

Forcing realisation of energy saving measures in business.

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1 - SYNOPSIS

What can be done to realise well known energy saving potentials. Which are the problems in the single steps. What are the main factors for successful campaigns.

2 - ABSTRACT

Today it is widely known that the commercial and industrial sector hold enormous energy reduction potentials. But beside the knowledge about these potentials it is decisive to motivate the companies to examine the possible measures and to translate economic potentials into action.

In several districts of Austria at present a multi-stage procedure is applied for this purpose, which consists of the following steps:

1. Providing and publication of branch energy concepts based on a detailed examination of companies which are representative for this trade. These examinations show, which typical possibilities are given to raise energy efficiency in the individual branch.
2. In the course of a short-term promotion, a specific energy concept is performed for several companies and a subsidy of 25% is given for the necessary investments to realise reductions in energy use.
3. The third step is a broad promotion of the results of step two, so that the members of the branch have concrete examples. The result is a large scale consulting campaign in energy patterns in order to realise savings in the whole branch.

The paper shows the previous experiences in Austria and the success factors as well as critical points for such multi-stage procedures, just like:

- A narrow co-operation between the trade representatives, the promoters as well as the involved energy consultants.
- Clear requirements on the quality of the concepts, where good experiences were made by the call for measurements as a basis for the concepts.

3 - INTRODUCTION

Nowadays it is widely known that the field of trade and industry holds substantial energy saving potentials [1]. However, it is not only important to be conscious about these saving potentials, it is particularly decisive to motivate the companies to study the individual measures and to put them into reality.

The best concept is worthless if after finishing the consulting it is filed away in a drawer of the company. Experience has shown that if you wish to put a concept into reality, a company needs an incentive at this initial stage. An incentive could be, for example, that a part of the necessary investments is subsidised which helps to

keep the amortisation period of the individual measures shorter.

As the enterprises often encounter difficulties in the realisation of the offered measures (e.g.: negotiations of agreements with suppliers and electricity companies, etc.) it is essential to attend the enterprise especially in this decisive phase. The procedures presented in the following try to consider these factors.

4 - HOW WE PROCEED

In Austria we are currently applying a multi-stage procedure, which basically consists of the following steps.

4.1. Making of Branch - Energy Concepts

In co-operation with the "Upper Austrian Energie Spar Verband", the "Styrian Landes Energie Verein" and ecological consultants the Chambers of Trade and Commerce of Upper Austria and Styria are continuously investigating energy saving potentials of interesting branches [1].

Doing so about 10 – 15 representative pilot enterprises are analysed in detail and branch relevant indices are evaluated. The results are summarised in a branch - energy concept, which is the basis for energy saving considerations within a company and which shall also be the basis for further consultations. At the moment the following branch - energy concepts are available:

- stone and ceramic industry
- machinery and steel industry
- butcheries
- sawmills
- gardeners
- joineries and carpenters
- food retailers
- offices, bank offices and insurance companies
- bakeries
- plastics processing industry
- tourism
- automobile workshops
- breweries (being worked on)
- mills and mixed feed mills (being worked on)

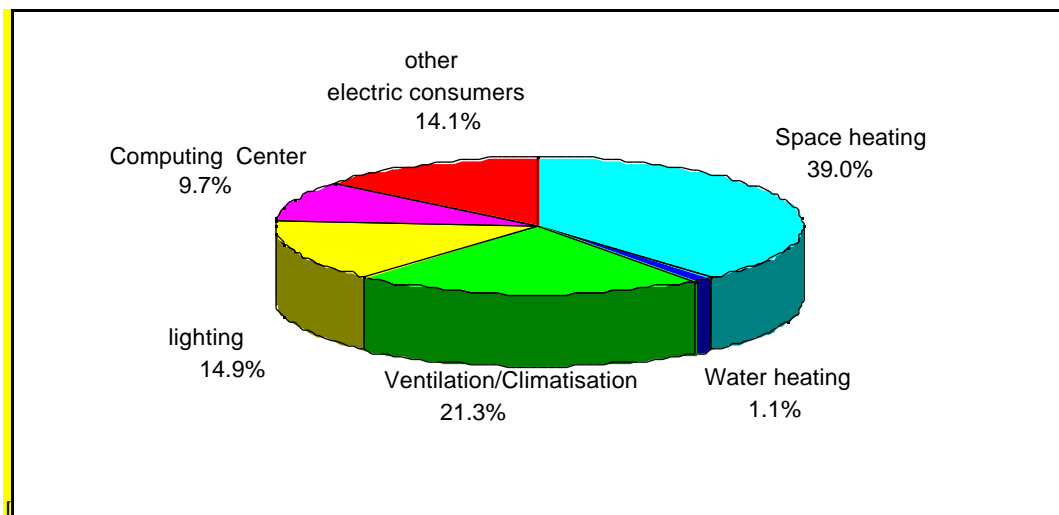


Figure 1a: - Total energy balance in the office sector

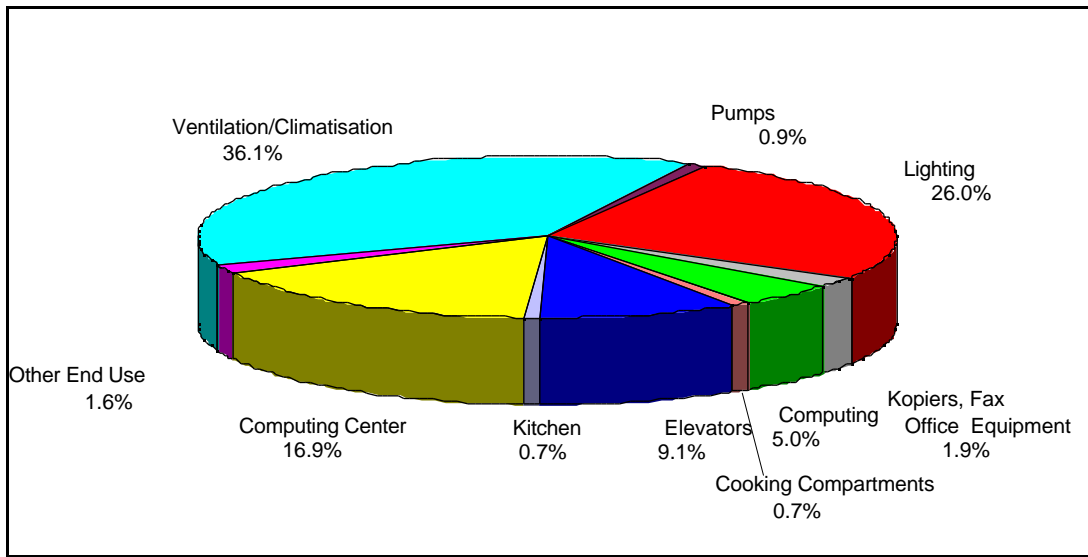


Figure 1b: Electric energy balance in the office sector

Beside important features like turnover, energy consumption and energy costs these branch concepts contain a list of typical critical points, figures for typical energy balance (see Fig. 1a and 1b) and various suggestions for energy saving measures. A concluding summary of the most important information rounds off the contents of the single brochures.

4.2. Realisation, Impulse Promoting Campaign

After this first phase, innovative small and medium enterprises are motivated by promotional schemes – including tailored consulting and subsidies – to realise energy efficiency measures. These promotional schemes are provided on a regional level and they are limited in time. The following promotional schemes are possible:

- 80 % “ECO measurement” for the first analysis
- 50 % for the energy-concept
- 25 % for the investments

Those measures considered as target oriented within these branch - energy concepts shall be realised. In concrete terms, the following features of food retailers and joineries/carpenters that were analysed up to now were sponsored [2,3]:

Scope of Subsidies – Food Retailers [2]:

- Optimisation of space heating and water heating.
- Optimisation of ventilation and suction, re-circulating air operation, use of waste heat.
- Optimisation of available lighting, if other consumers can be influenced positively by this measure (e. g. negative influence of available lighting on refrigerating devices).
- Automatic load management (optimisation of machines, peak regulators, reactive current compensation, data evaluation).
- Optimisation and exchange of refrigerating plants. The refrigerating agents of the new plant must also be HFCC-free.

Scope of Subsidies – Joineries/Carpenters [3]:

- Optimisation of space heating (no fossil energy carriers) and water heating.
- Optimisation of ventilation and suction, re-circulating air operation, use of waste heat.
- Optimisation and exchange of compressed air production
- Automatic load management (optimisation of machines, peak regulators, reactive current compensation, data evaluation)

A precondition to deserve a subsidy [2,3] is that 10 % of the consumed energy is saved both in the field of electrical energy and - if measures are taken there - in the field of thermal energy. In this case the basis is a

detailed concept of a competent consultant. It goes without saying that the application for subsidies must be submitted to the relevant authorities before the first measures are taken.

In addition, we would like to mention that optimization of heating does not mean that the boiler is exchanged. A new biomass boiler or the exchange of an existing boiler for a biomass boiler is subject to a different promotional scheme. Savings resulting out of this can not be counted as energy saving measures for this campaign as far as savings and costs are concerned.

Out of this impulse promoting action emerge model companies, which in the following shall be the model for a widespread campaign.

4.3. Consulting Campaign for the Entire Branch

Promotional measures based on branch concepts and the subsidised model companies should have a widespread impact on a consulting campaign and should induce the majority of the companies to put energy saving measures into action.

Decisive for the reduction of both CO₂ and costs, which is relevant for the companies, is the quality of the actual saving. This means that above all at this stage it is important to mobilise a big number of companies to implement big savings.

In this case the technological concept is the precondition, however, marketing is decisive for success or flop.

5 - PARTNERS AND THEIR INTERESTS

Several partners, which due to their mission and tasks represent different interests, are participating in this complete system and these single steps.

5.1. Energy Consultants of Energy Saving Associations, WIFI (Austrian Institute for Economic Promotion) and WK (Austrian Chamber of Trade and Commerce)

Ecological consulting for companies organised by the WIFI, the Austrian Institute for Economic Promotion, offers its members sponsored energy consulting. The companies are attended by independent consultants analysing them on site and who work out an appropriate energy saving concept. This consulting also includes the information about possible subsidies for the individual cases.

Moreover, the regional energy association and the energy saving association represent the interests of the traders in the field of energy. It is the task of these associations to promote the topics „energy saving“ and „rational use of energy“ on a regional level. The consultants shall offer the customers competent consulting at a fair price.

5.2. Trade Guilds of the Chamber of Trade and Commerce/Companies

Trade guilds are service institutions for companies. The aim of a guild is to take action in all possible fields so that its members are strengthened economically to survive strong competition.

The main interest of the companies themselves is to increase production and to realise cost reducing potentials. This means that for companies energy is only a cost centre which is seen from a mere economic point of view like any other investment. Taking useful, that means cost reducing measures and the fact that relevant necessary measures are subsidised is a big incentive for companies.

5.3. The Austrian Ministry for Environment, Youth and Family & the Austrian Kommunalkredit AG

The third partner in this campaign is the Austrian ministry for environment, youth and family and its subsidising bank Kommunalkredit AG.

The bank Kommunalkredit AG shall promote ecologically relevant projects in Austria. The main purpose is the reduction of CO₂ - emissions, which is the tenor of all measures.

Originally, the bank Kommunalkredit AG was specialised on financing local investments, financing and promotion of local and regional infrastructure projects as well as financing and promotion of local investments in environmental conservation [4]. With the promotion of energy saving measures in small and medium companies the Kommunalkredit AG entered new territory, and the experience in this field was modest.

5.4. Power Utility Companies

Due to a lack of interest of the Chamber of Trade and Commerce and due to the fact that the local power utility company already did good ground work in Lower Austria the local power utility company should be the partner of the Kommunalkredit AG. Despite the current trend towards the reduction of the customers energy costs, as it can be expected from e.g. the Chamber of Trade and Commerce or regional energy consultants and the regional energy association.

6 - EXPERIENCES

In the following we will try to give an overview of the experiences we made in Austria and will point out success oriented factors as well as critical points for such multi-stage procedures.

6.1. Branch - Energy Concepts

The main task of branch concepts is to draw the companies' interest to single areas, where for the majority of the companies saving energy is possible so that initial cost and consumption reducing solutions can be demonstrated [1]. In practice, however, the individual companies are extremely different from each other and almost no measures can be applied for each case. In order to achieve optimal results each company requires a tailored package of measures.

The basis for a package of measures like this is a detailed analysis of the enterprise. By means of this analysis the operation times and the way of operation as well as the technical efficiency of relevant machines and consumers shall be assessed.

We dispose of measuring devices especially developed for this purpose and we have developed our own software to analyse and evaluate the measured data. This „multi-channel load monitoring“ (see figure 2) forms the basis for establishing a reliable energy concept. Doing measurements we pay attention to the following features:

- We monitor the cumulative load curve and the individual relevant consumers (not only the cumulative value). This gives a break-down of the total consumption into individual consumers (=energy balance) - and allows a detailed cost location accounting. Factors responsible for load peaks and their portion become evident so that specific measures can be taken.
- We are monitoring during a continuous period of two weeks (rather than being confined to a few hours or days). Various operating factors (such as fluctuating utilisation levels, breakdowns, temperature effects, ...) become obvious.
- We are monitoring with a one-minute resolution (rather than 15 minutes), so that operation characteristics and the exact time pattern of each consumer can be identified.

Hereby customers obtain:

- Highest transparency of energy consumption.
- A package of measures which is especially designed for their company.
- The certainty of cost effectiveness.
- A serious basis for feasibility studies of cost effective measures.
- On demand, an exact cost location accounting.

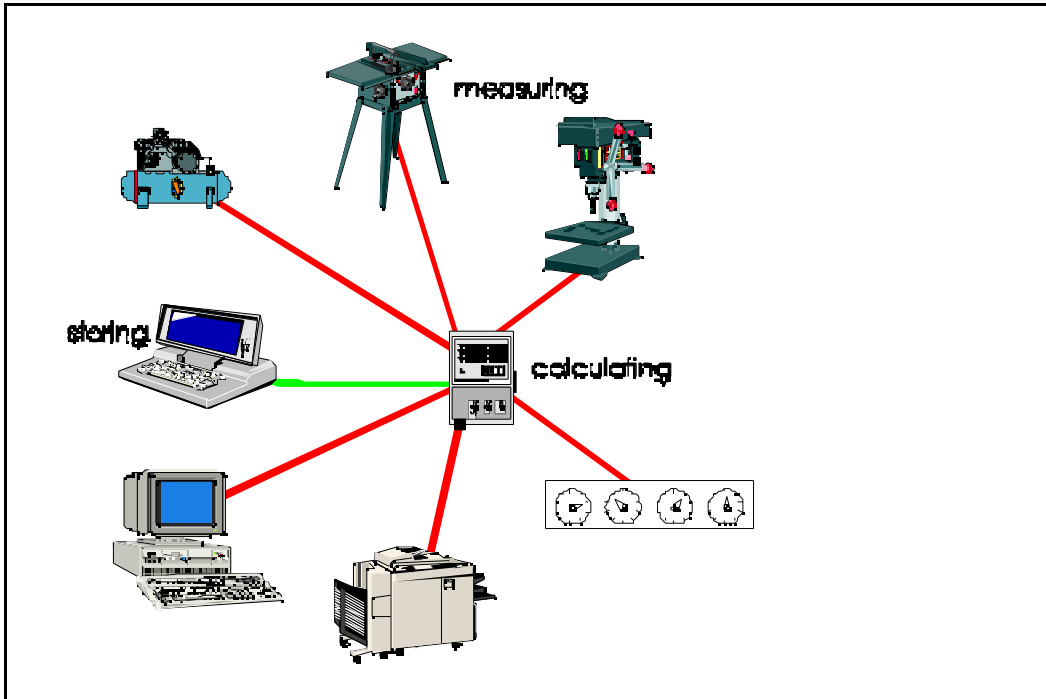


Figure 2: Principle of multichannel load monitoring

In most cases the measures to be taken arise directly from the discussions with the customers about our analyses and the suggestions given to them. In the following the cost effectiveness of these measures is examined. For us multi-channel power monitoring is the direct link between the actual status of energy consumption and the measures to be taken, since it makes energy relevant factors visible and measures become more or less obvious. As this correlation becomes visible and comprehensible to our customers during the evaluation and discussion, multi-channel power monitoring inspires their confidence which leads directly to a realisation of the measures.

Meanwhile this procedure is widely recognised. Based on this method we are currently elaborating branch - energy concepts for breweries as well as mills and mixed feed mills. In addition, the Kommunalkredit AG was asking for a campaign based on multi-channel load monitoring to be carried out in other Austrian provinces.

6.2. Realisation Phase

In January the promotional scheme "Operational energy saving measures for joiners and the food retail trade in Lower Austria, Upper Austria and Styria" was launched in order to put branch - energy saving measures into practice.

After detailed conversations with the partners (see chapter 5), on January 19th, 1998, the first consultant training was held. Entrepreneurs of companies with a high energy saving potential which had already been consulted before should be motivated to invest in energy saving measures. A further incentive should be the time factor as the promotion was limited to a rather short time. It was the aim of the Kommunalkredit AG to obtain energetically sound model companies after realising these measures.

Intensive marketing of the Chamber of Trade and Commerce should motivate a vast range of companies to apply for subsidies.

Results - joineries/carpenters [5]

In the course of the campaign "Operational energy saving measures for joineries and carpenters", by the deadline on July 15th, 1998, 34 applications were filed. Of these 2 were cancelled, 12 were rejected and 20 were proposed for subsidies.

Table 1: Summary of results with joineries

energy relevant costs: 9.331.200 ATS
 subsidy basis: 8.763.053 ATS
 subsidy amount: 2.190.766 ATS
 CO2 – reduction: 266 t/a
 electricity saving: 315.959 kWh/a
 heat saving: 586.879 kWh/a

	Low.Austr.	Upp.Austr	Styria	Salzb.	TOTAL
acc.+:	4	7	9	-	20
rej.-:	-	6	5	1	12
canc:	-	1	1	-	2

Rejections with energy consulting: 4
 Rejections without energy consulting: 8

Results - food retail trade [5]

In the course of the campaign “Operational energy saving measures in the food retail industry ”, by the deadline on July 15th, 1998, 44 applications were filed.

Of these 1 application was cancelled, 23 were rejected and 20 were proposed for subsidies.

Table 2: Summary of results in the food trade

energy relevant costs: 5.380.532 ATS
 subsidy basis: 3.958.609 ATS
 subsidy amount: 989.653 ATS
 CO2 – reduction: 187 t/a
 electricity saving: 226.590 kWh/a
 heat saving: 40.614 kWh/a

	Low.Austr.	Upp.Austr	Styria	TOTAL
acc.+:	1	7	12	20
rej.:	-	20	3	23
canc:	-	1	-	1

Rejections with energy consulting: 4
 Rejections without energy consulting: 19

The relatively high number of rejections without energy consulting might be due to the fact that application documents for subsidies of the Kommunalkredit AG are available at banks so that a comparably high number of companies were informed about this promotion scheme by their financial consultants. The companies started from the assumption that it was sufficient to fill in the application form and to present a confirmation of an electrician stating that with the measure(s) 10 % can be saved - and if it is only load management. These applications were completely insufficient and had to be rejected.

Considering the ratio of saving and costs one will find out that the costs per saved kWh are extremely high so that none of the measures really seems to be economical. However, it must be taken into account that the subsidy package also included measures that not necessarily led to a CO2 – and hence kWh reduction but to a cost reduction, for example by change of tariff [7] or load management. This should be the special incentive for the

firms and should improve the economic feasibility of the complete realised package. Some companies took measures that had been planned for a long time and which were not primarily the target of energy conservation - they were taken out of operational needs.

A further reason why these measures were taken was that many of these firms were small companies, mostly family businesses, that see pay back periods from a different point of view. Unlike in the industry, where pay back periods of six months or maximally two years are usual, these companies calculate with pay back periods of three to five years.

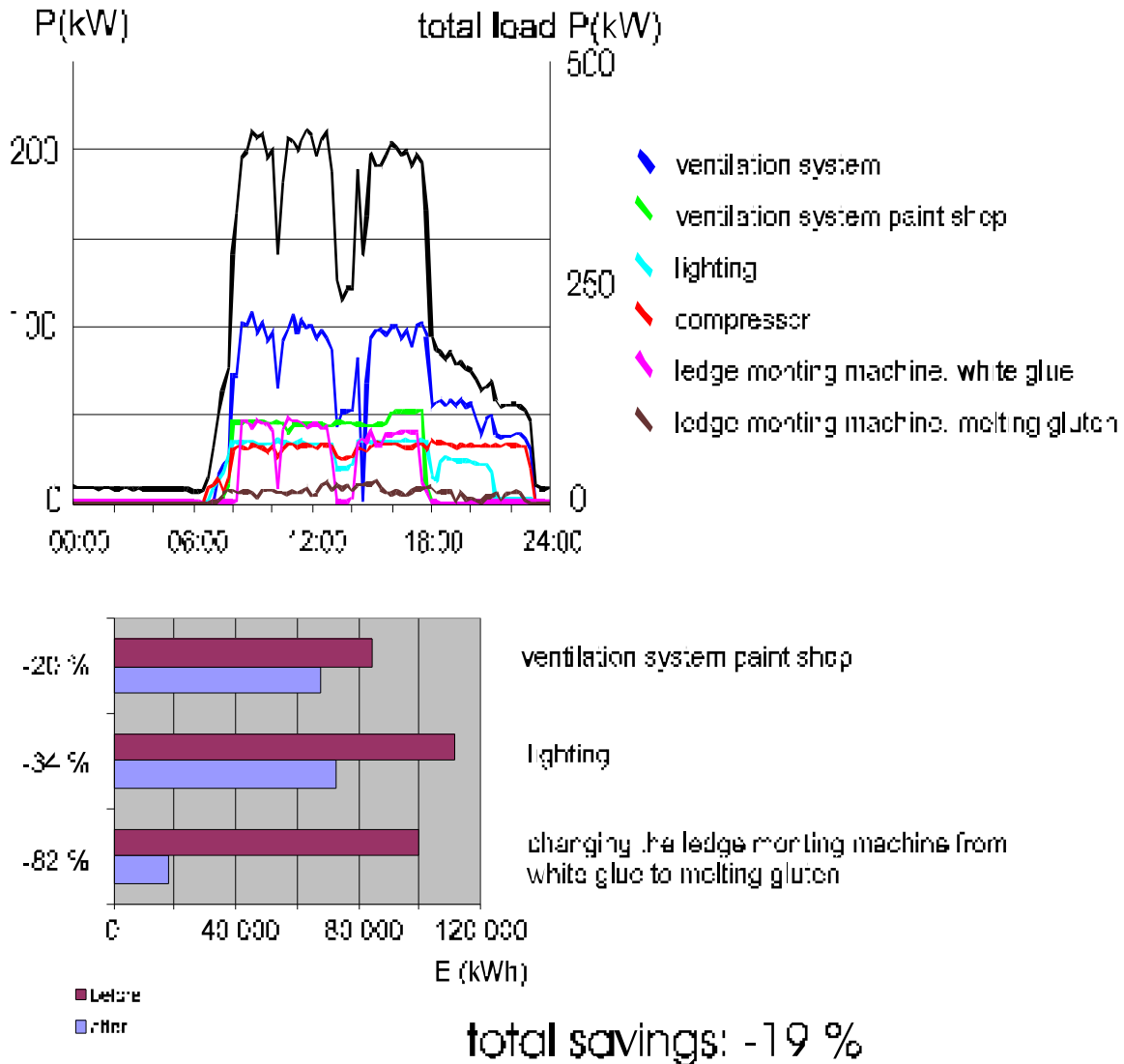


Figure 3: Example for a joinerie, where a result of 19% saving was pointed out by multichannel load monitoring

According to our personal statistics as consulting office 12 out of the 25 companies we consulted reached the concept and realisation phase. Out of these 12 firms 12 got the approval for subsidies but 2 cancelled their application later. We reached these good results by doing the multichannel load analysis (see fig. 3) for most of the companies and so were able to meet the high standards of the Kommunalkredit AG [2,3,6].

6.3. Widespread campaign

The Kommunalkredit AG does not provide any means for the application of the companies. It simply offers a space in the internet. Relevant success stories have to be prepared by the companies themselves and must be given to the Kommunalkredit AG.

Anyhow, this is not enough to attract companies. Marketing, which is necessary to achieve the desired effect, is up to the Chamber of Trade and Commerce and the corresponding syndicates of the Austrian provinces. At the moment the provinces Upper Austria and Styria are not trying to encourage the masses since massive campaigns of this second consulting phase caused a certain feeling of tiredness among the participants. On one hand it is very difficult to motivate the customers, on the other hand the functionaries of the Chamber became rather frustrated as subsidies for only 20 companies were obtained with a high personal and financial input. So the 3rd step is not yet to be taken at least in Upper Austria, Styria and Lower Austria.

The campaign "Energy saving measures for food trade and joineries" is now in its initial stage in the province of Vorarlberg. There this third step is already planned in the preparatory phase of the whole campaign (see chapter 8), so that good results can be expected.

7 - PROBLEMS

It turned out that during the first phase, this means while making the branch - energy concepts, the participants do not encounter serious problems, since they have more or less the same interests. Both the consultant and the customer are interested in a good consultation and both would like to achieve an optimal useful result. Even the responsible authorities of the Chambers are following the same objective, the only differences arise regarding the costs for the consulting. The weak points of the concept primarily can be traced back to the consultants themselves. If a process engineer elaborates a concept for a sawmill, what would basically be a task of an electro-technical engineer, certain statements might not be correct.

7.1. Different Philosophies and Expectations of Involved Groups

As described under point 5, the interests of the individual participants can strongly diverge in the following steps. This is the reason why there are always conflicts as soon as there are more than two participants with a corresponding number of different interests. This is especially valid for the present constellation with two partners, which already co-operated well during the first phase and which now encounter a third partner, whom they need but who tries to impose things they have to accept.

We found out that the Kommunalkredit AG clearly represents its ideas and that it is hardly ready to deviate from the guidelines. The attitude that „the payer is the payer“ even increased the discrepancies. It was not possible to bring in useful criteria, which from the companies' point of view would have been cost effective and which would have led to substantial savings. Let me give the example of a thermically useful measure for joineries:

Many joineries face the problem that their sawdust silo is not big enough. The consequence is that in the summer there is a surplus that can't be stored in the silo. The material is given away and in some cases it is stored in the open countryside where it decays. In some cases the heating is unnecessarily on in order to avoid that the silo becomes full, which requires additional electricity. During the heating period in the winter there is sometimes a lack of fuel. It is then necessary to transport wood pulp from other suppliers into the silo by means of a silo conveyor ventilator. In some cases it could be observed that this additional ventilator is responsible for expensive peaks. In the course of existing campaigns it was not possible to find a way to subsidise this definitely useful measure of a silo extension although this problem affected about 40 % of the Austrian joineries.

7.2. Little Experience with the Realisation of Operational Energy Saving Measures and in Co-operation With the Other Partner

At that time almost none of the partners had experience with the other one: Neither consultants in co-operation with the Kommunalkredit AG nor the Kommunalkredit AG as promoting bank for large-scale projects in the realisation of operational energy saving measures for small companies.

The result was a list of criteria, which were useful for branch concepts on one side but which did not consider whether and to which extent these criteria and the used promotional instruments were useful for the customer group. For economic reasons, the useful multi-channel power monitoring procedure can not be applied e. g. in the food trade as the saving to be expected is not worth the efforts and costs.

In part the subsidies applied for by the food retailers seemed ridiculous to the Kommunalkredit AG and it was tried to introduce a minimum investment limit in order to avoid that the processing costs for the applications were higher than the subsidy itself.

An examination of the companies by means of multi-channel power monitoring turned out to be ideal, since the demand of the Kommunalkredit AG to give a break-down of the total consumption into individual consumers and the saving out of different fields could be perfectly met (see fig.3). As mentioned these procedures could only be used economically in large-scale joineries. For small joineries and food retailers this would be like „taking a sledge hammer to crack a nut“.

In the beginning energy saving measures were discussed, which corresponded to the energy branch concepts of the WIFIs [1,2,3]. At the end of the promotion scheme the Kommunalkredit AG „wished“ a comprehensive energy concept for the individual company. Anyway, for the Kommunalkredit „wish“ was equal to „claim“ and for the consultant „wish“ meant „wish“, which you either fulfil or not. As a consequence some applications had to be amended to meet the demands of the Kommunalkredit AG.

7.3. Time

The current concept of this multi-stage procedure is very complicated and lengthy, as there are always long pauses between the individual steps. On the other hand only little time (only _ a year from the start to the closing date) was available for the impulse generating campaign.

We found that the companies' interest slowly increased and that two months before the end of the campaign more or less no company had prepared its application. Meetings were hastily organised in the Chambers and the energy topic was pushed, but hardly any effect could be achieved. Only shortly before the deadline the companies became active and we were bombarded with telephone calls. Maybe the problem was that the majority thought that the applications were easily and quickly written. Hardly anybody was conscious about the fact that a detailed examination of the company was necessary, which also needs some time. It also needs some time until a concept is ready to stand the examination of the subsidising authority.

At the end of the consulting campaign various companies would have wished to participate, however, they could not file their application in time.

8 - FUTURE PERSPECTIVES

The provinces of Upper Austria and Styria are going on elaborating energy concepts for further branches. At the moment breweries as well as mills and mixed feed mills is being elaborated. These concepts will focus on high quality and a corresponding reliable basis of data multi-channel load monitoring shall be the foundation.

In the province of Vorarlberg already existing concepts are put into practice in the course of pilot phases, especially pushing food retailers and joineries. Other branches that are interesting at the moment are tourism and bakeries. First discussions are being held in Tyrol, but also the provinces of Carinthia, Styria and Upper Austria are likely to follow this trend.

As far as the third step is concerned one can assume that for future realisations especially the third phase must be planned well. This is now the case in Vorarlberg, where right in the beginning special attention is given to a

widespread impact. In the course of this campaign we will support the local energy agency technically and with the organisation. Simultaneously, a marketing expert takes care that the campaign is based on an appropriate marketing concept.

8.1. Adaptations

Required criteria will be adapted as the precondition for subsidies must be stated clear from the beginning. This means that in future within the framework of the concept both thermal and electro-technical areas have to be examined.

Preconditions for subsidies can be modified in a way that the phraseology for required saving will be as follows: energy savings of 10 % in the field of electro-technics or in the field of heating technology or a total reduction of 15 %.

Multichannel load monitoring as desired by the Kommunalkredit AG is only useful if the structure of the companies (also depending on the branch) is worth the effort. In the beginning and as a precondition the structure of the corresponding branch within the province must be examined. A limit might be set and companies exceeding a certain limit of energy consumption (or energy costs) will have to be measured.

8.2. Quicker Handling - More Time for the Realisation

The single steps of the procedure shall be taken quicker and without delays. The first branch - energy concepts were already made three to four years ago and yet now the first branches have entered the realisation phase. The period between the single steps will have to be kept as short as possible.

On the other hand more time should be available for the realisation phase and an appropriate preparatory period should guarantee that the companies realise a really sensible concept.

First approaches will be made by involving the Kommunalkredit AG already at the stage when the branch - energy concept is elaborated and by motivating those companies, which are already being examined in detail, to take action already within this phase. This would mean that the first and the second step would be combined. In Upper Austria this concept could be applied for breweries and mills/feed mills.

In Vorarlberg we are thinking of combining the second and the third step. A consulting promotion for the masses shall be initiated, however, only the first 10 companies presenting a concept will deserve subsidies for the investment.

During this year we will find out which of these two approaches is more successful.

8.3. Marketing

As we already mentioned, for successful large-scale realisation measures it is necessary to promote them on a large-scale basis and to motivate an appropriate number of companies. This is a challenge rather for the marketing expert than for the technicians. According to our experience it will be important to contact companies on a regional basis and to motivate them, e.g. via district authorities of the Chambers, which shall guarantee a close contact between the tradesmen and the responsible persons of the Chambers. First approaches for joint actions can be observed in Vorarlberg, where we bring in our experience as technicians and co-operate with marketing experts, who have experience in this field.

8.4. Making Use of Experiences

Especially the realisation phase is characterised by regionally limited actions. As one partner, however, the Kommunalkredit AG is active all over Austria, it will gain a lot of experience, it is pointless for them always to co-operate with unexperienced partners.

Since our team is working all over Austria as well we try to offer our experience to the relevant regional authorities. This should create an optimal initial position. Based on this we negotiated with the energy agency of Vorarlberg and adapted the criteria according to the structure of the companies. Moreover, we will act as supervisors for the responsible energy authority in Vorarlberg during the complete consulting campaign.

In Carinthia and Tyrol, too we are involved in discussions regarding bakeries and tourism in order to support the responsible persons.

Also in Styria and Upper Austria we are permanently in contact with the responsible authorities so that we can bring in our experience at an initial stage if new campaigns are started.

9 - CONCLUSIONS

9.1. We Are on the Right Lines

We consider that the procedure we opted for is the right one and will help to achieve the objectives. However, some details still have to be improved and we have to overcome some obstacles to obtain the desired results.

For a company there might be no bigger incentive to realise energy saving concepts than subsidised investments. In order to get the full approval of the companies it is essential that the complete allocation of subsidies is transparent and that the subsidised activities can be put into practice by the companies. The points mentioned under point 8 will help to reach this goal.

A decisive factor is that the efforts made to obtain the subsidy can be justified. For this subsidised consulting, as it does the WIFI, will still be necessary.

9.2. Subordinate the Principles of the Individual to the Common Goal

Due to the different approaches of the involved groups and in order to have the desired success it will be necessary that the individual groups subordinate their principals to a common goal and become real partners.

It must be assumed that only economical measures are taken. We are working with companies that have to act economically and a certain scope regarding the contents of the subsidies will be necessary. This means that it should be possible to add fields of application emerging in the course of the campaign and which originally were not explicitly included in the scope of subsidies if they include efficient measures (e.g. the silo that was mentioned before).

9.3. Efficient Realisation

Top priority must be given to an efficient realisation of the program both in terms of the financial means and the time invested.

It's no use pursuing extensive marketing activities if some companies that would like to participate in the campaign have to be rejected in the end. This can be avoided if appropriate preparatory measures are taken.

A crucial point will be that the partners can clearly voice their wishes and targets and that they find a compromise, which is satisfactory to all parties involved.

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