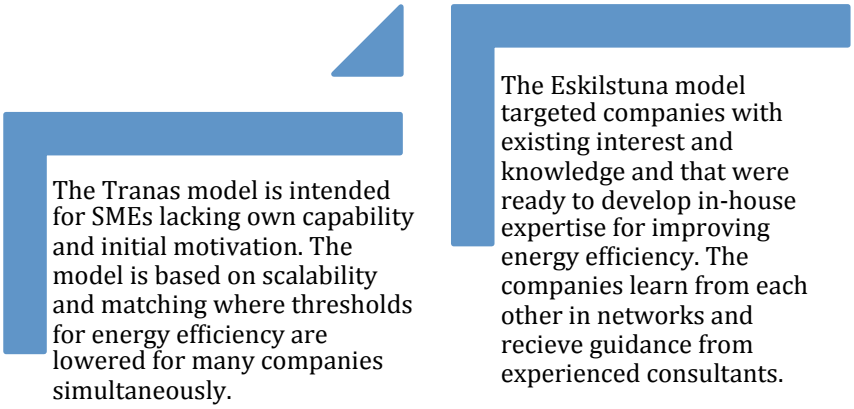

Figure 1. The differences in the two models.

Tranas put a lot of emphasis on harmonizing energy audits so that they produce a similar report in which cost-effective measures can be derived for different support processes[2]. Procurement of energy audits was split into groups of 10 to 20 SMEs in order to minimize risks and study strengths and weaknesses of the different auditors. Quite a lot of effort was put into getting a high quality and coherent product from the energy auditors. Tranas municipality has indicated that there was a big difference in the quality of energy consultants' work and deliveries. Tranas has further indicated that the energy audit market still needs to mature, and that there is a lack of standards in this area. A skilled consultant should be able to both communicate the results and motivate companies to harness identified opportunities for improvement. Insufficient communication skills on the part of energy-audit consultants can also affect the success of the network, as has also been found in the research related to the outcome from industrial energy audits (Thollander and Palm, 2012).

Tranas municipality, sometimes together with researchers from Linkoping University, attended most of the energy audits at the companies, to inform SMEs about the process and to acquaint themselves with the situation in each company. Where relevant, the audits identified cost-effective measures for reducing energy consumption by action/changed behaviour or investments.

Step 2: Analysis of patterns, gaps and concrete potential

Once the audits were completed, they were compiled and analysed to see where the potential measures/savings were in each individual company. Potential measures commonly relate to lighting, ventilation, the building envelope, heating and compressed air. A quantification of economic potential savings in kWh is done. The compiled list has allowed for quite a few common patterns to be identified. The energy-efficiency measures for which most companies have potential were prioritized for action. More detailed feasibility studies were carried out to calculate the possible cost reduction and other implications for the client companies.

2. The Swedish Energy Agency has developed a standardized checklist related to the contents of energy audits, which has been useful in projects like the one in Tranas.

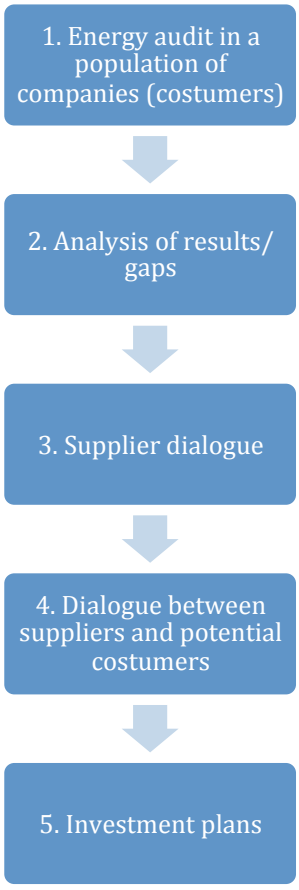

Figure 2. The steps of the Tranas model.

Step 3: Supplier dialogue

Thereafter a dialogue with potential suppliers was carried out to see which existing solutions and products were available to meet the needs. The municipality contacted the suppliers. This was a vital step as the dialogue often indicated that there are certain products and solutions available. It appeared, however, that there were in many cases problems or limitations with existing solutions that made application difficult for many of the companies. Limitations related to function, cost, energy efficiency, quality, length of production disruption and more.

In a related process the municipality initiated a dialogue with the suppliers about what would need to be improved to increase the relevance of the products and services they offer to the needs identified in the SMEs. This process was a step towards stimulating innovation, by introducing a set of requirements for new products and services.

Step 4: Dialogue between suppliers and potential customers
With support from the municipality, the SMEs were matched with the suppliers of energy-efficient solutions at workshops and via written information. The municipality approached all suppliers neutrally, to avoid unfair competition. By matching solutions and technologies, investment decisions are made easier for SMEs. Suppliers were attracted by the specified needs/requirements of the SMEs.

Step 5: Investment plans
The process ended with the municipality supporting client companies in developing investment plans and making purchases from suppliers. This was carried out at some of the SMEs and included elements of dialogue and negotiation to fulfil demands. Some of the client companies formed purchasing groups that described their need for an existing, or new and better, solution. LED lighting is an area where a purchasing group was formed under the leadership of the municipality. The supplier companies were key players in this last step. Knowledge and detailed information from the suppliers provided client companies with input to be able to define requirements on specific actions. This final step was carried out during the autumn of 2014.

THE ESKILSTUNA MODEL

Under the Eskilstuna model, the municipality supported and drove a process where companies collaborated and built a business network, with the aim of spreading expertise and knowledge about energy efficiency. During the ten-month process during which this model was applied, companies had the opportunity to reduce their energy use through knowledge, methods and calculation-tools, and networking. The municipality also offered businesses energy audit tools, coaching, measurements and support in the purchasing and procurement process. The process was initiated with a training day for the companies, led by the municipality, with information about energy efficiency and energy audits. This day was followed by an energy audit, looking at the company to identify potential energy-efficiency measures. During the networking phase, the companies met on a monthly basis. The meetings took place at the companies' premises, to continue the knowledge and skills exchange. The whole process was binding and the companies undertook to report back on the steps they had taken, and to measure their energy consumption both prior to implementing measures and after the end of the process.

A number of workshops were set up with the purpose of adding legitimacy to the work and to anchor it in the SMEs. Before companies were approved to start working using the Eskilstuna model, the municipality ensured that companies had sufficient dedicated time and resources to participate through the entire process, and that the issue was a strategic priority on the agenda of the organization, especially at the managerial level. These criteria were a priority, aimed at avoiding businesses dropping out of the programme midstream. Having two representatives from each company participate in the project helped the companies to able to produce better results. The monthly meetings with the companies focused on substantive discussions about concrete energy efficiency measures.

Eskilstuna has attracted companies to participate in its programme by maintaining a practical, results-oriented focus. Questions like "What is the situation for the companies like right now?," "What can be done to take us forward?" and "What actions will your company take between now and the next time we meet?" have been in focus.

As a municipality, it is important to be able to demonstrate credibility by providing knowledge and expertise to companies. Clear project management and process control is also important for attracting companies to participate in the program. To some extent: to know how to make things happen. This skill can be acquired through the use of consultants, should it not be available in the municipality. Eskilstuna municipality has been able to identify and collaborate with a wide network of local companies through the business promotion unit in the municipality. They have also engaged officials involved in the energy extension service and other relevant staff. Several workshops have been held within the municipality to better meet the companies and utilize available in-house competence.

The biggest challenge for the municipality has been to get the network groups to focus on commercial issues on the companies' terms. In addition, it has been important that the timing of proposed investments in energy measures correlates with the rest of a company's business plan. Most often there is competition between energy-efficiency and other investments. It has been important that the companies get training in how to see

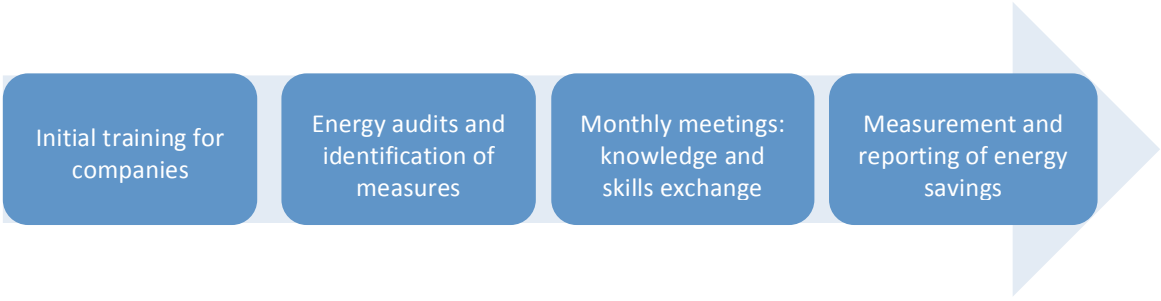

Figure 3. The Eskilstuna model.

the business value of energy-efficiency investments. The project has also been affected by the fact that energy prices have been low and are expected to stay low for a long time to come in Sweden. The number of energy-efficiency measures that are economically justified is smaller when energy prices are low. This situation has made it difficult for the municipality to highlight the business case for energy-efficiency investments. Another challenge has been that the companies themselves lack sufficient skills internally to see the business benefits of participating in the program and investing in more energy-efficient technologies.

Results

Many of the municipal projects, including Tranas's project, have not been entirely finished and evaluated. Results are still being assembled. Therefore, it is too early to elaborate extensively on results. It is clear, however, that the programme and the above-mentioned models have contributed to development of best-practices in Sweden with respect to network-based approaches for achieving energy-efficiency improvements. Many municipalities that have not participated in the programme have been inspired to investigate/initiate own initiatives for increasing energy efficiency within SMEs. The mobilization and interest of SMEs locally and regionally, together with the development of the two network models, constitute the bulk of positive results from the project area.

RESULTS OF THE TRANAS MODEL

Results from the projects are first and foremost the development of the Tranas model itself, with its steps of energy audits of client companies, matching SMESs with suppliers of energy-efficient solutions, as well as drafting investment plans. Furthermore, it is uncommon for municipalities to be involved in driving innovation in the energy sector. Lessons from attempting to do so are also a valuable output. A need for solutions for insulating warehouse ceilings has been identified using the results of energy audits. The suppliers are now looking at the potential for such solutions. Furthermore, supplier networks are beginning to emerge as a result of the project, where a number of suppliers of energy-efficient solutions have come together, learn from each other and will hopefully come up with collaborations resulting in efficient package solutions. In addition, the first integrated technology procurement for LED lighting has been completed with solid interest from SMEs. There is now a process initiated for trying to commercialize some elements of the Tranas model.

The municipality has achieved its project goals in terms of business contacts and energy audits of the participating companies. The compilation of energy audits conducted shows that there is a potential for energy savings of about 24 GWh (economic potential not considered). The municipality will continue to follow-up with the companies regarding the measures they have implemented.

The project has provided added value in the form of increased local knowledge about energy efficiency amongst politicians and officials in Tranas municipality. Cooperation is taking place between the municipality and the University of Linköping, Cleantech Ostergotland, the Regional Energy Agency Northern Smaland and the municipalities within the project area. The model has raised substantial interest, and is being considered by other municipalities and stakeholders in different parts of Sweden. Tranas has been very active in spreading lessons learned from the project and describing the process itself. The model is said to have reinforced Tranas' image as an eco-municipality and knowledge hub for energy efficiency.

ESKILSTUNA MODEL

Within Eskilstuna municipality the ultimate goal is to be recognized for having businesses and a public sector with minimal impact on the climate, as well as optimized energy use.

The project model has been successful in achieving results amongst the participating companies. Twenty-seven companies in Eskilstuna and an additional 19 companies in Strangnas and Flen municipalities have participated in the program thus far, with good evaluation results. These include a comprehensive package of implemented measures and significant energy savings. Energy savings in participating SMEs range from a few percent up to 80–90 per cent in some cases. The average company has implemented measures that are expected to reduce their energy consumption by between 20 and 30 per cent. Mainly companies in the manufacturing industry participated, which greatly affected the potential.

The companies within one network were striving to continue to meet after the project ended. However, already after their third meeting attendance was only five percent. This underlines the need for a coordinator to make the networking model work.

As added value, the municipality together with the City of Vasteras and Malardalen University conducted an Innovation Competition, focused on lighting.

During the period from September 2013 to March 2014 a training programme called Lean Energy – also focusing on energy efficiency and using a similar approach, was carried out with companies from the municipality. An additional similar programme started in September 2014.

Lessons learned

SMEs are usually a difficult target group for energy-efficiency programs. Despite significant energy-saving potential, there are major barriers to improving energy efficiency in SMEs, such as lack of resources, competences and commitment to implementing systematic energy-saving initiatives. The strengths of the Tranas- and Eskilstuna models can be found in their focus on helping companies to participate in the process and implement energy-efficiency measures. The Swedish Energy Agency has learned, through experience from a variety of projects and policy instruments, that it is difficult to change the way that companies work with energy issues through traditional information work and routine procurements. Experience shows that structural changes connected to energy issues are better achieved through practical assistance and direct contact with companies. Networks constitute a method with the Swedish Energy Agency will continue to work with.

The Tranas model focuses on creating incentives for businesses by offering an easily-communicated and well-packaged project method that makes it easy for companies to see the business benefits of participating. Most often the municipality turns to production managers or financial managers in

companies to make the business benefits of energy measures in other parts of the business clear. The work with the Tranas model was first and foremost conducted as individual support to companies and involved relatively few meetings. In this respect the model requires limited involvement on the part of the municipality, but instead the participating companies work on the project internally. This has been an important prerequisite for getting companies to want to prioritize time and resources in the project.

The Eskilstuna model focuses on direct contact between the municipality and the participating companies through a longer process, to create commitment, trust and active participation among and between companies. By having a practical and solution-/results-oriented focus, the Eskilstuna model attracted businesses and created participation. The starting point was to give firms the opportunity to reduce their climate impact through access to knowledge, methods and tools offered by the municipality. This creates opportunities for companies to independently and sustainably change processes and implement measures based on their individual circumstances. It also enables companies to make investments when they themselves need and have the prerequisites.

Both the Tranas- and Eskilstuna models have encountered challenges that could be partially overcome by combining characteristics of the two project models. The biggest challenge for Eskilstuna model has been attracting businesses to participate in the networks. It has been difficult for the municipality to justify the business case for energy-efficiency investments when energy prices are low and are predicted to remain so for a long time to come. These challenges have grown over time, as the more accessible companies – where potential and motivation were high – have undergone training. The project model is a somewhat demanding, both in terms of time and resources. Using the Tranas model it has been easier to justify involvement from a commercial perspective, because the model requires less time and resources from companies. The Tranas model, however, has encountered challenges in reconnecting with participating businesses and creating natural arenas for dialogue between the companies in the network in order to achieve significant energy-efficiency improvements in the companies. The Eskilstuna model has been stronger in this respect, indicating that the project models complement each other.

As both the Tranas- and Eskilstuna project models are well defined and elaborated, other municipalities within and outside the *Sustainable Municipality* programme have been allowed access to experience and knowledge available to start applying the models. The structure and packaging of the project models, as well as enthusiasts in the two municipalities, have been the key success factors for the Tranas- and Eskilstuna models' success and spread to other municipalities.

It is quite clear from the programme that there is an interest on the part of SMEs as well as local governments in creating energy-efficiency networks. This is confirmed not only by the fact that the companies attended and actively exchanged information in the networks, but also that they have expressed interest in continuing to gather after the networks ended. The fact that the majority of the SME networks that have the 20-20-20 climate and energy target as their goal can be explained by the fact that the municipalities see the network activities as providing potential to contribute to the EU's climate strategy. Energy audits are not enough to improve industrial energy efficiency at SMEs. The implementation of measures proposed in the audits should be further supported; otherwise they may be neglected by the companies.

The main finding thus far is that a network does not perform well without a champion. This was confirmed by almost all municipalities. The reason for this may be that industrial SMEs do not always have time and personnel to work with energy issues and, therefore, benefit from someone coordinating this work on a network level. Another reason may be that despite the fact that energy efficiency issues are familiar to everyone, not all the companies are aware of their own energy-efficiency potentials. The network coordinators did not mention the importance of a coordinator as such, but some sort of champion that drives the work within a network, organizes the meetings, invites external experts and creates engagement seems to be needed. This conclusion is supported by previous studies of factors influencing the promotion of improved energy efficiency, where a person with real ambition has been one of the highest ranked driving forces in industrial SMEs (Thollander & Palm, 2012). Network coordination can also be provided by someone supported by the companies, if this person has enough time to devote to network activities. The attendance of representatives from the participating companies' management teams at network meetings at least once a year can help to ensure continued interest within the member companies as well as within the network itself. This can also ensure commitment to implementing proposed energy-efficiency measures.

Experiences from the project area and other networks operated by the Swedish Energy Agency show that Swedish experiences are limited to more loosely composed networks with loose targets and an undeveloped system of monitoring. In contrast to this, German and Swiss networks are built on more structured network methods and management systems (Köwener 2014). There is a need for developing methods for networks in Sweden based on the best practices both in Sweden and abroad.

Nomenclature

EC European Commission
SME Small and Medium-sized Enterprise

References

European Commission, 2012. European Commission Enterprise and industry. Retrieved January 19, 2015 the European Commission's Web site: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/index_en.htm.

IPCC Working group, 2013. IPCC Intergovernmental Panel on Climate Change. Retrieved December 31, 2013 from the IPCC's Web site: http://www.ipcc.ch/ipccreports/.

Kannan, R. & Boie, W., 2001. Energy management practices in SME – case study of bakery in Germany. Energy Conversion & Management, Volym 44, pp. 945–959.

Köwener, D., Mielicke, U., Nabitz, L., Idrissova, F. (2014). Learning energy efficiency networks for companies – saving potentials, realization and dissemination. eceee 2014 Industrial Summer Study.

LEEN, 2012. Handbook for networks, Karlsruhe: LEEN, learning energy efficiency networks.

Shipley, A.M., Elliot, R.E., 2001. Energy efficiency programs for small and medium sized industry. ACEEE summer study, pp. 183–196.

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 organizations, SPRU's. Science and Technology Policy Research.

SCB, 2010. Statistics Sweden: Energianvändning i små och medelstora industriföretag. Retrieved January 19, 2015 from the web site: http://www.scb.se [In Swedish].

Thollander P, Palm J, 2013. Improving energy efficiency in industrial energy systems – an interdisciplinary perspective on barriers, energy audits, energy management, policies & programs. Springer. ISBN 978-1-4471-4161-7.

Thollander P, Rohdin P, Moshfegh B, Karlsson, M., Soderstrom, M., Trygg, L., 2013. Energy in Swedish industry 2020 – current status, policy instruments, and policy implications. Journal of Cleaner Production 51: 109–117.

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