

Mismatch or misunderstanding? Calculation and qualculation among economists and consumers in their framings of the electricity market

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Abstract

This paper studies how economists engaged in energy policymaking and household consumers frame the electricity market, based on interviews with prominent energy economists and focus group interviews with household consumers. Drawing on economic sociology, above all the contribution of Michel Callon, we analyse framing processes involved in the sense-making around the electricity market, including electricity consumption and the understanding of how households act with respect to the market. We found that the interviewed economists predominantly drew on a framing of the electricity market according to their theoretical understanding of markets, considering consumers as calculative agents in a strict sense. In contrast, the interviewed consumers argued a more inclusive and complex framing of the electricity market by also emphasising moral, social and political issues. Thus, they appeared to be qualculative rather than just calculative agents. This different framing did not emerge from consumers' misunderstanding or being misinformed about market mechanisms. Rather, we observed a mismatch between the energy economists and the household consumers regarding the underlying rationality of their framings, how they perceived consumption of electricity, and what they included and excluded in the framing of the market.

Keywords: electricity market, household energy consumption, calculation, qualculation, framing, economic sociology

Introduction

Economic sociology has frequently challenged economics, not the least in the understanding of consumers and economic institutions (see, e.g., Pinch and Swedberg, 2008). This paper contributes empirically to such inquiries by analysing

and comparing how economists and household consumers frame and account for the electricity market, based on individual and focus group interviews.

There is a growing amount of social science research on household energy consumption. A main finding is that such energy use is entrenched in habits that are difficult to transform (Gram-Hansen, 2010; Shove, 2003; Shove et al., 2008). Accordingly, economists have been faulted for externalising important socio-cultural dimensions of energy use (Biggart and Lutzenhiser, 2007), overlooking how household energy consumption, is shaped by a combination of activities, values, technologies and material aspects, which goes beyond a singular focus on costs and investments (Aune, 1998; Stephenson et al., 2010). For example, studies like that of Ek and Söderholm (2010) and Karlstrøm and Ryghaug (2014) show that both economic and environmental motives play a role in households' decision-making regarding their energy consumption.

This paper contributes in a novel fashion to such social science inquiry by comparing empirically how economists and household consumers account for and frame the electricity market, including their respective interpretations of households' consumer practices. We analyse how economists engaged with energy policy issues (including energy efficiency) and household consumers describe these issues. From the above-mentioned previous research, we expect to find clear differences between the two groups. The paper asks whether the differences are due to consumers misunderstanding or being misinformed about market mechanisms or caused by distinctly different interpretations of the electricity market and the involved acts of consumption.

The study was done in Norway, a country rich in energy, including large supplies of hydropower, and among the first countries in the world to deregulate its electricity market in 1991. Mainly, energy consumption in Norwegian households is based on electricity, which is used widely even for heating. The energy standard of homes is relatively high, which has contributed to a recent levelling out of households' energy consumption (Aall, 2013).

Before the deregulation, the government made the investment decisions regarding hydropower as well as grid constructions. The price was set annually to accommodate investment needs. The market reform was motivated by expectations of increased revenue from electricity production. It separated electricity production, which was to be liberalised, and grid management, which was to remain a monopoly. This is reflected in a split of electricity bills in two main parts, which may come as one or two invoices, depending on the utility's practice. One part is calculated from the supplier's price, which is influenced by the trade at the electricity exchange Nord pool. The other part is based on government decisions to cover grid management and investment costs, in addition to a consumption tax. In household bills, both parts are calculated from actual consumption, but there is an additional fixed item in the grid costs. Grid costs compared to costs based on the price of electricity decline relatively with increased consumption. Through this system, legislators also wanted to avoid interference from what was considered to be inconsistent politicians. Still,

economists play an important role in Norwegian energy policy by monitoring and legitimising the system (Karlstrøm, 2012).

The social science research literature on households' consumption of energy suggests that many aspects of households' consumption of energy are similar in affluent, industrialised countries (compare, e.g., Aune, 2007; Gram-Hanssen, 2010; Stephenson et al., 2010). Admittedly, there are particularities in the Norwegian case because of the dominant role of electricity and the high level of energy security. However, the comparison in this paper between economists and household consumers' framing of the energy (electricity) market should be relevant in many other contexts.

Understanding markets

Economic sociology analyses markets in terms of networks, institutions or performances (Fourcade, 2007; Fligstein and Dauter, 2007). Here, we pursue the latter idea, that markets are constructed. According to Michel Callon (1998), markets are designed mainly by economists. The design involves efforts of economic, legal and other experts as well as a diversity of socio-technical devices to facilitate the calculations that underpin market exchanges. These efforts are expected to make markets performative, disciplining suppliers and consumers to make them engage in calculation activities according to their constructed roles (Callon, 1998; Callon and Muniesa, 2005; MacKenzie et al., 2007).

Callon (1998) proposed to study the design of markets through the concepts of framing and calculation, inspired by interactional sociology (Goffman 1974). He understands framing as the process whereby some elements are made part of the calculation practices of a given market, while other elements are externalised and thus left out of calculations, potentially resulting in so-called overflows of the framing. Framing is needed to facilitate calculation, often by simplifying the involved issues and by externalising others. The ensuing, more or less complex calculation practices use numerical measures of costs, prices, profit, utility, etc. Consequently, Callon (1998: 3) argued that a market assumes the presence of calculative agents or agencies; the market is an arena where calculative agents interact in the setting of prices, etc.

Externalisation may be seen to produce problematic overflows. In such cases, reframing may become necessary to include the aspects causing problematic overflows in the calculations (Callon, 1998). From a sociological perspective, elements that are considered as externalities in relation to established ways of calculating may be seen as essential parts of the contexts of phenomena. For example, one may consider climate change mitigation as an important aspect of the consumption of electricity that should be included in the framing of the electricity market to be part of decisions about saving electricity.

However, many of the qualities that according to social science research characterise consumers' enactment of energy efficiency and consumption are not numerically measureable like costs or prices (e.g., Godbolt 2015). For instance, if moral values are internalised in the framing of the electricity market and households' consumption of energy, it is difficult to include them in usable

calculation devices. To understand how consumers decide in situations where a singular focus on calculation activities would be too restrictive, Cochoy (2008) proposed to use the concept of qualculation. This concept is meant to combine quantitative and qualitative elements, like price and assessment of quality. The basic idea is that a qualculating decision process is based on a ranking of the elements that are taken into consideration in the decision-making. From this approach, a decision about how much electricity to consume could be assumed to be based on an overall judgement of the ranked elements.

The concept of qualculation was developed in Cochoy's study of supermarkets and shopping carts. He demonstrated that during the process of shopping with a cart, consumers considered family needs, product qualities, market information and shopping equipment, in addition to making economic calculations. Consequently, qualculation should be understood as 'quality based rational judgement' (Cochoy, 2008: 17). This means that qualculation does not preclude calculation; rather, it is an extension, a more comprehensive rationality that may include calculation. This means that the concept transgresses the traditional distinction between 'rational' and 'non-rational' action (Callon and Law, 2002). Its usefulness has also been demonstrated in studies of, e.g., intellectual capital (Rooney and Dumay, 2016), medical decision-making (Moser and Law, 2006), and project management (Georg and Tryggestad, 2009).

Following Callon (1998) we would expect economists to frame the electricity market and household consumption to allow strictly for calculation and calculative agents. Further, his idea of the performativity of markets suggests that household consumers should be disciplined by market mechanisms to produce a framing that facilitates calculation and to consume on the basis of calculations. However, social science studies of energy consumption (e.g., Aune, 2007; Gram-Hansen, 2010; Stephenson et al., 2010) find household energy consumption to be more complex and embedded in culture in a way that rather suggests the employment of a framing for qualculation. The paper investigates these ideas about differences pertaining to the respective enactments of calculation and qualculation by household consumers and economists, respectively. Do we observe consumers simply being misinformed about market mechanism, or do we find more fundamental dissimilarities? What is the difference between being a calculative and a qualculative actor?

Methodology and data

The paper is based on two sets of data. Dataset 1 consists of individual interviews with 12 experts in energy economics, conducted in 2009. We started by selecting interviewees who had played a visible role in the deregulation of the electricity market. Then, we used a so-called snowballing method asking interviewees to suggest other people to interview due to their role in policymaking or as advisors to policymakers. The resulting sample contains a selection of energy economists and people with corresponding economic expertise (for instance, a former Minister of Finance). They provide or have provided advice to relevant ministries and members of parliament.

Some interviewees played an active role in developing the knowledge base for the deregulation reform, while others had political roles, like Minister of Oil and Gas. The interviewees included professors of economics, research scientists at the National Bureau of Statistics, and employees at the Ministry of Oil and Energy. Several have been active in public debates in newspapers and other media. The interviews, which were qualitative and semi-structured, lasted one to two hours and were taped and transcribed. The interview guide focused on interviewees' opinions of the design of the deregulated system and how it had worked. The twelve experts were then asked questions concerning the design of the deregulated electricity market and how energy companies and household consumers were expected to respond to the reform. We also inquired about the effects of the law: Did the interviewees believe that the deregulation reform worked according to the intentions? We did not promise them anonymity but we have chosen to refer to them by position, rather than names, since most of the names are unknown to most readers.

Dataset 2 consists of nine focus group interviews, conducted in 2009 in Oslo, Trondheim and a small community in northern Norway. A total of 44 people participated: 19 women and 25 men. They represented a considerable age span. The youngest were in the twenties, while one group consisted of retirees. In terms of occupational background, both professionals and blue collar workers participated. The most common kinds of households were represented – single persons and couples with and without children (see Godbolt, 2015: 27 for more details). We observed substantial variation in political views as well as knowledge about and attitudes towards electricity consumption and the electricity market. The participants were recruited through existing social networks and snowballing (Morgan, 1997). In some focus groups, one person was known to us (a family member, friend, colleague), but the rest of the group was this person's own network (neighbours, colleagues, band members). Other focus groups were assembled in other ways, like neighbours in a northern small community, recruited by a family member who used to live in this area, or a group of old friends of a colleague.

The focus group interview method is well-suited for exploring attitudes and arguments (Morgan, 1997). We used a semi-structured interview guide that accommodated participants' own inputs. It centred on participants' everyday energy and electricity consumption, the role of electricity costs, their efforts (or lack of effort) to improve energy efficiency and their perceptions of Norway's energy policy and the deregulated electricity market. The interviews took place at locations familiar to the interviewees, like work or home. They lasted for approximately one and a half hours and were taped and transcribed. In the analysis, interviewees have been given fictive names to preserve anonymity. All quotes have been translated into English by the authors.

The analysis of both sets of data was inspired by grounded theory (Strauss and Corbin, 1998), using an abduction approach (Reichert, 2007). We worked with the theoretical concepts of framing, calculation and qualculation to develop propositions while using the transcribed interviews to generate grounded categories of, e.g., arguments about energy consumption, acts of calculation and

qualculation, and values. In this process, we selected quotes from the interviews to represent the categories emerging through the coding of data. Also, we tried to clarify the relationship between the initial key concepts of framing, calculation and qualculation by linking them to concrete, empirical phenomena. In particular, we have made efforts to develop the concepts of qualculation and qualculating agents and demonstrate benefits of employing them in the analysis of an intangible object like electricity.

The next part starts with the analysis of the economists' accounts of their framing of the electricity market. Subsequently, we analyse the interviews with household consumers. In both sections we study what phenomena that are internalised and externalised in the framing processes. Were the framing related to calculations or qualculations? How were electricity suppliers, consumers and policy-makers perceived amongst the interviewees?

The economists' framing: competition, choice, and calculation

When the Norwegian Parliament passed the new Energy Act in 1990, the main aim was to improve the economic efficiency of the electricity system. Norwegian policymakers also assumed that the reform would cater for energy efficiency in households (Karlstrøm 2012). Still, this second aim was not given particular mention by the interviewed economists. They considered the deregulation mainly to have been motivated by overcapacity in the production of electricity and the inefficiencies of the previously thoroughly regulated electricity system. As a high-ranking civil servant and economist put it: 'The profitability of the production of hydropower was poor. This was an industry with large competitive advantages, which did very badly. In addition, there were many signs of overinvestment.'

Thus, when we brought up the deregulation reform in the interviews, the main response was narratives of a previous system of electricity production acutely in need of change. In particular, industrial development in post-war Norway was said to be too singularly based on hydropower investments to produce aluminium and other metals as well as pulp and paper. The interviewees saw this development as having resulted in overinvestment because the aim had been to provide cheap electricity, not a profitable electricity sector. An economist and former Minister of Oil and Energy with a major role in the reform claimed that: 'Previously, one could develop [new hydropower facilities] without a concern for profit. One would get rid of a part of it [the produced electricity] anyway; it was only a matter of putting the price sufficiently low.'

Briefly summarised, the interviewed economists stressed the following advantages of the deregulation: (1) it created a real market, prevented overcapacity, and provided a more rational use of the electricity grid, (2) Norway was made part of a larger, international electricity market and able to buy and sell electricity, and (3) electricity could be sold whenever profit was highest. We shall look more closely at the accounts.

To begin with, when prompted about household electricity consumption, the interviewed economists argued that private consumers definitively should have benefited from the deregulation. However, this positive outcome was thought to

depend on utility companies fulfilling their role as retailers, providing customers with good information and service. In this manner, the economists presented a framing of the electricity market with economic efficiency as the main internalised concern, making electricity into a calculable commodity and all actors involved into economically rational decision-makers.

Competition was essential to this framing: electricity should be offered at the right price and be easily accessible, with producers informing and providing service to consumers. Consequently, consumers should make rational choices about their demand for electricity by balancing needs and costs in the context of relative prices. Further, consumers and utilities were seen as interdependent to make the system beneficial for all. The expectation was that deregulation would discipline grid owners, electric utility companies, and customers to enact the market, which for consumers meant to exercise rational control of their electricity expenses.

In the initial market design underlying the new Energy Act, production and distribution were argued to be the main concerns. With respect to consumers, the interviewees emphasised their freedom to choose the cheapest supplier. This was described by one interviewee in the following way: 'It [the design] was primarily about (...) breaking the link between production and distribution. About demonstrating that one [customers] had freedom of choice to buy so-to-say from wherever one wanted.'

Further, electricity consumers were seen as needing information, in particular about the prices of every utility company, enabling them to make rational calculations of future electricity expenses and potential pay-off from energy saving investments in terms of reduced electricity costs. This was explained in the following manner by an economist with a leading position in the Ministry of Oil and Energy:

'If it [the investment in energy efficiency] turns out to be very expensive ... and you abstain from the effort, then there is an underlying economic idea (...). We [economists] are on fairly safe professional ground when we believe that this [the market reform] is a rational way to do things in the sense that you get a sufficient amount of electricity at a lower price than you otherwise would.'

Thus, consumers were thought to benefit from deregulations by saving money.

However, the interviewed economists thought that consumers could find it difficult to understand how the system worked and to appreciate its benefits. In particular, when prices were high, the public was seen to be angry because they did not understand why prices were beyond political control. As expressed by the economist quoted above:

'They [the public] are provoked by the fact that decisions are made in a market, and they are told that prices have to rise, otherwise we will have too little electricity left for spring. This only makes them angry. So they demand that the government (...) hereafter has to intervene.'

Similarly, another prominent economist researching energy issues stated that: 'In 2002 and 2003, when prices nearly rose to about one [Norwegian] krone per kilowatt hour [approximately 0.12 €], then many people yelled and shouted, you know?' However, the same economist claimed that: 'Increasingly, people have become more market conscious.' His argument was that, when information proved a change of electricity supplier to be profitable, people would respond accordingly. Yet another energy economist argued in the same vein:

'When prices increase, you use less electricity. Then you get what economists call automatic stabilisers. You get a reduction in demand (...) so that you avoid scarcity (...). In the short run (...) there is nearly no price sensitivity. But in the longer term, when people have time to change and make some adaptations, then the price sensitivity is quite significant.'

In this manner, these economists dismissed or externalised popular complaints about high and unpredictable prices that occurred in periods of price hikes, often during frosty winters. First, the observations of angry complaints were seen as emotional and non-rational protests against the market, not as valid arguments. Second, the economists articulated beliefs that increasingly, the market was becoming better understood and accepted. In the longer run, protests should be unnecessary because the market system would allow people other options than paying for expensive electricity, like investing in energy efficiency.

Thus, we see that the interviewed economists stayed with a framing for calculation by believing household consumers to be disciplined by the market to become calculative agents, expected to choose utility companies with the lowest price of electricity and to invest in energy efficiency. The public calls for political interventions were externalised. To the extent that the protests could be considered an overflow, this overflow was not seen as sufficiently important to make the economists extend their framing of the market. The energy research economist quoted above put it bluntly: 'If you don't bother [to change utility companies], then it's a bit your own fault. Because "out there," the competition is pretty good.'

To be fair, this strict view of what household consumers should do was not shared by all interviewees. For example, one economist argued that it actually could be rational for consumers not to respond to price signals because the signals were weak: 'Quite a few consumers who refrain from acting in the market, loose in the magnitude of a couple of hundreds [NOK, approximately 12–25 €] a year. It is not particularly irrational to refrain from that.' From this point of view, household consumers could react rationally to calculations regarding electricity consumption in more than one way. Thus, the economists disagreed to some extent about the expected effects of consumer rationality, but they still agreed about the main issue, namely that calculative behaviour was at the centre of their framing of the electricity market.

Further, the interviewees agreed that good information and service from utility companies would transform energy consumption in the long run, and utility companies were expected to improve their service. As the former Minister of Oil

and Energy put it: ‘There is to date no invention that works as well as competition [in a market] to encourage better customer service ... and greater awareness of ingoing costs and outgoing prices.’ Still, it is important to note that the above quote does not refer to any empirical observation. Actually, the interviewed economists mainly presented abstract, theory-based arguments rather than empirical evidence, showing little concern about actual market behaviour differing from theoretical assumptions. In general, as we saw articulated in the quotes above, they expected the logic of the market in the end to discipline household consumers as well as suppliers of electricity.

As previously observed, energy efficiency concerns were not explicitly articulated in any of these interviews. We interpret this lack of explicit interest as indicating that the energy economists did not consider such concerns as important reasons for or effects of deregulating the electricity market. However, the lack of explicit focus on energy efficiency in the interviews may also be explained by their reasoning around the dynamics of electricity consumption and prices as we have seen above. The predominant view of consumers, expressed in the interviews, was based on the assumption that, in the long run, consumers would rationally consider their electricity costs, investing in energy efficiency measures and/or save electricity when this was profitable. The argument of the economists was that measures pertaining to energy efficiency and saving of electricity would be decided on the basis of calculations involving electricity bills, investment cost, and appraisal of comfort and convenience from consuming electricity. Accordingly, energy efficiency activities would result from informed calculation efforts of calculative agents, not calling for particular extra measures.

According to a 2009 survey (Karlstrøm, 2012), a substantial majority of the Norwegian adult population reported not to act in line with the assumptions of the interviewed economists. For example, the respondents showed limited concern for prices, and few actively searched for companies offering the cheapest electricity. In the following, we explore the reasoning around the electricity market and consumption in the focus group interviews with household consumers. As we have seen, the interviewed economists’ argued that the deregulated electricity market provided considerable economic benefits and that it should discipline consumers to become calculative agents. If the survey gave a correct picture and consumers act differently from what the interviewed economists expected of them, is it because consumers misunderstand or are misinformed about market mechanisms or because they consider the consumption of electricity in a distinctly different manner?

The consumer framing: the need for calculations

Questions about the electricity market, electricity consumption and costs, energy efficiency and energy efficiency measures generated a lot of discussion in the focus groups. As we shall see, the emerging framing of the electricity market, including the understanding of electricity consumption, was more diverse and consequently more complex and contested than among the economists. However, a main first impression was that the participants engaged in calculations like the interviewed economists. Many stated that saving money was a main motive for saving electricity, and several groups reflected about the relationship between

investments to save electricity and how much money they would save. Often, the conclusion was not to invest, either because the amount of money saved was too small or because of their time perspective. Arne, who was 80, stated that: “When you reach a certain age, we do not save as much as the investment”.

Electricity prices and bills were also given a lot of attention. Some complained about high prices, others said that to them, it did not matter much. Overall, the consumer interviewees engaged a lot in calculation-oriented arguments. Unsurprisingly, consumption of electricity was considered an economic issue. However, there was not a singular focus on economic calculations. In all of the focus group interviews, the participants transgressed the rather narrow framing we observed among the interviewed economists in the previous section. For example, it was commonly expressed that saving electricity was also important with respect to climate change and the environment. Like Anne, a young woman, put it:

It becomes sort of a symbolic act. You may turn off electricity for an hour and save the world. Ok, it may not be that important ... but you do it anyway.

Many interviewees emphasised that they would be motivated both by costs and environmental concerns. In this manner, their way of thinking transcended calculation and moved into qualculation. Being in a mode of qualculation made the interviewees bring in a greater number of issues into their discussions about the consumption of electricity and energy, more generally.

Thus, the household interviewees viewed electricity and hence framed the electricity market in an inclusive manner. Their qualculations could include, in addition to calculations related to costs, environmental issues that often were treated as calling for moral responsibility, considerations regarding household routines and comfort levels, trade-offs related to inconveniences from making changes, deliberations with respect to trust and lack of trust in the working of the electricity market, the possible moral right of Norwegians to cheap electricity, and concerns regarding whose responsibility it was to save.

References to household routines and comfort levels were usually made to provide excuses for not saving electricity. The present level of consumption was argued to be necessary; ‘we use what we need’. Or, a bit more thoughtful, like in the following exchange:

Interviewer: ‘To what extent do you believe that you think that, now, I’m using energy?’

Finn: No, that’s not something you usually think about. It’s an issue, you may say. But in that moment [when you spend energy], you don’t start to speculate why. Ordinarily, then it’s like ... you turn on the stove, you don’t think about it like that. So I believe it happens quite automatically. Otherwise, I don’t know.

Agnes: ‘(...) taking a shower and turning on the stove and all that, I don’t think about that. That just happens, so the only consideration I make is if I should turn on the heat or not’.

Many admitted that perhaps, they ought to be more concerned about their consumption, but this was much more of an issue with respect to driving a car than the use of electricity.

The issue of inconvenience by making changes could have been managed in a calculative mode by balancing gains and “transaction costs”. For example, although the interviewees noted that electricity prices varied between utility companies, very few said that they cared to shop for the lowest price. Most reported sticking with their local utility, with which they had a long-term relationship, for several reasons: gathering information about prices was seen as difficult and time consuming; moreover, price differences were seen as minor and spending time to locate ‘the best deal’ was not considered worth the trouble. Actually, many of the household interviewees claimed that there was no noticeable economic benefit to changing suppliers or saving electricity. However, it is unclear if a long-term relationship with the local utility companies was valued in itself.

When the household interviewees mentioned issues that could be calculated, it was unclear if the calculation actually had been made. Rather, we interpret the arguments for not bothering to search for a supplier with lower prices or not investing in energy efficiency measures as suggesting the more intuitive and qualitative approach of guesswork. At least many of the interviewees engaged in calculations with little emphasis on actually performing calculations, strictly speaking. This interpretation is supported by the frequently articulated feeling that there was not much one could do with electricity prices, clearly expressed in the following exchange in one of the focus groups:

Rolf: ‘No, we can’t do anything with those prices, so it is no use in being bothered (...).’

Jan: ‘At the end of the day, I don’t think it’s worth it.’

Rolf: ‘I have a motto – don’t be bothered. And then I just pay the bill without making protests. We can’t do anything about it.’

Rolf even went to the extreme of stating that it would ‘ruin the quality of my life’ if he had to try to keep track of electricity prices. Thus, the inconveniences of making change efforts were a significant overflow with respect to a calculation-centred framing of the electricity market. Only one of the 44 interviewees claimed to have saved a lot of money by changing supplier. Overall, the interviewees did not find the available information about prices and suppliers relevant to their decisions about consumption of electricity, making a strictly calculation-based approach less pertinent.

The inconvenience argument was reinforced by the claim that consumers’ actions did not really matter. This was for example articulated by Rolf in the focus group exchange quoted above, arguing that the price of electricity was beyond his influence. This statement may also be read as a complaint that the electricity market was opaque and unpredictable and thus not trustworthy, which is openly expressed in the exchange below:

Agnes: ‘I sometimes feel that when you try to save energy, it does not show. You get nothing in return from saving. It does not show anywhere that you are saving electricity. Of course, you are

supposed to understand that you are saving the environment or something like that if you use less energy, but it would have been nice if the bill got smaller, for instance. But it does not.'

Gunn: 'And still the bill only gets bigger every time you receive it.'

Oda: 'You save energy and spend less kilowatt-hours, but on the bill of that year's total usage of energy, something else has increased, like grid costs or something, so you are not able to lower your electricity bill.'

There is a deep irony to this exchange. The women expressed the sentiment that their efforts to save electricity ought to provide them with an economic benefit. When this benefit was not experienced, it led to critical considerations. The rough calculation they started from – less consumption, smaller bills – proved to them to be incorrect, as new bill items, in particular grid costs, had been added. This created frustration and a lack of trust in the mechanisms of the electricity market. The premises of calculations had changed in ways that were considered to be in consumers' disfavour, difficult to understand: 'No, I do not understand why the price of the grid use is higher than the price of the electricity itself. I find that very strange' (Gunn).

As mentioned earlier, in the Norwegian system, grid costs are decided by the government from assessments of the need for investments in and maintenance of grid infrastructure and are calculated from an equation with a fixed term and a term varying with the actual consumption. This is a complex and opaque computation to most people. A consequence, as we saw in the quote above, was the interpretation of electricity bills as evidence that saving efforts went unrewarded. Some also claimed that the grid costs should not have been part of the electricity bill at all or that they were calculated unjustly.

Actually, quite a few of the household interviewees expressed some distrust in the way prices were set by the market. One issue was the expectation of a link between precipitation and electricity prices. Many interviewees believed that earlier, a lot of rain in a region had resulted in reduced electricity prices. Now, they claimed that it could pour down for weeks and prices would still increase. Distrust was also articulated with reference to what interviewees believed to be increased export of electricity: 'And they talk about the energy crisis you know (...) the need to increase the production and build more power plants. Well, it doesn't make sense to me all the time they are exporting electricity to other countries for a low price' (Agnes).

The interviewed consumers were aware that Norway was part of a North European electricity market and that there was considerable export and import of electric power. Many saw this as harmful to their situation as consumers. Anders, a retired man, argued that utility companies reaped large economic benefits from being able to export electricity at higher prices than could be obtained nationally; 'and if you look at the annual results of these utilities, they show large profits.' Thus, he thought consumers were treated unfairly because the utilities were allowed to increase the price of electricity due to the possibility of export. Several, in particular older people, he argued that electricity really should not be treated as

a market commodity because that was an infringement of consumers' right to cheap and plentiful electricity, living in an energy affluent country.

A final element in the qualculations related to consumption of electricity concerned the responsibility of enacting energy saving or energy efficiency. Most interviewees considered that saving electricity was a relevant response to concerns regarding climate and environmental issues. However, it was frequently debated in the focus groups whether such activities should be a collective or an individual responsibility. There was considerable disagreement about this issue, but as we have seen, many interviewees thought they had at least some responsibility to save electricity and energy, more generally. This influenced the outcome of their qualculations.

We have seen that the focus group interviews transgressed the framing provided by the economists, meant to facilitate calculation and making consumers become calculate agents. The result was not one distinct consumer framing but rather a more open, inclusive way of looking at the electricity market and households' electricity consumption, making consumers into qualculative agents. This allowed for a reduction of the amount of overflows, but it varied what kind of potential overflows that the interviewees included. The important finding is the widespread practice of combining quantitative calculation of prices and costs with qualitative reasoning around value issues, political beliefs, considerations regarding routines and comfort levels, assessments of inconvenience with respect to making changes, and deliberations regarding their trust in the market. The ensuing qualculations also included reflections related to obligations to engage in saving and efficiency activities with respect to the consumption of electricity.

Following Cochoy (2008), we see the importance of the concept of qualculation as a way of avoiding having to assess decisions and actions in terms of calculation-oriented rationality. Both calculation and qualculation are rational activities; they just differ in the kind and the amount of elements that are made part of the judgements. Qualculations may not be more difficult to do than calculations, maybe because people tend to decide everyday life issues on the basis of routine. In this sense, the focus group interviews created a situation out of the ordinary because at least some of the questions that were asked, represented concerns that the participants usually did not think that much about. In addition, the interview setting represented a pressure to reflect upon and make sense of actions usually taken for granted.

We observe this from the qualculations made with respect to keep to existing routines or making changes. The main judgement was to decide whether changes should be made or not. This was a balance between accepting a need to reduce the consumption of electricity to contribute to climate change mitigation and perceiving oneself as able or obligated to act. Quite a few managed such judgements through a narrower framing of the issue, by excluding obligations to make changes. For example, some argued that in a cold country, electricity was a necessity, which one should be allowed to use in whatever quantity needed without having to worry about the bill or political demands.

Another move was the argument that household consumers were victims of an opaque system, where efforts to reduce electricity costs apparently were fairly futile. The system could not be trusted because seemingly, new items were added to the bill, making the outcome of consumers' saving efforts perceived as unpredictable. Such qualculation activities became visible in many focus groups, often centred on moral issues that were made part of their framings: What is a fair price? How much electricity can one rightfully consume? Do Norwegians have particular rights in this respect?

Thus, the framing efforts of the focus group participants were rather fragile and unsettled. Did this make the qualculation unstable? Cochoy (2008) argues that qualculation is fairly robust and embedded in material features of shopping. Material objects were also present in the focus group interviews, where there were a lot of references to objects like economy bulbs, economy showers, wood stoves, heat pumps, panel heaters, and heater cables. Implicitly, this shows how electricity is consumed indirectly, through the use of artefacts. Thus, the consumption of electricity is materially embedded. The strong tendency to consider this consumption as a routine issue speaks to the stability of qualculation also with respect to electricity.

The discussions in the focus groups disturbed in a sense this stability by introducing moral and political concerns related to the consumption of electricity. The electricity market became something more than just an institution that decided the cost of the household's consumption of electricity. This suggests that the observed qualculation activities of the consumer interviewees should be considered as quite context-dependent. When the topic of discussion shifted, judgements could change. Qualculation was at least to some extent flexible and shifting. The materiality of the household consumption of electricity did not prevent the emergence of moral and political considerations.

Conclusion: misunderstanding or mismatch?

This paper has demonstrated how the interviewed energy economists and household consumers framed the electricity market in distinctly different ways, which resulted in two dissimilar ways of perceiving consumers and household energy consumption. In the economists' framing, electricity was an ordinary commodity and most other issues apart from costs and the balance of supply and demand were externalised. Due to the assumed disciplining features of the market, household consumers were expected to adjust their demand for electricity according to price signals, acquiring relevant information to be able to choose the cheapest supplier, and making profitable investments to improve energy efficiency – in short, to become calculative agents. This framing was fairly simple and consistent, clearly based on professional economical expertise, and made to facilitate calculation. It is also easily recognisable from the international research reviewed in the introduction. We observed little disagreement among the economist interviewees.

The interviewed consumers offered, unsurprisingly, more comprehensive, complex and contested framings of the market. Compared to the interviewed economists,

the focus group accounts provided more inclusive framings even if there were disagreements about what was relevant to consider when making judgement concerning electricity or energy consumption. These inclusive framings provided space for calculations regarding costs and prices but in addition they allowed for more comprehensive judgements where many qualitative issues could be brought into consideration. This was reflected in the engagement of focus group interviewees in qualculation, where concerns about climate change and the environment, fairness, everyday life routines, consumer rights, and inconveniences were juggled with economic calculations. Thus, we observed these interviewees as qualculative rather than just calculative agents.

Like Callon (1998), the interviewed energy economists expected the market to discipline consumers to enact economic rationality, to make them calculative agents searching for information about the cheapest supplier, investing in energy efficiency when this was lucrative, and so on. Whether consumers were disciplined in this manner was not a concern, maybe because the economists all claimed that the deregulated market worked. What this claim meant was not clear, besides that supply and demand was seen to have been balanced while the overall revenue from the trade in electricity had increased. When the interviewed economists showed little interest in whether consumers behaved as expected, maybe because to their ends, it really did not matter much if consumers were calculative agents of the anticipated sort or qualculative agents as we have observed in this study.

Did the household interviewees become qualculative agents because they failed to understand the electricity market? Clearly, some aspects were reported to be difficult to comprehend, like the calculation of grid costs. However, the interviewees had a reasonable understanding of how a market worked. They knew quite a lot about how they were expected to act in relation to price changes and that they should be shopping for cheaper electricity. Possibly, some of them might have found it easier to navigate the electricity market if they understood the grid issue better. However, the more open and inclusive way of framing the market of electricity that we have observed in this paper was not a result of misunderstanding how a market operates.

Rather, we see a mismatch in the ways in which the electricity market was framed. This mismatch was linked to different strategies for managing potential overflows and with respect to engagement in calculations and qualculation. The interviewed economists were not very concerned with potential overflows. They did not consider their fairly strict framing problematic. The focus group participants were not worried about overflows either, but that was because their framing strategy was inclusive and did not produce challenging externalities. The concerns considered important to the consumers were included and could be part of their qualculation. To paraphrase Latour (2004), the interviewed economists stuck with the market as a matter of fact, while to the consumers, the electricity market was a matter of concern.

Returning to the issue of calculative and qualculative agency, we have observed that the role of calculative agents is fairly straight-forward but not necessarily easy to enact. Many of the interviewed consumers complained that acquiring

information and doing the calculations were too much work compared to the assumed, intuitively assessed benefits. Qualitative agency involved, as we have seen, the making of judgements by balancing economic and other concerns. A particularly important feature of this, which goes beyond Cochoy's (2008) outline, was the frequently used option of externalising action. When the responsibility of making changes were placed with somebody else, like the government or politicians, or one considered it difficult to see how the consumption of electricity could be altered, inaction resulted from the calculation.

The energy efficiency policies of the last decades have not been particularly effective. Arguably, this may be caused by the fact that these policies have been based on the idea that people decide on their consumption of energy only by calculating the balance of costs and benefits (Sørensen, 2007; Aune, 2007; Karlstrøm, 2012). This mismatch in emphasis between calculation in policymaking and calculation in actual practice may represent a stalemate in the need to improve energy efficiency in households. Policy-makers need to address more concerns than economic ones, like climate issues and fairness in the distribution of gains and strains, but also to find ways to demonstrate that increased energy efficiency really is an option to most households.

In this context, it is surprising to note the low level of interest in actual market behaviour of consumers among the interviewed economists. Their main arguments were presented as based in theory rather than empirical analysis. This lack of concern among economist for what household consumers actually do should be studied further.

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References

Aune M (1998) *Nøktern eller Nyttende. Energiforbruk og hverdagsliv i norske husholdninger*. PhD Thesis, Norwegian University of Science and Technology, Norway.

Aune M (2007) Energy comes home. *Energy Policy*, 35: 5457–5465.

Biggart NW and Lutzenhiser L (2007) Economic sociology and the social problem of energy inefficiency. *American Behavioral Scientist* 50(8): 1070–1087.

Callon M (1998) *The Laws of the Markets*. Oxford: Blackwell.

Callon M and Muniesa F (2005) Economic markets as calculative collective devices. *Organization Studies* 26(8): 1229–1250.

Callon M, Millo Y and Muniesa F (2007) *Market Devices*. Malden, MA: Blackwell.

- Cochoy F (2008) Calculation, qualculation, calculation: Shopping cart arithmetic equipped cognition and the clustered consumer. *Marketing Theory* 8(1): 15–44.
- Ek K and Söderholm P (2009) The devil is in the details: Household electricity saving behaviour and the role of information. *Energy Policy* 38: 1578–1587.
- Fligstein N and Dauter L (2007). The sociology of markets. *Annual Review of Sociology* 33(1): 105–128.
- Fourcade M (2007) Theories of markets and theories of society. *American Behavioral Scientist* 50(8): 1015–1034.
- Georg S and Tryggestad K (2009) On the emergence of roles in construction: the qualculative role of project management. *Construction Management and Economics* 27: 969-981
- Godbolt ÅL (2015) The ethos of energy efficiency: Framing consumer considerations in Norway. *Energy Research & Social Science* 8: 24–31.
- Gram-Hansen K (2010). Residential heat comfort practices: Understanding users. *Building Research and Information* 38(2): 175–186.
- Karlstrøm H (2012) *Empowering markets? The construction and maintenance of a deregulated market for electricity in Norway*. PhD Thesis, Norwegian University of Science and Technology, Norway.
- Karlstrøm H and Ryghaug M (2014) Public attitudes towards renewable energy technologies in Norway. The role of party preferences. *Energy Policy* 67: 656–663.
- Latour B (2004) Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern. *Critical Inquiry*, 30(2): 225-248.
- MacKenzie D, Muniesa F and Siu L (eds) (2007) *Do Economists Make Markets? On the Performativity of Economics*. Princeton: Princeton University Press.
- Morgan DL (1997) *Focus Groups as Qualitative Research* (2nd ed.). Thousand Oaks, CA: SAGE.
- Moser I and Law J (2006) Fluids or flows? Information and qualculation in medical practice. *Information Technology & People* 19 (1): 56-73
- Pinch T and Swedberg R (eds) (2008) *Living in a material world. Economic sociology meets science and technology studies*. Cambridge, MA: The MIT Press
- Reichertz J (2007) Abduction: The Logic of Discovery of Grounded Theory. In: Bryant A and Charmaz K (eds) *The SAGE Handbook of Grounded Theory*. Los Angeles, CA: Sage, pp. 214-228.

Rooney J and Dumay J (2016) Intellectual capital, calculability and qualculation. *The British Accounting Review*, 48 (1): 1-16.

Shove E (2003) *Comfort, Cleanliness and Convenience*. Oxford: Berg.

Shove E, Chappells H, Lutzenhiser L and Hackett B (2008) Comfort in a lower carbon society. *Building Research and Information* 36(4): 307–311.

Stephenson J, Barton B, Carrington G, Gnoth D, Lawson R and Thorsnes P (2010) Energy cultures: A framework for understanding energy behaviours. *Energy Policy* 38: 6120–6129.

Strauss A and Corbin J (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks, CA: SAGE.

Sørensen, KH (2007) Energiøkonomisering på norsk: Fra ENØK til Enova. In: Aune M and Sørensen KH (eds) *Mellom klima og komfort – utfordringer for en bærekraftig energiutvikling*. Trondheim: Tapir Academic Press, pp. 29-45.

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