**Counterproductive legitimations? Energy, construction and the professional media**

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## Abstract

In addressing the challenges of climate change one of the often-suggested remedies is to increase energy efficiency and the production of renewable energy in buildings. Although emphasis has, hitherto, predominantly been given to the role of government policy, energy suppliers and technologies, there is an increased interest in the role that building professionals play in this respect. Drawing on discourse analysis, this paper focuses on the ways in which building professionals frame the issues of. increasing energy efficiency and the use of renewable energy in buildings, and legitimate their particular standpoints. Based on an analysis of how these issues have been addressed over the last 14 years in the Danish professional media targeting architects, engineers and other building professionals, we find that sustainable energy innovations are not subject to much contestation. Although there appears to be a general consensus as what the relevant technological solutions could be, the building professionals legitimate these solutions in different ways. We identify five distinct ways in which this is done – through techno-functional, economic, legalistic, aesthetic and pragmatic rationalizations. The professional media discourse provides a ‘deficit’ view of the construction sector and does not devote much attention to the practical details and organizational challenges of improving energy efficiency of buildings in a sector characterized by interdependency and uncertainty. This risks propagating the ‘gap’ between what can and needs be realized in terms of improving energy performance and mitigating climate change.

Keywords: building professionals, energy innovation, discourse analysis

**Introduction**

Increasing energy efficiency and the use of renewable energy sources are some of the cornerstones in mitigating climate change. In light of the vast energy usage associated with the building sector it is hardly surprising that energy innovation for construction figures prominently on the political agenda in the EU as well as a number of European countries. Even though the economic advantages of increasing energy efficiency are widely documented, and there are new and more energy efficient technologies and production methods on the market, it is striking that these technological and economic opportunities remain largely untapped. Why is this the case?

Building professionals are often seen as playing an important role as third parties, brokers, bridgers (Fischer & Guy, 2009) and as change agents (Janda & Parag, 2013). Qua their position and roles, building professionals are able to exert influence on other actors in the construction sector and its stakeholders by e.g. enabling or promoting particular technologies, altering a technology used in one situation so that it can be adapted to another and by espousing their aggregated experiences (Janda & Parag, 2013, p. 45). However, relative little attention has been given to the role of building professionals in taking up innovative technologies and to the ways in which they propagate ideas and suggestions for reducing energy loads and introducing alternative, renewable energy sources.

In keeping with the growing interest on the role of building professionals as important “middle actors” (Janda & Parag 2013), this article investigates the ways in which three types of building professionals – engineers, architects and other building practitioners – frame these issues of building energy use and justify particular approaches to improving their energy performance. We do so by analyzing how these issues are treated in the professional magazines; one for each of these three professional groups. Although the professional media clearly serves an informative role, in our view it does more than just providing information – it also participates in setting agendas for issues to which their readers should attend (Dearing & Rogers, 1996), thereby, influencing the uptake of new technologies or the lack thereof.

To explore the role of the professional media in adoption of new climate friendly innovations in the construction sector, the paper draws on discourse analysis (Joutsenvirta & Vaara, 2009; Vaara & Tienari, 2008) of the professional building media in Denmark. We seek to (1) highlight the approaches to energy innovation that the professional groups depict as available and viable, (2) identify the discursive strategies through which these solutions are legitimized, and (3) discuss what implications this can have on energy innovation. Although the professional media may alert us to common challenges and solutions already known in the sector, the analysis of the media also allows us to assess which topics are not being debated and, therefore, perhaps also neglected in practice. It is our contention that the legitimation strategies used to justify certain solutions or approaches can inform us of key self-understandings within the sector. By unpacking the discourse of building professionals, our analysis sheds new light on the persistent discrepancy between the potentials for increasing the energy efficiency of buildings and current industry performance.

The paper is organized as follows: First, we make a case for taking a discursive approach to the issue of energy and sustainability in construction. This section is followed by a brief presentation of our methodology and data. Our analysis is found in the third section. The analysis is structured so as to highlight the solutions for energy efficiency and their justifications in the energy efficiency discourses taking place amongst the building professionals. The implications of these findings are discussed in the fourth section, which is followed by our conclusion.

## Discourse analytical approach to the professional media – legitimizing energy efficiency solutions

Discourse analysis (DA) has been put to widespread use within the humanities and social sciences over the last few decades, but there are relatively few discourse analytical studies in the field of construction. A handful of journal articles deals with discourses in and around construction related policies, i.e. on housing policy (Lundquist, 2004), urban development policies (ter Borg and Dijkink, 1995) and interurban rankings (McCann 2010). There are, however, to our knowledge, no analyses of the professional media discourse on energy innovation in the construction sector[[1]](#endnote-1). Our aim is to use discourse analysis in an examination of how one particular domain of “green construction”, namely energy efficiency, is discursively framed, rendering particular solutions to the challenge of energy efficiency as legitimate and attractive. More specifically, we do so in the context of three professional journals.

Following Vaara and Teinari (2002) we consider discourse analysis “as a method for analysing the social constructions of (organizational) phenomenon in textual form,” which in the context of this paper is the ways in which journalists and commentators in the professional media present and debate issues pertaining to increasing energy efficiency in buildings. Hajer (2004) defines a discourse as ‘an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices’ (Hajer 2004). The professional media discourse thus provides frames, which building professionals can use in making sense of what energy innovation and mitigating climate change entails. According to Fairclough (1995), discourses also put forward specific definitions of identities and relations between actors and issues. In what follows, we identify the ideas, concepts and arguments that building professionals have put forth in their respective media discourses as part of their “sideways” (Janda & Parag, 2013) communication with their peers. This is their way of framing and influencing what is at stake and how best to attend to the issue of improving the energy performance of buildings.

The media’s influential power is a key tenet in discourse analysis. Fairclough (1995), for instance, portrays media representations as (re)producing societal power relations, and Vaara and Tienari (2002) argue that discourses, including media discourses, (re)define what is justified and legitimate as well as constitute subject positions and social identities[[2]](#endnote-2). In general, discourses may become a disciplinary force that in a taken for granted manner permit and limit the existence of particular meanings and the performance of particular actions (Livesey 2001). In other words, media can be considered as participating in a process where particular problems, solutions and understandings of the world become naturalized.

While discourses work to frame a concern, an issue or conflict as well as the actors involved, they also provide justifications for these framings that can confer them with legitimacy, i.e. “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, val- ues, beliefs, and definitions” (Suchman 1995, p. 574). In the field of discourse analysis legitimacy is, as defined by Vaara, “*a discursively created sense of acceptance in specific discourses or orders of discourse”* (Vaara et al. 2006: 793). Legitimation may be drawing on, for instance, legal, technical and political discourses (Joutsenvirta and Vaara 2009). Based on analysis of discursive struggles, different types of legitimation strategies have been identified, such as scientific rationalization, commercial rationalization, nationalistic rationalization, moralization, and normalization (Joutsenvirta 2011; Vaara and Tienari 2008; Vaara et al 2006). In these terms, specific energy solutions could, for instance, be discursively justified by referring to the commercial opportunities associated with developing them or to their scientifically demonstrated performance characteristics.

According to Vaara and Tienari (2002), some legitimation strategies and related justifications are more successful than others. This is often the case if they confirm existing presuppositions or norms/values in the dominant discourse (Kuronen et al. 2005, Vaara and Tienari 2002). Thus, established arguments are often essential parts of legitimation and naturalization of specific ideas. The downside of this can, however, be that critical and reflective voices are silenced and made absent in so far they do not echo the dominant discourse. In terms of construction, such dominant ways of justification may restrict the array of acceptable solutions for energy efficiency to those readily defendable within the dominant discourses.

In what follows, we examine the justifications provided in various professional magazines with the aim of identifying the dominant as well as the more silent legitimization strategies used in the media. Combined with our analysis of the medias’ suggested solutions for the energy related challenges in construction, this enables us to highlight the implicit assumptions and presuppositions regarding the nature of the construction sector as advanced in the professional media. In the light of our findings, we discuss the possibility of these discursive constructions preventing actors from articulating alternative approaches to what and where the solutions for the increase of the energy efficiency might be.

**Methods: mapping the discourse of building professionals**

Our study focuses on the professional media directed towards architects, engineering professionals as well as a wide variety of practitioners in the building industry, i.e. contractors/builders as well as material, component and technology suppliers. Our empirical material consists of articles retrieved over the last 14 years (1999-2012) from a monthly magazine, *The Architect*, targeting architects[[3]](#endnote-3); a weekly newspaper, *The Engineer*, targeting engineers[[4]](#endnote-4); and a monthly (and from 2003 quarterly) magazine, “Construction”, targeting the building sector employers[[5]](#endnote-5). This mix of professional magazines allows us to follow the debate on energy related questions in the construction sector across the many different professional groups. The time span of our study was selected so as to be able to capture the various professional groups’ responses to changes in the Danish building regulations that were introduced in 1998, 2006, 2008, 2010 with the aim of increasing energy efficiency. In the course of these changes to the Danish building code more emphasis has been given to the use of performance-based measures. This has given building professionals greater discretion in determining how to meet the energy consumption requirements, i.e. stay within the allowed energy performance frameworks.

Each professional magazine was screened for articles pertaining to energy use in building as well as to the use of different energy sources. This was done manually for the professional magazines that were not available in digital form, i.e. *The Architect* from 1999-2012 and *Construction* from 1999-2003. These were sourced for articles with relevance for energy related questions in construction. The magazines that were available digitally were searched for articles containing the words “energy“ and “construction“ or “building“. Following this broad search, the (copied) material was manually sorted so as to limit the sample to articles focusing on ways to improve energy efficiency and enable the use of renewable energy sources in buildings, i.e. on more sustainable energy solutions. This two-tier sourcing strategy resulted in a sample of 691 articles, 241 in the architectural magazine, 183 in the engineering newspaper, and 267 in the monthly magazine for the construction sector.

The content of these articles was analysed using open coding to identify: (1) how the issue of increasing energy efficiency in building was described, i.e. whether this issue was being accepted or discredited by the various building professionals; (2) what topics were being debated in the various magazine. This process revealed some patterns in the array of topics treated in the media; the most pervasive of which were: description of building design concepts such as ‘passive house’ and ‘active house’; components, technologies and production methods that can increase energy efficiency; the role of information and the need for further information dissemination regarding e.g. calculation programs; regulatory requirements and changes as well as rallying for better financial incentives. Subsequently we coded the material using analytical codes from discourse analysis to identify (3) the argument the professionals were making for/against (a) increasing energy efficiency in general and (b) particular technologies/approaches. As a final step in the analysis we carried out an analysis of the professional differences and similarities in regard to the solutions and legitimations strategies in use.

**Findings**

The desirability of increasing energy efficiency and the use of sustainable energy sources in the construction sector has been widely commented upon in the Danish construction media over the last decade, as it has in many other countries as well (Oreszczyn & Lowe, 2010). Moreover, the three publications that we have studied have had remarkably similar positions on this. Looking across the professional construction media it appears that energy efficiency is generally considered “a good thing”. In the absence of conflicting views about the goal, the overriding theme is *how* to ensure that this is achieved. Based on a content analysis of all articles in our sample we identified a number of recurring measures. The key ones suggested in the professional media are listed in figure 1 showing the number of articles touching upon each measure.

Figure1. Overview of the professional magazines’ suggestions as to how to improve the energy efficiency of buildings, 1999-2012.

As can be seen from figure 1, there is a broad consensus as to the most important measures, even though there are slight differences between the professional groups with regard to the number of articles devoted to a particular measure. Emphasis is primarily given to the same four main measures – the introduction of ‘sustainable technologies’ and design concepts, the need for increasing the level of information and improving information dissemination so that practitioners can acquire the necessary insights as to why and how energy efficiency can be improved, and regulatory incentives. The latter is, however, not something that is widely addressed in *The Architect*, compared to the emphasis given to this topic in the two other journals. Instead, and not so surprisingly, *The Architect* contains more articles on the integration of architectural visions in the design, work and products than the other two professional magazines. Economic incentives are also a topic mentioned in all the journals. In the following, we briefly introduce the predominant solutions advocated in the three journals before proceeding with the discussion about the ways in which their adequacy and legitimacy is construed in the media.

*Technologies for improving the energy performance of buildings*

Judging from the number of articles dedicated to the topic, the introduction of particular technologies and building components, labelled ‘technologies’ in figure 1, appears to be of great interest for all three professional groups. Of the many articles focusing on improving energy performance the most commonly noted technological options include: reducing the heating loads through an increased use of more energy efficient windows, adding more and new types of insulation and an increased use of heat recovery technologies as well as improving energy efficiency by heat pumps, different ventilation and cooling systems, and by getting the building to produce green energy through, for instance, an increased use of solar panels and local wind mills.

An alternative way to enhance the energy efficiency of the building is to orient it in such a way as to optimize the use of daylight, shade and ventilation without the use of add-on technology. Architects generally see this as a relatively straightforward and simple way of reducing building heat loads and electricity consumption. Interestingly, it is almost only discussed in *The Architect*. There are a few notable exceptions in both *Construction* and *The Engineer*, where some of the articles addressing design concepts such as Passive House and Bolig+, the Danish version of an active, energy surplus house, also mention these passive measures to enhance energy efficiency.

A few engineering professional have, however, within the last few years begun to debate the efficiency gains of on-site energy production by solar panels, heat pumps and windmills as opposed to optimizing the energy supply system. From this perspective, on-site energy production may lead to local sub-optimizations relative to what can be achieved through optimizing the energy supply system. This may lead to a problematization of many of the technologies that hitherto have received quite a lot of positive attention in the media.

*Better information*

In the Danish professional media, adequate and sufficient information is seen as instrumental for choosing, developing and marketing the best technologies and designs. Thus, the interest in better information is closely linked to the most widely noted approach to improving energy performance, namely the use of cost-saving, efficient, intelligent technologies and materials. The media also call for more and better quality information in order for the clients to become more aware of their choices and of the economic consequences of these, and to correct their false beliefs regarding what effects enhancing energy efficiency can have on other building related parameters such as indoor air quality. Component and product producers need additional information for other reasons, i.e. in order to be able to understand the market opportunities for their products as well as to be better positioned to develop system solutions. Architects and engineers are, however, criticized for lacking the necessary competencies to design and execute energy efficient buildings.

Apart from calling for more information, the importance of improving the dissemination of information to key actors in the buildings sector is another pressing issue in the professional media. In a few instances, calls are made for further research into the technological options and for improving professional training and education within the realm of energy efficiency.

The media debate on better information shows a clear underlying assumption of the reason why the energy efficiency and the transition to renewable energy sources in buildings has not yet happened. This is because clients as well as the building professionals have an information deficit. Once provided with the necessary additional information, however, they will be able to make more informed decisions and increase their competences within the realm of energy efficiency, provided that they have sufficient economic incentives for doing so. This information deficit model is further strengthened by the ways in which the media discusses technologies as solutions to the problem of climate change and energy concerns: the tone of these articles is mostly that of dissemination of performance related information about the best available products.

*Regulations*

While many of the articles appearing in the professional media are dedicated to providing the readers with information regarding the latest regulatory changes, there are numerous articles emphasizing the importance of government sending clear signals as to existing and future regulatory demands. Regulation is considered a driver of energy efficiency and on-site production of renewable energy in *The Engineer* and particularly in the *Construction* magazine, whereas *The Architect* is almost silent on this issue. *The Engineer* and *Construction* call for better and – sometimes even - stricter regulation. The implicit and sometimes explicit argument for this is that strict regulartion can spur innovation and this may provide companies with a competitive advantage. In a similar vein, some articles discuss the favourable effect of having the long term regulatory goals announced well in advance as this gives the companies time to re-orient their businesses. In Denmark, the construction sector is quite knowledgeable of the plans to tightening the Building Code’s energy stipulations up until the year 2020. This has commanded a great deal of interest for not only developing future solutions but also for going beyond compliance in on-going building projects so as to acquire a competitive advantage in the coming years.

### *Economic incentives for improving energy performance of buildings*

Providing practitioners with an economic incentive to improve energy efficiency is one of key concerns for all three professional groups, particularly the issue of how to re-cover the investments and the costs of doing so. Subsidies in a form of direct financing (subsidies, rent subsidies, energy savings fund), innovative financing schemes (such as ESCO) or differentiated loans are suggested as important means for making energy efficient building and renovation more attractive both in the long and short term. Apart from emphasizing the costs, many articles note the business opportunities that enhancing energy efficiency might bring about. Although the importance of economic incentives figured prominently in all three magazines, this issue received most coverage in the *Construction* magazine, targeted at building professionals in general.

**Modes of legitimation**

In addition to identifying particular technological solutions or approaches to increasing energy efficiency, the construction media offers views as to why these solutions are the most viable and salient. In going through the articles and the arguments used for legitimating specific solutions we distinguished five modes of justification that form subcategories to a generic legitimation strategy of rationalization. Rationalization is legitimation by reference to the utility or function of specific actions or practices (Vaara et al 2006). In the media texts, the following forms of rationalization were employed: techno-functional rationalization highlighting the technical features, qualities and often superior performance of particular technologies; economic rationalization[[6]](#endnote-6) emphasizing cost minimization and market opportunities; legalistic rationalization focusing on compliance; aesthetic rationalization and pragmatic rationalization, respectively, emphasizing the architectural, health and comfort related qualifies of new technologies and that they are easier to work with and maintain. Table 1 presents an overview of these modes of legitimation with examples retrieved from each of the interrogated magazines.

Table 1: Overview of modes of legitimation in the professional media used to justify specific solutions for sustainable energy performance in construction.

*Techno-functional rationalization* justifies the use and status of a specific solution for energy related concerns in construction. These articles often have a technological slant, describing materials, components and production methods, or design concepts, e.g. the passive house concept, and highlighting the ways in which these can contribute to reducing energy use, improving energy performance and allowing for the use of other energy sources than the conventional ones. This is by far the most common way of legitimating technologies across all the professions. This form of legitimation is, however, the most common way of justification in both *The Engineer* and *The Architect*, and notably less so in *Construction*. The role of techno-functional rationalizations in the architectural media is particularly interesting, as architects are often considered to privilege and be preoccupied with aesthetical concerns (Ryghaug & Sørensen, 2009).

The *economic rationalization* is used to legitimize specific technologies and the inclusion of energy related concerns in the design process by relating the technologies to cutting costs and the possibilities of exploiting market opportunities at home and abroad. With regard to the former, a number of articles justify energy efficient buildings and technologies in terms of their superior performance when it comes to total economic calculations. This is a response to the allegedly widespread arguments and ‘prejudices’ concerning the high up-front costs of constructing energy efficient buildings. Although there are sceptics, it is widely claimed that if maintenance costs are included in the economic calculations, then the higher costs of constructing an energy-efficient building can be substantially reduced, if not reversed.

The other instantiation of the economic rationalization highlights the business opportunities associated with the development of new competencies, technologies, components and markets. For architects the prospect of developing new energy design competencies is considered as a way to grapple with increasing competition from other professionals, notably engineers. By developing these competencies it is claimed that they may be able to regain some of their lost professional terrain. The engineering and construction magazine emphasize how the development of new sustainable energy technologies and building components can expand existing or lead to new business domains. Although these market opportunities are generally considered in beneficial terms, there are a few articles problematizing the nature of these markets; warning about the risks and uncertainties associated with them. There are, however, also a number of articles pointing to the dangers of the loss of competitiveness vis-à-vis the building industry in other countries, notably Germany and Austria, if Danish companies continue with business as usual. Economic mode of legitimation is common in all the three magazines, notably so in *The Engineer* and especially *Construction*.

Yet another form of legitimation – *legalistic rationalization –* is mostly used to remind the readers of the benefits of a particular technology or design detail when working towards compliance with energy regulations. This legalistic rationale is also employed as a justification for introducing new management tools such as integrated energy design; the argument being that with the help of the tool companies will be able to comply with existing and, more important, future regulatory demands. This mode of legitimation is most widely used in *The Architect*.

In addition to the above mentioned ways of justifying measures to increase the energy efficiency of buildings, *The Architect* uses two additional but quantitatively much weaker modes of legitimation: *aesthetic* and *pragmatic* rationalizations. In this journal, the involvement of the architect profession in sustainable design is often justified by the importance of including aesthetic considerations in the technical design of the building. This line of argument is premised on observations of how energy solutions have predominantly been treated as a technical issue completely neglecting aesthetic considerations, the result of which has been to the detriment of the built environment and its users. The conflict between energy efficiency and aesthetics is also present at a more generic level, e.g. in discussions of the aesthetic qualities of energy efficient window frames, energy efficient glass, increased insulation and solar panels or the lack thereof. This category of rationalizations also includes arguments related to comfort and experienced indoor air quality. While this mode of legitimation is most frequently used in *The Architect*, *The Engineer* also refers to it at times.

The sustainable technologies and energy performance calculation programmes are furthermore often justified by the practical benefits with which they endow their users. New insulation products, for instance, might be easy to install thereby saving time and resources. Energy performance calculation programmes should be used as they make it easier for the architects to process complex information and link it with specific products to ease their work-load and reduce errors. The superiority of package solutions for building refurbishment where the building owner gets an all in one solution including everything in energy renovation and renovation in general, are justified by the media by their easiness and lack of burden placed on the building owner. While this being the least used of the modes of legitimation, it is surprising that it is mostly used by *The Architect* and to a certain extent by *Construction*, not by the engineers.

All in all, the professional media for the Danish construction sector puts forwards a rather homogeneous picture of how to improve energy innovation. The importance of enhancing both energy efficiency and the use of sustainable energy sources is widely agreed upon. In the same vein, the various professional magazines provide similar suggestions as to how this can be achieved, i.e. the introduction of new materials, component or technologies is by far the most widely discussed option across the different sources. In addition to calls for stricter or clearer regulation, the need for economic support and the importance of strengthening the actors’ knowledge base are also regularly mentioned. These two recommendations are, however, linked to the technological aspects of improving energy performance: economic support and better information are seen as necessary for promoting the use of new technologies.

Although the professional magazines take similar positions with regard to the salience of introducing new, more energy efficient technologies and building components, they differ more in terms of how they justify the different solutions for energy efficiency and renewable energy technologies. Although the techno-functional rationalizations figure prominently in all three magazines, this way of legitimizing the introduction of new technologies is employed most prominently by the engineering and notably by the architectural professionals; the latter also being the prime one making use of aesthetic and pragmatic rationalizations. The building sector employers rely predominantly on the economic mode of legitimation, interest in which is also shared by the engineering professionals.

**Discussion and implications**

We have shown the similarities and subtle differences in the Danish professional media’s discursive framing of the solutions for energy and climate related concerns and in the justifications that legitimize these specific solutions. Rooted in its emphasis on the technological solutions, and the technoeconomic and regulatory justifications thereof, the media comes to produce a specific, yet implicit, understanding of the nature of change and innovation uptake in the construction sector. In what follows, we will discuss this understanding in the light of alternative views put forward by a number of scholars on the ways in which the construction sector enables – or does not – enable change.

Danish construction media, we argue, defines combatting climate change as a question of straightforward technology adoption. The media informs its readers of energy efficient building products and on-site renewable energy production opportunities. It is assumed that barriers to the adoption of these are related to information and economic incentives. If these are right, the adoption of solutions will be unproblematic, because, after all, the technology is readily available. The technology that yields the best results in terms of energy performance is furthermore often depicted as economically profitable and compliant with regulation.

The extant academic literature on change and innovation within the building sector offers a drastically different view on the challenges of new technology adoption. Sustainable energy related technologies and practices are in principle no different from other novelties and, we argue, there are reasons to anticipate that the same difficulties will also prevail in this context. In what follows we will highlight key explanations of the building sector’s (generic) lack of innovation and resistance to change in construction. We then hold these arguments up against those suggested in the professional media in order to find alternative understandings of the low pace of energy innovation.

Koskela and Vrijhoef (2001, p. 200) discuss two predominant aspects of the building industry that influence its relation to change: uncertainty and interdependence. These stem from three basic characteristics of the industry, namely one-of-a-kind production, site production and temporary project organization. Accordingly, new product development and design is inherently uncertain. Also, uncertainty is part of the in-site production where many conditions remain uncontrolled. Temporary project organizations add to the uncertainty as no accumulated interpersonal understanding exists to make the communication and expectations smoother. Apart from uncertainty, the building sector is also characterized by a high degree of interdependency. For a building to come into being different professional groups are dependent on each other both during the design and production practices but also between these, and building sites only function if different tasks are carried out as concerted action.

The interdependency and uncertainty that characterize the sector are also central to the ways in which other scholars conceptualize the sector’s resistance to change. According to Winch (1998, p. 270) innovation within a project is not only defined by the novelty itself but also by a large range of actors including clients, regulators, professional bodies, architects, contractors, trade contractors, specialist consultant and component suppliers. Harty (2008) puts forward a similar claim: innovation must be implemented in an inter-organizational landscape of numerous firms, actors and disciplines working together in projects. This multi-actor character of construction leads both Winch and Harty to emphasize the role of negotiation in innovation uptake: the take up of a novel approach or a product must be negotiated with one or more actors within the project coalition and beyond. Harty suggests that in order for us to comprehend the difficulties and opportunities related to innovation in the sector, a processual approach to these negotiations is needed: only by following such dynamic and uncertain interactions and accounting for a range of influences, actors and artefacts will it be possible to provide a better understanding of innovation (Harty 2008, p. 1039).

In addition to the complexities and interdependencies described by Winch (1998), Harty (2008) and themselves, Koskela and Vrijhoef (2001) note that the building sector generally tends to ignore these characters of the sector. Rather than acknowledging the uncertainties and interdependencies involved in building projects, the ideal of systematic and efficient realization of tasks prevails. The present doctrine and practice of construction management is based on the ideal of rational task management and centralized control. This leads to a situation detrimental to innovation. Under these conditions, according Koskela and Vrijhoef (2001), the inherent variability of practices of the construction sector leads to counterproductive outcomes. Interdependent issues become managed by a fragmented and myopic organization and bad control across all phases, which is likely to seriously hamper not only innovation initiatives launched by managers but also innovative ideas brought up by employees in the course of specific projects.

Koskela’s and Vrijhoef’s observations (2001) have a marked resemblance to our findings: in the professional media, enhancing energy efficiency and increasing the use of renewables in buildings is reduced to a question of adopting the best performing technology, particularly if supported through adequate economic incentives and the provision of the necessary information. The inter-dependencies and complexities of doing so do not figure prominently in the media discourse. The variability of practices and the differences in the actors’ interests are to a large extent abstracted away in the rationalizations for the various technical solutions. Hence, the complex task of improving energy performance and mitigating climate change is cast as a matter of simple technological diffusion. Moreover, legitimation strategies based on regulatory compliance also serve to justify particular technologies, namely the ones that can ensure that the construction companies are compliant with existing and perhaps also coming energy performance regulations.

Another indication of the three professional media abstracting away the practicalities of energy innovation is the rarity and superficial nature of justifications related to product qualities such as workability, usability, healthiness and aesthetics. By not paying attention to these, the media neglects the variable interests of the different actors in the construction sector. A third sign of oversimplification is the way in which economic profitability of the promoted technology is dealt with in the media. Many solutions are argued to be economically viable – if only their costs are calculated as total economic costs instead of the usual up-front investment costs. While the logics in this argument about economic superiority are alluring, they do not take into account the prevalent practice of cost estimation in the construction sector.

Novel technologies and design concepts are, no doubt, important for improving the energy performance of buildings, and thus contributing to mitigating CO2 emissions and to reaching the overarching goal of sustainable construction. Understanding of the up take of technologies as simple task management, however, leads the professional media to introduce partial solutions: more and better technologies, information and incentives of generic nature. Yet, despite widespread agreement about improving energy efficiency being a ‘good thing’ and despite the overwhelming amount of information available in the professional media regarding what different technological options to pursue, this has proven not to be enough for a wide adoption of these technologies.

**Implications for practice and research**

We believe that there lies an enormous potential to produce more relevant and meaningful debates regarding the solutions for sustainable energy performance in the professional construction media. After all, architects, engineers and construction sector employers have unique hands-on experience in the difficulties and successes in developing and taking up new sustainable technologies and practices. The implication of our study for the media practitioners is simple: what is needed is more and stronger articulations of why it really is so difficult to ‘walk the talk’, i.e. what might form part of the multifaceted explanation for why more progress is not being made.

What is surprisingly absent in the media debates are detailed considerations as to how the uncertainties and interdependencies characteristic of the sector impinge upon how energy innovation does or does not take place. There are issues and processes, which appear to currently be black-boxed in the professional media despite of their significance for understanding why novel technologies or methods do or do not spread in the sector. How, for instance, does a specific technology come to be considered a viable solution and what other issues are at stake than its technical performance and compliance with regulations? And how do the various existing practices of the interdependent actors participate in keeping the new clean or energy efficient technologies out – or how could they be changed to enable the inclusion thereof?

How, then could the media help us better understand what makes a technology superior to different actors? While the present media discussion this mostly in terms of their energy performance, the sheer amount of actors involved in a construction project would suggest that defining what constitutes as superiority is a much more complex issue. Hence, considering technology uptake merely as a matter of diffusion risks underestimating some of the challenges. Even though the professional media debates offer some indications as to the competing requirements for the technologies and building concepts that building professionals face, e.g. aesthetic concerns as well as concerns regarding functionality in construction, end-use and economic viability, it appears that the professional media could play an important role in shedding light on the anatomy of these and other qualities and their possible conflicts with those of the sustainable energy technologies.

The interdependency of different actors during the construction process further implies that the process of technology uptake can be both restricted and influenced by the practices of actors other than themselves. The professional media, however, is by large silent on how incumbent practices and technologies are held in place. Could it be, however, that the routines, commonly held understandings of how the construction process ought to proceed, social ties, entrenched calculation procedures, rules of tender, etc. act in such ways as to keep inefficient energy-related practices and technologies in place? If this is the case, then increasing the amount of energy efficient technologies and the level of information will hardly be enough to promote energy innovation within the building sector. Rather, it could be argued that part of the solution is a change of professional norms, practices, social ties etc., which makes these and similar issues worthy of further inquiry.

Although it can be argued that by providing information regarding the technological possibilities the professional media is contributing to a change of professional norms, it is likely that this will primarily take place within the various professional domains, thus, without attending to the interdependencies of the building professionals. There are, however, some themes that have already been mentioned by the media and that are indicative of a wider understanding of the challenges of energy innovation, and could be cultivated more in depth. These include the ways in which the construction industry is organized (tender systems/requirements, contract relations.); the decision-making structures calling for binding (and likely the ‘wrong’) decisions early on in the construction project; the incentive and time structures of the different actors, notably owners and renters, and how routine-thinking, despite all calls for integrated design approaches, precludes cross-disciplinary teams working together to solve the energy related challenges.

In terms of implications for future research, several different paths could be pursued. Our study is set within the context of a single country and the results of our discourse analysis have yet to be compared to how the professional media attends to energy innovation in other settings – given that sustainability has become a salient discourse in both the EU and a host of national governments. Another obvious implication for future research is to move beyond discourse analysis and attend to the practices of construction to investigate whether and how the identified underlying assumptions materialize in the work of construction sector professionals. This could provide timely contributions to the academic literature on energy innovation in buildings that – much like the professional literature – does not devote much attention to the organizational, social and behavioral concerns and challenges of developing sustainable construction (Schweber & Leiringer, 2012).

**Conclusion**

The Danish construction professional media depicts a broad consensus as to the significance of combatting climate change and as to the measures through which energy efficiency and renewable energy production in buildings can be enhanced. There are, however, some differences as to how the various professional groups legitimate their suggestions as to how to improve the energy performance of the building sector.

The ways in which the different solutions, and the legitimation strategies used to promote them, are presented implicates a ‘deficit’ understanding of the building sector; one in which only lack of information, incentives and technological insights slows down the pace of necessary changes; and one in which the building professionals operate almost atomistically. When information and technological options are available, the uptake of new technologies and methods becomes a question of pure task management. Sociologically informed academic literature on innovation and change in the construction sector challenges this understanding. Following from the insights of this literature, in order to fruitfully contribute to the debate about the sector’s role in climate and energy concerns, the professional media ought to attend to the uncertainties and interdependencies of actors and practices that complicate adoption of climate wise appropriate technological innovations. In the paper, two areas worthy of further media focus are highlighted: competing interests and requirements for products and methods and practices in conflict with the adoption and use of the new technology or method of work.

Table 1:

|  |  |  |
| --- | --- | --- |
| **Type of rationalization** | **Discursive features** | **Examples** |
| Techno-functional | Uses technical terms, explanations, quantifiable results | “New guide for U-values and insulation thickness…” (*Construction*, nr. 3, 1999, p. 27).  “Energy efficient dust extractor in the wood industry…testing the potential for regulating energy use…” (*Construction*, nr. 3, 2000, p. 42-43).  “The energy meter runs backwards. …The concepts behind the new active house, called ‘a house for life’, are relatively simple. All strings have been played upon in reducing energy use and CO2 emissions. For instance, it has thick and well-insulated outer walls; utilizes the light coming in through large windows that comprise roughly 40% of the building envelope, as opposed to 20% in normal houses; uses a number of renewable energy sources – heat pumps, PVs and solar panels as well as ventilation with heat recovery, intelligent shading, and many other things…” (*Construction*, nr. 4, 2009, p. 26-27).  “Daylight is the only sustainable source of light” (*Construction*, Nr. 6, 2010, p. 17)  I følge Wessenberg A/S, der har været ingeniører på projektet, forventes tagløsningen at kunne producer 37.573 kWh på årsbasis, hvilket svarer til en samlet besparelse I CO2 –udslip på 30%. (*The Architect,* 1/2011. p. 90)  All in all will each EcoFlow be able to save around 700 CO2 per year. With a life span of at least 15 years this means the the yearly production of EcoFlow, according to Danfoss, can save the climate from at least 100 million tons CO2. (*The Engineer* 18.6.2010, p. 13) |
| Economic | Focus on competition, future benefits  Maximization and optimization arguement | It seldomly happens that architects get served a new business area on a silver plate. But this is what is happening in regard to the energy agenda [energy performance certification of buildings] (*The Architect,* Christian Lerche, 5/2012)  ’Desuden kan man forvente, at Miljørigtig Projektering bliver en væsentlig konkurranceparameter fremover.’ (*The Architect,* 23/1999, p. 6)  Det betyder, at større, ukomplicerede solcelleanlæg nu – for første gang – kan etableres med simple tilbagebetalingstider, der er under 20 år og dermed i visse tilfælde – baseret på nettoafregningsordningen i Danmark – har mulighed for at give overskud på investeringen allerede første år. (*The Engineer* 10.9.2010, p. 8) |
| Legalistic | Focus on compliance,  Factualizes regulatory changes | “We have to think differently, if we’re to meet the [government’s] ambitious goals for energy savings…The building industry unanimously agrees with the conclusions of the recent evaluation of the key policy instruments in the [government] Energy Action Plan from 2005 – it has worked as planed. The energy companies [utility companies] have not been able to do their job, private consumers have wasted millions on energy labeling, and government has not been able to lead the way. It is time to think differently.” (*Construction*, nr. 1, 2009, p. 30).  “Its been said before, but we won’t make it [be able to reduce the CO2 footprint], if we don’t talk about a radically different tender-policy. We have to look less at the price and think more holistically. There is a need to include others early in the process. There is no doubt about it, that it would e.g. be useful if the producers of materials are invited to give their advice, when a project is being planed and the call for tender is being made” (*Construction*, nr. 2, 2012, p. 8)  Vi har allerede nu oplevet en enorm interesse i forbindelse med forberedelserne til lanceringen på det danske marked. For det første fordi de højere krav i BR10 til energieffektivitet i boigbyggeriet meget let kan opfyldes [med dette produkt] (*The Architect,* 3/2011, p. 77). |
| Aesthetic |  | Efterisolering på traditional vis viste sig flere steder I bygningerne at kompromittere rummenes dimensioner i voldsom grad, og der var fare for, at det oprindelige spinkle udtryk i fxkviste ville forsvinde eller eksisterende gerichter bliver skjult. Derfor blev der fra opgavens start søgt efter alternative isoleringsmaterialer, der kunne løse den nutidig problemstilling i historiske rammer. [about a specific insulation technology Aerogel Spaceloft] (*The Architect,* 4/2012, p. 85)  Vi har fået U-værdien ned på 6.6 og samtidig formået at holde et smalt design, som også vil kunne burges I et skandinavisk byggeri. (*The Engineer* 7.11.2008, p. 6) |
| Pragmatic |  | The insulating concrete is twice as expensive as the traditional concrete. Due to the faster installation and less work arounds during the construction, savings can, however be accumulated.  (*The Architect,* 3/2008, p. 28)  If you can remeber your address, a new webpage, husetsweb.dk can give you an answer to the question whether it extra insulation would create savings in your house.  (*The Engineer* 20.6.2008, p. 14) |

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Endnotes

1. The work by Gluch and Sandberg (2006) on how and in what terms green building is presented in construction related trade magazines also focuses on the meanings communicated by the media, but takes a communication theoretical perspective and focuses on how these insights might be received rather than a discursivelyproduced approach. [↑](#endnote-ref-1)
2. According to Fairclough (1995) as well as Vaara and Tienari (2002), the ways in which media texts come to circulate into the hands of their readers and acquire meaning is through social and linguistic processes, in which individuals relate to the texts based on their psychological predispositions, experiences and interactions with others. All of these processes condition what impact the media discourse may have. [↑](#endnote-ref-2)
3. The professional magazine is titled “The Architect” [Arkitekten], and published monthly by the Danish Architectural Press. [↑](#endnote-ref-3)
4. This professional magazine is ”The Engineer” [Ingeniøren], published weekly by The Association of Danish Engineers. [↑](#endnote-ref-4)
5. This professional magazine is titled “Construction” [Byggeriet], and published by The Danish Construction Association, which is an employers’ organization for approximately 6000 companies within contracting, construction and the manufacturing of building components. The Danish Construction Association [Dansk Byggeri] was established in January 2003 with the merger of two employer associations – the Danish Contractor Association and the Association for Construction Employers. The magazine ”Construction” [Byggeriet] had up until that time served as a magazine targeting the members of the latter association. Following the merger, the editorial board was changed, as was the rate of publication. Although the magazine has always been directed to what the editors perceived as member interests, there is a change in the journalistic approach – putting more emphasis on longer, more detailed articles rather than short briefs. [↑](#endnote-ref-5)
6. The economic rationalization as identified here includes what Joutsenvirta (2011) calls commercial rationalization, i.e. legitimation by referring to commercial and competitive benefits. However, it also extends beyond this by including non-commercial but still economic justifications. [↑](#endnote-ref-6)