Towards new national policy instruments for promoting energy efficiency

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Abstract

Energy efficiency is necessary for purposes related to securing energy supply as well as achieving climate mitigation. However, most countries struggle with finding effective energy efficiency policies. In this paper we analyze a variety of such policy efforts, in order to find ways of making them more effective and to identify possible new and innovative approaches to energy efficiency governance. The efforts to be studied include past and current use of economic instruments like taxes and subsidies as well as non-economic instruments like support of R&D, information campaigns, direct regulations (including building codes), development of infrastructure, and social experiments. We also analyze how national framework conditions influence the effects and non-effect of policies.

The paper synthesizes almost two decades of research carried out in the area of energy efficiency and energy policies in Norway with a particular focus on the building industry and energy use in the households. The paper provides a critical review of more than 30 years of energy efficiency governance in the Norwegian context, with a particular emphasis on the achievements and limitations of policy efforts that has been based on the assumption that energy efficiency measures also should be economically efficient. Additionally, we aim to answer how energy efficiency has been understood and how it is done in practice.

Energy efficiency seems to a large degree to have happened as an indirect consequence of the introduction of new technologies and/or comfort enhancing measures. In addition, stricter building codes have probably been the most effective policy measure. The paper also point to some recent findings based on practice studies of pro-environmental behavioral transformations that may be helpful for designing new policies in the area of energy efficiency with examples from the transport sector.

Introduction: Energy efficiency between economics and engineering

Norway, like many other countries, has been struggling to establish effective policies to increase energy effiiciency since one began to focus on such policy in the aftermath of the socalled oil crisis in 1973. In this paper, we suggest that the problem in part is caused by the shaping of energy efficiency policy as mainly an issue of economic and engineering concerns. The dominant focus on such concerns has framed energy efficiency so that important social and cultural features of the production and use of energy has been externalised and left

out of view. We argue that new and revised policy instruments are needed to help realize the considerable potential for energy efficiency that still exists.

Norwegian official documents tend to refer to the country as an "energy nation". The term is shorthand for the fact that in Norway, energy plays an important but different role from that found in most other Western countries. The labeling of Norway as an "energy nation" is based on the observation that the country is a large exporter of energy in both raw (oil, gas, electricity) and processed (e.g., aluminum) form. The Norwegian energy situation is characterized by the dominance of renewable hydropower as the source of electricity and by a large national income from the export of oil and gas. Norway is a large producer of hydropower and has a tradition of low electricity prices compared with other nations (NVE, 2010). Even if the country is part of a Northern European electricity market, electricity is still perceived by the public as a given good, a fairly abundant supply that should be cheap and readily available (Aune 2012, Aune et al. 2011, Karlstrøm 2012).

In the last 35-40 years Norway has been a large net exporter of energy. This has led to an expectation that both production and use of energy should be profitable (Ryghaug & Sørensen 2008) because of the economic significance of energy in its pure form. This in contrast to the view of energy as an input factor to value creation in industry, found in most other Western countries. Consequently, while energy policies of most Western countries largely have been concerned with security of supply, this has less so been the case in Norway (Sørensen and Skjølsvold 2013).

Altogether, this has created an exceptional context of implementing energy efficiency measures, acknowledged already in the first Norwegian green paper on energy efficiency (NOU 1975: 49). It is with this in mind we must understand the political interest for energy efficiency - substantial in all OECD countries – which has been formulated as a policy for energy *economization*, shortened to ENØK in Norwegian. The idea behind ENØK has been that energy efficiency should pay for itself, in line with the premises for describing Norway as an energy nation. Saving energy as an end in itself was not a priority because energy in the Norwegian context was supposed to generate profit.

As indicated above, Norwegian energy efficiency policy (ENØK) has been shaped through the articulation of two sometimes competing professional logics emerging from economics and engineering, respectively. This article traces these two logics in the energy efficiency policies that have been enacted in Norway over the last 30 years, to evaluate their effectiveness. As a point of departure, we may note that ENØK policies largely – and increasingly – have been dominated by an economics oriented approach to energy efficiency (Solli 2004, Sørensen 2007). While the development and implementation of new technologies have been considered important throughout, energy efficiency activities have been understood as first and foremost economic. For example, one has supposed that the most important motive for households to implement energy efficiency measures is monetary savings. Industry on the other hand has been assumed to engage in energy efficiency because it is profitable. In the following we will look at what kind of policy instruments has been used in pursuit of energy economization.

Past and current use of policy instruments for energy efficiency

After World War II, the Labour Party-dominated government prioritised access to electricity at a reasonable price for everyone by constructing new hydro dams for tax money whenever the demand for electricity threatened to approach the current supply. However, by the 1980s the Norwegian electricity system was having some problems. After several decades of constructing large hydro power stations, the government was facing a situation of large production surpluses and increasing popular resistance to further development. At the same time, excess power in years of rich rainfall was sold dirt cheap to Norway's neighbouring countries. This was bound to raise questions about the economic viability of the current setup: why not let prices be set through market interaction and leave investment decisions to companies making calculations about supply and demand? In response to these questions, the Norwegian Ministry of Petroleum and Energy asked a group of economists at the Norwegian School of Economics to come up with a new design for the national system of production and distribution of electricity. The research team, headed by professor of economics Einar Hope, produced more than 60 reports discussing different aspects of a projected market based electricity system, from the minutiae of electricity price futures trading to the limitation of natural monopolies. In the end, they had designed what from an economics point of view was a complete market based system for the production, distribution and sale of electricity in Norway. This design was too market oriented for the Labour Party government that originally had commissioned the work. They were looking for something more in line with the existing system, but with tweaks to overcome the inefficiencies of the large centrally governed system already in place. However, the presentation of the new market design coincided with the ousting of the social democrats from power and the introduction of an 18 months short intermezzo of a centre-right coalition in the national election of 1989. Just six months after the election, the economists' original design was taken into law almost without changes. From 1992 onwards, Norwegian electricity users have been allowed to choose their electricity supplier freely while prices are set on an hourly spot market (Karlstrøm 2012).

It is not clear whether this reform actually aimed also to promote energy efficiency, but from the debate in Parliament, we observe contributions that suggest that at least some politicians believed there would be a link. The assumption was that the reform would help make Norwegian consumers more economically rational in their use of electricity, and that this rationality would spur energy efficiency measures (Godbolt et al. 2009). This belief seems also to be in line with the main presumptions of the ENØK policy – that energy effiency could and should be economically beneficient (Sørensen 2007).

At the same time, we find considerable political ambiguity with respect to the effects of the reform and energy efficiency policy in general. While the belief in the potential of economic rationality was widespread, doubts were also voiced. First, consumers of electricity were argued to be deficient with respect to knowledge as well as morality. Consumers were believed to lack sufficient knowledge about energy efficiency and to be wasteful and extragavent in their consumption of electricity. On top of this, some politicians argued that the policy-making with respect to liberalising the market for electricity was characterised by a 'caring deficit'. The measures to take care of weak or unfortunate consumers were argued to be insufficient or missing (Godbolt et al. 2009).

Still, there was considerable agreement about the main policy instruments to promote energy effiency. These instruments were shaped by the dominant framing of energy consumption as an economic activity. Thus, the most important instruments were:

- Information and motivation campaigns
- Liberalisation of the electricity market
- Taxes
- Subsidies.

Taxes came to include a CO_2 tax, which was introduced in 1991. In addition, building codes came to be seen as an energy efficiency instrument. In 2001, a government agency called ENOVA was established to implement energy efficiency measures in industry and households. ENOVA did not mean a break with the economic framing of energy efficiency, but the practice of the agency has to a considerable extent been to try to explain the potential economic benefits of energy efficiency to its diverse audiences.

It is complicated to assess the effectiveness of these instruments, not the least because of the complex nature of energy efficiency and the substantial potential for interaction effects between the instruments as well as with other measures and development trends. However, we have some clear indications that the instruments based on an economic framing have severe deficiencies and limits.

To begin with, it is well known that in general information and motivation campaigns are not very effective. Moreover, such instruments have played a fairly minor role in Norwegian energy efficiency policy, despite a widespread suspicion about knowledge deficits.

Second, the liberalization of the electricity market cannot be said to have exercised any considerable influence on the consumption of electricity. In Norway, people are users of energy services rather than market oriented consumers of electricity. Also, presently, prices seem only to have marginal influence on the use of electricity in households (Karlstrøm and Ryghaug 2012).

Third and related, politically acceptable taxes are on an average too small to have much effect. In general, it appears that energy costs are quite low compared to other expenditures (in households as well as in small and medium enterprises), so relative prices remain quite ineffective as instruments to promote saving.

Fourth, with respect to subsidies, the outcomes seem ambiguous. For example, ENOVA has since 2006 practiced a support scheme for households investing in heat pumps, pellets heating, centralized control systems and solar collectors. A recent evaluation of the support scheme concludes that it has helped increase the introduction of heat pumps but none of the other technologies. Further, the subsidy has only to a small degree been decisive with regard to the decision to invest. About 55 per cent of the approved grants were not used (Rambøll 2010).

In the last few years, some new instruments to increase energy efficiency have been put to use. One of them is the mandatory energy classification of buildings/apartments to be sold. Another is the mandatory energy classification of white goods. The effects of the first instrument seem very small (Aune 2012). We still lack information about the effects of energy classification of white goods.

The most convincing effect of policy measures targeted towards energy efficiency is found in the building codes. This instrument is emphasized as very important by most building industry actors (Hubak 1998, Ryghaug 2003, 2005, Moe 2006, Hojem and Lagesen 2011), and it has been given increasing attention by policy-makers.

In the following section, we look more closely at a series of challenges to energy efficiency policymaking that may serve as an argument to extend the framing of such policymaking and maybe also point to a need for reframing. The main focus of these challenges is buildings and households, arguably some of the areas with the largest potential for increased energy efficiency.

Challenges to energy efficiency policies

We see four main challenges to energy efficiency policies:

- The role of comfort in the consumption of energy

- The ethos of energy efficiency
- The importance of enthusiasts
- The "Bermuda triangle" of the building industry

In the following, we discuss each of them.

I. The role of comfort in the consumption of energy

Modern society may be characterized as a "comfort society", due to the central role of comfort as a dominant criterion of well-being and a main objective underlying the organization of everyday life (Aune 1998, Shove 2003, Aune and Sørensen 2007). Comfort represents a challenge to energy efficiency policy, not because it is inconsistent with economic rationality (it is not!), but because it represents a way of framing everyday life where cost effectiveness is not a prime objective. In this sense, an emphasis on comfort represents a different rationale for engaging with energy efficiency. What does that mean?

To begin with, households represent a significant share of the national energy consumption, especially when it comes to electricity. Private consumption has continued to rise in spite of large investments in new and refurbished homes that have increased the energy quality of buildings substantially. Consumption of energy has not been significantly reduced, but has rather been stabilized at a level equal to the situation found at the end of the 1990s (Hille et al. 2011). This is more than double the consumption in the 1970s when worries over energy use first surfaced.

The last 20 years have shown changes in the understanding of how energy consumption impacts the environment. Before, the main environmental concern was nature degradation in connection to the construction of hydro power installations and local pollution. Lately, energy consumption has garnered much attention in connection to anthropogenic climate change. One might have expected that this would have motivated households to save energy, and survey findings suggest some such effects (Karlstrøm 2012). However, there is little overall change in the way the consumption of energy is conceived by households. Aune (1998) found that energy consumption of households mostly was framed as a question of comfort by the households themselves. Energy was expected to be used to increase comfort, perhaps especially through having a light and warm house, but also through cleanliness and general physical comfort (see also Berker & Gansmo 2010). At the same time, Aune observed that households could represent different energy cultures, with different approaches to the use of energy. Comfort does not mean the same to everyone. The extremes can be described as either ebullient – "we should be able to allow ourselves this" – or sober; "waste is culturally and morally reprehensible". Whether one belongs in one energy culture or the other does not have so much to do with attitudes as with what type of life one has become accustomed to (Aune 1998, 2007). Energy consumption manifests itself as an embodied practice. We believe that information campaigns have relatively little effect because of this, but also because they tend to address its audience as undifferentiated and thus neglecting energy culture differences.

Overall, people in Norway continue to perceive the energy they consume as renewable and abundant (Aune et al. 2011), with relatively little concern for energy prices. However, we do observe some ambivalence regarding the comfort focus, maybe because of a shift in the general discourse around energy use. The comfort culture has been challenged by the climate problem, something which can be traced in new ways of reasoning about energy consumption (Ryghaug and Næss 2012). For example, according to a survey from 2009, 60 % of respondents say they have made lifestyle changes due to the fear of climate change. 80 % think the general population waste electricity, and almost 40 % claim to want to reduce their use of electricity (Karlstrøm 2010). We see a potential interest in energy efficiency and saving, articulated by the respondents.

Nevertheless, focus group studies find a clear ambivalence towards reducing comfort (Næss & Ryghaug 2007, Ryghaug, Sørensen & Næss 2011, Ryghaug and Næss 2012, Godbolt, forthcoming). We observe – like in Aune's 1998 study – that people find it hard to reduce their energy consumption, probably because the consumption of electricity is inherently tied to other forms of consumption: living, transport, cleanliness, leisure time, entertainment, etc. This situation makes the consumption of energy, and electricity in particular, strongly embedded in everyday life routines and material structures. Thus, change seems unmanageable.

Environmental issues, in particular climate change, have influenced the situation somewhat, raising some doubt about the sustainability of the present comfort society. Nevertheless, the comfort framing of energy use in the households seem quite stable, still constituting a serious challenge to an economically focused energy efficiency policy. There is little doubt that the home is a comfort-making machine – not an instrument for making money. To frame energy efficiency as mainly a way of saving money is not a very effective message to the majority of Norwegian households.

II. The ethos of energy efficiency

Godbolt (forthcoming) argues, based on a series of focus group interviews the existence of an ethos of energy efficiency characterized by partially contradictory norms and interpretations. She finds that some of her interviewees are upset about increased electricity prices but energy costs remain a weak motive for engaging

with energy efficiency. Rather, energy efficiency is accounted for as an object of moral assessments. On the one hand, it is considered morally correct to engage with energy efficiency – this is something one ought to do. Underlying such statements is often some form of thriftiness, but also assessments related to potential environmental issues related to the consumption of electricity. On the other hand, people tend to see energy as something they deserve to have plentiful of access to since Norway is so rich in energy resources. Some conceive plentiful access to electricity as a rightful privilege of Norwegians living in a dark and cold "energy nation".
In addition, many Norwegians see households' obligation to engage with energy efficiency as relative to the efforts of industry and government. Their willingness to improve the energy efficiency of their home or to reduce their consumption of energy depends on whether they see industry and government fronting energy efficiency. Industry and government are seen as the most accountable as well as the most influential actors – if they do little, or next to nothing, why should small households care?
The contradictions within this ethos create space for individual navigation. You may choose to get engaged in energy efficiency, but also find good reasons to let it be. This individual navigation is not much affected by the main instruments of energy efficiency policy. Rather, it suggests that it could be a very effective measure if government and industry are seen to be doing energy efficiency in an outspoken and comprehensive manner.

III. The importance of enthusiasts

A striking feature of many studies of buildings is the importance of enthusiasts as originators and promoters of energy effiency, either during design and construction (e.g., Moe 2006, Kongsli et al. 2009, Hojem 2012) or during operation (Aune et al. 2009, Bye 2008). We lack representative data, but it seems that some particular motivation is needed to take the initiative to construct buildings with energy and environmental standards exceeding those demanded by building codes. Sometimes we find building owners wanting a design that symbolises, e.g., environmental friendliness. Or, in the public sector, officials or politicians that find opportunities to realize political goals (Ryghaug 2005).
In non-residential buildings, the running of heating and ventilation systems is a professional task often given to janitors, supervisors or building operators. The actual use of energy is clearly influenced by the people working in the building and their habits with respect to room temperature, lightning, computer usage, etc. However, Aune et al. (2009) identified building operators that actually were engaged in saving energy and who might take considerable liberty in instructing other people how to behave, energywise.
These enthusiast are missing in the standard accounts of energy efficiency made to inform policy-makers. Arguably, the presence of enthusiasts is accidental, but this may be a misleading assumption. For example, if policymakers would decide to use public sector buildings as showcases for energy efficiency, this would probably create more room for energy efficiency enthusiasts to engage with building design. Appreciation of energy saving efforts as well as supportive measures like training and schemes for the sharing of experience could produce more energy saving enthusiasts among building operators. However, such policy measures fall outside of a framing mostly concerned with cost cutting.

IV. The "Bermuda triangle" of the building industry

Buildings represent about 40 per cent of the energy consumption in Norway, similar to most other European countries. Thus, one would expect the building industry to be targeted by energy efficiency policies. However, this industry has proved to be fairly resistant to such policy initiatives and policy-makers seem only to have been moderately interested in developing new instruments to encourage more energy efficiency efforts. The situation could be seen as an interesting example of how economic and engineering approaches to energy efficiency have failed to support each other.
The making of stricter building codes is an example of an engineering strategy to achieve energy efficiency through command and control with respect to building technologies. This strategy has been effective to the extent that one has been willing to make the codes stricter, but this has been a slow-moving process. Moreover, building industry actors claim building codes to be the only policy instrument with a decisive influence upon the energy standard of buildings (Hubak 1998, Ryghaug 2003, Moe 2006, Hojem 2012). In the accounts of such actors, there is a striking absence of economic considerations related to taxes or energy prices. The dominant economic framing of these actors is cost-cutting, which make energy efficiency measures appear too expensive.
The issue of energy efficiency of buildings should be understood as related to a complex sociotechnical system where diverse stakeholders act at the intersection of industry and market structures, institutions of governance, innovation systems, evaluation practices, supplier-user chains, designer and engineering practices, etc. Thus, there are many potential sources of failure, and the challenges in providing a comprehensive analysis of the situation are formidable. Also, we know that the building industry seems to offer some unique characteristics and barriers to improvement. According to OECD (2003, ch. 4), this includes the long-lived nature of its products, the extended supply chain, discrepancies between owners and users, the spatially fixed nature of products and production processes, the heterogeneity of buildings, high capital costs, and dominance by a large number of

small firms. This contributes to the fact that it has proven difficult to establish effective policy measures to achieve greater energy efficiency in this sector.

A clear challenge is the lack of tangible criteria for environmental quality (Hubak 1998, Moe 2006). We find that construction projects where environmental concerns have been influential tend to be characterized by idiosyncratic, often local, ideas about what an environmentally friendly building is. Energy efficiency is often a part of such ideas, but not always, and we also find diverging criteria for energy quality. For example, should energy consumption in a commercial building be measured by square meter or per employee?

Ryghaug and Sørensen (2008) argue that energy-efficient construction has been seriously restrained by three interrelated problems: (1) deficiencies in public policy to stimulate energy efficiency, (2) limited governmental efforts to regulate the building industry, and (3) a conservative building industry. With a more dramatic metaphor, we suggest that policymaking to stimulate energy efficiency in the building industry faces a Bermuda triangle that easily wrecks well-meant efforts. The three corners of this triangle are (1) lack of demand for energy efficiency, (2) passive public regulation efforts, and (3) the dominance of a conservative building industry. What does this mean?

The lack of demand for energy efficiency is related to the fact that builders and building owners tend not to be so concerned with future energy cost, energy use and related aspects of indoor environment because they will not use the buildings themselves (Hubak 1998, Ryghaug 2003 – see also Ryghaug and Sørensen 2008). Many buildings are constructed as a part of real estate development or the goal is to lease the premises afterwards. A tricky aspect of this situation, occasionally called the tenant-owner dilemma, is that the costs of achieving a higher energy standard are very noticeable and have to be covered by the builder, while the gains are unclear and basically benefit the tenant. The effects of this problem are reinforced through the fact that the energy standards weighs less in the stipulation of rent and the assessment of attraction than other qualities of a building, like location, design, accessibility, and size (Lovell 2005). Anyway, energy costs constitute a relatively small part of the total rent.

However, since 2002 EU has had a common building directive in order to instruct the building industry in developing more energy-efficient buildings (European Union 2002). Moreover, the Energy Performance Building Directive (EPBD) requires mandatory labeling or energy performance certificate (EPC) of all buildings within the European Union to provide tenants or buyers with information about energy consumption and technical standard (European Union, 2010). The EPC has to be delivered at the time of advertising the building, which implies that energy labels will be included in future dwelling advisements (IEA, 2010). However, as already noted, the effect of the certificate system seems uncertain (Aune 2012, Kjaerbye 2009, Gram-Hansen et al., 2007).

Summing up, it seems obvious to claim that the market for energy efficient buildings does not work properly. However, this has not been recognized by policy-makers in the field of energy efficiency, who seems wedded to a market romance in their approaches besides stricter building codes. The problem is accentuated by the dominant practice of cost-cutting in the building industry (Ryghaug and Sørensen 2008, Tøsse forthcoming). Again the tenant-owner dilemma, coupled with lack of information about economic gains from increased energy quality of buildings, seem to rule out any effect of existing economic incentives. Only subsidies may work, but policymakers trained in economics tend to stray away from such instruments.

The conservative features of the building industry in Norway are also evident from the low level of investment in R&D and innovation, and there seems at least traditionally to have been little concern with innovation (Ryghaug and Sørensen 2008). This observation has also been made in studies from other countries (Guy and Shove 2000, Manseau and Seaden 2001). A number of institutional characteristics seem to generate conservatism and a lack of priority given to sustainability and energy efficiency in buildings, thus blocking the translation of energy efficiency policies into attractive avenues of action. First, the emphasis on short-term cost efficiency and the high pace in the design process result in an extensive re-use of solutions (Hubak 1998, Ryghaug 2003, Amdahl 2005, Hojem 2012). Therefore, it is more important for companies to have an overview of earlier designs that can be copied than to have someone to engage with innovation and new technologies. Second, the conditions for transfer of new knowledge from research institutions have been quite poor (Hojem 2012a). The building and construction industry in Norway is large and complex and dominated by small and medium-sized enterprises (apart from a few large actors) that cooperate on the design and construction of buildings.

Third, there are challenges related to the contract system and the legal practices in the building industry. Most building projects are subject to juridical contracts that regulate the relationship between a great number of actors regarding remuneration, deliverables, time of delivery, etc. The legal practices in the building industry have traditionally demanded that all essential planning, including the specification of requirements and criteria for acceptance, happen in the first stage of the building process. In this early phase, actors enter into contracts that actually freeze the technological quality of the building. Later changes may result in substantial cost increases. The consequence of the contract system is that any innovative thinking must happen in the first stage of design.

A fourth problem is in the communication among the actors in building projects. A building project is a joint venture where a diversity of actors and professions participate and may influence the energy standard of the

resulting building. Potentially, there are many conflicting interests in the building industry because of a diversity of professional traditions, epistemic paradigms, and competences (Hubak 1998, Ryghaug 2003, Moe 2006, Bye 2008).

Out of the Bermuda triangle?

According to Aune (2012) socio-cultural analyses of energy consumption and everyday life have demonstrated that households have been, and still are, challenging targets for energy policy (Godbolt et al. 2009, Gyberg and Palm 2009). One of the problems is that economic instruments, which have been important to the formation of energy-saving measures directed towards households, are insufficient to address the rationality of everyday life. By focusing on practice and the sociotechnical network of everyday life, some scholars have demonstrated that energy policy instruments needs to communicate with routines and cultural preferences, especially requirements of comfort and convenience (Shove 2003, Linden et al. 2006, Gram-Hansen 2010, Aune et al. 2011). Aune (2012) points to the importance of understanding change. For example, comfort requirements and user motivation may vary over time and across individuals and groups (Shove et al. 2008).

Norwegian energy policy created the oxymoron of ENØK to guide efforts to achieve energy efficiency, not only with respect to households and buildings, but as a general take on the challenges. In practice, this has resulted in a concern for energy costs and a focus on saving on energy investments rather than saving energy. In addition, a wary government has chosen general and indirect public regulation activities. Clearly, there has been a preference for ineffective instruments like information and economic incentives, rather than to engage in effective direct regulations. In the introduction to this paper, we cast ENØK as a shifting compromise of economic and engineering concerns, where the economic framing increasingly throughout the 1980s and 1990s became dominant.

Seemingly, after the so-called climate agreement made in the Norwegian parliament in 2008, policy instruments usually thought to emerge from an engineering approach to policymaking gained in support. First, it was decided to increase public R&D to promote environmentally friendly energy. Second, an increased focus emerge to make building codes stricter. Does this make Norwegian energy efficiency policies more effective? Is the increased popularity of instruments emerging from an engineering approach undermining the Bermuda triangle that for a long time has been wrecking energy efficiency in the building industry?

It is a bit premature to provide a final answer to these questions, but there are good reason for caution. On the one hand, the recent introduction of stricter building codes and the promises of making them even stricter in the near future, seems to have made the building industry more active in exploring the new options. For example, there is a growing engagement with passive houses and similar ways of increasing the energy quality of buildings.

Stricter building codes probably hold considerable promise, not the least because of they correct some flaws with respect to the market for energy efficient buildings. Such flaws include the lack of symmetry between building owners and tenants concerning investments versus running costs. However, the engineering approaches to energy efficiency policymaking have their own deficiencies. For example, it is difficult to imagine that the rental market may be transformed by simple means. More generally, a conservative culture is not dismantled easily and quickly. This is not the least due to the entrenchment of many practices that inhibit increased energy efficiency of new buildings.

Thus, there are no easy ways out of the Bermuda triangle. Probably, what is needed is a comprehensive mix of instruments. First of all, better and clearer standards are needed with respect to environmental friendliness and the measuring of energy efficiency of single buildings. Second, to help the building industry increase their competence in designing and constructing environmentally friendly, energy-efficient buildings, public sector actors should be at the forefront in asking for such buildings. Third, the contractual regimes of the building industry should be evaluated. Four, more research should be directed at finding ways to document economic and other benefits of increased environmental and energy efficiency standards.

One could also ask whether the Bemuda triangle diagnosis is becoming outdated, and that actually, energy efficiency goals are becoming realised without much particular attention. A recent review published by Statistics Norway (http://www.ssb.no/magasinet/miljo/art-2011-09-26-01.html) show that the energy intensity of Norwegia industry and services has been reduced in the period 1990-2009 and that the average energy consumption of households have gone down. The latter development is claimed to be a results of better insulation of buildings, increased efficiency of electrical appliances, increased efficiency of water heaters, use of heatpumps, higher outdoor temperature and energy saving activities. With respect to heat pumps, 18,5 % of Norwegian households had installed such technology in 2009 – the share of detached houses with heat pumps was as high as 33%. This is explained with reference to increased prices of electricity (http://www.ssb.no/husenergi/main.html). Does this mean that we should give more credit to the economics approach to energy efficiency after all?

We do not have valid information about why households install heat pumps at a rapid pace, but anecdotal data suggests that motivation is mixed and that concerns for comfort is at least as important as economic issues.

Arguably, we face a bandwagon-effect – that heatpumps have become something that a modern household needs to have at the same time that technological development has made air-to-air heatpumps quite affordable. Similarly, to increase the energy quality of the home is something a refurbishing Norwegian population has come to see as a kind of standard measure when one is undertaking a serious upgrading of the house.
If energy efficiency is so-to-speak piggybacking technological improvement, increased energy prices and a widespread strive for increased comfort, should we just wait and see and let things run their course?
The traditional ENØK policy framed energy efficiency in terms of profitable investments. Energy efficiency should be pursued when economically profitable. As already indicated, to many actors it proved difficult to perform such calculations because economic effects were uncertain or unknown (Hubak 1998). Others did not find the economic outcome sufficiently attractive to engage with the necessary investments. However, this does not mean that the economic framing was wrong or misleading – only that it was to narrow and excluded too many factors that should have been considered.
First, a reformed policy for energy efficiency – in particular when it is directed at the household sector – should be more concerned with non-economic motives like comfort, indoor environment, and climate concerns. Moreover, the economic approach needs to take on board that most people tend to think of investments in their homes in terms of affordability than of profitability (see, e.g., Palm 2012).
Second, one should take on board the fact that the doing of energy efficiency is about learning how to do it and just doing it. Friends and neighbors are the most important sources of information regarding how to organise everyday life and its material contexts. Is it possible to find policy measures that encourage the pioneers from which other people learn and copy?
Third, in the final instance, user practices are decisive with respect to the outcome of technological changes. Energy efficiency policies tend to overlook this. Users are formatted either as economically rational agents or implementors of standardised technologies. Thus, policies try to shape people either socially or technically despite the fact that most arrangements in industry or at home are socio-technical. This is a tricky issue because efforts to learn users ”appropriate” ways of using technologies may be seen as unwanted intervention into private affairs (Palm 2012). On the other hand, the differences in outcome when retrofitting or installing heat pumps are pretty substantial, so the matter need concern.

Concluding remarks

In this paper we have argued that the national policy instruments for promoting energy efficiency in Norway mainly have pursued two modes of thought, an *engineering approach* focusing on development and implementation of new technologies, and an *economics approach* that formats energy efficiency in terms of economic efficiency and cost-efficient use of energy. The main problem with the engineering approach to energy efficiency policy is that it neglects that users may need to be persuaded to procure new technologies and may apply them quite differently from the intentions of the designers. The economics approach on the other hand makes untenable assumption about the economic rationality of individuals and the ability of relative energy prices to promote energy efficiency efforts. As an alternative, we have proposed to extend and combine a host of policy instruments with a particular emphasis on the need to understand the socio-material qualities of energy and energy use.
Energy efficiency in Norway seems to increase, but the link to energy efficiency policies appear to be weak. Technological development, comfort concerns, and bandwagon effects look more important. We have argued that the ineffectiveness of energy efficiency policies is due to their inability to cope with challenges like the role of comfort, the contradictory ethos of energy efficiency, the role of enthusiast and the phenomenon we described as the Bermuda triangle of energy efficiency in the building industry.
Mainly, we call for a reframing of energy efficiency policy. It needs to be extended beyond the engineering and economics formats to engage with actual practices. Some issues call for regulation. Stricter building codes are the prime example, but there are interesting efforts with regard to energy labeling as well as efforts to push certain technologies like low energy lightning. Other issues may be better taken care of through more conscious engagement in real-life practices of actually doing energy efficiency. For example, how may one turn more people into pioneers and enthusiasts?
Finally, a very important part of a reframing would be in the way people gets motivated to engage with energy efficiency. Rather than just focusing economic benefits, more emphasis should be put on energy efficiency measures as potential tools for increased comfort, improved indoor climate and ways of reducing CO_2 emissions.

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