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Addressing and overcoming barriers for energy savings in business – experiences from 7 municipalities facilitation of 100 Danish companies

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Abstract

Energy savings are generally viewed as an effective way to cut GHG emissions, as there are huge potentials for improvements because of several barriers and constraining factors for implementing otherwise profitable solutions. Several different policy tools have been applied to overcome these barriers including local political programmes aiming at facilitating a change in the local companies. This paper draw on empirical data from one such local programme, the Carbon 20, carried out by 7 Danish municipalities.

The paper present discussions in respect to the overall role and approach of the local authorities, evaluating the specific concept applied, highlighting the specific barriers and constraints encountered during the project so far, as well as how the local authorities can help the companies overcome these.

With the paper, the author intent to provide some inspiration for other local authorities (and other intermediates in the energy saving area) for how they can interact with companies to assist them overcome different barriers and constrains taking a role and approach as a “reflective dialogue partner”.

1) Introduction

Energy savings at end-users are high on the political agenda internationally and in Denmark. Energy savings and –efficiency are considered a cost efficient mean to achieve GHG emission reduction, where e.g. IPCC has argued that energy savings in the industrial sector has a huge untapped potentials for cost- efficient energy savings and thus GHG emission reduction (IPCC 2007, Paton 2001).

In 1994 Jaffe and Stavins pointed out, that a gap exist between potential cost-effective energy savings and savings actually implemented (Jaffe and Stavins 1994).

Following their argument, several scholars have been occupied with explaining this gap covering both more theoretical-economic based approaches occupied with various “market failure”, and more empirical based approaches pointing at specific barriers in the different settings (Brown 2001; Sorrell et al. 2004; Thollander et al. 2007, Lees 2012, Armstead 2012; Fleiter et al 2012).

Based on concepts derived from neoclassical-, institutional- and behavioural economics Sorrell et. al 2004 introduces a basic taxonomy consisting of some overall categories of barriers: Imperfect information including transaction cost, Hidden cost, cost of disruptions to production and staff replacement/training, technical and financial risk, Access to capital, Split incentives where the investors cannot fully appropriate the benefit, as well as Bounded rationality where constraint on time, attention and the ability to process information prevent the individuals in charge making otherwise “rational” decisions.

According to Fleiter et. al 2012, these rough categorisation may overlap, co-exist and interact depending the different context including the size and type of companies, the regulatory frames and institutional settings etc. (Fleiter et al 2012). Fleiter further stresses that the categorisation has functioned as a basic reference points for several recent studies assessing how the different barriers appears in different settings (Sorrell et al 2004; Fleiter et al 2012).

In addition to pointing at this gap and being occupied with defining barriers causing the gap, several of the above mentioned scholars also advocates/calls for political actions to close and overcome this gap (Jaffe and Stavins 1994 and 2005; Sorrel et al. 2004; Paton 2001; Thollander et al. 2007, Lees 2012, Armstead 2012; Fleiter et al 2012).

While the majority of these programmes have been on a national scale targeted the big energy consumers such as large companies, several programmes have also been set up on a local scale targeting also the small and medium-sized companies (SME)(Thollander and Dotzauer 2010, Bradford and Fraser 2008).

Most of the scholars occupied with these political driven programmes are generally focussing on specific means and tools to motivate the companies and for the SME segment advocating especially for a free or subsidized preliminary assessment of potentials and solutions combined with tight facilitation of implementation (Thollader and Dotzauer 2010, Bradford and Fraser 2008, Lees 2012). Lesser attention is however provided to discussions about the role of the local authorities as facilitators in terms of how actually to approach the companies.

Malmborg 2004 and 2007 do however precisely discusses this in relation to local political programmes promoting the implementation of Environmental Management Systems. He distinguishes between what he frames as a teacher versus a tutor role (Malmborg 2007) or earlier respectively knowledge bank versus knowledge broker (Malmborg 2004). In Malmborg’s distinguishing, the local authorities as teacher or knowledge bank “holds and provide the main ideas about how a problem should be solved (..) as well as most of the knowledge that is needed to make this happen” (Malmborg 2007). Opposite, as a tutor or knowledge broker, the local authority “does not hold the specific knowledge needed in the companies and thus, does not engage operatively in the specific knowledge creation and transfer process (instead, the authority) acts to enable the ones that are in need of knowledge (...) to get in contact with the actors that hold the relevant knowledge” (Malmborg 2007).

Similarly Broberg and Hermund 2003, point out in relation to the Occupational Health Service (OHS) field, that the role of “change agents” traditionally have been discussed on basis of a distinguishing between an expert role on the one end and process consultant on the other.

They argue however, that in respect to agents driving for a change in relation to a specific agenda – in their case the OHS - such agents should instead be considered as what they frame as a “political reflective navigator”. With this term, they try to capture, that the OHS consults act politically in terms of trying to advocate for a specific view on technological change processes, while they reflectively need to navigate their approach for promoting their objectives aligning the agenda to match the experiences of their target group (Broberg and Hermund 2003).

Based on the experiences gained from taking part in a Danish EU supported project, Carbon 20, where 7 Danish municipalities and a university in 2010 joined forces to engage 100 companies primary SME 's in implementing energy savings and achieving GHG emissions reduction of 20%, the author of this paper intent to discuss: how the local authorities have and sees their role, the general concepts provided in the project and how they are applied locally, and further what barriers and constraints the local authorities have encountered in their dialog with the companies and how they can address these.

In the next chapter the project is introduces together with data collection method derived from the author being involved in the project. Chapter 3 include a discussion of the role and approach of the local caseworkers. Chapter 4 present an evaluation of the specific facilitating concept applied in the project, while the author in chapter 5 present the main barriers and constrains specifically encountered during the project and discuss how local municipalities can address facilitating companies to overcome these.

2) Methodology

The paper draws on empirical data derived from taking part in the Danish EU supported Project, “Carbon 20” spanning 2010 to 2013. The project is thus in its final year, whereas the presented point in this paper should be viewed as some preliminary conclusions drawn before finalising the project.

The project is carried out primary by seven Danish municipalities and Aalborg University. It takes its outset in these municipalities political commitment to reduce the CO₂ emission of their territory including emission derived from local citizens and business. The aim of Carbon 20 is that the seven municipalities gain experience from engaging 100 local businesses in achieving a 20% reduction of their GHG emissions.

The main concept in the project is, that the 7 municipalities inters a voluntary agreement with each of the 100 companies, where the companies “commit” themselves to strive for a 20% reduction of their Climate gas emissions. As part of the agreement the companies are offered an energy screening free of charge provided that they agree to work constructively together with the caseworkers from the municipalities, consultants, universities and others to conduct an action plan with deadlines for the implementations, following up visits on the status as well as a monitoring of their emitted GHG to document reductions using a simplified web based GHG footprinting scheme covering minimum their direct emissions and emissions derived from their electricity use.

In the project it have been decided to use the simplified web based Danish CO₂ reporting tool, climacompass.dk for reporting the development in the companies GHG emissions during the

project period. The portal is co-developed by the Confederation of Danish Industries (DI) and the Danish Business Agency under the Danish Ministry of Business and Growth based on the same overall typology as the Climate Gas Emission protocol on organisations operating with a scope 1, 2 and 3 in respect to respectively own controlled direct emissions (use of oil, gas etc.), use of electricity and the emission not directly controlled by the organisation in question, but within its influences sphere (e.g. supply chain, employs commuting, CO2 emissions from products in use and at end-of-life etc.). This protocol focuses on the scope 1 and 2, while slowly also adding element in scope 3 (<http://www.climatecompass.dk> 15.04.2012). It is intended to ease especially the SME's reporting of GHG emissions, and also provide overall guidance on options to reduce the emission. The focus of this project is also the scope 1 and 2 for the majority of the companies, while also looking at some scope 3 elements for a minor part.

The author are taking part in the project being among others in charge of a yearly monitoring of the progress of the project and its activities. As such the caseworkers from each of the participating seven municipalities have been interviewed. Likewise have a pool of the participating companies. At present the monitoring report for the 2 first years are available at <http://carbon20.t2w.dk/Videnv%C3%A6rkt%C3%B8jer/Moniteringsrapporter/>

The authors has furthermore been taking part in several project meetings, capacity/competences building and skills development activities and participated in specific activities around the interactions with companies – e.g. observing some of the specific dialogues with companies e.g. presentation of the screening and agreeing on the action plan, follow up meetings etc., as well as participated in several different events and arrangements between (some) of the municipalities and companies.

The paper is based on empirical data derived from the above activities including the content of the 2 monitoring reports.

3) The role and approach of Local authorities in facilitating energy savings among companies

Similar to Malmborg's discussions between a teacher/knowledge bank or tutor/knowledge broker, the participating caseworkers has also been discussing whether they need to be technical experts, that can tell the companies with solutions to implement, or rather be process consultants that have little insight into actual solutions, but have insight into the implementation process and can facilitate the contacts to different experts etc.

Generally the project is carried out by the environmental units and in the majority of the municipalities by the caseworkers also in charge of the environmental regulation of the companies (permitting and monitoring). As such, several of the caseworkers are accustomed to a rather narrow dialogue with the companies focussed around specific technical areas and within the boundaries of what is viewed as the legal foundation (Dirckinck-Holmfeld and Smink 2012).

As this project strive to engage companies voluntarily and covering a topic not generally included in the environmental regulation the caseworkers operate outside their normal sphere of actions involving a more open dialogue about motivating them rather than

enforcing specific norms (See Dirckinck-Holmfeld and Smink 2012/13 for a deeper discussion on the options for law enforcement caseworkers to promote a broader environmental view and adopt a more facilitative approach as part of their permitting and monitoring activities).

As a response, several of the caseworkers seek to obtain rather details technical knowledge to form a basic platform for the dialogue among other as a mean to appear as competent partner, who can add value to companies by providing knowledge by identifying potentials, while also acknowledge that they cannot be experts and need to be able to refer to others as well.

Several of the involved caseworkers has however been promoting a voluntary environmental going beyond compliance along side their legal authority role for long, and are as such accustomed to such broader and open dialogues. However they still take the departure in the more technical (and organisational) possible improvement options, and often using the monitoring activities at platform for being knowledge provider of specific predefined offers and concepts.

In one of the municipalities, the ones involved in the project is caseworkers solely engaged in promoting a voluntary efforts and have for several years been more or less separated from the units carrying out the traditional regulation task. During the last decades, they have gradually been altering their focus to a much more network driven approach. Supplementing their facilitating of individual companies they are working to find different cooperation settings trying to matchmaking those in need of solutions, with those who have something to offer as well as focusing on combining the more traditional information/knowledge exchange meetings with more social events.

The caseworkers from this unit within this municipality are thus accustomed into focussing a lot more on processes and the surroundings than the actual technical improvement options and the specific context of the single companies. They did however also have some intentions to involve the law enforcing caseworkers, but didn't manage, pointing out that the main barrier is this movement out of their comfort zone of not having precise legal as well as technical directions for their communication.

Bringing these different experiences into the project, there has been a rather intense discussion in terms of what to focus on during the capacity buildings activities during the projects. Several have called (and to some extend still do) for activities to enhance their technical insight into some of the common energy savings options, while others has agitated more for focussing on knowledge exchange of the different caseworkers experiences in respect to the current activities in the projects. Increasingly the caseworkers are also starting to ask for activities to enhance their competences in respect to performing such more open ended dialogue with the companies.

Throughout the project there have been diverse activities around the capacity building trying to accommodate those different wishes. Quite early, the universities involved, but also several of the caseworkers pointed out that the capacity buildings element of the project should relate to the whole project, and not just be seen in respect to the specific sessions specifically addressing this. Supplementing some general introductions into the energy savings options and technicalities, several of the caseworkers have thus participated during the energy consultants screening of the companies and hereby getting hands-on experiences on what is

focus in these technical screenings. However some of the caseworkers still calls for more specific technical insights into some of the more common options for energy savings in companies e.g. light (LED, sensors etc.), ventilations and pneumatic compressors, as something that would be quite useful to bring address during normal monitoring activities. They especially argue, that any capacity activities targeting law enforcement caseworkers not directly involved in this project should take its departure in such more technical issues that bring about knowledge that can expand their comfort zone. However they also argue that capacity building sessions targeting these colloquies not involved in the project or experienced in this more promotional way to work with companies, should also address tools on how to conduct a more open ended dialogue and get the companies motivated.

Supplementing these broader introducing of the energy saving technicalities, the capacity building courses have been devoted to knowledge- and experience exchange, aiming at using the courses as means to get the caseworkers to reflect on the different processes and courses with the companies in terms of both successes and constrains and drag out what they have learned and reflecting on their own role and how to approach the companies in respect to motivating a change in behaviour.

As outcome of these discussion there seems to be some kind of common understandings, that the approach need to be flexible as the targeting companies are very different in terms of what triggers them and what kind of facilitations is needed. The caseworkers thus need a combination of several competences that they can bring into paly depending on the current situation. One the one hand they should have some basic insight into the technical areas in terms of identifying overall potentials and focus areas, but at the same time knows where to direct the companies for more specific guidance in the different areas. However they should also be able to show interest in the companies experienced challenges – not only in respect to this topic - and be able to try to align their agendas to offer suitable contributions to solutions to the companies experienced challenges. As one of the caseworkers puts it: “several companies really appreciate this broader interest from the municipalities in respect to how they run their companies and actually often calls for a more open dialogue”.

In the project, this role of the authorities is tried captured with a renaming of “political reflexive navigator” into a “reflective dialogue partner”, where Aalborg University specifically has prepared some questions to bring about during following up visits at companies aimed at triggering both the caseworkers and companies to reflect on the process and the challenges that they encounters.

As such a reflective dialog partner, the local authorities emphasise that one need to be active in respect to perform a continuing follow up to keep momentum and focus on the topic, while also showing a interest in listening to their problems and help find ways to overcome or ease such whether this is to help facilitate contacts to other experts and actors or bring back the raised issues into the political system and try to alter the social frames causing the obstacles.

4) Experiences with the carbon 20 concept for facilitating the companies

In the project a concept for the dialogue process was set-up consisting of an involving process identifying overall potentials and motivations and commitment for participating, a technical

screening for potentials, agreeing on an action plan and timeline, reporting of their Carbon footprint as well as follow-up visits to facilitate the actual implementation:



Figure 1: The cooperation process between the municipalities and single companies (<http://carbon20.t2w.dk/AboutCarbon20/TheCoorporationProcess/> 1. May 2012)

This paragraph will try to evaluate the concept and several of the points can also be found in the 2 first monitoring reports from the project.

Overall there seems to be consensus, that the concept in total has fulfilled its task in terms of providing a proper scheme for committing and sustain the companies on a road for implementing energy savings and GHG emissions. However there are also a general consensus, that this concept has been quite resource demanding, whereas the municipalities will have to adjust it for applying it among the rest of the local companies. Likewise some concludes and experience can be drawn out for recommendations for several similar programmes.

First of all it can be concluded that, the timeframe from when such projects are promoted until a precise concept and concrete “offer” is presented can be critical for the companies motivation to participate.

As part of the preparation for the application for EU, the municipalities already there asked for a preliminary proclamation of participation from 100 companies. However after a quite long application process, and a further the set-up of the structure for the implementation of the project as well as finding and agreeing on a concept to bring about to the companies, several of the preliminary companies had either already began the work themselves or lost interest judging the project to bureaucratic.

After almost a year, one of the participating municipalities thus realised that they had to alter involvement strategy abandoning affords to involve the companies making the pre-commitment and instead follow a more cluster-approach of trying to involve the neighbouring

companies to those managed to commit and also trying to utilise more social networking structure. Similarly another municipality has retrospectively concluded that they used too much affords to try to commit some of these pre-committed firms in spite of their reluctance to make final commitments.

A second conclusion to be drawn relates to the use of energy consultants to perform a technical screening of savings potentials at the companies.

Denmark has, like several others countries, has implemented Energy saving obligations for the energy utilities combined with a more or less white certificate scheme providing a “market” for selling energy savings. The project attempted to utilise this framework to involve some energy consultants to conduct the screenings assuming they would also have self-interest in respect to realising the savings in this scheme and thus a valid business case.

However several of the energy utilities having the obligations have abandoning providing the screenings free of charge experiencing that the identified savings are sold elsewhere and increasingly instead relies on buying savings from bigger customers instead.

Agreements were however made with several consultant – being both energy utilities as well as vendors of hardware equipment seeing a screening as platform for selling hardware – where the consultants agree to offer a screening free of charge for the companies, but with a possible compensation by the project on specific terms (varying slightly in the different agreements).

While caseworkers generally found the screening reports valuable as a common basic document in the following dialogue with the companies, and further has gained knowledge by participating in the screenings, the overall settings for the agreement did however provide some tensions related to:

- Confusion about on the terms for the project compensating for the screening
- Lack of precise understandings of the overall mechanism by all actors
- Failure in actually establishing a proper business models that accommodates the saving achieved for the energy utilities involved providing the screening
- Confusions about the responsibilities in the following up process
- Lack of actual savings achievable in several of the smallest companies to actually justify the time spent on a detailed screening

In spite of these challenges in the set-up, most of the actors do see possibilities for continuing and extending the cooperation. However it will require that the municipalities take a discussion with some of the consultants agreeing on some common terms and a setup that manage to acknowledging all interest (See Dirckinck-Holmfeld 2012 for further discussions on this topic).

A third experience to drag out is, that the so called “action plan” document has for the vast majorities of the companies not been adopted as a useful internal working document to structure the companies implementation. However the document have functioned well as an

agreement document between the municipality and company highlighting the actions to follow up on the next meeting.

Several of the caseworkers thus point out, that they have used too much time with actual limited success, trying to make the companies adopting the action plan themselves, whereas Others had quite good success agreeing on the action plan on location after discussing the screening and other potentials.

Treating the Action plan as agreement document between the companies and municipalities, do however also cause some companies to be reluctance to sign and finalise the action plan before assessed the feasibility of all the options. Even in spite that the caseworkers point out that it is valid that some actions are marked as further assessment needed with a specific date.

While several actions plan are thus still not finalised, the caseworkers point out that several of the companies has begun implementing solutions anyhow.

Similar conclusions can be dragged out in relation to efforts of getting the companies to report their carbon footprint.

The caseworkers again interpret, that the majority of the companies is not showing interest in their carbon footprint, seeing it more of a necessity in relation to the project than actually something that could be of value for them. The caseworkers point out that it have been quite a challenge to get the companies to report their emission and feel that they constantly have to push the companies. Most of the caseworkers have thus began to fill out the data in the portal themselves, but still feel they use a lot of time and efforts to remind the companies to provide the needed data. One of the caseworkers has even began to stay half an hour extra at the companies to get the secretary or other to get the data at once, judging this is faster and more efficient than the constant reminders.

The caseworkers do however also point out, that the tool promoted – climatecompass.dk – also has some drawbacks that they conceive is impeding the usefulness of the tool. First of all, the portal has so far not been able to provide companies the possibility to follow the development in the emission year by year on the portal, but need to export the data into another system to get a view of this. The caseworkers and the project managers have pointed at this several times, and now this functionality has just been launched in April 2013. Another critique has been, that the calculation is solely based on national average dataset without the possibility to ably local dataset adjusting for the local energy mix and efficiencies. Especially one caseworkers find it frustrating that the district heating figures are based on a general national average, without the possibility to chose either the specific areas and the dataset applying to that areas, or more generally choose the sources of the energy mix e.g. waste, biomass (possible diverted), fossil fuels etc. However the mangers of the Climate Compass fear that open op such options might confuse the intended users – being the SME – more than actually helping them, while also providing more room for actually making misuse of the data.

A last issue to drag out her here, is, that it is very important to constantly follow up on the companies to keep momentum and focus on the task.

As one of the caseworkers put it: “Energy savings etc. is not part of their normal focus and even very committed companies are often down prioritising even very favourable solutions in a busy working day, where the servicing of customers has priority. One needs to accept this, but keeps on following up to keep the topic on the agenda”. He continues, that several of the companies actually appreciate this friendly reminder to get things going.

5) Barriers for implementing energy saving in Companies and how municipalities can facilitate addressing these

As mentioned in the introduction, several scholars have been occupied with barriers for implementing energy savings taking outset in Sorrells overall categorisation. Also in this project, the monitoring processes have focused on highlighting some of the barriers that the companies have encountered. Based on the empirical data obtained, and also reflecting the options for local authorities to intervene, I for the purpose of this paper find it useful to discuss the barriers in respect to a categorisation into 3 overall parameters:

1. Internal capacities to implement the solution related both to lack of time, manpower and insight to actively prioritise the task as well as competences to implement solutions
2. Economic and financial barriers in terms of especially access to capital for the needed investment, but also investment horizons and payback period, as well as
3. Structural constraints related to the societal frame such as e.g. tax systems etc.

Relating this categorisation to the 6 categories of Sorrell et al. the internal capacities do include several of the aspects that Sorrell term as Bounded rationality as well as staff replacement/training – or more lack of competences). In principle this categorisation would also include aspects related to cost of disruption and imperfect information but neither of these has been highlighted specifically during this project.

In respect to economic and financial barriers, the access to capital is dominating, but also financial risk aspects expressed by very short investment horizons has been encountered.

The split-incentives in relation to landlords and tenants are here covered as a barrier related to overall societal frames that need political action on a national scale together with a specific conceived barrier related to the specific tax structure in Denmark in respect to taxes on the utilisation of surplus heating.

In the following, I will shortly present the constraint encountered in the project as well as how the municipality caseworkers can address them

Internal capacities

As already touched upon, several of the participating companies do in spite of good intentions and the present of very profitable savings find it a challenge to find the time and man power to actually implement the savings.

For the vast majority of the companies – and especially the industrial/production based ones – it is a matter of internal prioritization of scarce resources as the competences generally are

present. However for a few smaller and/or non-industrial ones, it do relate to lack of competences internally manage the implementation of the highlighted solution.

Prioritisation

For the majority of the participating companies, looking at energy savings is not their core competences, and thus not something they are accustomed to focus on. In spite of the financial crises, several of the participating companies are actually experiences a busy time and are very focused on pleasing their customers. Or as one participating company express:

“The biggest barrier in getting this done is a matter of priorities. And here, the customers are always the most important! And when you're busy during the working hour with respect to production etc. then it is difficult to find the energy and resources to get these things done as well”.

For many of the companies, the energy savings and other solutions is thus something on the “nice to do” list and often the energy bill is not necessarily seen as the biggest concern where often a more urgent or familiar task gets the attention.

While the crisis for the vast majority haven't provided extra time for addressing energy savings etc. one interview company, who had experienced severe drawbacks in terms of reduced sales and closure of several sales unit around, sees the involvement in finding energy savings as a way to at least postpone an adjustment of the workforce her at the production site:

“In relation to the implementation of energy savings, it is an advantage that we are electricians, as we can do most of it ourselves. Moreover, it is out of season here in winter and due to the crisis extra quiet so for a period there is plenty of time to get these thing done”

Competences

For some of the participating companies, especially the smallest one and some of the non-industrial/production based ones, it is however not “just” a question of internal prioritisation, but also a question of lack of competences to actually work structured with realising the identified savings.

While the majorities of the companies do possesses knowledge and know-how in respect to manage getting from the overall identified potentials in the screening, several of the participating companies do find it difficult to go from these screenings to the actual implementations of the solutions.

Addressing these by the “reflective dialog partner”

As already referred, the constant following up by the caseworkers is viewed both by the caseworkers, but also by several companies, as central for keeping focus and attention on securing progress and counteract down prioritisation.

Supplementing this, several of the caseworkers are also starting to cooperate with the internal units in charge of local job creation asking the participating companies, whether they need additional workforce e.g. utilising possibilities for some subsidised jobs as element in the general labour market policies. At present a few companies have joint in - not necessarily

employing one specifically for the implementation of the energy saving project, but than releasing some of the workload of others so that they can prioritize the implementation process.

In respect to the lack of competences, one of the municipalities have involved an additional partner – first as trainee/student employee but later on an agreement on more consultant basic - to facilitate the implementation process including managing the involvement of subcontractors etc.

Inspired by Malmberg 2004/7, the municipalities could try to explore on the cooperation with the job creation units to make some tailor made re-educations of the unemployed to actually act as such facilitator for those companies lacking the competences – either as an internal municipality function or as shared employment at several companies.

In line with some of the discussion about the reflective dialogue partner and the value of listening and understanding the concerns of the companies, the caseworkers and others trying to promote energy savings could increasingly try to align their “sales” strategy to what triggers the companies (or the represent of the companies in question) enthusiasm, whether this is the technicalities or economic reasoning (cost reductions) generally assumed, or other aspects such as e.g. linking is to the adding value for possible customers, Social responsibility etc.

At an evaluation meeting with some of the participant energy consultant, one of the invited presenters, Søren Dyck Madsen, advocated for such a change in focus for some of the companies e.g. promoting the energy saving as primarily CSR, that on the same time actually also has cost savings. With reference to a new survey among 347 SME carried out for Danish Business Authority (EPINION 2013) that find that 79% of the asked SME considers that they apply some kind of CSR, whereas 72% of the companies considered it a moral issue and only 23% relate it to have economic value. He therefore argued, that the whole CSR agenda provide a possible entrance that can add value to the energy saving agenda – making it primarily a matter of doing good and image (in a way that actually also saves money) instead of focussing narrowly on the savings potentials.

Economic and financial constraints

A large portion of the participating companies is experience severe constrains establishing proper finance. Due to the crises several companies are themselves challenged economically, where some even have difficulties looking more than a few month ahead as uncertain that they still are in business. Furthermore as reaction to the increased requirement to the banks and financial institutions, getting loans have become significantly more difficult.

According to one of the participant energy consulting, the crisis have generally meant that the ROI (a calculation of a simply payback time in respect to investment divided by annual savings based on current energy prices) typical has been reduced from between 3-5 years to now under 2, whereas even bigger companies need approval for investment paid back within the same year – in principal it could be taking within the provided budget.

Looking overall on the solution present in the action plans adopted by the companies, it is however not solely those with the very short ROI that are present. Also solutions with even

quite large payback periods such as solar cells have been adopted as action in several action plans.

So even in spite of constraints of capital and uncertainties about the future, the companies seem to engage in some bigger projects – especially for the more visual things as solar panels – indicating, that it is not solely the economic considerations in terms of ROI, that are decisive for what is implemented.

It doesn't however change the fact, that several of the participating companies actually do lack finance for the investment. Furthermore, it have been pointed out, that the financial sector is very reluctant to get involved and it is quite difficult receiving loans with extended requirements about proof of profitability compared to earlier. Even bigger well reputable companies have trouble borrowing money.

As a make of world wide known designer furniture express it: "Focus right now is on the extension of the building. We are using most of our own capital on this project, and need to raise capital for the investment in respect to climate action. However, despite a 17% growth last year, the bank will not help us to invest in anything"

Addressing these by the “reflective dialog partner”

As a consequence of this lack of financial options, several of the involved energy consultant pointed out, that they are starting to try to engage different financial institutions supplementing the catalogue of improvement options with suggestions for how to finance it through the savings achieved. They haven't done so in respect to the current project, as considered this concept rather fixed, but are starting up some cooperation with different banks.

At the earlier referred evaluation meeting, one of the consultants in prolongation began reflecting a bit on the “product” that they actually provide, and suggest that for some companies it could properly make sense to expand their product into covering the whole “packet” of both identification, financing and managing the implementation.

However, if the packet should be feasible to offers for SME with low actual saving potentials, it needs to be adapted in respect to lowering the resources used for the screening etc. E.g. appoint student employee instead of the most experienced consultants, make pooling of similar and “neighbouring” companies, provided standard self-assessment tools as baselines and/or utilise the established standardised data for calculation of saving of specific solutions often used in the domestic market rather than the specific calculations used in the business segment.

Similarly, several of the municipality is also starting to consider how to expand the packet with both managements- and financial support elements build into the packet.

As mentioned one of the municipalities has over a longer period of time moved in a direction of creating a math of those in need of energy- and climate solutions and actors that can find a business case offering such solutions. Latest they are trying to engage an actor specialised in offering the full “packet” of identifying potentials, bringing the financial, as well as the craftsman to implement them in the domestic market, into also being such a mediator in

respect to the SME's. However one of the constraints is, that in contrast to the domestic markets, the majority of especially the smaller companies do not own their buildings, and cannot provide these as a security/guarantee for the loan – see more about this broken agency or split incentives related to tenants beneath.

Structural aspects

In this project two constraints related to some more structural aspects connected to the overall frames in society have been discussed repeatedly - respectively the split-incentives between landlords and tenants also underlined by Sorrell, as well as an issue related to conceive tax constraints for utilising surplus heat.

Split-incentives between property-owners and tenants

In Denmark the majority of the companies rent their facilities from different property-owners such as investment funds etc. While the bigger companies often have some quite long-term arrangement several smaller companies rent on rather short-term basis.

Especially in relation to SME, there often is a split of incentives in terms of who hold the investments in e.g. improving the buildings envelope, and who actually gains in terms of reduced cost. Also in this project this barrier is highlighted as hampering implementation of several solutions especially concerning the envelope.

Even in cases where the landowner actually is the municipality itself, there seems to be difficulties finding a proper arrangement. One of the companies' reasons for participating in the project was actually directed at getting another entrance to the municipality, who could act as internal allied in their effort of finding a proper solution for a bigger renovation of a whole old municipality own business district. While this has also resulted in some preliminary dialogues on the topic, no final solutions have been established yet.

Opposite, also companies actually renting the buildings do experiences constraints for their involvement. Several landlords are participating in the project, whereas some own themselves, while others are actually also tenants themselves, who rent some of the space for small 1-10 man offices and start-ups. As with the rest of the real estate market, several business offices etc. is also empty. Some real-states are beginning to view an up to standard energy performance as basic for staying in business, and some even considers that focus will rise in the future judging, that their tenants increasingly will value it as an assess. However, also for them, the split incentives provide barriers for several saving potentials. Or as a participant, who rent office spaces to small companies - often start-ups by younger people - puts it:

"I believe that energy and climate increasingly will become a competitive parameters for office rental. But it is a challenge, as the energy use is generally included in the rent, whereas the tenants have no motivation to save. And it is actually difficult to address this, without going to sound money-grubbing (...) so I am currently considering how I can establish some incitement for tenants to save energy - without it appearing to be greedy! (...) I am e.g. considering making some kind of competition of the week/month or similar, where the prize e.g. could be free bears during Friday bar".

In spite of this split-incentives, one of the participating companies have actually managed to find an agreement with the landlords about sharing the risk and gains in respect to a larger retrofitting of the buildings. It did however also evolved several discussions between the two partners finding the proper split and arrangement, and further also an active pushing from especially the local district heat company still owned by the municipalities in terms of especially using a quite high subsidy for the kwh saved as motivating factor.

Taxes on the utilisation of surplus heat

In Denmark we have quite high taxes on the energy. While it generally makes the saving more profitable, the taxes do also sometimes actually causes some barriers. This is e.g. the case concerning the utilisations of surplus heating either for own use or at neighbouring companies or in the district heating system. The extra taxes that derive from utilising the surplus heat is generally in the energy saving sector conceived as a barrier for companies utilising their surplus heat.

Taxes on the electricity are differentiated according to what it is used for, whereas the taxes for using electricity for heating is taxed higher as it until recently with the introducing of heat pumps etc., was a rather inefficient utilisation of the electricity. This apply in spite of that the utilisation of the heat, is not the prime function in relation to e.g. servers etc.

Furthermore if the companies cannot utilise the surplus heat themselves and would be able to distribute it either to neighbouring companies or into the district heat system, the companies will be taxed as an energy supplier.

When entering into the surplus heat utilisation, the companies thus encounters additional tax requirements. Requirement that by most of the actors are conceived as quite complicated, where several restrain from getting into such projects in spite of, that the Danish Energy Agency in different document have argued that the utilisation of surplus heat in most cases will be profitable for the companies (Skatteministeriets and Energistyrelsen 2006; Viegand & Maagøe and SRC International 2009).

One of the caseworkers do however highlight that one of the companies actually planned to engage with a project reusing the heat from the ventilation, but stopped it as the tax significantly reduced the profitability of the project. Likewise one of the other companies (a big server hotel) have abandoned implementing utilisation of the surplus heat from servers, and are instead looking at groundwater cooling arguing that the taxes makes the utilisation non-attractive.

Opposite, there are companies still working on regaining heat from the ventilations, while also a bigger industrial site is entering an agreement to provide their surplus heat to the local district heat system.

Addressing these by the “reflective dialog partner”

As already argued these two constraints relates to the societal frames and as such will need some kind of national altering on these frames. However as being a public representative, the caseworkers can act as a carrier to bring the problems back to the political system and try to get some pressure up the system.

In the project, some attempt to make both these a political issue for the Green Cities to bring up the system have actually been taken.

In respect to the surplus heat aspect, the Energy Agency had has referred concluded that in most cases it would still be attractive economically. To make it a political issue worth fighting, it would thus require some specific calculations showing how the taxes makes it unattractive.

However when ask to provide such, the specific companies in question actually withdraw from getting involved in that.

However, as the topic has been discussed for decades, the latest energy agreement from the government does include that an assessment of the possibilities for utilisation of surplus heat shall be conducted, whereas the latest national agreements for promoting growth further allocate some funding for supporting implementation of such solutions (Regeringen 2012 and 2013).

Also in respect to the split incentives, the energy agreement did actually contain suggestions to ease the rather strict rental laws (seemingly mainly in the domestic sector) providing landlords and property owners increased possibilities for raising the rent in respect to energy renovations paralleling the energy savings gained by tenants, while opposite also provide the tenants possibilities for regaining some more of investment they made into improvements with a energy focus (Regeringen 2012).

While both these constrains generally are view as relating to overall legal frames and as such the caseworkers role would be to carry the information back to the political system, the caseworkers could also take an active role in finding set-ups that challenges the frames. At the evaluation meeting with energy consultants, one of these point out that some attempts are being made in other areas trying to challenges the tax structure for the utilisation of surplus heat by e.g. forming common heat communities. The municipalities could actually act as facilitators of such cooperation between the neighbouring companies.

Similarly, it did as mentioned actually succeed for one of the municipalities assisted by the energy consultants involved – from the local district heating supply company actually still a part of the municipality - to get both a participating company and its landlords to find a proper arrangement for splitting the risk and savings among them overcoming the tenant-landowner split incentives. However the district heat consultants also point out, that it did require quite some “persuading” of especially the landlord including providing for a very good price in respect to selling the savings achieved through the national saving obligation scheme.

Conclusions

Energy savings are generally viewed as an effective way to cut GHG emissions, as there are huge potentials for improvements because of several barriers and constraining factors for implementing otherwise profitable solutions. Several different polity tools are applied to overcome these barriers including local political programmes aiming at facilitating a change in the local companies.

This paper evaluate one such local programme, the Carbon 20, carried out by 7 Danish municipalities discussing respective the overall role and approach of the local authorities, evaluating the specific concept applied, highlighting the specific barriers and constraints encountered in this project, and how the local authorities can and have tried to help overcome these.

The paper concludes, that the local authorities should be a “reflective dialog partner” that are capable of adjusting strategy and approach to align the overall targets to fit the interest and mentality of the company in question. This means that the caseworkers both need to possess some basic insight into available solutions and be able to judge/spot overall gaps in current situations, be able to listening and understand the situation of the company in question, while furthermore know where to direct the company for the right solutions.

The overall concept applied in the project is generally viewed as providing a useful frame for committing and sustaining the companies focus on the agenda forming a valuable baseline for further interactions and cooperation. However the concepts is viewed to be to stiff, where several elements are considered to be out of scope for some of the companies resulting in a quite resource demanding process of especially collecting the needed data for the reporting as well as trying to get companies to adopt the action plan as their own. The concept will thus need some adjustment for the future involvement of new companies.

During the project 4 overall barriers have been encountered related to:

- Internal capacities to implement the solution related both to lack of time and insight to actively prioritise the task as well as lack of precise competences to implement solutions
- Economic constrains and lack of access to financial capital for the needed investment,
- Split-incentives between property-owners and tenants and
- Energy taxes on the utilisation of surplus heat.

These barriers differ quite substantially, and so do the municipalities options to act upon them. Throughout the project the different caseworkers and other actors have in varying degree tried different means for helping the companies overcome barriers including: A frequent and persistent following up to keep the focus on the agenda, showing interest in the companies general business situation and interest and trying to align the energy saving and climate agenda into fitting what triggers their enthusiasm, engaging in trying to find different settings for involving actors, that can see a business case being the ones facilitating the implementation of solution and get actors to adjust their services to include the whole packet of finding solutions, bringing the finance and manage the implementation – also in respect to the challenges specific for the smallest companies, where the possible savings often are too small to be interesting for those intermediates; As well as feeding back to the political system about conceived barriers that need change in the overall regulatory frames.

The paper thus provide some inspiration for other local authorities (and other intermediates in the energy saving area) for how they can interact with companies to assist them overcome different barriers and constrains taking a role and approach as a “reflective dialogue partner”.

Litterateur

- Armstead, R. 2012: "Carrots, Sticks, Tigers and Wheels – A case Study of Municipal Governance for Energy Efficiency in New Buildings in the Öresund Region", Thesis, IIEE, Lund.
- Broberg, O. & Hermund, I. 2004, "The OHS consultant as a "political reflective navigator" in technological change processes", *International Journal of Industrial Ergonomics*. 33, pp. 315-326.
- Bradford, J. & Fraser, E.D.G. 2008, "Local authorities, climate change and small and medium enterprises: identifying effective policy instruments to reduce energy use and carbon emissions", *Corporate Social Responsibility and Environmental Management*, vol. 15, no. 3, pp. 156-172.
- Brown, M.A., 2001: "Market failures and barriers as a basis for clean energy policies" *Energy Policy* Vol. 29, Issue 14, Pages 1197–1207
- Dirckinck-Holmfeld, K. 2012: "Can energy utilities play a role in local political energy savings programs?" proceedings ECEEE industrial summer study 2012
- Dirckinck-Holmfeld, K. and Smink, C. 2012: "Can local environmental regulation of companies deal with a broader environmental view?", *Proceeding GIN 212* – in process for publishing in *Journal Cleaner Production*
- EPINION, 2013: "Muligheder og barrierer for samfundsansvar i små og mellemstore virksomheder", *Erhvervsstyrelsen*
- Fleiter, T., Schleich, J & Ravivanpong, P., 2012, "Adopting of energy-efficiency measures in SMEs – An empirical analysis based on energy audit data from Germany!". *Energy Policy* (in press – available online)
- IPCC 2007, *Climate Change 2007: "The Physical Science Basis Summary for Policymakers, Geneva"*, Intergovernmental Panel on Climate Change (IPCC), Geneva.
- Jaffe, A.B. & Stavins, R.N. 1994, "The energy-efficiency gap What does it mean?", *Energy Policy*, vol. 22, no. 10, pp. 804-810.
- Jaffe, A.B. & Stavins, R.N. 2005: "A tale of two market failures: Technology and environmental policy" *Volume 54, Issues 2–3, Pages 164–174*
- Lees, E. 2012, "Energy efficiency obligations - the EU experience", *ECEEE*.
- Malmberg, F. V. 2004, "Networking for knowledge transfer: towards an understanding of local authority roles in regional industrial ecosystem management", *Business Strategy and the Environment*, 13, 334-346.
- Malmberg, F. V. 2007, "Stimulating learning and innovation in networks for regional sustainable development: the role of local authorities", *Journal of Cleaner Production*, vol. 15, no. 17, pp. 1730-1741.
- Paton, B. 2001, "Efficiency gains within firms under voluntary environmental initiatives", *Journal of Cleaner Production*, vol. 9, no. 2, pp. 167-178.
- Regeringen 2012: *Energiaftalen af 22. Marts 2012*
- Regeringen 2013: "Aftaler om Vækstplan DK" April 2013.
- Rohdin, P. & Thollander, P. 2006, "Barriers to and driving forces for energy efficiency in the non-energy intensive manufacturing industry in Sweden", *Energy*, vol. 31, no. 12, pp. 1836-1844.
- Skatteministeriets and Energistyrelsen 2006: "Skatteministeriets og Energistyrelsens undersøgelse af barrierer for udnyttelse af industriel overskudsvarme", *Skatteministeriets og Energistyrelsen*.

- Sorrell, S., O'Malley, E., Schleich, J. Scott, S. 2004, "The economics of Energy Efficiency", Elgar, Chaltenham
- Thollander, P., Danestig, M. & Rohdin, P. 2007, "Energy policies for increased industrial energy efficiency: Evaluation of a local energy programme for manufacturing SMEs", Energy Policy, vol. 35, no. 11, pp. 5774-5783.
- Thollander, P. & Dotzauer, E. 2010, "An energy efficiency program for Swedish industrial small-and medium-sized enterprises", Journal of Cleaner Production, vol. 18, no. 13, pp. 1339-1346.
- Viegand & Maagøe and SRC International, 2009: "Virksomhedsrentabel udnyttelse af overskudsvarme, samt afdækning af evt. Potentiale", Energistyrelsen