

Duplicating the success - From positive examples to socioeconomic marketing strategies for greater energy efficiency in industry

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Synopsis

An empirically based socio-economic analysis of successful industrial energy efficiency provides a differentiation and classification of implementation processes and resulting policy recommendations.

Abstract

The paper presents the Project „Interdisciplinary Analysis of Successful Implementation of Energy Efficiency in Industry, Commerce and Service“. Based on empirical case studies in Germany, Denmark, Austria and Switzerland, the interdisciplinary approach combines techno-economical variables from traditional barrier analyses with new socio-economic and socio-psychological aspects. It is the objective to gain a broader understanding of successful implementation processes in industrial enterprises.

The positive examples include energy conservation measures within the context of individual success stories as well as efficiency programmes. The project examines the interdependencies between boundary conditions and the features and dynamics of the internal change processes analysed. It identifies main actors inside and outside of the company, the crucial determinants of their energy related behaviour, and influence factors suitable for energy policy use.

The project derives first typical patterns of social innovation and organisational development. Generalizing the findings in order to contribute to holistic policy recommendations, the project puts emphasis on instruments of economic and social marketing strategies to promote cooperative energy efficiency initiatives.

1. Introduction

The paper presents preliminary results from the Project „Interdisciplinary Analysis of Successful Implementation of Energy Efficiency in Industry, Commerce and Service (InterSEE)“ carried out within the framework of socio-economic research of the EU JOULE programme. Based on the empirical investigation of positive examples of industrial energy efficiency (individual success stories and efficiency programmes) with emphasis on small and medium enterprises in less energy intensive sectors, the paper gives a view especially from the socio-economic and socio-psychological perspective, contributing to an interdisciplinary and holistic understanding of real implementation processes.

1.1 Background

Extended studies point at a significant share of cost effective but neglected energy efficiency potentials in industry (e.g. de Beer et al. 1994, Wuppertal Institut 1994). Considering the wide range of efficient energy technologies already available on the markets, this insufficient degree of rational energy use seems to result rather from implementation deficits than from technology deficits. Especially in the case of small and medium enterprises, efficien-

cy measures - although contributing to higher productivity, competitiveness and environmental protection - are not taken due to different hindering factors, incorporating all kind of motivation and information deficits, technical barriers, financial restrictions or market imperfections¹.

Regarding the discrepancy between techno-economical reasonable investment opportunities and the observed much lower degree of implementation - in literature referred to as the energy efficiency gap (Jaffe and Stavins 1994) - the question arises, what determinants influence the investment behaviour of companies, which has been subject to empirical studies (Gillissen et.al. 1995, Velthuisen 1995, Gruber and Brand 1990). Within the perspective of traditional barrier analysis, the company is often seen as a timeless decision making entity, reacting on economic incentives within the regulation framework and being influenced and hindered to a certain extent by barriers and obstacles, which have to be eliminated by policy intervention. An energy efficiency measure is seen as a single and detached event with its outcome determined by the related set of decision variables. This point of view reflects a rather static and one-dimensional perception of the complex issue of efficiency implementation in real business world.

1.2 Objectives and Scope

From the normative point of departure of the InterSEE project, the techno-economical approach has to be broadened by integrating and emphasising socio-psychological and socio-economic aspects because

- efficiency measures are not stand-alone-events but part of a process
- companies are not an entity but a complex social structure of human actors
- company actors and their behaviour are not exclusively determined by the (rational) deliberate assessment of decision criteria but through their subjective perception of organizational culture and social reality, too.

It is the objective of the project to identify the main determinants of successful implementation processes and to gain a holistic understanding of the socio-economic interactions within and without of the companies. The findings should serve to derive typical patterns of successful implementation processes in order to structure and differentiate the target group of SME, contributing to integrated efficiency policy strategies.

Based on the wide range of analysis on insufficient implementation and related barriers, the project is concentrating explicitly on positive examples in order to identify decisive determinants and characteristics of successful energy efficiency implementation.

As a basic idealized notion, successful realization of energy efficiency means more than a single intervention reducing energy consumption for one time only. Success is characterized as a continuous improvement, i.e. a self-supporting pursuit of efficiency measures on the base of lasting behavioural and organizational change.

The project is investigating the conditions of implementation of energy efficiency in industry, commerce and service with focus on examples of small and medium enterprises (SME)² in less energy intensive industries. The target group can be characterized by (Wuppertal Institut 1994, Gruber et.al. 1995, Gruber and Brand 1990):

- the existence of a wide range of untapped energy efficiency potentials,
- the dominance of cross-cutting technologies, i.e. energy technologies which are not related to a specific production process like lighting, space heating etc.,
- a relatively high importance of electricity consumption
- low financial incentives due to relatively and absolutely low energy costs

- typical barriers due to insufficient efficiency know-how and missing personal capacities to built it up.

The research strategy of this project comprises the analysis of the implementation process within the implementing firm as well as its complex interrelations with external actors and factors of influence. In cases of a significant impact of efficiency programmes, the analysis will be extended to the level of the programme actors and instruments in order to describe their impact on change, depending on the strengths and characteristic features of the particular example.

2. Methodology

The first sample of 32 companies from the case studies with 87 Interviews has been carried out (Tab. 2.1), including single SME from Austria, Demark and Germany as well as two swiss policy activities concerning an energy management model and market transformation instruments (target values and labels, Bundesamt 1996). It provides a wide structural variation of the research object (Kleining, 1982), because companies and measures differ in character, scope and context. This heterogeneity of examples will be a helpful contribution to investigate the similarities as well as the differences across the various cases in relation to the respective frame conditions, company cultures, individual and joint activities etc. Especially the concentration on similarities of successful implementation processes will provide useful findings for european cross-national and cross-sectoral policy making.

It has to be stressed, that the project does not provide a representative analysis in a statistical sense. Due to the strictly qualitative approach, emphasis is put on gaining an in-depth understanding from the contextual, process and intersubjective approach (Lamnek 1993) rather than carrying out a comprehensive screening of industrial activities. Taking the methodological scope for deriving general conclusions from qualitative case studies into account (Mayring 1990, Glaser and Strauss, 1967), the findings of the project will be able to make an useful contribution to energy policy.

Table 2.1: Overview on branch structure of case study companies)*

Branch	No. of companies
metal manufacturing	6
electro-technics	4
plastic	5
food industry	4
wood	2
textile	1
printing	2
service	2
other	2
utilities	4
total	32

*) including utilities being involved into the companies' efficiency implementation efforts

Within a case study, various actors from different levels are interviewed on the base of a semi-structured interview concept, incorporating the main features of the underlying framework. The information is analysed in order to obtain an understanding of the specific implementation process observed (drawing the lifeline of success) as well as to identify core subjects, describing crucial factors of influence. Additionally, a cross-case analysis will be carried out on the base of a computer aided coding and clustering of the interview material. It is the objective to identify combinations of characteristic core subjects, specifying proto-typical patterns of successful change.

As the underlying basic framework, the distinctions between different stages of an innovation process and different levels of actors serve as the two key dimensions for pre-structuring the empirical work and preparing the analysis. The first dimension represents the development of an implementation process over time with the following stages:

- the time before the topic of energy efficiency or conservation gets on the agenda
- the arousing event (initial impulse)
- the strategic initiation of the process
- the decision phase
- the stage of concrete realization

- the project evaluation / time after the implementation (where the implementation the continuity of effects has to be ensured).

The distinction between the respective phases is ideal-typical and not suggesting that this is a straight line, rational process. Implementation can fail and stop at any of the suggested stages or fall back to earlier stages. However, the distinction provides a framework to conceptualize the investigation of trajectories of implementation processes in time in relation to the specific and often changing involvement of actors from different levels.

The second dimension concerns the different levels of actors, being more or less important for the progression of the implementation. The factors related to internal company interaction can be separated into the level of individual actors and the level of group interaction. Concerning the individual actors, the focus should be on three different types of actors, which have different roles in the progress (in some cases certain actors may realize different roles):

- the decision-makers, who bear the core responsibility (e.g. general manager),
- the change managers, who are entrusted with the task of mediating the process of change (e.g. technical manager),
- the change agents, who take on the job of concrete realisation (e.g. technical staff),

The different actors outside the company can be distinguished with respect to the interaction with frame conditions (legal, economical, political), energy policy measures (efficiency programmes etc.) and especially with the group of other external actors (social networks). The latter consists of similar firms, customers, energy suppliers, energy efficiency service suppliers, all kind of interest groups etc.

3. Results

As depicted in Part 1 and 2, the important contribution of an integrated socio-economic approach has to be seen in providing a process understanding of energy efficiency implementation. The major findings of the first empirical case studies will be outlined and structured with respect to the following aspects:

- Efficiency measures can only be realized if efficiency is on the top of the agenda, raising the question: What makes efficiency important?
- Action not only has to be made possible, but has to be actually started: Where does the impulse come from?
- The outcomes of decisions are strongly influenced by the subjective preferences, decision criteria and decision procedures chosen by the actor: What does profitable mean in the specific context?
- Decisions have to be turned into real activities in order to accomplish an implementation process, demanding the cooperation of other internal and external actors involved: How can internal resistance be overcome?
- Due to constraints concerning financial and personal resources as well as know-how, SME are hardly able to realize efficiency measures on their own: What is the role of external support?

3.1 The Question „Why“ - Energy Efficiency as General Motivation?

The case studies indicate, that energy efficiency is rarely an objective per se. The increase of energy efficiency and the issue of CO₂ reduction seems to be too abstract, not suitable for every day identification. On the contrary, four types of motivation can be distinguished on the firm level:

- General environmental concern in a broader sense (doing something good to the environment) is important for the type of actors (partially) driven by ecological philosophy. In this case, economic profitability is less source of motivation than just a necessary baseline for business activity.
- For the second type, pure economic interest in cutting down energy costs is the major motivational factor. Here, the actor is seeking for pure cost cuttings, where energy is perceived as one cost figure among others within the controlling scheme and efficiency is a techno-financial success indicator without social value.
- Thirdly, an engineering interest in process optimization especially on the technical middle management level creates general motivation for efficiency measures. These actors are seeking for technical and managerial excel-

lence without special focus on energy, which is not a single subject but part of the general attitude of showing responsibility by „keeping the company clean“. Having everything under control, i.e. technical mastery and optimization of energy consuming technologies, is seen as precondition for responsible and ethical correct entrepreneurship in a broader sense and as a proof for engineering excellence. In this case, energy efficiency is an indicator for production process productivity and quality.

- Finally, there is the actor without interest into energy efficiency at all, where energy efficiency has no priority as such. This is not only due to financial reasons (energy costs have a comparatively small share of total costs) but also due to time restrictions of key persons, scarce personal resources are concentrated on core production issues (output, quality). In this case, the type and power of the initial impulse is of utmost importance, because a certain inertia has to be overcome (eg. by legal requirements or sharp market demands).

All these factors are not necessarily linked to branch specifications like energy intensity or exposure to environmental pressure but depend mainly on the subjective perception by the actors.

3.2 How to Get Started - the Initial Impulse

Depending on the pre-existing general motivation, a more or less powerful kick is needed to get energy conservation measures going. The type and source and especially the right timing of the initial impulse are important parameters determining the beginning of successful implementation processes. Initial impulses can be roughly divided into:

- Production technology related requirements such as recurrent technical breakdowns, technical constraints of the local infrastructure or the occasion to link the measure with investment which has to be undertaken anyway. Especially in this case, the companies depend on internal or external impulses to realise efficiency measures within the regular investment, stressing the importance of the right kick at the right time.
- The inspiration of high and middle management are major sources of initial impulses. The latter, however, are often influenced by external impulses as through contact to experts, consultants and free or cheap energy audits.
- Environmental regulation can provide a decisive push towards ecological activity, especially as first steps for a company being non-active so far (Holm et.al. 1994). The same holds for the case of customer side pressure demanding clean products.

3.3 Money Talks - the Perception of Economic Parameters

In most companies cost effectiveness in the sense of economic reasonable investment is a mandatory baseline for decision, i.e. apart from single exceptions non-profitable options are not taken. The subjective perception of profitability, however, differs significantly, which is not necessarily linked to business success. On the one side, only measures fulfilling strict quantitative requirements are put into action and financial aspects are very important for the decision process.

By contrast, other companies try to execute every reasonable and useful efficiency measure evaluated in a broader qualitative sense. Energy costs and efficiency are seen only as one factor among others, connected with multiple features of the measure such as working conditions, increase in quality or productivity etc. in this case, the restriction on energy costs is seen by the executives as a destructive fixation on the financial dimension, destroying the holistic value of a multifunctional investment..

Interestingly, in quite some cases the quantitative saving effect of a conservation measure is not exactly known by the companies due to insufficient monitoring and measurement. Even in cases where costs savings are perceived to be significant and relevant to the decision, reliable data is rarely obtainable, leaving the assessment open to personal judgement. This lack of objective decision parameters underlines the subjective character of profitability assessments.

3.4 From Decision to Accomplishment - the Importance of an Inspired Change Manager and a Relating Organizational Culture

Successful efficiency implementation depends on team work, because energy efficiency measures are often concerning complex technical problems, influencing different parts of the company. In order to achieve the full amount of possible savings, proper operation and permanent awareness (good housekeeping) from the staff's side is necessary.

Once decided, however, energy efficiency projects need a change manager who is taking the initiative and responsibility for the accomplishment of activity. Very often it depends on his personality, whether a project can be put through against internal reluctance and resistance. Especially with projects not directly connected to the core business or when unfamiliar solutions have to be implemented, a strong management and the leading role of innovative high hierarchy personnel are important fostering factors for the initiation as well as for the implementation and continuation of a measure. Sometimes, the commitment of the owner and top manager of the firm, is connected with an authoritarian management style, so that objections on the side of the employees are overcome through strict orders. Problems regarding the internal acceptance can turn up at the beginning of energy efficiency projects, as the involved employees are not yet fully convinced of the project, but have to face a bigger work load in the course of the realisation.

Charismatic leadership of the top management, aiming to influence the opposition of internal actors by participation from the beginning and communication referring to objective physical measurement, is one of the most important drive for successful activity. It creates a fostering organizational culture, providing a risk-free and stimulating atmosphere for activities, being essential for creating the middle management's crucial commitment to the corporate philosophy. The participation of all relevant actors from the beginning of the project contributes to less internal resistance, better results through additional ideas and inputs including experiences from the worker's side. For continuing improvement processes it is indispensable, that every member of the organisation commits himself to the common goal of higher efficiency. However, the case studies indicate that an engagement of staff grows slowly and it takes some time and communication effort to generate self-supporting participation processes. As observed in the case studies, many contributions to energy savings are stemming from waste management and quality measures, because these fields are much more concrete and easy to visualize - the energy and climate subject remains often to abstract, impeding full identification of workers with the issue.

3.5 Success Needs External Support - The Role of Social Networks

The input of external know-how is in nearly all cases of crucial importance. Energy audits, consultancy or networks provide impulses, information and concrete know-how for solutions which cannot be built up the the companies itself. In some cases, fostering network relations have been built up, where internal engagement is fostered more generally through contacts with other firms making the same experiences, providing regular exchange of information and experiences. It has to be stated, however, that certain limitations has to be depicted in relation to these cooperations. Generally, the network observed supports mainly already existing, fairly advanced movements and does not create new activities from the scratch. Networks demand engagement, representing effort and investment into social links, which can reach significant dimensions and might exceed the SME's capacities. Furthermore, networks demand commitment and trustful cooperation, which is hindered in case of direct competition between the participants.

However, most of the restrictions and barriers can be overcome by open minded attitude of all actors involved and by sophisticated moderation, confidence and creating stimulating social learning processes. Furthermore the case study results indicate, that access to a network of professional energy specialists in the sense of a technical hotline, providing specific information for detailed realization problems, would be an important fostering factor for the technical management.

3.6 The Dimensions of Successful Change Processes

The case study findings have pointed at a wide range of process features, some of them ambiguous in impact and

strength or even contradictory. Many details have been skipped due to the limitation of this paper presentation and much more could have been said about interdependencies and temporal relations or causalities. However, some aspects can be found throughout all considerations: In terms of fostering energy efficiency, actors on all levels have to develop motivation and commitment to the goal of reducing energy inputs, i.e. change has to take place on the level of the willingness to act.

Additionally, the course of implementation demands technical and social skills, cooperation with internal and external partners and access to sufficient personal, technical and know-how resources. Since in most cases SME and the staff members are lacking sufficient expertise in at least one of the areas, change has to take as well on the level of the technical and organizational capability to act.

Consequently, the scope for companies to increase energy efficiency is determined by the pre-existing state of development, i.e. the history of efficiency in the company with regard to the general motivation to tackle that issue and the existing organizational and technical competence. Within the course of an ongoing improvement process, the company can develop with respect to these three dimensions, and different trajectories are possible (see. Fig. 3.1).

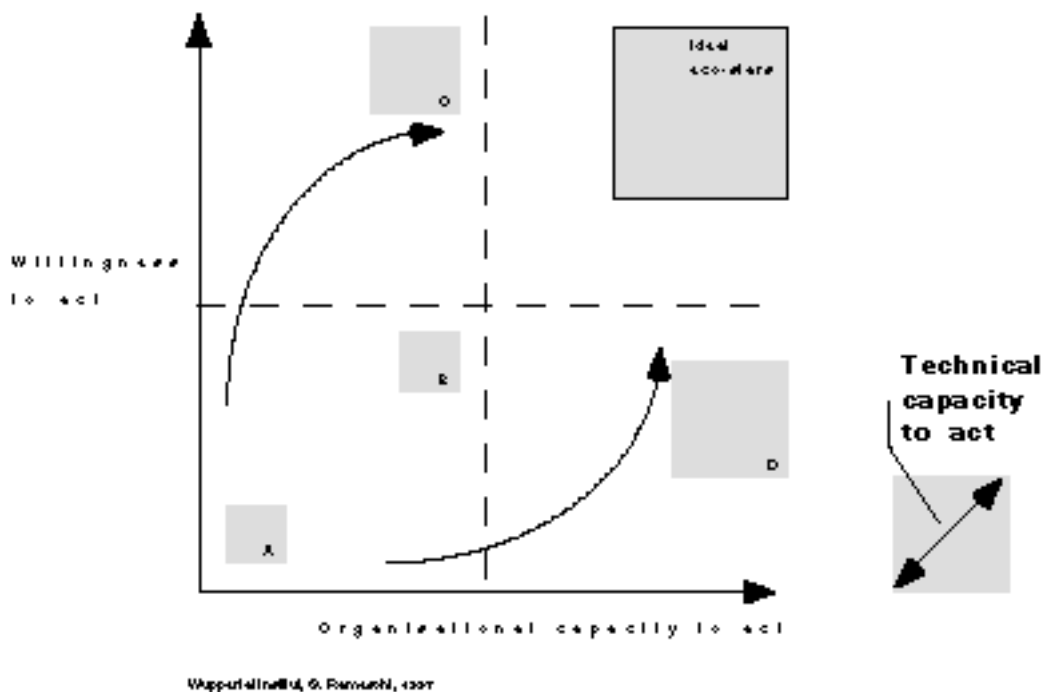


Figure 3.1: Three dimensions of successful change process and a proto-typical classification of firms

In relation to the internal capacities and the external impulses or inputs, the company starts to built up motivation, technical and organizational competence. The underlying steps differ for instance in terms of actors involved, time or money required, internal resistance, external support or opportunities for cooperation. From the case studies, there is strong evidence for four rough proto-typical clusters of companies as depicted in Fig. 3.1, which seem to be independent from branch specific characteristics or traditional economic criteria as size or turn over.

TYPE A: This type has neither sufficient motivation nor competence to enter a successful self-dynamic implementation process. These companies depend on external kicks to get going such as regulation, financial incentives or strong social inputs. Even if positive experiences are already made, energy conservation measures are only taken isolated without continuation. In spite of insufficient activity on the firm level, some factors might be fairly advanced, e.g. concerning the engagement of the technical manager, who still stands alone with his ideas. These

advanced factors represent the first starting points for energy policy, which have to be identified and addressed.

TYPE B: This type shows a certain willingness to act, but has no sufficient know-how to act on its own. To certain extent, however, enough organizational competence could have been developed in order to use and exploit external inputs, but without deliberately and systematically seeking for. This company implements nearly every measure being told by consultants or other external actors but does not reach the state of a self-supporting process yet.

TYPE C: This type is characterized by very high motivation and fairly good technical and organizational competence. Energy efficiency and environmental concern are parts of the corporate philosophy and most staff members show strong commitment to these common goals. Since in this case motivation and enthusiasm are higher than the necessary implementation skills, this firm is facing the risk to overestimate its possibilities by tackling unrealistic tasks. Sometimes, this leads to (unnecessary) failures, putting a damper on the actors' engagement.

TYPE D: This type is characterized by the development of sufficient technical and organizational resources, driven by production or cost reasons. Often the staff has first elaborated technical know-how before gaining additional organizational skills by management systems, controlling etc. The company might even be very open minded in terms of innovation and adaption of advanced technologies without having a corresponding ecological philosophy. Due to this high competence, positive experiences can be expected for first efficiency measures contributing to stimulation by feedback of success.

Even if not every company will fit into this structure, the classification presented gives a first glance on different types and stages of development processes. The main features described will have a strong influence on the character and pace of change processes. Especially the aspect of process speed will have to be taken into account by effective energy policy strategies in order to place the right incentive at the right time:

Success is slow - the role of process pace

The realization of energy conservation projects demands financial and personal resources - and most SME are lacking both of them. Additionally, the technical competence, especially concerning non-core activities, is limited and cannot be easily increased. Even external support needs an internal contact being subject to the same limitations. All these restricting factors indicate, that SME have to take small and manageable steps in order to achieve their efficiency goals. Furthermore, small steps reduce financial commitment and thus reduce risk of wrong decisions. Accordingly, in most cases, success is not characterized by the optimal turn-key solution but by a permanent step-wise approach followed over longer time. From the socio-psychological perspective, this approach is one of the most important preconditions for successful and lasting processes. Every step provides results, which can be feed into an internal feedback loop. The feedback of positive experiences is a major source of motivation, confidence, trust and readiness to take risk, increasing the self-efficiency of engagement. Instruments like energy management systems and internal communication channels can contribute to this feedback by providing measurements and data, and by documenting and multiplying the achievements.

3.7 A Broader Understanding of Innovation - The Need for Social Innovation

Successful change processes increasing energy efficiency in SME depend on new and unfamiliar devices, methods and behaviour, i.e. on innovation. Within the context of the project and regarding the company typology derived from the case studies, innovation can no longer be exclusively interpreted as a product-oriented improvement of the technical features of energy technologies. Without doubting the need for further R&D in the technical field, the case studies indicate, that the energy political focus has to be shifted more towards process-oriented innovations. The results of the case studies and the derived three-dimensionality of change processes (motivation, technical capability, organisational capability) emphasise the importance of social innovation. Social innovations increase the willingness to act and organizational capacities to act. They have to be introduced by internal activities such as new communicative structures (e.g. efficiency work groups), management systems or the documentation and publication of positive results. At the same time, social innovations refer to external links such as local or branch-specific networks, social and political engagement and customer-supplier relations. As any

innovation, social innovations cannot be commanded by politics but a stringent policy framework can create a fostering environment, making it more likely to spread.

4. Conclusions

The case study results stress once more the existence and importance of energy efficiency potentials on the industrial end user side. Within the target group analysed, energy conservation measures contribute to a significant better performance of the companies by reduced energy costs, better working conditions, motivation of staff, higher quality and productivity or powerful management systems.

In order to address these untapped potentials, the findings from the case studies and the derived socio-economic perspective on the implementation process can contribute to a modification of traditional, rather linear and static understanding of energy policy. Energy efficiency should not longer only be seen as result of techno-economical equilibrium finding, partially affected by timeless barriers and market imperfections. By contrast, the findings point at some aspects generating an intergrated view on dynamic interaction, leading to an integrated implementation support and social marketing strategy:

Policy mixes for implementation support

Integrated policy mixes providing support and assistance through the whole implementation process from the very beginning to the end will contribute to increased effectiveness and efficiency of policy strategies. That does not mean, that measures are entirely initiated and realized by public means and funds. By contrast, the focus should be on initiating a self-supporting change process within the company, which has to be strengthened in decisive moments by a fostering environment. This demands a specification of the instrumental bundles with correspondance to the target group and stage of the process. Additionally, the schedule and evaluation procedures of policy strategies have to take the small steps and thus relatively slow pace of change processes into account. Main features of a process oriented implementation support strategy are:

- **Mandatory differentiation target group:** The specific definition of target groups and how to address them suitably according to their prevailing motivation is a major challenge for policy makers. The average energy intensity of a branch or single technologies are likely to be a misleading indicator in setting target group priorities for energy conservation policy. Special analyses are necessary to identify more precisely these firms that consider energy consumption a promising field for action in order to define target groups more aptly.
- **Differentiation of economic criteria:** implementation results are not exclusively determined by economic criteria. Even if cost awareness contributes to general motivation, the impact of cost-benefit calculations is often restricted to the pure decision phase. Very important factors bringing efficiency on the agenda (pushing a decision) and ensuring the realization success (implementating a decision) are to a high degree influenced by social parameters, demanding non-economic instruments.
- **Increasing internal competence by external support and social networks:** The internal competence and thus capability to initiate and realize efficiency measures has to be increased by various means:
 - Supply of practice-oriented technical know-how and information by special training and education for technical personal, planners etc., and network contacts such as a technical hotline, providing precise information to detailed implementation problems.
 - Supply of management know-how by introduction and support of energy and environmental management systems and decision tools.
 - Supply of organizational and social know-how by information and training on organizational development, methods and instruments of internal communication and cooperation and staff participation

Social marketing

Energy policy should put more emphasis on the initiation of self-enforcing processes in order to achieve a continuity of engagement and activity within the target group even without further policy interference. Key players, such as inspired executives and decision makers especially from the high management level, have to be activated and supported. In order to raise their concern and motivation for the issues, special activities to address this target group despite its severe time restrictions are essential. Thus, it is necessary to evaluate the outcome of meas-

ures and to provide a feedback of success by actors specific marketing and communication strategies (see Fig. 4 1). Pilot studies or demonstration projects of best practise in typical applications are suitable instruments to stimulate initiation and motivation if they are combined with an adequate marketing strategy e.g. by decentrally organized workshops. Competitions and awards provide a platform to give energy saving actors a positive feedback on their efforts and thus contribute to an increased motivation.

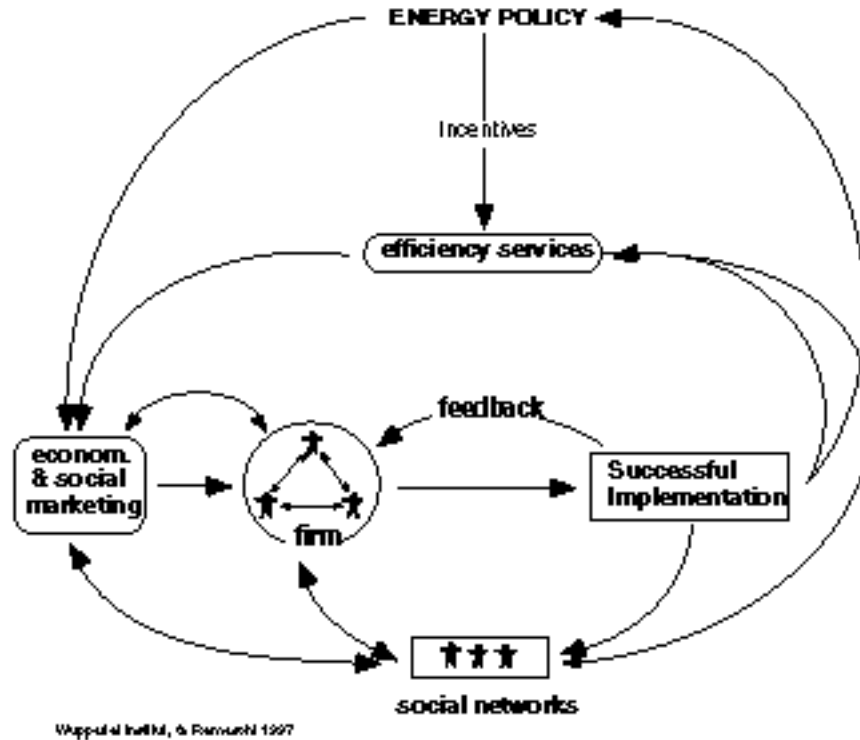


Figure 4.1: Cyclic and self-enforcing energy policy approach

And finally: policy makers too should look upon energy efficiency measures as „products“ which have to be „sold“ to the target group of SMEs. Beside a appropriate differentiation of the targeted actors, policy strategies and instruments have to be accompanied by sufficient marketing and communication efforts. Actors within companies and institutions have to be adressed and convinced by thoroughful selected and designed marketing instruments, requiring a sufficient share of funds for this purpose.

Acknowledgements

The authors gratefully acknowledge the financial contribution of the European Commission (DGXII) to the research project „Interdisciplinary Analysis of Successful Implementation of Energy Efficiency in Industry, Commerce and Service (InterSEE)“ within the framework of the Socio-Economic Research Area of the JOULE Programme, and the contributions of the InterSEE research partners AKF Institute of Local Government Studies Copenhagen, Energieverwertungsagentur e.V. Wien, Fraunhofer Institute for Systems Analysis and Innovations Research Karlsruhe, as well as Amstein & Walthert AG Zurich and Dr. Eric Bush, Felsberg, to this paper.

Endnotes

[1] Cf.: DeCanio 1993, Energie&Klima 1990, Gruber et.al. 1995, Gruber/Brand 1991, IEA 1995, Sanstadt/Howarth 1994.

[2] The study follows the often used SME definition: less than 250 employees, total balance sheet of 27. Mio. ECU and a yearly turn over of max. 40 Mio. ECU. Due to pragmatic reasons of empirical research, the final selection of case studies, however, includes few larger firms (up to 500 employees for instance).

References

- Bundesamt (Hrsg.). 1996. *Evaluation der Verbrauchs-Zielwerte für Elektrogerätele* elaborated by Fraunhofer-Institut für Systemtechnik und Innovationsforschung (ISI), Karlsruhe, Bundesamt für Energiewirtschaft. Bern.
- De Beer et. al. 1994. *ICARUS* Universiteit Utrecht, Department of Science, Technology and Society.
- DeCanio St. 1993. *Barriers within Firms to Energy-Efficient Investment* Energy Policy, Vol. 21, Nr. 9 (September 1993), S. 906-914.
- Energie und Klima, Vol. 2. 1990. „Energieeinsparung sowie rationelle Energienutzung und -umwandlungen“ and Vol. 10 „Energiepolitische Handlungsmöglichkeiten und Forschungsbedarf“. Bonn/Karlsruhe.
- Gillissen M. et al. 1995. *Energy Conservation and Investment Behaviour of Firms* Universiteit Amsterdam, Dep. of Environmental Economics, Universiteit Utrecht, Department of Science, Technology and Society.
- Glaser B. and Strauss A. 1967. *The discovery of Grounded Theory: Strategies for Qualitative Research* Chicago. 1967.
- Gruber E. et. al. 1995. *Analyse von Hemmnissen und Maßnahmen für die Verwirklichung von CO2-Minderungszielen* Elaborated from Fraunhofer Institut für Systemtechnik und Innovationsforschung, ifo-Institut für Wirtschaftsforschung, Gesellschaft für Energieanwendung und Umwelttechnik. Studienprogramm der Enquetekommission „-Schutz der Erdatmosphäre“ des Deutschen Bundestages, Band 3 Energie, Teilband II, Bonn, 1995
- Gruber E., Brand M. 1990. *Rationelle Energienutzung in der mittelständischen Wirtschaft* Köln: TÜV Rheinland.
- Gruber E., Brand M. 1991. *Promoting energy conservation in small and medium-sized companies* Energy Policy 19(1991), Nr.3 S.279-287
- Holm J. et.al. 1994. *Two cases of environmental front runners in relation to regulation, market and innovation* Network contribution to the EU-SEER research project: Conditions of Success for Environmental Policy, Department of Environment, Technology and Social Studies, Roskilde University, Denmark.
- IEA (International Energy Agency), 1995. *Market Barriers and the Deployment of New Energy Technologies* Working Party on Energy End-Use Technology, OECD, Paris March 1995
- Jaffe A.B., Stavins R.N. 1994. *The energy efficiency gap. What does it mean?* Energy Policy 22(1994)10 S. 804-810
- Kleining G. 1982. *Umriß zu einer Methodologie qualitativer Sozialforschung* Kölner Zeitschrift für Soziologie und Sozialpsychologie; Köln 1982, S.224-253
- Lamnek S. 1993. *Qualitative Sozialforschung. Band 1. Methodologie* (2. Ed.) Weinheim 1993
- Mayring Ph. 1990. *Einführung in die qualitative Sozialforschung* München 1990
- Sanstadt A.H., Howarth R.B. 1994. *Normal markets – market imperfections and energy efficiency* Energy Policy 22(1994)10 S. 811-818
- Velthuisen J.W. 1995. *Determinants of Investment in Energy Conservation* Rijksuniversiteit Groningen.

Wuppertal Institut, Öko-Institut 1995. *Integrierte Ressourcenplanung* Die LCP-Fallstudie der Stadtwerke Hannover AG
Ergebnisband, Dokumentationsbände 1-5 & 8, Stadtwerke Hannover (Ed.), Hannover.