LÄNSSTYRELSEN
DALARNAS LÄN
County Administrative
Board of Dalarna, Sweden

Policy recommendations

Effective use of European Regional Development Fund for energy efficiency in SME

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Policy recommendations

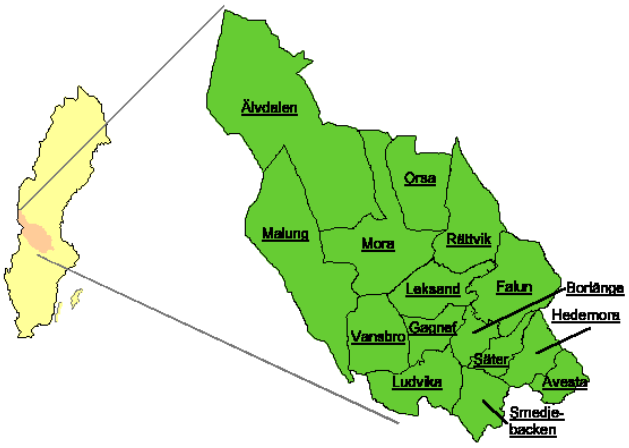
Effective use of European Regional Development Fund for energy efficiency in SME

Author: Marit Ragnarsson

Introduction

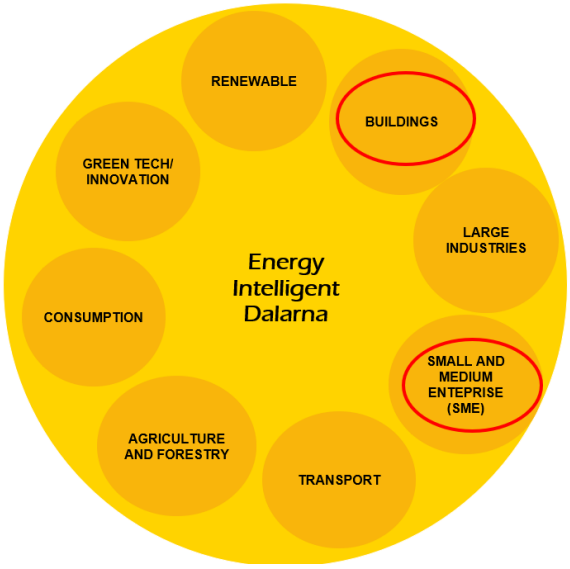
For the current program period EU has dedicated a significant part of the European Regional Development Fund to achieve a low carbon economy. In Sweden these funds are partly managed by regional programs and partly by a national regional fund.

Climate Action Network has ranked Sweden as the EU country with the most ambitious climate politic. Money has been allocated to several energy projects that support companies' and organizations to become more energy efficient.



Dalarna, Sweden, has 276 000 inhabitants and 15 municipalities.

The County Administrative board of Dalarna has for the last ten years actively worked with energy efficiency, not least as a Pilot region for green growth coordinated by Energy intelligent Dalarna in different sectors. In the areas "Buildings" and "Small and medium enterprises" several energy projects are carried out, partly financed by the European Regional Development Fund. When the program period has reached half-time an evaluation was made to build upon gained experiences.



This report is a part of the project EFFECT4buildnings, financed by Interreg Baltic Sea Region, The project supports energy efficiency in buildings by financial tools and methods. As a part of this we wanted to evaluate what kind of aid that is currently available to investigate if this can be used more effectively and to give recommendations for policy level.

Marit Ragnarsson, The County Administrative Board of Dalarna

Content

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Summary

This report is a half-time evaluation of the energy projects in which The County Administrative board of Dalarna is involved and that are financed by the European Regional Development Fund, together with policy recommendations.

Some projects are managed by Swedish Energy Agency, financed by the European national regional development fund in cooperation with regional partners. In Dalarna the projects are carried out in cooperation between The County Administrative board and the regional office of Region Dalarna. The report presents the results and experiences by The County Administrative board of Dalarna regarding the following projects:

- Aid for energy audits
- Aid for environmental studies
- Energy efficiency networks

In other projects The County Administrative board of Dalarna is the sole project owner. This report presents results and experience regarding the project:

- Framework program for company aid, ENCOM

Recommendations for further actions in each ERDF project are presented. These can also serve as input for developing new kinds of financial instruments. A reoccurring conclusion is that new projects and financial instruments should be based on previous experiences making it more effective and faster to make use of generated knowledge and experience. The County Administrative board of Dalarna welcomes a more organized and increased sharing of experience in many fields between the EU country members.

Some central conclusions and recommendations:

Increase energy auditing and structure it by business categories

- Increase the resources to organizations that support energy management in small and medium enterprises and design programs that focuses on different business categories.

- Design support systems also for smaller companies that can be regarded as big because they are members of bigger business groups.

- Reduce the administrative work in funded energy audits and adjust the amount of grants according to type of business.

- Implement a pilot with more cost-efficient energy audits based on a data base with generated general knowledge from proposed energy measures in previous energy audits.
- Continue to give aid for environmental studies.

Quality of energy audit

- Increase the requirements for real energy measurements and the distribution of all the energy used in energy audits.
- Introduce a standard for what kind of data that should be included in energy audits to make it possible to generate key figures, benchmarking and a more standardized way to distribute the energy use – making it possible to generate new knowledge.
- Establish national/European data base to collect high quality data from energy audits, to identify key figures and enable benchmarking.

Increase requirements on companies

- Enhance the environmental legislation and its implementation by increasing resources and the environmental inspection pace.
- Increase the requirements to have an energy audit and implemented less costly measures to be able to receive aid.
- Increase the requirements for measuring during energy audits.
- Stress the issue of implementation of measures in large companies.

State aid for investments

- Prioritize regional framework programs, making use of synergies between economic growth and the conversion to a low carbon economy.
- Continue to search for the best possible decision making according to the new form of aid in "Investments in energy efficient measures".
- Develop and implement the private-public-partnership model on investment projects, as described in the report.

Monitoring

- Introduce energy indicator standards that can be used for energy efficiency project comparisons like cost per more effective kWh. Do also design mutual indicators when it comes to regional development, employment effects, e. g. cost per new job.

1 Target group analysis

To reach our energy and climate targets we need to make all companies much more energy effective. Effective supporting programs require good knowledge about the companies that operate in the region. A complete list of all the companies in the Dalarna region has been created and then reduced, using several parameters to map the target group most adequate for support. Companies not regarded as small or medium has been excluded, since in Sweden these cannot be supported by the European Regional Development fund.
The final list of companies is used to analyze the need of new initiatives for different company categories, as a base for recruitment of companies to existing projects and coordination to avoid multiple contacts from several projects to the same company.

1.1 Number of SME

The list of all small and medium enterprises being target group in Dalarna for energy support indicates the number of companies in each business category. Companies with an annual turnover above €70 000 are included. Around 1000 SME with an energy use equal to, or lower to that of a normal household, has been excluded.

Sector	Number SMC*	Using >300 MWh annually**
Primary food producers	70	?
Haulage and other logistic companies, contractors	700	680
Low-consumers besides their own transports, e.g. craftsmen and small excavator entrepreneurs.	750	?
Real estate companies	350	100
Condominiums	700	?
Others, Including: - Manufacturing and coating industry - Service and repairs - Building, installations, craftsmen - Trade and vehicle service - Sales and shops - Hotels and restaurants - Care, education, leisure - Others	2 600 530 60 320 250 700 350 150 200	500

* Estimated number of SME with an annual turnover of €70 000 and an estimated energy use exceeding that of a normal household.

** Whereof number of SME with roughly estimated energy use over 300 MWh annually.

Primary food producers
Primary food producers is a group of companies excluded from the ERDF financing.

Haulage and other logistic companies
The companies in this target group can be grouped into passenger transports (bus and taxi), freight transports (fuel transport and other freight), forestry companies (forestry machines) and contractors (catchment, building, construction and contracting machines). These are not currently included in the ongoing energy programs. They need aid especially designed for logistic companies.

Real estate and condominiums
The category ”Real estate” includes companies that own, administer and rent out real estate and has an energy use derived from the management of real estate. These companies are well suited for long-term support since energy issues are parts of their core business and they are highly motivated to work with them in a systematic way.

There is a large number of condominiums, but it is hard to find data about their size and energy use. They seldom have staff members with energy competence making it hard to offer them different kinds of energy support. We recommend an especially designed offer for energy efficiency in condominiums.

Other companies
The category Others includes several types of companies with similar need of energy efficiency support after a complete and traditional energy audit with proposed measures, presented as a bundled package or as a list of individual measures. Energy issues is not in primary focus in these companies and the energy audits is often regarded as a project – not a long-term work. There are seldom personnel appointed to work with energy issues which leads to competition with daily work and other important developing needs.

Experience from a previous project “BEE-Energy Efficiency in Business categories” performed by The County Administrative board of Dalarna in 2013-2014 shows that, to design and offer special program for each sector is a successful method. It makes it easier to recruit the companies, the energy audit quality is improved, and it leads to a more cost-effective manner to carry them out. See the chapter “Increase speed and reaching further”.

1.2 To motivate companies

Experience show that some incentives for a company to work with energy issues are valued higher than others when motivating them to accept support.

Incentives for working with energy efficiency
Lowered costs
Environmental legislation requirements
Better working environment
Customer requirements
Increased market attraction, marketing
Increased operation safety
Attractive employer, employees' involvement
Environmental responsibility

The companies' incentives for active energy work in the order of importance, perceived by the companies, as experienced by us during the last years recruitment. Environmental legislation is a strong incentive for the companies' engagement.

The incentive to work with energy efficiency is closely related to the economic situation. The companies cannot afford investments during recession and during boom they lack time for investigations. According to our experience it is easier to raise interest for energy audits that can lead to lowered costs during recession. Positive peer pressure also makes recruitment to energy projects easier. To be able to say "we have a special program for your business in which several of your sector peers already are participating" is usually a very effective way to raise interest.

1.3 Policy recommendations

- Compile national lists of all target group companies for the energy projects carried out with ERDF financing.
- Allocate funds from the agricultural program for energy efficiency in agriculture sector.
- Design and carry out a new program for energy support to logistic companies.
- Consider an especially designed energy efficiency program for condominiums.
- Custom make offers regarding energy support to companies by different business categories.
- Intensify the work to reach SMEs in the category "Other companies".

2 Large companies and business groups

Large companies

In the county of Dalarna there is around 350 companies operating that is classified as large companies with more than 250 employees in average. Around 50 companies have a turnover that classify them as large companies. Beside these, around 250 smaller companies are part of a larger business group and thus classified as large companies. The latter category could be a suitable target group for different energy projects but cannot today be financed by e. g. ERDF in Sweden.

To find out whether companies in business groups should be regarded as large or not (due to staff size or turnover) require manual and time-consuming work. It would be very helpful if this data could be acquired from national authorities.

As a group, large companies stand for a considerable amount of the energy used in the county and our experience is that they often require the same amount of support as the smaller ones for their energy efforts. Today there is no such support, neither for auditing or further studies. Especially small companies in business groups question these limitations as they act as – and consider themselves – as small companies.

Some form of support to offer these larger companies would be desirable, even though they fall under the legislation of energy audits in larger companies.

The law of energy audits in large companies

The recently adopted law about energy audits in large companies has intensified the energy work in large companies. Our experience is however, that many of the smaller enterprises being part of bigger groups have only been involved in an overall manner. The auditing has been done on group level and not involving all companies' representatives.

Comparison with the Swedish environmental code legislation

The energy auditing law is in many ways a weaker incentive to persuade companies to work with energy issues actively than the Swedish environmental code. The law allows large companies to spend several years to carry out an energy audit while the environmental code requires a much tighter schedule. The auditing law doesn't point out what measures that need be enforced after the audit has been done, while the environmental code makes it possible to do so. This makes the Swedish environmental code more effective if you want to achieve energy and climate targets using legislation. Because the larger companies usually follow (or hide behind) the law stating that introduction of measures should be done during the coming four-year period, small and medium enterprises can be subject to higher demands than large companies.

Quality requirements
Another problem with the Law for energy auditing in large companies are the low requirements for standards and quality in energy audits. There are e. g. no requirements regarding real measurements of energy use, not even in detailed mapping. As a result, many action plans are based on guesses and possible energy savings are missed. Without measuring, there is less information on whether equipment is shut down during weekends and nights and calculations are based on stated, not the actual, energy use.
Measurement of energy use does not necessarily lead to higher costs for the audit and increased requirements should not be a burden to the company.

2.1 Policy recommendations

- Find a way to set up lists of companies that are small or medium enterprises.
- Design energy efficiency support also for larger companies, especially for smaller enterprises that are categorized as large because they are part of a business group.
- Clarify the requirements to implement energy measures from action plans in larger companies.
- Require measurements in energy audits, especially for larger companies.

3 Subsidy for energy audits

Experiences and recommendations in this chapter are based on data from all the companies in recent years that have received support from The County Administrative board of Dalarna to apply for subsidy for energy audits. In 2015-2017 we helped 42 companies to apply for aid from Swedish Energy Agency and to carry out energy audits. Prior to that The County Administrative board of Dalarna granted consultancy checks for energy audits.

Aid level for energy audits, based on energy use	
300-499 MWh/annually	Aid amount €2000
500-1999 MWh/ annually	Aid amount €3000
2000-3999 MWh/ annually	Aid amount €4000
> 4000 MWh/ annually	Aid amount €5000

Companies with an energy use above 300 MWh annually can apply for aid. This is central to the energy efficiency work in companies since the first step includes a complete good quality mapping. However, there is potential for improvement of this kind of subsidies.

Costly aid administration.

The County Administrative board of Dalarna and the Energy Agency in Dalarna has jointly given all possible help to pilot "our" companies through the process. On average we, as supporting organizations, have spent around 25 hours per company in aid information, company administration, applications in the e-channel, quotations, contact with energy consultants and verification, economic reporting, reporting of energy data and submission of supplementary data required by the Swedish Energy Agency. In this case the company spends around 30 hours on initial understanding, anchoring the participation in the company, compiling facts, participate in the application process, hiring an energy consultant, contacts with the energy consultant, energy and economic reporting. The aid administration costs by Swedish Energy Agency and Swedish Agency for Economic and Regional Growth should be added to the above.

The money spent on administration in all steps tend to be equal to, or even exceed, the amount of aid given. The administrative costs are even higher since the aid now is financed by the ERDF funds with additional administrative rules.

The high administrative costs require an energy use of at least 500 MWh annually (and the possibility to achieve €3000) for us to recommend a company to apply for aid. The companies' awareness and the fact that several

companies already have made energy saving efforts makes it no longer possible to "market" the subsidy for energy audits in terms of guaranteed savings and fast return of energy auditing costs.

Bearing in mind the amount of time the companies need to invest we consider it reasonable to give aid that covers 100% of the external costs for a hired energy consultant. In practice this equals to a 50% subvention of the total costs.

Companies that co-finances with in-kind find the requirements for financial reporting especially burdening. Often help by e-mail and telephone is not enough, you need to visit the company and help them to compile everything on site. One company writes:

> *" Your help has been brilliant, and we are very inspired. Thanks to the project we have lots of new knowledge and are now making energy investments. Thanks a lot! But we are hesitant to participate in anything like this again, the bureaucracy and the amount of paper work was insane! We have been parts of other projects before where this wasn't the case."*

The biggest problem with this is the fact that the administrative work steals focus from the most important; the companies' engagement in hands-on energy improvements.

Co-financing of energy audit aid

The fact that it is no longer possible to use approximative estimates of the time spent, since the aid is financed by ERDF funds, has made it harder for companies with low salaries to co-finance the projects with in kind and it contributes to the extensive aid administration. If possible approximative estimates of hourly rates should be allowed.

Energy audit aid to several companies in the same business group

The Swedish Energy Agency can currently not grant aid to several companies in the same business group, it doesn't matter if each company has an energy use of over 300 MWh annually and the company as a whole is regarded as small or medium. The motive for this is that companies belonging to a group should be considered as **one** company and aid cannot be granted twice to the same company.

It is important to encourage as many companies as possible to make energy audit and because there are quite a few business group companies that are classified as small and medium, it would be desirable to change these restrictions. In our experience it is more relevant to make separate energy audit for each company in a group. It would be desirable to change these rules.

Level of support according to type of business

The aid level is today determined by the amount of energy used. In our experience this is only to some extent a good motive for aid to be offered. The company's type of business is often more relevant. To map an industrial facility located on one site in a compact/homogeneous building is much less time consuming than mapping a real estate companies many buildings. Even though the total energy use can be similar.

The effect of this is that the aid only covers a small part of the auditing of the many buildings in a larger real estate company and they cannot, with the existing regulations, apply for additional aid to be able to map the rest of the buildings. It would be motivated to change the regulations, or implementation of the regulations to make it possible to get more aid for businesses that are located on several sites, e. g. real estate companies.

An adjusted aid for energy audits in real estate companies is also motivated by the law of energy declarations, to complete the support to these declarations.

Energy audit quality

The requirements and guides for energy audits are both good and extensive. However, we would rather see requirements for measuring of energy use instead of approximations. There are no requirements on allocating the energy use between different energy users and leaving a maximum of 10 percent not allocated (as being best practice). In our experience you need to increase the requirements for energy use allocation and the documentation on what grounds this was made.

Increased requirements for higher energy audit precision is also coherent with the environmental law's demand on all operators to keep track of their energy use. We have many examples verifying the importance of energy measuring, in order not to miss things like idle running and to use incorrect energy use figures as basis for planned measures. Energy audits based on energy use approximations and/or have as much as 75 % of the process energy use stated as "Energy use, other" should not be approved.

In our experience there is no clear correlation between price and energy audit quality when comparing different energy consultants. In several cases the ones with the lowest price has delivered the highest quality. The individual energy consultants' competence is crucial for both price and quality.

Comparable energy audits

Today there are no uniform requirements or recommendations on how to allocate the energy use. This variation leads to a missed opportunity to compare the energy use in different businesses. Increased knowledge on how

much energy our Swedish industries and real estate companies use for different purposes is a valuable basis for research and development. It is also a needed for benchmarking with other similar companies or branches and to obtain key figures.

We would like to see a more standardized way to allocate the energy use and propose the use of the units produced by Linköping University for supporting processes.

Standard units for allocation of energy use in energy audits:	
Building heating	Building cooling
Ventilation	Lighting
Compressed air	Pumps
Hot water	Internal transports
Administration (only administrative equipment)	

For a real estate company, the energy should be allocated on the same units, but there is need for another distinction of what should be accounted as supporting and production processes.

Methods to present recommended measures

Standardization of measure proposals is harder to make recommendations for. A clearly specified list of profitable solutions is a good basis for decision making. The problem is the evident risk of" cherry-picking". Bundling could be a more successful way, when measures are presented as a package (and together with an offer from an EPC provider. This manner is however not possible under the current Swedish regulations if financed with aid. It should be possible to test alternative ways to present measure proposals.

Guiding the companies throughout the entire energy auditing process

To carry out an energy audit is something that most SME make for the first time and there is a big need for support during the process. The set-up of regional energy nodes on the regional energy agencies is of great importance, as they can guide the companies throughout the process.

3.1 Policy recommendations

- Simplify the applications and financial reporting of energy audit aid as much as possible, especially in-kind co-financing.
- Make it possible also for SME in larger business groups to get energy audit aid.
- Take kind of business into account when the level of aid is determined.
- Raise the level of the contribution/aid (percentage) for energy audits.
- Increase the requirements for measurement and allocation of energy use in audits.
- Introduce requirements for standardized allocation of energy use in audits.
- Set a standard for key figures in energy audits to make benchmarking possible.
- Increase the resources to regional organizations that recruit and help companies to apply for aid and to carry out the audits.

4 Energy auditing data base

It is highly motivated to collect and compile the large amount of knowledge generated in all energy audits and to make the data accessible for different purposes:

- Possibility to compile statistics and to generate new knowledge.
- Benchmarking between business categories and individual companies (of energy use and measures)
- Getting more ideas on energy measures for different type of companies and businesses and to find out their profitability when they have been proposed to other companies

The users of such data could be researchers, energy agencies, energy consultants, energy users/companies, energy projects, etc. A data base like this should be financed with public money and could also developed in transnational cooperation. The data base should be administrated by an external actor, preferably close to research environment, as it is important to verify the data quality and to present the energy use in a coherent way. Also, data from measure should preferably be standardized. Experiences, from e. g. Boverket, National board of housing, building and planning, show that gathered data, according to energy declarations of buildings, has limited use if the data quality is not guaranteed.

Standard data regarding proposed energy measures:
Measure in short
The standard unit the energy saving measure belongs to (or if it is a general measure)
Savings in kWh and monetary
Cost for implementing the measure
Pay-off calculation and optional LCC calculation

Except for this, some basic data from each company can generate much more statistics, key figures, benchmarking and knowledge.

Proposal for standardized energy auditing data
SNI code (type of business)
Production hours
Number of employees
Heated building area
Turnover

Key figures

If the above information is collected, it would be possible to obtain significantly more and more reliable energy key figures, which we see a great need for. However, it requires coordination and that a comprehensive approach is taken as to what data need to be collected in connection with energy audits. Key figures can serve as comparisons at several levels:

Benchmarking between companies – total amount of energy use
Comparisons of this kind are often hard to make because the processes and the conditions differ between companies. However, it is relevant in case there are several similar entities in the same business category, e.g. fuel stations, real estate companies or shops.

Example of key figures:

- MWh in relation to turnover for each business category
- MWh in relation to A-temp for each business category
- MWh in relation to staff for each business category

Benchmarking between companies – certain processes
This can often be more interesting for individual companies. It requires quality assured measurements, standard units and a mutual data base. Key figures have been proposed by Linköping University in the report" Benchmarking of small and medium size industrial companies' energy performance".

- Heating: kWh/m^2 A-temp*
- Lighting: kWh/m^2 A-temp x h production
- Ventilation: kWh/person
- Compressed air: kWh/produced unit
- Office: kWh/person
- Air conditioning: kWh/m^2 A-temp
- Hot water: kWh per person
- Internal transports: kWh/produced unit

* A-temp = Temperate building area

To obtain these key figure data the basic data as noted in the section above from every company is needed.

Internal benchmarking of total energy use
For key figures to compare the energy use internally in one company there is of course no need for a mutual data base, but the same kind of data is needed for the mapping. Many manufacturing companies find it hard, or almost impossible, to obtain correct key figures as the kind of production varies. Examples of key figures to compare the internal energy use over time:

- kWh per produced unit
- kWh per hour of production
- kWh per square meter
- kWh per turnover
- kWh per employee
- kWh per volume/weight of raw material

Data base development through Nordic Energy Audit

The County Administration of Dalarna has, in cooperation with Nordic Energy Audit AB, participated in the development to complete this requested data base for energy auditing and key figures. The company, a spin-off from Linköping University has collected data from audits made with support from Swedish Energy Agency and currently has a database with data from 2000-3000 proposed energy measures. A user-friendly visualization tools has been designed to visualize energy use and other key figure functions making benchmarking possible.

4.1 Policy recommendations

- Set up a long-termed financed national data base to compile high quality energy data from audits and to produce key figures.
- Use the data base developed by Nordic Energy Audit for regional energy projects.

5 Increase speed and reach further

The climate threat requires considerable higher speed in the energy efficiency work. With the current speed it will take a long time before all companies in Dalarna have an energy audit and an action plan. In our experience the most important starting point is the energy audit, making it necessary to conduct hundreds of energy audits in Dalarna in the years to come.

To reach the energy targets there is great need for:
- Inspiring more companies to make energy audits
- Find faster energy auditing methods
- Find cheaper ways to make energy audits

At the same time, the core quality of the energy audits needs to be higher rather than lowered. This might seem as an impossible equation, but according to our experience it is actually possible to achieve. Listed below are examples on how to make this happen.

5.1 Support to projects and groups of companies

Instead of aid to individual companies' energy audits that require plenty of administration, more support should be given to projects that involves more than one company. The projects get a joint administration for accountancy of company aid activities but will be much less time-consuming per company for all involved parties.

One example:
50 companies apply for €2000 energy auditing aid, totally €100 000. The administration of this aid, including support from the county board or energy agency, in combination with the companies' own time and the time used at Swedish Energy Agency, would cost around €150 000. A total cost of €250 000. If a project is granted €250 000 to help 50 companies to make energy audits the administrative work could be cut in half and each company can get an energy audit of €3500. And, most importantly, the focus will be on energy issues, not on administration.

5.2 Support to different business categories

One of the most effective ways to carry out more energy audits, at a lower cost and in the same time with a higher quality, is the public support to different business categories for energy audits and implementation of measures. This method has been tested in pilots by The County Administrative Board of Dalarna with good results, documented in the report" BEE-Branschvis energieffektivisering", Länsstyrelsen Dalarna 2015.

The evaluation of the project shows that the amount of public money spent per saved kWh amounted to €0.021.

Experience shows, among other things, the following benefits:

- The companies tend to be more interested to take part in energy projects if there are customized offers for their individual branch and their colleagues participate (group pressure, interesting to meet fellow colleagues and the sense of being up to date on the market).
- The cost of energy audits significantly reduces when a consultant can be procured to make multiple mapping of a similar nature and in the same geographical area (reduced travel, increased rationality)
- The quality of energy audits increases when a consultant makes several energy audits of the same kind of business (the work is speeded up, the consultant can build up specific branch skills, identify more energy saving measures that can be added to previous reports).

There are several examples of business categories and groups of SME companies in Dalarna estimated to have an energy use over 300 MWh annually, that we not yet have reached. The cost effectiveness and the quality enhancement would benefit from coordination of energy auditing.

A joint procurement of energy audits could be done for example for bakeries, wood industries, print shops, car retailers, food markets, petrol stations, hotels, restaurants, health care center, bus companies, mechanical workshops, real estate companies and condominiums.

For many of these energy auditing cost could be lower than €1500-2000 per organization (provided that the most cost-efficient methods described in this chapter is used). For the real estate companies the cost is slightly higher. In total, it would amount to about €1million to perform energy audits in the remaining SME in Dalarna.

Branch organization cooperation

As projects are time limited, energy work needs to be ongoing through a systematic approach by the companies after an energy audit have been done. The County Administration of Dalarna has tried to start cooperation with branch organizations to give them the lead in knowledge and results over time and thus contribute to continuity. The problem has been that the organizations seldom are staffed for this kind of role and the projects need to finance extra branch organization resources. There are also examples where the companies compete in the same branch and do not want to participate in mutual energy work. In these cases, there is a need for even more divided energy cooperation levels instead of a whole branch. Even if the branch organizations should get more resources to administer and lead the energy work within its branch, most of the organizations are national.

We find it necessary to exploit the possibility of large-scale investments in energy auditing by initiating collaborations with different business categories, but this co-operation usually needs to be initiated at national level.

5.3 Auditing based on general knowledge

Another way to simplify and lower the energy auditing cost is to use general knowledge regarding companies with similar business in combination with site visits as a starting point. This can be made if we have a data base with lots of data from energy audits previously performed at similar companies.

Using the large amount of data regarding estimated and proposed measures can reduce the time for energy audits and increased quality of data. The time needed to find out measures can be reduced when earlier estimations can be used. Comparisons with previous proposals can contribute to accurate estimations.

The County administration of Dalarna suggest a pilot project with accessible data bases (se previous chapter “Energy Auditing Data base”) to develop methods for more rational energy audits based on general knowledge in combination with site visits. The aim should be to find methods for large-scale energy audits in companies that haven't done them.

5.4 Environmental inspection

The Swedish Environmental legislation, Swedish environmental code, require all businesses to save energy and primarily use renewable energy. The business owners must have knowledge about their own energy use and a systematic action plan for carrying out of reasonable measures.

To reach full complicity within the energy work also the inspection according to the legislation must be strengthened, not least in companies that do not start energy work at their own initiative. This require inspectors’ increased energy competence. For a fair and business friendly inspection the environmental inspection must be performed with similar starting points in order not to impose requirements on companies that are dependent on individuals.

Increased speed in companies' energy work and implementation of energy audits require increased resources for inspections under the Environmental Code. Environmental supervision is also the only way to guarantee 100% implementation and should be strengthened within the European Community.

5.5 Policy recommendations

- Support energy auditing projects that involve groups of companies.
- Develop branch projects and cooperate with branch organizations.
- Make pilot projects for more cost-effective energy audits based on general knowledge of previous proposed energy measures in combinations with site visits.
- Enhance the environmental legislation and its implementation by increasing the resources and the speed of environmental inspections.

6 SME networks

The County Administration of Dalarna has during 2015-2018 in cooperation with Swedish Energy Agency run five networks with SME companies that are high energy consumers. It has been a national project financed by the European Regional Development Fund. The project incentive was to achieve energy efficiency by exchanging experience and through support from experts. The project is the Swedish Energy Agency's largest energy efficiency project for SME with a budget of €4.7 million for 40 networks in the country.

6.1 Recruitment of companies

A total of 31 companies were recruited to the networks in Dalarna. They were organized to achieve maximum value from experience sharing and to avoid unnecessary travels. It resulted in four industrial networks, according to their geographical position and one real estate company network.

Thanks to previous knowledge of energy use in different companies in Dalarna, we could establish a target list that meant that approximately 60% of companies were in favor of participating. Compared with the recruitment of previous energy projects, we can note that in recent years, companies have achieved a much higher energy awareness and have already started to take energy actions.

The most common reason for declining the offer to participate in the networks has been:

1. The companies have already a systematic energy work and most of the measures have been carried out.
2. The companies think that their energy use is low and are therefore not motivated to participate.
3. The companies are interested, but lack time and resources to participate.
4. The company rents its premises and does not think that it is possible to persuade the owner to participate.
5. The company lacks interest for energy.

The major reason for the company recruitment success in such short time depended on the facts that it was marketed as branch efforts and we could refer to previous success stories. We also stressed the fact that the companies can determine how many years they want to participate in the network. The most persuasive argument for the companies was the offer of a large amount of consultancy hours.

6.2 Implementation

The Swedish Energy Agency has been lead partner with regional coordinators for county boards and energy agencies in charge of regional implementation. Coordinators have built up good relations with the companies and supported them throughout the project phases.

The participating companies had to sign a participation agreement, in which the parties' commitments were regulated. The companies committed to attend to three network meetings a year, to make an energy audit, to implement energy targets and energy policy. They also had to pay an annual fee of €1000 plus taxes. Participants received 150 hours from energy experts plus support from the coordinator. The agreement runs with three months' notice.

Evaluation

A signed agreement between the participating parties can be beneficial as it involves an active position to take part in the network and it creates clarity about resources and expectations. However, it requires that as little administrative work as possible.

The participation fee of €1000 annually was as expected no recruitment obstacle since the offer was beneficial. The fee makes it necessary for the companies to take a stand each year weather they find it valuable to continue and make hesitant companies to exit faster from the project. A single start-up fee would have been preferable if you want to keep the companies in the networks.

Energy audits

The companies' first activity was to perform an energy audit. The project contributed with help throughout the entire process and to purchase, carry out, approve and report the audit. Procurement of energy consultancy was coordinated by the networks.

A total of 620 energy measures were proposed for the 31 participating companies. 85 % of the energy measures regarded operation maintaining and service, 15 % regarded investments.

Energy efficiency potential

Energy saving potential

The average energy use in the participating companies is 3400 MWh annually. 4900 MWh for real estate companies. In both cases there is a large span between individual companies.

	Average Turnover	Average Energy use	Energy use in relation to turnover
Mechanical industries	€9.5 million /annually	2 900 MWh/annually	30 MWh/€ 100 000 turnover
Wood industries	€4.1 million /annually	4 000 MWh/annually	97 MWh/€ 100 000 turnover
Real estate companies	€3.6 million /annually	4 900 MWh/annually	136 MWh/€ 100 000 turnover

A comparison between turnover and energy use in different industries show that that the real estate companies have the largest energy use. The fact that the wood industries use more energy than other industries is due to the large amount of wood chips combustion. The comparison also show that real estate companies have the highest energy costs also in relation to their turnover. This supports the projects' conclusion that real estate companies are the most motivated for active work with energy issues.

The total energy use, as mapped by the networking companies, amounts to just over 128 MWh. The project has identified and proposed energy efficiency measures leading to 19 000 MWh energy savings, equal to 14.7 %. However, many of identified measures are not economically profitable.

Energy saving results

It is hard to measure energy efficiency in percentage. There are many uncertain factors on how to compare different years, what should be measured and there is a need for a definition of energy efficiency in relation with production volume. As changes in production volume could not be followed up, the data cannot be converted to energy efficiency.

The companies say that they, as a result of the project, plan to carry out measures that amounts to 15 100 MWh of energy savings, that is 11.7 % of the current energy use. Furthermore, the project has led to €3.2 million energy efficiency investments. Another €6 million worth of energy investments are planned.

Evaluation

Energy savings of 11.7 % is less than in earlier projects. In our experience the energy issue awareness has increased during the last years and there are nowadays few companies that have not made measures, something that is very positive. It also leads to a decreasing savings potential.

The project cost to achieve results has amounted to around €0.1 in public funding per saved kWh.

One public euro has generated 18 euros in private funding.

Energy expert's consultancy aid

Enterprises in the networks have had access to more than 150 hours from the energy expert in individual support for technical assistance and the introduction of systematic energy work.

Evaluation

The strength of the project has been the companies' access to expert support, also after the energy audit has been done, as it is usually necessary to carry out further studies before decision making. Often alternative solutions have been presented, or the proposed solutions need to be studied more deeply to provide the company enough facts for decision making. To avoid application for supplementary aid it has been very valuable to be able to offer expert support within the project. Around 30 % av the available hours were used so the conclusion could be that a network needs around 50 hours of expert support per participants after a complete energy audit.

The supporting expert need to be the consultant who has carried out the energy audit in order to keep the process together and to avoid the need to build up relations with multiple experts.

Energy management

One of the main project goals has been to support SME in long-term systematic energy management, something that easier if the project runs for several years. Therefore, there has been a requirement for the participants to implement energy targets, energy policy and an action plan.

Evaluation

The concrete task for companies to implement energy targets, energy policies and action plans have been positive to make the work systematic and action oriented. So far, we have not experienced any interest in applying ISO 50001 energy managing system from SMEs, simpler systems are needed although using the same methods.

Networks

In Dalarna each network has met 5-6 times during the active network period in a year and a half. There have been lots of participants and the seminars have included training, rewarding discussions, exchange of experience, homework, pear reviews and planning of the next step, etc. Network meetings have taken place at the participating companies, taking turn being the host. Some common goals for the networks were never put in place, as companies did not perceive it as relevant.

For 70 % av the SMEs the CEO has been the network representative, 25 % have been production managers and 5 % energy/environmental managers.

Evaluation
We see the need for strong support to achieve a continuous successful energy management and to make this process easier there is a need for external support for the auditing, planning and systematics. The project's coordinators and energy experts could give this support, but according to our experiences it does not rely on SME cooperation. The advantage with mutual meetings is to be able to add extra inspiration, exchange experience and get more tips. They can also serve as milestones for performed actions and other reports.

In practice, one cannot argue that the project created a network of companies. The definition of network is companies with business relationships, which is difficult for public actors to create and need to build on other needs than just the energy issue. The groups formed in the project are rather to be corporate groups that participated in the same process, with the main relation to coordinators and experts. We see no problem in this, the main thing is that projects deliver benefit to their target group and when companies do not see the benefits of continued joint work, it should be terminated.

More branch-oriented groups are more easily developed into real networks.

6.3 Continuation

The industrial networks
The SME in the industrial networks were satisfied and done with their project participation and decided to terminate their membership after two years. The network project has resulted in an energy audit and an action plan for planned measures. Several measures have also been implemented. Through network meetings, companies have gained more motivation and knowledge in their energy work. Technological solution seminars have also been carried out

To keep full steam ahead these companies now need a renewed contact to move forward and as a reminder for implementing planned measures. So far, the energy audit results show that many SMEs have actions with a bit too long pay-back time to make them eligible to carry out. More profitable measures have to a large extent already been introduced and investment aid is a mean to go further.

The real estate network
The real estate network has been more far-reaching in its work as it is a part of the real estate core business. The network exchange has been very active, and a continued cooperation was requested so this network lives on.

6.4 Policy recommendations

- Continue to support different business categories in their energy work, but use the experience gained when new efforts are planned.
- Use the companies' real needs as a starting point and avoid to large national projects unless a "bottom-up" perspective is possible.
- Offer energy experts, making both energy audits and giving technical assistance for further studies.

7 Aid to environmental studies

The Swedish Energy agency offers aid to environmental studies ahead of investments in SME. The financing is made with funds from ERDF and the county boards guide the companies in applying for the funding. The initial requirement is an energy audit performed by the applicant. Aid is granted with 60-70 % of the total cost (level is determined according to needs).

The SMEs that were helped by the County Administrative Board of Dalarna to apply for aid have received €5000-25 000 for technical studies to produce basis for investment decisions. The studies have been made by the energy consultants who previously made energy surveys and built up trust with the SME.

Administration evaluation
The aid application and report processes are similar to those for energy audits but requires a somewhat comprehensive administration to report. It has been an advantage that the SME have done this recently when reporting the aid for energy auditing and thus know how it is made.

To simplify and give concrete support during the entire application, implementation and reporting is vital to keep the aid interesting.

Aid evaluation
In our opinion environmental studies is a natural continuation of energy audits. Many times, it is the heaviest investments, with the greatest energy saving potential, which is not studied enough as it would need too much resources in the audit. To achieve investment decisions, aid like support for environmental studies and further technical assistance is needed.

All participating companies has planned to make the studied measures. We estimate that one third of the companies would not have proceeded with the plans without the aid and one third would most likely proceed anyway, but it would take longer time.

We think that there are strong incentives to use the aid also for start-ups when e. g. planning for energy effective new buildings or processes (without previous energy audits).

7.1 Policy recommendations

- Continue to give aid for environmental studies
- Include, if possible, aid also for start-ups to make new energy efficient investments.

8 Regional framework program for aid to SME

In the years 2016-2020, The County Administrative Board of Dalarna operate a regional framework program for energy investments and increased competitiveness in small and medium enterprises in Dalarna. The project, "ENCOM – Energy investments for competitive companies", has a budget of €8 million. It is the first of its kind and it has inspired other Swedish counties to launch similar programs.

Half of the program budget is financed by the ERDF thematic area for a low carbon economy and half is financed from governmental funds for sustainable growth in small and medium enterprises. Allocation of the funds is governed by EU Commission regulation No 651/2014 about state aid.

8.1 Implementation

Categories of aid

The different kinds of aid are:

- Regional investment aid
- Investment aid to SMEs
- Investment aid for energy efficiency measures

The two first categories, where aid is given to measures that aim for increased competiveness and increased energy efficiency, are most common.

The aid for energy efficiency measures is of a new kind, allocated to energy measures that will fulfil the Europe 2020 strategy's priorities towards a low carbon economy and should thus justify more aid than other kinds of support. The aid has previous not been used in other Swedish regions so the project ENCOM has been a pilot when it comes to implementation. Eligible costs according to the regulation are "the extra investment costs necessary to achieve the higher level of energy efficiency". If the costs of investment in energy efficiency can be identified from the total investment cost as a separate investment, this energy efficiency-related cost shall constitute the eligible costs. In all other cases, the costs of investing in energy efficiency are identified by reference to a similar, less energy efficient investment that probably would have been carried out without the aid. The difference between the costs of both investments identifies the energy efficiency-related cost and constitutes the eligible costs.

The understanding of the term" extra investment costs" has stirred up some discussion in Sweden. Our implementation is that the entire cost for an investment with energy efficiency as its main cause, is equal to this added cost. The investment can be separated from other investments like increased

production. We don't find it possible in practice to make another implementation to partly support energy measure investments related to processes, machinery and other equipment.

Machinery and other equipment's usually have better energy performance than what has been available on the market and it is hard to find a superior class that is much better. However, when investing in new buildings, an extra cost can be calculated to build more energy efficiently.

According to ENCOM's regulations it is *possible* to grant aid to energy efficiency measures if the investment also enables new or increased production. The latter is not a requirement according to the regulations, but the regional priorities for the program is also to promote new jobs. Investments in more efficient facilities to enable production, can be equally as motivating as supporting investments in more efficient machines for increased production.

Type of investments

In order to find out if the investment leads to increased energy efficiency and thus is justified in the program, a dialogue has taken place with the companies that has applied for aid. To receive aid, there is also a number of formal criteria, e. g. the need for financial support.
The aid granted is divided into two investment categories:

- Investments in increased and more energy efficient own production.
- Investments in new products and services leading to energy efficiency on the market.

Based on experience from the first calls principles have been set up about investment priorities. For the first investment category, energy efficiency in production, there are detailed guidelines:
- Energy efficiency aid for building oriented processes
- Energy efficiency aid **not** building oriented
- Efficiency in production processes
- New energy efficient facilities/buildings for new business

Increased energy requirements - a success factor

The request for concrete energy calculations has forced the applicants to reflect and collect information, making them more energy aware. The program budget includes an energy expert who can help the applicants and the county to verify the energy calculations. During the expert visits they have at the same time been able to give more advices on energy measures, which has been much appreciated.

Due to the increased national legislative requirements on the companies regarding their energy use and systematic work with measures, the energy requirements in ENCOM is higher to be able to receive aid.

The companies now need to present an energy audit with an action plan to receive aid. In order not to delay planned investments, it is enough that this can be shown before aid can be transferred.

On many occasions the companies have chosen to order a supplementary energy audit at their own expense to be done by the energy expert hired by ENCOM. Financing this, in connection with a larger investment, has not been burden but as a logical well-timed effort at a reasonable cost, delivered to a motivated part. Particularly as it often contributes to find the best investment solution and simplifies the possibilities to get aid granted. In our experience timing is a key factor when it comes to inspire companies to make energy auditing and work systematically with energy issues. The companies are most motivated when they plan new investments. In this way the program setup has been more successful than introduction of energy auditing to companies on other occasions.

Bundling as a tool for Public Private Partnership

Within the program a new model for bundling of energy measures has been developed. During the energy auditing process, a list of measures has been compiled – from the simple and least costly to the costlier and less profitable. When this is done it is possible to make a partnership agreement with companies who apply for investment grant for energy efficiency measures. The applicants undertake to carry out the simpler measures at their own expense while the costlier measures can be granted aid. In this manner the goal to carry out all measures can be achieved.

The model also regulates that a company cannot get aid for a measure if there also is another measure with higher energy saving potential and this measure is not carried out. In some cases, further measures can be added if they are entitled for aid and if this will guarantee implementation. In other cases, requirements for further measures can be an included prerequisite for grant. We find this method successful and recommend it to be tested on a larger scale within the EU.

Follow up, evaluation and exchanging of experience

The project results have continuously been followed up and presented. In framework program half-time an evaluation has been made. The plan is to send out an on-line evaluation form to all participants that need to be filled in before aid can be distributed.

The county has also initiated exchange of experience with other framework programs in the neighboring counties, something that has been very valuable.

To further develop the program, it would be valuable to exchange ideas with similar programs in other countries.

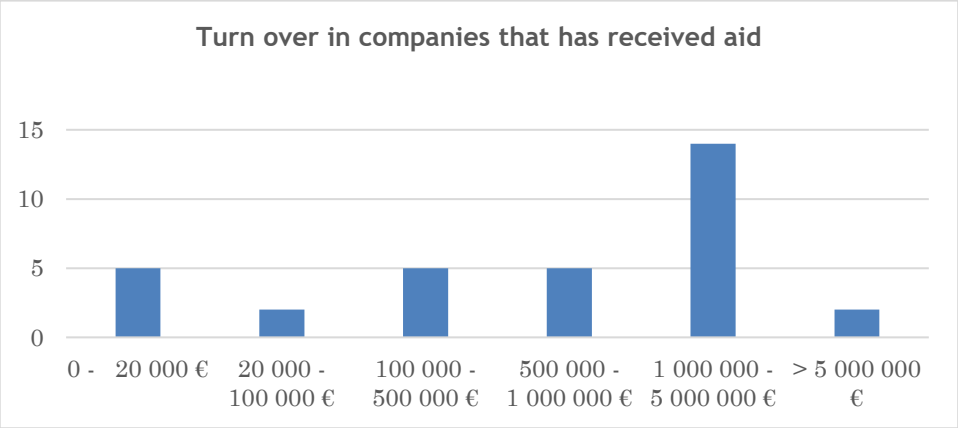
8.2 Results

33 company aids have been granted during the two-year project time. Another 37 applications have been rejected. The most common causes for rejection were companies' lack of need for economic support, the investment was not eligible for support, competition reasons or an incomplete application.

About the receiving companies

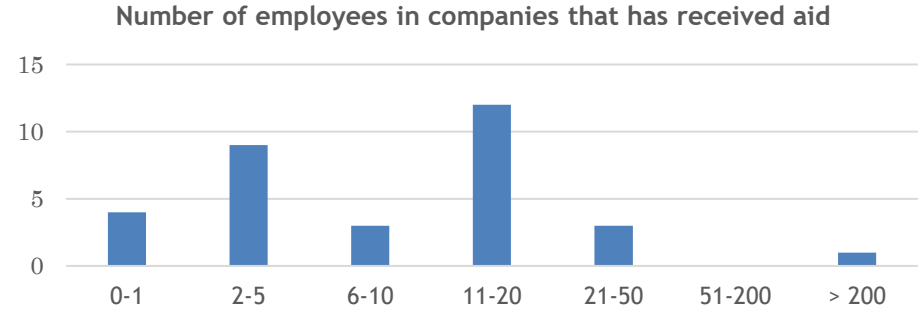
72 % of the receiving companies operate within manufacturing, mainly in metal and wood industries.

Company turnover



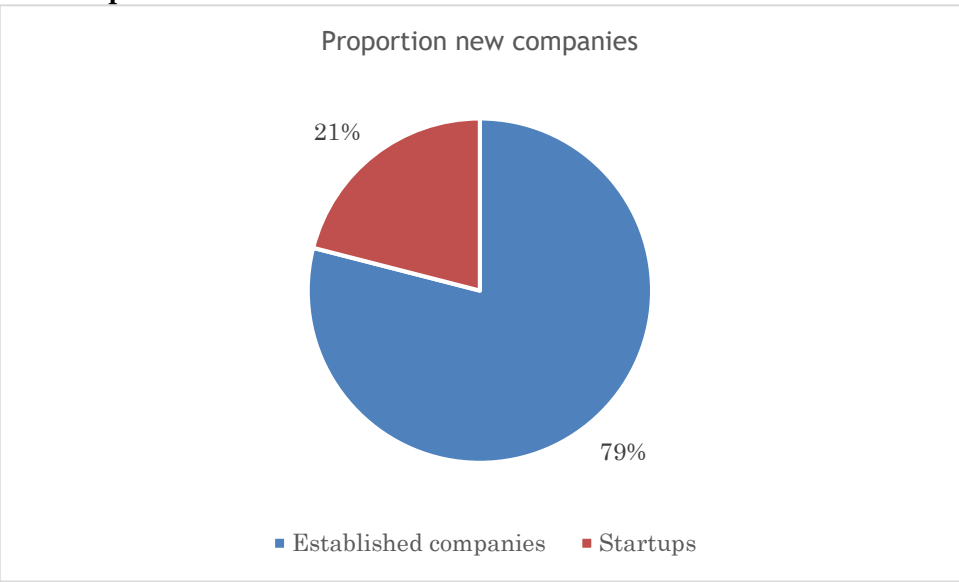
Size of the companies receiving aid (number of companies in each span). All companies are regarded as small according to their turnover except one.

Number of employees



All companies, except one, are regarded as small companies when it comes to number of employees.

Start-ups



Number of start-ups receiving aid.

Financial results

€3,9 million, of total budget €4 million, has been used for aid and the rest has been used for program management.

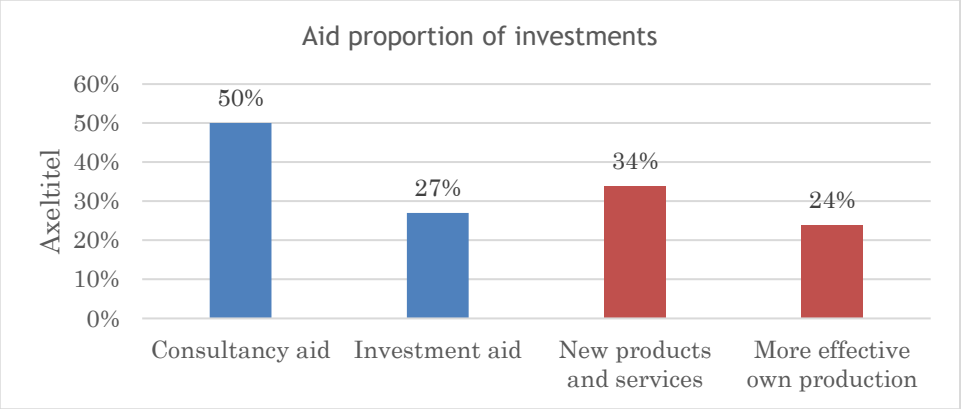
The granted aid spans from €100 000 to €850 000, with an average of €130 000.

Aid percentage

The percentage of aid granted for each applicant is determined by individual evaluation according to the rules regarding maximum aid levels. Regional investment support can be granted with up to 35 % in priority municipalities (area A) and up to 30 % in area B.

The different aid percentages, in final decisions, are determined by:

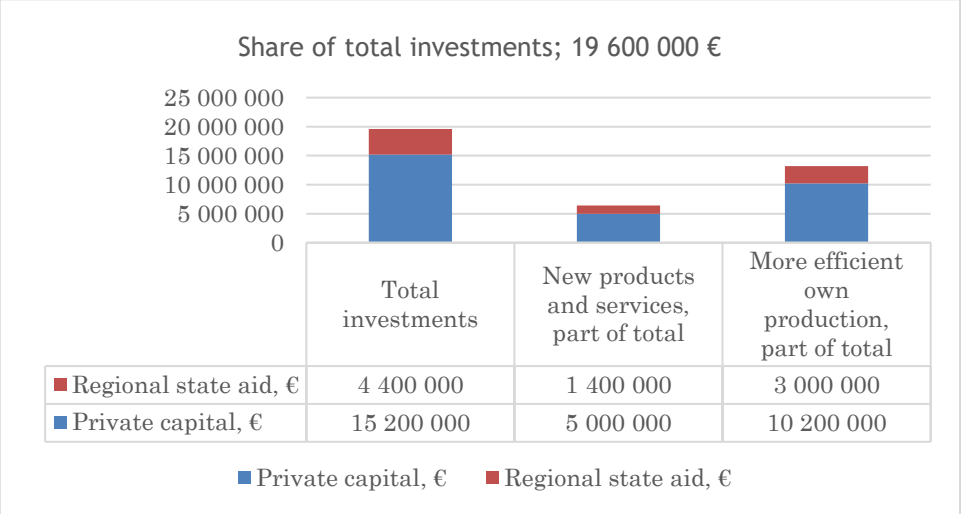
- The kind of support/regulation that is to be applied
- Available funds in the program
- Company's need for aid
- Applicable geographical area



Aid for consultancy has been granted with 50 %, The investment aid has varied from 20 % to 40 % with an average of 27 % for the eligible costs. Applications regarding development of new products and services have generally received more aid than those who regard productions improvements. The motive is more job opportunities.

Total investments

Many applications also include investments not eligible. The amount of €16,5 million out of €19,5 million has been assessed as eligible, even though the aid contributes to the full investment.



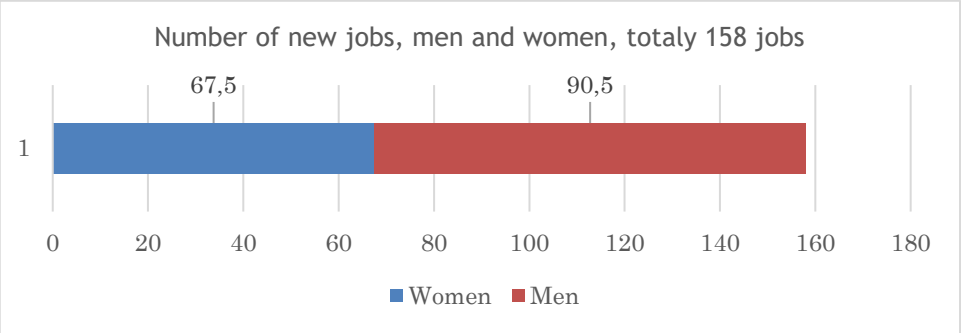
The framework program investments amount to a total of €19 600 000, including both eligible and not eligible costs. The companies themselves have contributed with €15 200 000. Total investments in new products and services amounts to €6 400 000. Total investment in more efficient own production amounts to €13 200 000.

Employment effects

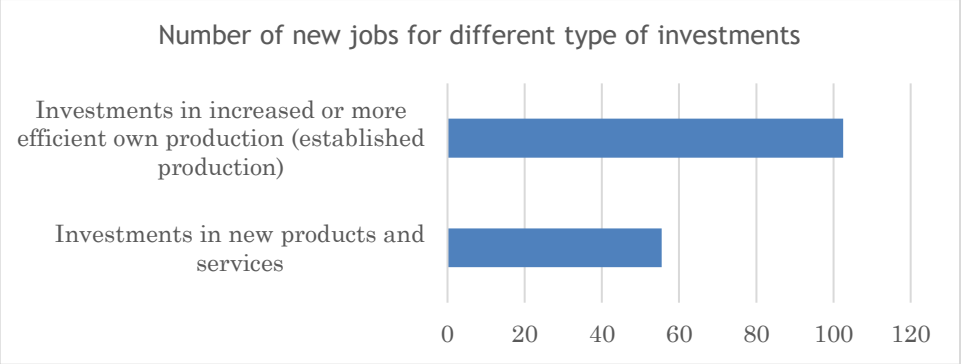
At the time of application the applicant has been urged to estimate the investment's employment effect. The number of jobs created has been calculated for men and women. In total, the program has created 158 new

jobs, based on planned volumes, in our view a very good result. We think this figure has high credibility, but there is also a need to follow up the result in a few years.

Employment effect



Funded investments have created 158 new jobs, whereof 57 % men and 43 % women.



The number of new jobs divided between development of entirely new products/services and development of existing companies. Total for the whole program.

The category" increased and more efficient production" contains funding for investments in existing companies that aim for increased volumes, diversification and a more efficient existing production. The category "new products and services" contains consultancy checks and funding to starts-ups or existing companies investing in entirely new products/services.

Funding in early stage implicate a risk of multiple counting of indicators. A company can receive aid on several stages through the innovation system, both as initial consultancy support, incubator support and production start-up support. It is hard to relate the new jobs created to a specific individual funding.

Cost of new jobs
The cost of new jobs varies in a large span from €8 000 to €130 000. In every new job an additional €100 000 of private capital has been invested.

Public costs per new job	
Cost per new job, existing operation	€29 000
Cost per new job, new products and services	€25 100
Cost per new job, average all granted aid	**€27 600**

The average cost of €27 600 per new job must be related to the cost of the society's other labor market measures. In our judgement it is a relatively low cost.

Energy and climate effects

Energy efficiency indicators
We have chosen to estimate the number of MWh more effectively used by the investments. The difference compared to estimate only savings achieved is that not only the energy savings but also the production volume is taken into consideration. If the production is increased using the same amount of energy the result is an increased energy efficiency, but not energy savings.

To be able to compare the project efficiency with other energy projects we have estimated the cost per energy efficiency kWh in this program.

Framework program energy indicators
→ Annual energy efficiency in MWh as a result of funded investments.
→ Cost per kWh for increased efficiency annually.

The ambition has not been to make exact energy efficiency calculations in this project. This would often call for actual measurements before and after made investment. The aim has been to motivate aid from an energy point of view and to get an estimation of the size of energy efficiency.

All granted investments and its energy and climate effects, in MWh, is found below.

INVESTMENTS IN INCREASED AND MORE EFFICIENT OWN PRODUCTION					
Type of investment	**Aid granted, € K**	**Energy savings MWh/year**	**Energy efficiency MWh/year**	**Savings and increased efficiency MWh/year, total**	**Cost per saved kWh, €/kWh, public money**
Buildings/machinery	74		300	300	0,25
Machinery	59	21	14	35	1,7
Facilities	49	50		50	0,98
Facilities	472	68	75	143	3,3
Buildings/machinery	249	125		125	1,9
Machinery	66	6	84	90	0,74
Machinery	22	10	12	22	1,0
Machinery	47	10	90	100	0,47
Machinery	48	31	5	36	1,3
Buildings	90	1	19	20	4,5
Machinery	75	160	184	344	0,22
Machinery	21	24	22	46	0,46
Machinery	130	8		8	16,2
Machinery	25	45	119	164	0,16
Machinery	62	100		100	0,63
Machinery	180	204		204	0,88
Coating equipment	441	248	222	470	0,94
Robot	30	11		11	2,7
Snow making system	570	950	467	1 417	0,4
Machinery	124	33	15	48	2,5
Robot	45		16	16	2,8
Machinery	67	32	40	72	0,9
Buildings	25	540		540	0,05
Sum € and MWh	**€2978 k**	**3 421 MWh**	**1 384 MWh**	**4361 MWh**	
Sum CO_2			**=13 840 tons**		
Average					**0,68 €/kWh**

Energy results from 23 cases of granted investments for increased production or investment in increased energy efficiency in the company's own production.

Comments to calculations:

- When estimating the energy efficiency for machine investments the estimates have been based on the machine specifications, not on actual measurements.
- The definition for energy savings used: Less amount of energy used for the same process.
- The definition for increased energy efficiency used: Increased production leading to increased energy consumption, but less energy used per unit produced.
- The following formula has been used for calculation the energy efficiency, in this case the investment leads to 35 % increased productivity: $(E_{before}-E_{after}) +(1,35*E_{after}-E_{after})$

- The climate energy efficiency effect has been calculated according to Nordisk elmix electricity used, that is 100 kg CO_2 per MWh. The investments' total climate effect amounts to 13 899 tons reduced CO_2 emitted annually.

INVESTMENTS IN NEW PRODUCTS AND SERVICES			
New product/service	**Granted aid, € K**	**Energy saved for clients/society MWh/annually**	**Cost per saved kWh, €/kWh, public money**
Energy management systems	15	2400	0,006
Energy efficient detached houses)	198	63 000	0,003
Composite antennas	50	280 000	0,001
Electric locomotives	14	1 790	0,008
Wood fibre insolation	857	60 800	0,001
Robotic cutters	63	48	1,3
Transformer systems	101	660	0,15
Ventilation systems	15	1 875	0,008
Electric generators	15	14 000	0,001
Electric charging systems	66	0	-
Sum € and MWh	**€1395 thousand**	**363 000 MWh**	
Sum CO_2		**3 630 000 tons CO_2**	
Average			**0,004 €/kWh**

Energy results for 10 cases of aid granted for investment in new more energy efficient products and services.

Some important comments to the calculations above:

- The calculations on energy efficiency assumes that the business plan is being followed.
- If a company is granted aid in different product development phases there is a risk that the amount of energy saved is counted several times.
- The calculations are based on comparisons with alternative products currently found on the market not taking in consideration that also they could become more energy efficient.
- The energy efficiency climate effect has been calculated according to Nordisk elmix, that is 100 kg CO2 per MWh. The total climate effect for these investments amounts to a reduction of 3 635 733 tons CO_2 emission annually.

Investments that are granted aid have not been prioritized according to the amount of energy saved, but to a total perspective where jobs created and the overall importance to society weighs heavily. Despite this, the conclusion is that it is possible to save considerable amounts of energy to a competitive cost for the society.

The cost of € 0,68 per saved kWh for investments in production is cost effective taking into consideration the fact that 102 new jobs have been created.

The low cost for energy effectiveness related to funding of new products, € 0,004 per saved kWh, is especially notable. Despite the calculation uncertainty it indicates the importance of supporting innovations to achieve our energy and climate targets there are reasons for a stronger focus on business development as one of the most important energy and climate efforts.

8.3 Evaluation

Interviews with receiving companies

So far half of the companies that have received aid was interviewed during the external evaluation of the program.

The question whether the company should have done the investments without the aid was answered with yes by 6 %. 24 % answered that only parts of the investment should have been made, 35 % answered that the investment should have been delayed and 35 % that it wouldn't have been done at all.

The main effects, according to the companies asked, was decreased energy consumption, increased production and an overall development of the company. Anticipated effects were also increased competitive ability and more employees in the company.

64 % of the company's state that awareness of energy issues has risen as a result of the program. The rest think that they had a previous awareness.

Conclusions

Our conclusion is that framework programs for company aid, aiming for a combination for increased competitiveness/more employees and energy efficiency, are successful. Strong synergies will be reached when these are combined and almost all granted aid leads to both effects. Most of the investments done also lead to increased efficiency and affect the energy use. To use ERDF for framework programs like ENCOM is an effective way to allocate the funds. Exchanging of experience with similar programs in other countries is requested.

Project efficiency

It would be interesting to compare the cost efficiency with an average grant of €27.600 per new job in relation to other programs.

We believe that the cost per saved kWh is a good measurement when it comes to comparing the efficiency of different kinds of energy projects like information projects, technical assistance or investment programs.

Project comparison – efficiency in different energy projects	Cost per reduced kWh, public money
Information project BEE: Support to energy auditing and further technical studies.	€0.021 /kWh
Company networks: Perennial support to energy auditing, further technical guidance and energy management.	€0.098/kWh
ENCOM- framework program for state aid Investments in increased and more efficient production, more jobs an energy efficiency.	€0.683/kWh including cost for more jobs
ENCOM- framework program for state aid Investments In new products and services, more jobs and energy efficiency.	€0.004/kWh including cost for more jobs

The average cost of €0.683 per kWh of efficiency in the companies' own production process can be compared with e.g. carried out information projects and company networks. It should be pointed out that the priority in the framework program not primarily is the amount of energy saved but the companies' ability to grow. The average cost of 0.004 per kWh of efficiency for funding new energy efficient products and services supports the significance of prioritizing innovation and business development during the environmental and energy work.

8.4 Policy recommendations

- Prioritize regional ERDF framework programs for company support that makes use of synergies between growth and transformation to a low carbon economy.
- Continue to search for best practice for decision making according to the new support for "Energy efficiency measures".
- Organize exchange of experience between framework programs.
- Increase requirements on the participating companies of performed energy auditing and carried out measures to receive aid.
- Engage energy experts to the framework program who can contribute with energy expertise.
- Develop and implement the private-public-partnership model for investment packages.
- Develop mutual indicators regarding regional development and job effects, e. g. cost per new job, to be applied by all regional funds.
- Apply mutual energy indicators such as euros per saved kWh that can be used for comparison of energy efficiency in different energy projects.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